6.0 BIODIVERSITY

6.1 INTRODUCTION

6.1.1 Scope and content

This chapter presents an assessment of the likely impact of the proposed Cloghercor Wind Farm on habitats and species of conservation importance, excluding bird populations which are covered in Chapter 7 of this EIAR.

The chapter was prepared by Tom Gittings. It includes the results and conclusions of assessments of the aquatic habitats and fauna by Sinead O'Reilly, and of the bat populations by Tina Aughney. The full reports for those assessments are included in Appendix 6-2 (Aquatic Report) and Appendix 6-4 (Bat Assessment Report).

The initial research and surveys for this project covered the entire wind farm site. However, the proposed wind farm project, including the grid connection and substation, will only involve development of the section of the site to the south / east of the public road, apart from the installation of a met mast 300 m to the west of this road. Therefore, most of the detailed assessments in this chapter refer to the section of the site to the south / east of the public road, which is referred to as the development site to distinguish it from the overall wind farm site (Figure 6-1 and 6-2). The development of the met mast and associated access track is included in all the relevant assessments in this chapter. The potential impacts of works along the turbine delivery route are also included in all the relevant assessments.

The habitat classification scheme from *A Guide to Habitats in Ireland* (Fossitt, 2000) is used for all habitat names, unless otherwise stated. This is referred to as the Fossitt classification. The relevant Fossitt habitat codes are included when habitat names are first mentioned in a section of the report.

Where relevant, potential correspondences with habitat types included in Annex I of the Habitats Directive (92/43/EC) are assessed. These are referred to as Annex I habitats. Annex I habitats can form Qualifying Interests of Special Area of Conservation, but numerous examples of Annex I habitats also occur outside of Special Area of Conservation.

To help general readers, English species names are used in this chapter (where widely accepted English species names exist). Species names are capitalised (e.g., Broad-leaved Pondweed), while lowercase is used for broader taxonomic categories (e.g., pondweeds). Scientific names for all the species mentioned in this chapter are included in Appendix 6-1.

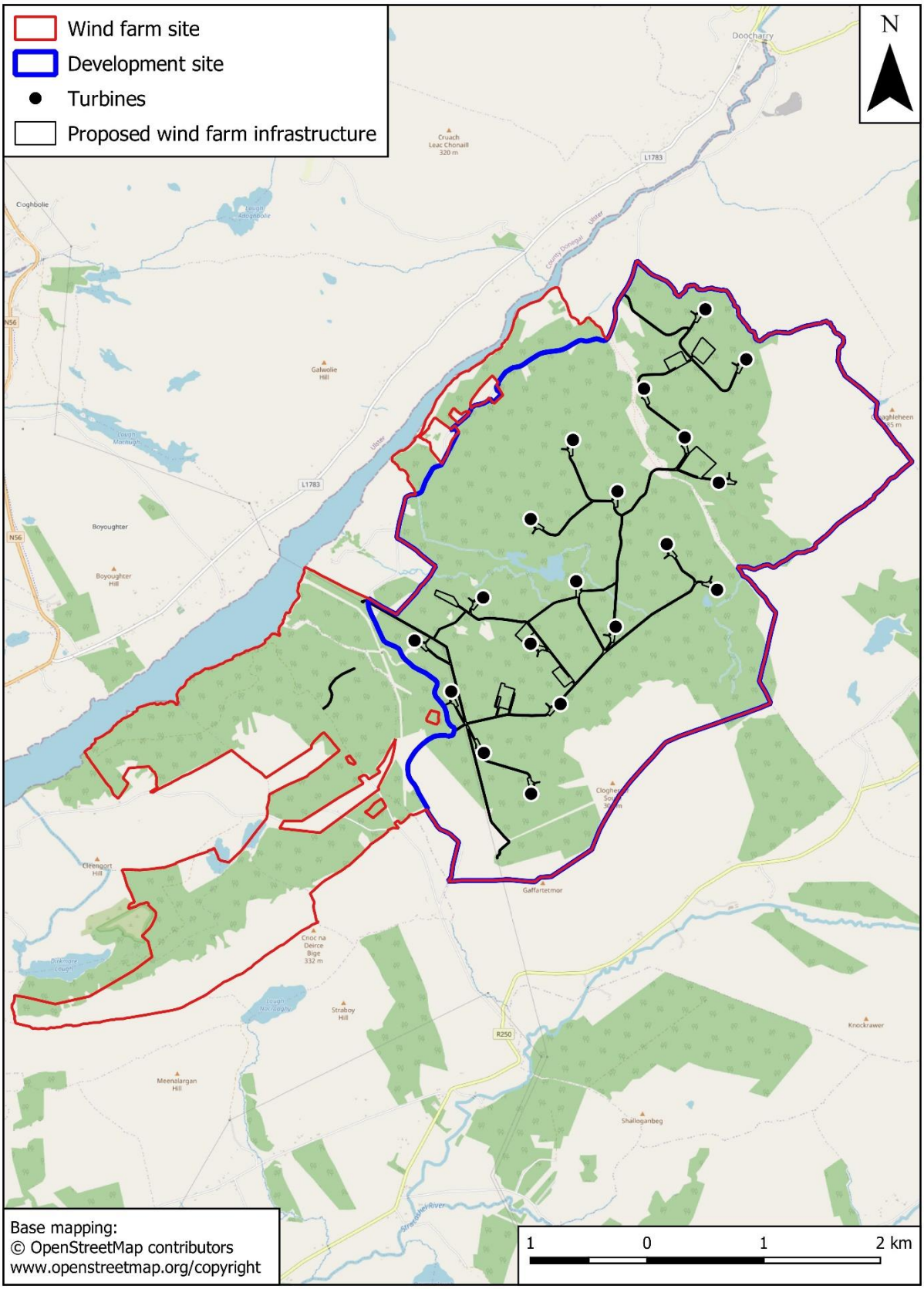

Figure 6-1 – The proposed project site.

6.1.2 Limitations

The habitat surveys of small parts of the infrastructure buffer, and of the hardstands along the turbine delivery route were carried out in November, which is outside the recommended period for habitat surveys. However, due to the nature of the habitats in the context of the wind farm site and surrounding landscape, and the scale of the impacts in these areas, this timing factor is not considered to have affected the assessment.

6.2 METHODS

6.2.1 Desk review

An initial desk review was carried out at the start of the project. This was updated in August-October 2022.

This review included all records held by the National Biodiversity Data Centre for the two hectads (10 km squares) overlapping the wind farm site. Where records from this source are discussed in this chapter they are cited as NBDC records

Other data sources used included: information from rare and protected species records supplied by the National Parks and Wildlife Service (cited as NPWS records); review of Inland Fisheries Ireland research data; information and data on water catchments from the River Basin Management Plan 2018-2021; GSI Online mapping; the Bat Conservation Ireland Database; the Bat Conservation Landscape Favourability GIS layer; and review of previous ecological assessments undertaken within the area. Consultation requests were also made to the National Parks and Wildlife Service for any additional relevant records not contained in the rare and protected species records.

Further details of the sources used for the desk review of aquatic habitats and fauna and bat populations are included in Appendix 6-2 and Appendix 6-4.

As recommended by the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2019) the results of the desk review are integrated with the findings from the ecological surveys in Section 0.

6.2.2 Consultations

A pre-planning consultation letter was sent to the Development Applications Unit in April 2020, with a follow-up in November 2020. A response was received in August 2021. An online meeting with Emmett Johnson (Divisional Ecologist, National Parks and Wildlife Service) was held in September 2021, although that meeting focused on ornithological issues.

A pre-planning consultation letter was sent to Inland Fisheries Ireland in June 2021 (with a follow up in September 2022). Responses were received in July 2021 and October 2022 (see Appendix 1-4.

6.2.3 Surveys

6.2.3.1 Habitat and vegetation surveys

An initial overall habitat survey of the entire wind farm site was carried out in August 2020. This survey mapped the broad distribution of habitats across the entire wind farm site.

A more detailed survey of the development site was carried out in September 2021. This covered all of the development site, with a particular focus on areas around the then proposed wind farm infrastructure layout. A detailed survey of the areas around the final infrastructure layout (the subject of this application) was carried out in August and November 2022. This covered the footprint of the proposed infrastructure, and a 50 m buffer either side of the footprint (Figure 6-2). This survey is referred to in this chapter as the infrastructure buffer survey.

The August 2022 survey also included a survey of the aquatic and marginal vegetation of Lough Aneane More. This is the only lake or pond with the potential to be affected by water quality impacts from the wind farm development.

The turbine delivery route hardstands and blade changeover location were surveyed in November 2022.

The habitat survey methods were based on Smith *et al.* (2011). All the habitat surveys classified and mapped habitats to level 3 of the Fossitt classification (Fossitt, 2000). The surveys also assessed affinities with habitat types included in Annex I of the Habitats Directive (92/43/EEC). All the surveys included compilation of lists of characteristic plant species lists for habitats of conservation importance and recorded any rare/scarce plant species and / or stands of invasive species. The detailed survey of the infrastructure buffer included searches for rare / scarce plant species within the infrastructure buffer.

Figure 6-2 – Area covered by the infrastructure buffer survey.

6.2.3.2 Aquatic surveys

A baseline aquatic ecological assessment was carried out at nine survey sites in selected streams and rivers draining the wind farm site close to proposed turbine locations and road crossings (Figure 6-10). The surveys were carried out during base flow conditions in September 2021. These surveys included an aquatic assessment of the riverine habitat available to support fish and aquatic species, an assessment of the macroinvertebrate community and an analysis of the biological water quality of the watercourse. The purpose of the surveys was to assess the overall aquatic habitat value of the river downstream of the proposed project, particularly in relation to protected species such as Atlantic Salmon, lamprey and Freshwater Pearl Mussel.

At each survey site, an assessment of the aquatic habitat was carried out based on the UK Environment Agency's River Habitat Survey methodology (EA, 2003). A broad appraisal / overview of the upstream and downstream fisheries habitat at each site was also undertaken based on the Fishery Assessment Methodology (O'Grady, 2006). An assessment was made on the suitability of the habitat for aquatic species of conservation concern (e.g. Freshwater Pearl Mussel, River Lamprey, Brook Lamprey and Atlantic Salmon). Aquatic surveys were conducted along the selected sites and consisted of kick sampling for invertebrates to assess water quality. Aquatic plants as well as rare and/or protected plant species and non-native flora were recorded at each site where present.

A broad appraisal / overview of the upstream and downstream habitat at each site was undertaken to evaluate the wider contribution to Freshwater Pearl Mussel and the potential for this species to be present within the proposed project. Based on the general riverine habitat, topography, steep gradient, substrate and surrounding habitat, the potential for this species to be present was universally poor. Therefore, no Freshwater Pearl Mussel survey was carried out within the streams of the proposed project site (see Appendix 6-2).

An ecological survey of Lough Aneane More was carried out in August 2022 to determine whether the lake contained Annex I habitat(s). The lake margins were walked and species within the benthic zone were identified and recorded. An interpretation of the lakes plant communities / Annex habitat(s) was then carried out using the species recorded and information on the physical characteristics. Guidance was taken from O Connor (2015) to aid interpretation of potential Annex I habitats within the lake.

Full details of the aquatic survey methods are included in Appendix 6-2.

6.2.4 Bats

Bat surveys of the wind farm site were carried out between 2020 and 2022. Full details of the bat survey methods are included in Appendix 6-4. The following sections provide a summary of the survey methods.

6.2.4.1 Daytime inspections

Daytime inspections were carried out to determine the potential of bat roosts within the survey area.

Buildings and structures that could provide a roosting space for bats were inspected during the daytime for evidence of bat usage. The inspections were carried out visually with the aid of a strong torch beam. The buildings were assessed to determine their suitability as a bat roost, and their suitability was classified as negligible, low, medium or high using criteria from Collins (2016) and Marnell *et al.* (2022).

Trees that could provide a roosting space for bats were classified using the Bat Tree Habitat Key (BTHK, 2018) and the classification system adapted from Collins (2016). The Potential Roost Features listed in BTHK (2018) were used to determine the potential bat roost value of the trees. The trees identified as Potential Bat Roosts were inspected during the daytime for evidence of bat usage.

6.2.4.2 Night-time bat detector surveys

Dusk and dawn bat surveys

Dusk emergence surveys were completed from 10 minutes before sunset to at least 110 minutes post sunset. Dawn surveys were completed from 110 minutes before sunrise to 10 minutes after sunrise. The surveyors positioned themselves adjacent to the building / structure to be surveyed to determine if bats were roosting within the structure.

Transect surveys

Walking transects were completed after the dusk emergence surveys and involved the surveyor(s) walking the survey area and recording and mapping all bat detections.

Driving transects were undertaken for large survey areas following Bat Conservation Ireland's car-based bat monitoring methodology (Aughney *et al.*, 2018). All bat detections were recorded and mapped.

Filming

A camcorder (with night shot capability) with infra-red lamps was used to capture any emerging bats from potential roosting sites. This was completed from 10 minutes before sunset till at least 110 minutes after sunset.

Filming using a thermal imagery scope was also used to capture potential emerging bats from potential roosting sites. This was completed from 10 minutes before sunset till at least 120 minutes after sunset and 110 minutes before sunrise to 10 minutes after sunrise. Captured film was watched post-survey and any emerging bats were noted.

Bat detectors were attached to the filming units to aid species identification.

Passive Static Bat Detector Survey

Passive Static Bat Surveys were carried out by leaving static bat detector units (with ultrasonic microphone) in specific locations and set to record for specified periods of time. The location of static units was determined by the proposed location of turbines. However, the location of turbines changed a number of times over the duration of the survey and therefore static unit locations changed from season to season to compensate for this. The nightly number of bat passes recorded per species on the static units were analysed using the website based tool Ecobat (http://www.ecobat.org.uk/).

6.2.5 Other fauna

During the habitat survey in 2020 and 2021, searches were made for potentially suitable habitat for the Marsh Fritillary butterfly. The habitat suitability was evaluated based on the presence and abundance of the foodplant (Devil's-bit Scabious) and the vegetation structure (see NBDC, undated). As no potentially suitable Marsh Fritillary habitat was identified in the development site, no further Marsh Fritillary survey work was carried out.

The surveys of the infrastructure buffer in August and November 2022 included searches for signs of protected species. These surveys covered 50 m buffers around the proposed infrastructure and around Lough Aneane More. Searches for Otter signs were also carried out along accessible sections of streams and drainage ditches within the wind farm site, as part of the aquatic surveys in September 2021. Sightings and signs of protected species were also recorded during the other habitat surveys in 2020 and 2021, and during the various bird surveys that were carried out between 2019 and 2022 (see Chapter 7).

6.2.6 Personnel

The scoping, design and management of the general biodiversity surveys and assessment (excluding the aquatic ecology and bat surveys) was carried out by Tom Gittings. The overall habitat survey was carried out by surveyors from TOBIN Consulting Engineers (John Sherry, Sophia Couchman and Jason Cahill), with some assistance from Tom Gittings. The surveys of the infrastructure buffer and Lough Aneane More in August 2022 were carried out by Cian Ó Ceallaigh, with supplementary areas surveyed by Kate McNutt in November 2022. The aquatic ecology surveys and assessments were carried out by Sinead O'Reilly. The bat surveys and assessments were carried out by Tina Aughney,

Tom Gittings has a BSc in Ecology, a PhD in Zoology and is a member of the Chartered Institute of Ecology and Environmental Management. He has 27 years' experience in professional ecological consultancy work and research. Tom specialises in ecological surveying, monitoring and evaluation, ecological impact assessment, habitat management, and avian, invertebrate, wetland and woodland ecology. He is currently working as an independent ecological consultant. His previous experience includes working for the RPS Group (a multi-disciplinary environmental consultancy) and carrying out research into forest and wetland biodiversity in the Department of Zoology Ecology and Plant Science at University College Cork. Tom was the recipient of the Distinguished Recorder Award 2014 from the National Biodiversity Data Centre in recognition of his contribution to invertebrate recording in Ireland.

John Sherry has a BSc in Wildlife Biology and holds the title of Project Ecologist with TOBIN. John has over three years post-graduate experience in ecology and environmental consultancy, where he has mainly been involved in the surveying and reporting of large-scale infrastructure projects where he has carried out AA Screenings, NIS reports, EIARs and Ecological Management Plans. John has a proven knowledge of field skills and has been involved with the planning and implantation of a variety of surveys including habitat surveys, non-volant mammal surveys and bat assessments. He has mainly been focused on ornithological surveys, involving winter and breeding bird surveys associated largely with proposed wind farms or other large infrastructure developments.

Sophia has a BSc (Hons) Ecology and Environmental Biology and has been part of the TOBIN Environment & Planning team since 2018. Her experience includes baseline ecology surveys (including Q value), habitat surveys, habitat mapping, mammal surveys, undertaking Ecological Impact Assessments (EcIAs), contributing to EIS's and compiling Appropriate Assessments reports on a wide range of development types.

Cian Ó Ceallaigh is an Associate member of the Chartered Institute of Ecology and Environmental Management (ACIEEM) who has extensive botanical and habitat knowledge (FISC Level 4, 2018) and has worked as a professional ecologist in Ireland and Britain since 2017.

Kate McNutt has a first-class degree in Ecology, a postgraduate diploma in Geographic Information Systems (GIS) and a masters in Conservation and Rural Development. She worked

full-time for BEC Consultants as an ecologist and GIS specialist for six years and has about six years of experience as a freelance ecologist. She is a competent botanist, her primary project involvements having tended to be national-scale survey and monitoring projects for native woodland, semi-natural grassland, uplands and coastal habitats, besides also having more minor and piecemeal involvement in various development projects.

Sinead O'Reilly (M.Res.) is a Senior Ecologist with TOBIN Consulting Engineers. She holds an honours degree in Zoology from University College Dublin and Research Masters in Science in Freshwater Ecology from University of Glasgow. Ms O Reilly has over 14 years of professional experience in scientific research in freshwater ecology and environmental consultancy specialising in fisheries. Sinead has prepared and delivered annual research reports, research papers, preparation of screenings for Appropriate Assessment (AA), Natura Impact Statements (NIS), Invasive Species reports, mammal survey reports and other relevant documents. Sinead has a strong technical background as a freshwater ecologist and has extensive field survey experience in all freshwater habitats, terrestrial habitats, bats and mammal activity across Ireland.

Tina Aughney has worked as a Bat Specialist since 2000 and has undertaken extensive survey work for all Irish bat species including large scale development projects, road schemes, residential developments, wind farm developments and smaller projects in relation to building renovation or habitat enhancement. She is a monitoring co-ordinator and trainer for Bat Conservation Ireland. She is a co-author of the 2014 publication Irish Bats in the 21st Century. This book received the 2015 CIEEM award for Information Sharing. Dr Aughney is a contributing author for the Atlas of Mammals in Ireland 2010-2015.

6.2.7 Evaluation

The nature conservation importance of the habitats and species populations within the development site were evaluated using the criteria in the National Roads Authority's *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009). This evaluation scheme uses a geographic scale as recommended by the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2019). The NRA evaluation scheme provides the only published criteria for evaluating habitats and species in Ireland and is widely used in ecological assessments for all types of projects (not just road schemes).

The local scale is not defined in the NRA evaluation scheme. For the purposes of this assessment, the local scale was defined as the range of hills extending from Crocknadreeavarh in the west to Croaghleheen in the east. The boundaries were defined by the Gweebarra Estuary, the streams that the hills drain to along their eastern slopes and southern slopes, and various roads around the western side (Figure 6-3). The total extent of this local area is around 70 km^2, which is roughly equivalent to the size of local areas used by the author of this chapter in other comparable assessments.

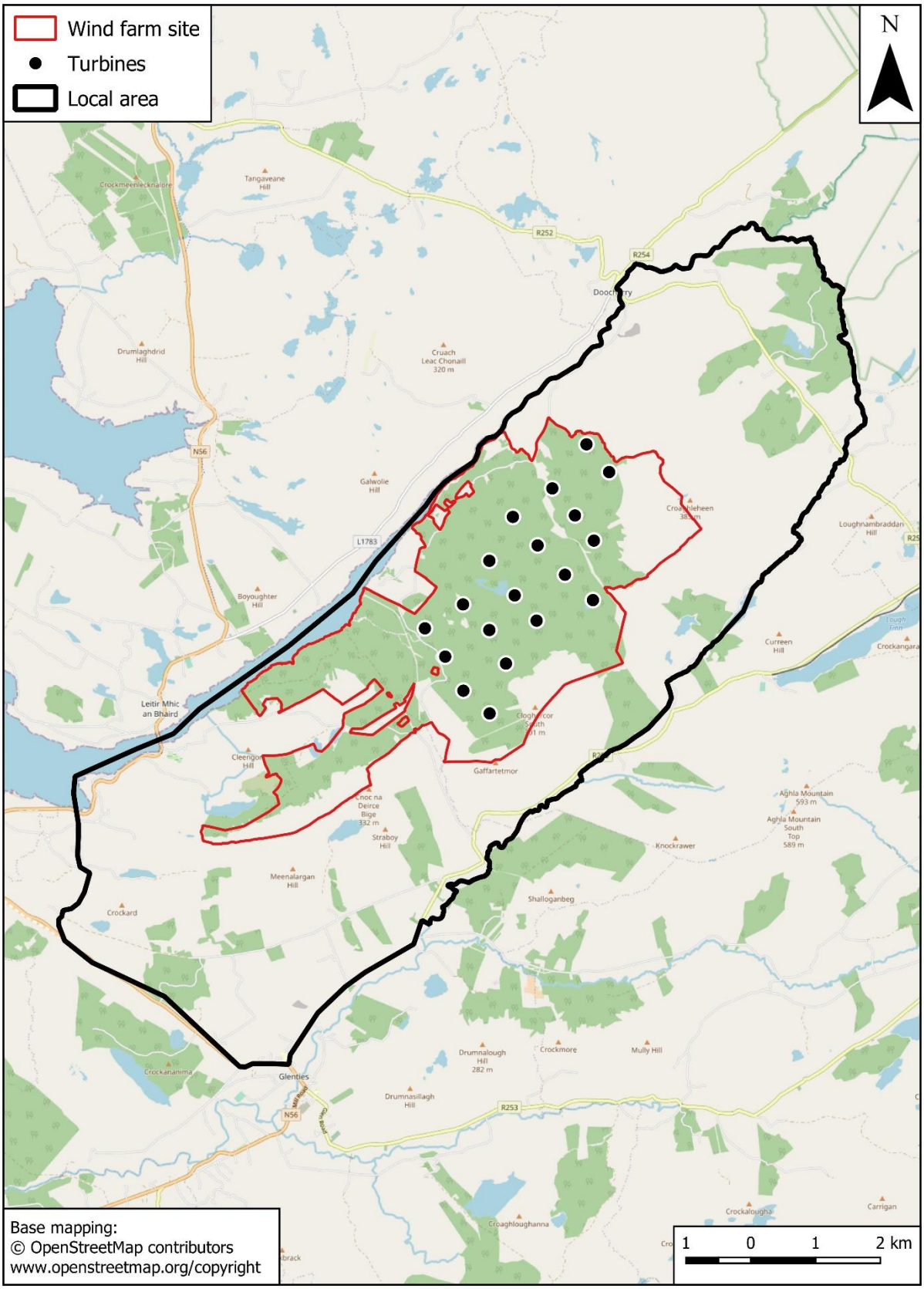

Figure 6-3 - Boundary of the local area used for the evaluations and assessments.

6.2.8 Impact assessment

6.2.8.1 Impact significance

The significance of the predicted impacts was categorised using the terminology from the Environmental Protection Agency's *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (Environmental Protection Agency, 2022). This provides an eight-point scale to categorise impacts in order of increasing significance from *neutral* to *profound*. A significant impact is an impact classified as *significant*, *very significant*, or *profound*, and is significant at the geographic scale described, but not at higher geographic scales. For clarity, the term *very slight* was used to replace *not significant* in the Environmental Protection Agency significance scale.

6.2.8.2 Impacts to bat populations

Details of the methods used to assess the potential collision risk to bat populations are included in Appendix 6-4.

6.2.8.3 Cumulative impacts

For habitats and species where the potential impacts were assessed as very slight or slight, cumulative impacts were assessed at the local scale (Figure 6-3). Where the potential impacts were assessed as of moderate or greater significance, the cumulative impacts were assessed at the geographical scale that the habitat or species had been evaluated at (e.g., within Donegal for receptors assessed as of county importance).

At the local scale, the cumulative assessment included all planning applications from 2010-2022 on the Donegal County Council planning register, An Bord Pleanála website and the EIA portal within 10 km of the wind farm site. At larger scales, the cumulative assessment focussed on impacts from other wind farm projects within the relevant geographical scale. However, other existing, approved and in-planning projects and activities were also considered, where relevant.

6.3 EXISTING ENVIRONMENT

6.3.1 Designated sites

6.3.1.1 Statutory designations

The Special Areas of Conservation and Special Protection Areas within 15 km of the wind farm site, or more than 15 km from the wind farm site but with with potential connectivity with the wind farm site, are reviewed in the Cloghercor Wind Farm Natura Impact Statement (submitted as part of the planning application documentation). The sites with potential connectivity with the wind farm site are: West of Ardara/Maas Road SAC, the Derryveagh and Glendowan Mountains SPA, the Inishbofin, Inishdooey and Inishbeg SPA, the Inishmurray SPA, Roaninish SPA, West Donegal Coast SPA and West Donegal Islands SPA.

The Natural Heritage Areas, proposed Natural Heritage Areas, and Nature Reserves within 15 km of the wind farm site are shown in Figure 6-4.

The Derkmore Wood Nature Reserve occurs adjacent to the western section of the wind farm site. This is a statutory nature reserve and is also a proposed Natural Heritage Area. Its main interest appears to be oak woodland habitat.

The Meenmore West Natural Heritage Area occurs adjacent to the south-east corner of the wind farm site, with a small section extending into the wind farm site. This Natural Heritage Area is designated for its blanket bog habitat.

There are 16 other Natural Heritage Areas / proposed Natural Heritage Areas within 15 km of the wind farm site. Most of these are included within Special Area of Conservation and / or Special Protection Areas.

The only Natural Heritage Area / proposed Natural Heritage Area within 15 km of the wind farm site that is not also included within a Special Protection Area or Special Area of Conservation is the Meenybraddan Bog pNHA. This is around 13 km from the wind farm site and has no potential connectivity with it.

The West of Ardara/Maas Road pNHA includes the Gweebarra Estuary, which has potential connectivity with the wind farm site.

Bird populations associated with some other Natural Heritage Areas / proposed Natural Heritage Areas have potential connectivity with the wind farm site. The potential impacts on these bird populations are assessed in Chapter 7.

Apart from the West of Ardara/Maas Road pNHA, the wind farm site does not have potential connectivity with any non-avian interests of any Natural Heritage Areas / proposed Natural Heritage Areas within 15 km of the wind farm site, or more than 15 km from the wind farm site.

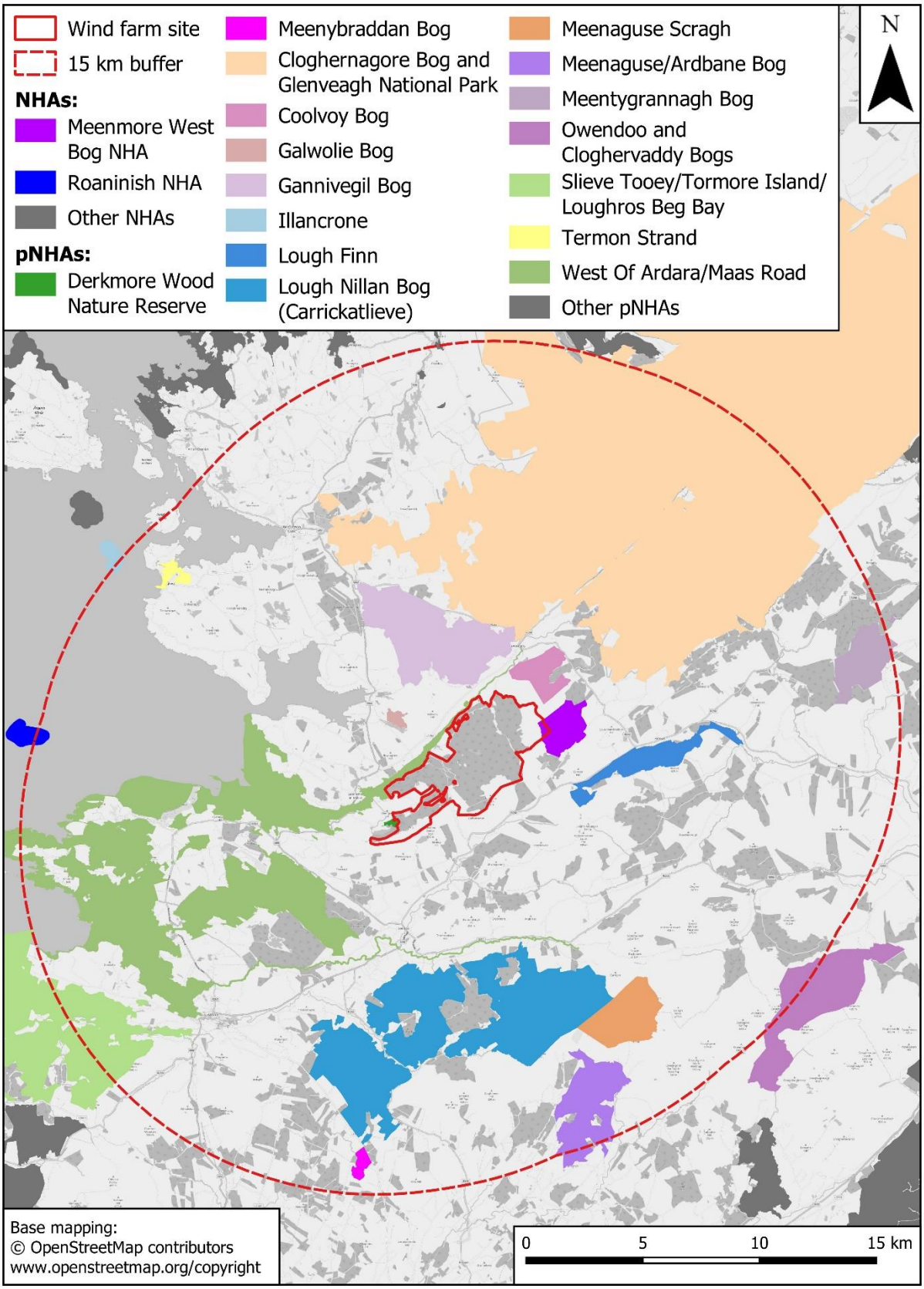

Figure 6-4 – Natural Heritage Areas, proposed Natural Heritage Areas and Nature Reserves within 15 km of the wind farm site.

6.3.1.2 Coillte BioClass sites

Coillte have identified and mapped over 2,300 sites that are important for biodiversity across their estate, which are referred to as BioClass sites (Coillte, undated). There are seven BioClass sites in the Cloghercor Wind Farm site (Figure 6-5). These mainly comprise blanket bog and wet heath habitats in open areas around the margins of the wind farm site. However, one blanket bog BioClass site is located along the access track within the forest plantation area in the northern part of the wind farm site.

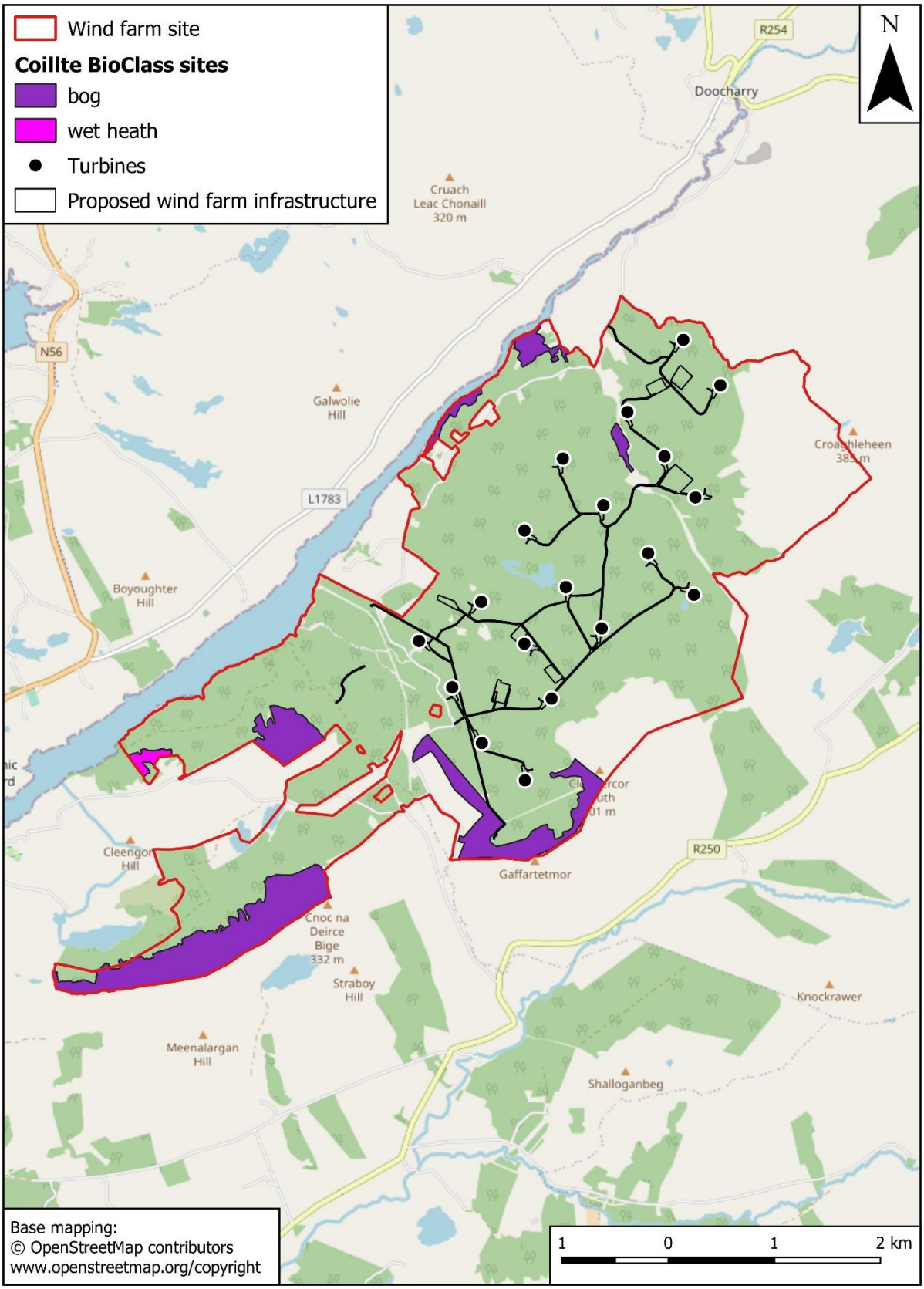

Figure 6-5 – Coillte BioClass sites.

6.3.2 Habitats

6.3.2.1 Local area

The local area for this assessment was defined as the range of hills extending from Crocknadreeavarh in the west to Croaghleheen in the east. This area is dominated by peatland habitats (Figure 6-6). These are classified as peat bogs in the CORINE landcover mapping, but, as well as blanket bog, are likely to include significant areas of wet heath habitat. Most of the wind farm site is occupied by conifer plantations, which are classified as coniferous forest in the CORINE landcover mapping. The areas mapped as transitional woodland scrub in the CORINE landcover mapping are mainly young plantations.

Table 6-1:Total areas of CORINE landcover types in the local area.

Code	CORINE landcover class	Area (ha)
112	Discontinuous urban fabric	21
231	Pastures	156
242	Complex cultivation patterns	51
243	Land principally occupied by agriculture, with significant areas of natural vegetation	173
312	Coniferous forest	1,766
322	Moors and heathland	4
324	Transitional woodland-shrub	597
412	Peat bogs	3,835
423	Intertidal flats	14
522	Estuaries	104

CORINE landcover data from *CLC18_IE_ITM.shp*. The extent of the local area used for this analysis is shown in Figure 6-3.

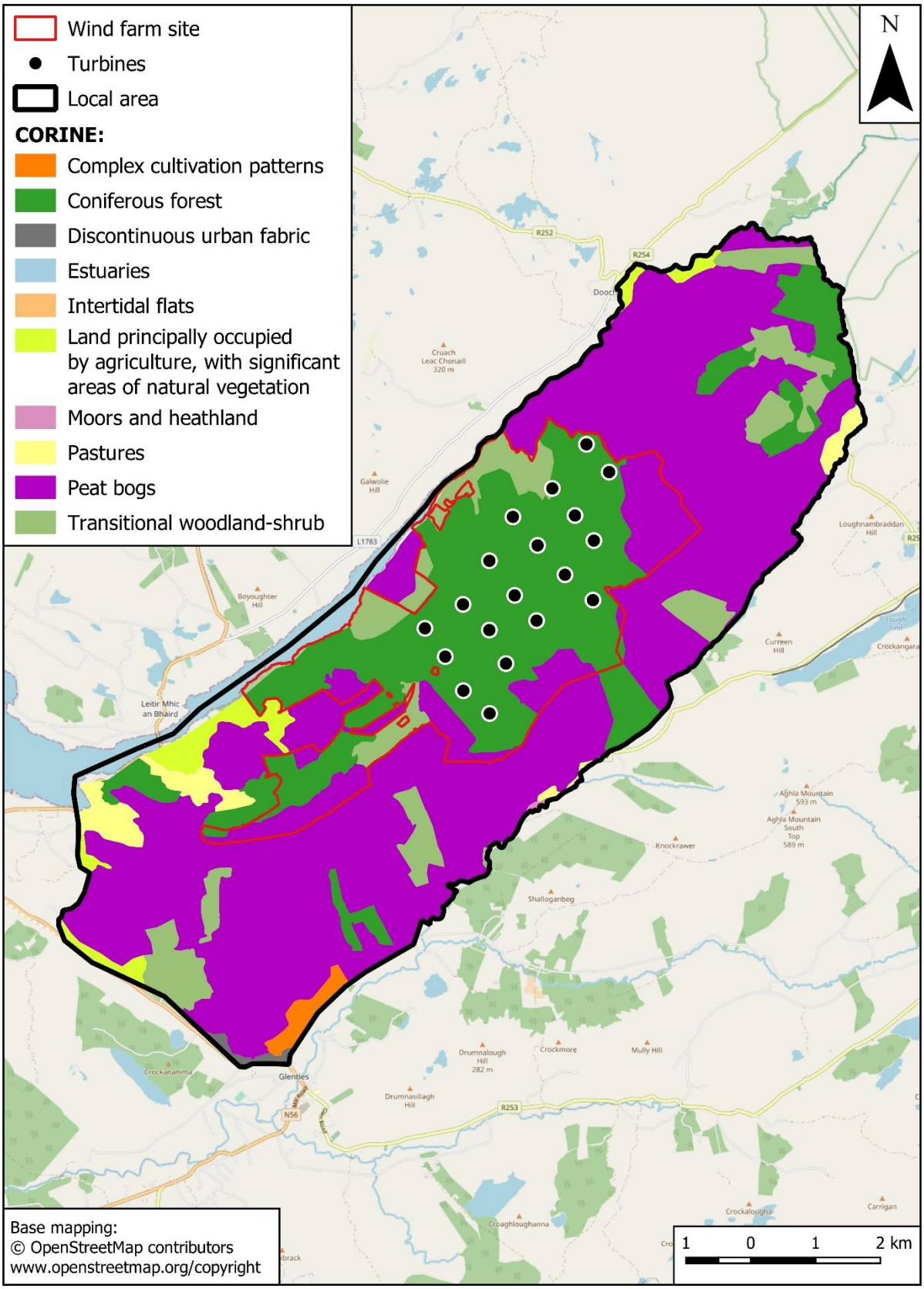

Figure 6-6 – CORINE landcover map of the local area.

6.3.2.2 *Wind farm site*

The overall distribution of habitats across the development site is shown in Figure 6-7.

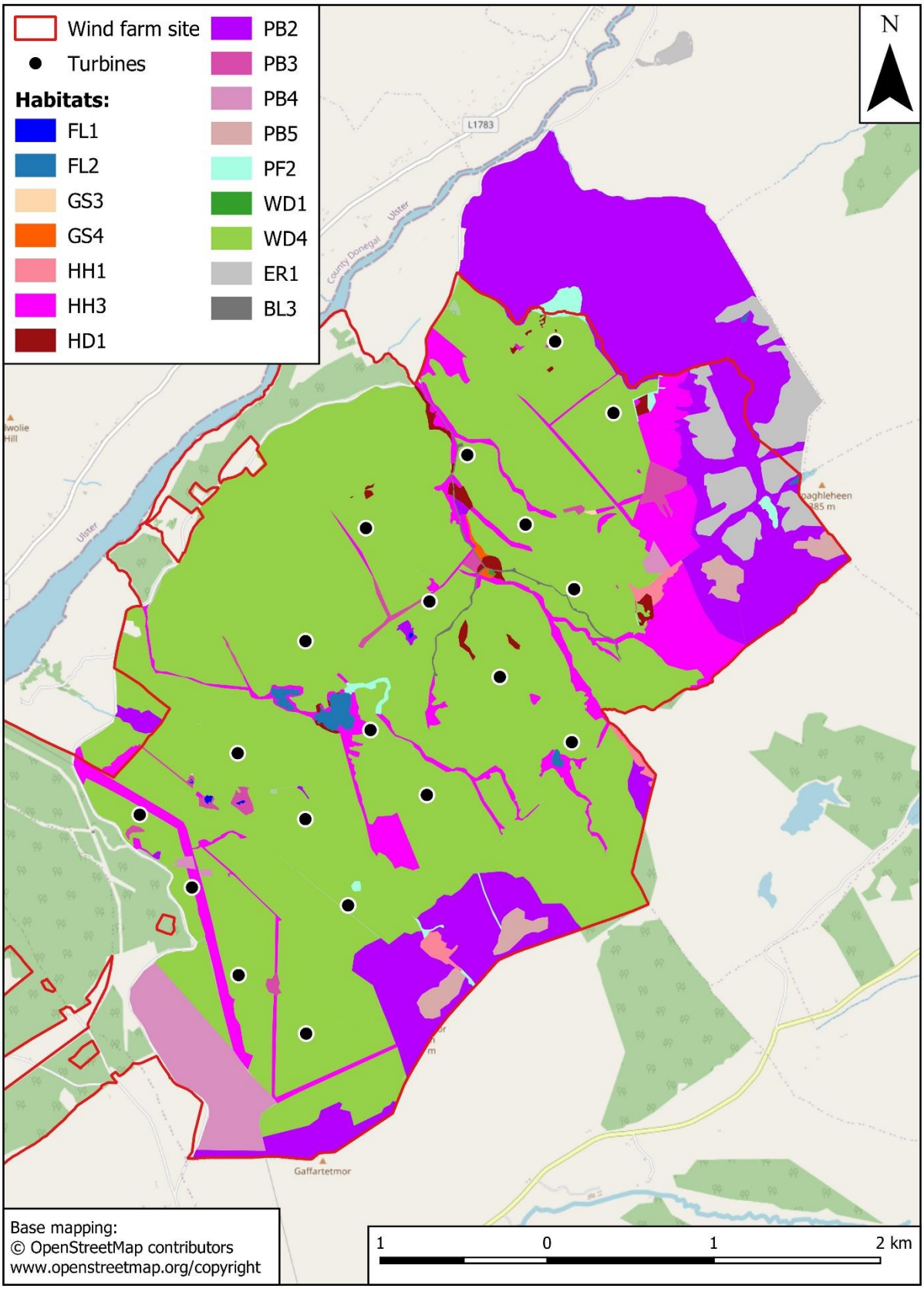

Figure 6-7 – Habitat map of the development site.

Most of the site is occupied by conifer plantation (WD4) habitat. Small patches and narrow strips of open habitats occur along forest roads, rides, stream corridors and in small clearings. These are mainly wet heath (HH3), with some areas of dense bracken (HD1) and lowland

blanket bog (PB3). Wet grassland (GS4) occurs along the forest road in the north-eastern part of the site.

Three small lakes occur within the conifer plantation: Lough Aneane Beg, Lough Aneane More and Lough Sallagh. These lakes were all classified as acid oligotrophic lake (FL2). Small ponds occur within some of the lowland blanket bog patches, which were classified as dystrophic lakes (FL1).

The watercourses within the wind farm site were all classified as eroding / upland rivers (FW2).

Open areas of peatland habitats occur on the western slopes of Croaghleheen in the north-east corner of the site; on the north-western slopes of Gafarretmoyle along the southern edge of the site; and on the northern side of Gaffaretcor in the south-western corner of the site. These open areas are mainly occupied by upland blanket bog (PB2) on the high ground with wet heath (HH3) on the lower slopes below Croaghleheen, and small areas of dry siliceous heath (HH1) on some of the steeper slopes. Heavily eroded peatlands occur around Croaghleheen and Gafarretmoyle, with areas of eroding blanket bog (PB5) and exposed siliceous rock (ER1) where the peat cover has largely disappeared. The lower-lying open area to the north of Gaffaretcor is mainly occupied by cutover bog (PB4).

Table 6-2: Habitat areas in the development site and in the infrastructure buffer.

Habitat code	Habitat	Wind farm site (ha)	Infrastructure buffer (ha)
FL1	Dystrophic lakes	0.4	0
FL2	Acid oligotrophic lakes	5.6	0
GS3	Dry-humid acid grassland	0.2	0
GS4	Wet grassland	0.9	0.3
HH1	Dry siliceous heath	6.5	0
HH3	Wet heath	112	28
HD1	Dense bracken	7.5	1.1
PB2	Upland blanket bog	141	6.0
PB3	Lowland blanket bog	11	5.3
PB4	Cutover bog	45	3.1
PB5	Eroding bog	16	1.4
PF2	Poor fen and flush	8.3	0.2
WD1	Modified broad-leaved woodland	0.1	0.1
WD4	Conifer plantation	973	193
ER1	Exposed siliceous rock	44	0
ED3	Recolonising bare ground	not mapped	0.2
BL3	Buildings and artificial surfaces	2.7	1.1

Habitat classification follows Fossitt (2000).

6.3.2.3 Infrastructure buffer

The infrastructure buffer mainly contained conifer plantation (WD4) habitat, with small patches of open habitats where it crosses rides and stream corridors, and in unplanted clearings.

Conifer plantation (WD4)

Dense stands of semi-mature conifer plantation occur throughout the infrastructure buffer. They are made up of dominant Sitka Spruce, frequent Lodgepole Pine and rare European Larch, with a typical canopy height of around 15 m (however this is very variable depending on the conifer stand). An understorey is absent although there is occasional sapling/shrub development around the edges mainly of the above species but with some native species such as Eared Willow, Rowan and Holly. The invasive non-native species Rhododendron is also present along the edges. A field layer is virtually absent but Purple Moor-grass is locally frequent around the edges. There are also some bryophytes in the field layer including *Plagiothecium undulatum*, *Thuidium thamariscanum*, and *Sphagnum* spp.

Wet heath (HH3)

Within the infrastructure buffer, wet heath was the main habitat between the stands of conifer plantation. The habitat was generally tussocky with a mixture of shrubs and grass up to 1 m tall in places. Shrub species within the habitat include frequent Heather and Cross-leaved Heath, and occasional Bog-myrtle. Graminoid species (grasses, sedges, rushes) include abundant Purple Moor-grass, frequent Deergrass, locally frequent (along wetter, marshy areas) Soft-rush, and occasional Carnation Sedge. Others that were rare included Sweet Vernal-grass, bent grasses, Heath Wood-rush, and Common Yellow-sedge. Broad-leaved herbs and ferns within the habitat include frequent Tormentil and Round-leaved Sundew, occasional Bog Asphodel and Hard Fern. Species that were rare throughout the habitat include Pale Butterwort, Common Butterwort and male-fern. Mosses and liverworts recorded included frequent *Sphagnum* species, *Hypnum jutlandicum*, *Polytrichum commune* and *Pleurozia schreberi*, occasional *Campylopus interoflexus*, *Dicranum scoparium* and *Racomitrium lanuginosum* and rare *Polytrichum juniperinum*, *Rhytidiadelphus loreus*, *Campylopus atrovirens*, *Leucobryum glaucum*, *Frullania* species, *Pleurozium purpurea*.

Upland blanket bog (PB2) and lowland blanket bog (PB3)

An area of upland blanket bog occurs at the south-western end of the infrastructure buffer. Although peat depth was not measured it is likely to be deeper than 0.5 m due to evidence of turf cutting in bog habitat adjacent to the area as well as absence of outcrops within the immediate area. The vegetation comprised a mixture of shrubby and graminoid species (grasses, sedges, rushes) with a height of about 30 cm (and lower) throughout. Shrubby species within the habitat included frequent Heather and Cross-leaved Heath with occasional Bog-myrtle. Grasses and sedges included frequent Black Bog-rush and occasional White-beak Sedge and Purple Moor-grass. Forbs included frequent Round-leaved Sundew and rare Oblong-leaved Sundew. Bryophytes were not surveyed in great detail although the genus *Sphagnum* was abundant throughout with frequent *Campylopus* spp. also.

Linear strips and small patches of lowland blanket bog was present in other areas in the infrastructure buffer. It had a broadly similar vegetation type to that described above for upland blanket bog but was below the 150 m point which separates upland from lowland blanket bog.

Cutover bog (PB4)

Cutover bog was present in the infrastructure buffer in several areas. This included sections that appeared to have had the surface made bare through removal or repeated tracking over presumed to be linked to forestry works and other areas where peat was/is being extracted for domestic use. The habitat was broadly similar to the PB2 and PB3 described above but Heather had a higher cover and *Sphagnum* mosses were less frequent, due to drier conditions. Some wet loving species such as sundews were also less frequent also.

In two areas (Figure 6-8) this habitat appeared to correspond with the Annex I habitat: depressions on peat substrates of the Rhynchosporion (7150). Here White-beak Sedge was abundant as well as other species characteristic of this Annex I habitat such as occasional Common Cottongrass and *Sphagnum* mosses, as well as rare Round-leaved Sundew.

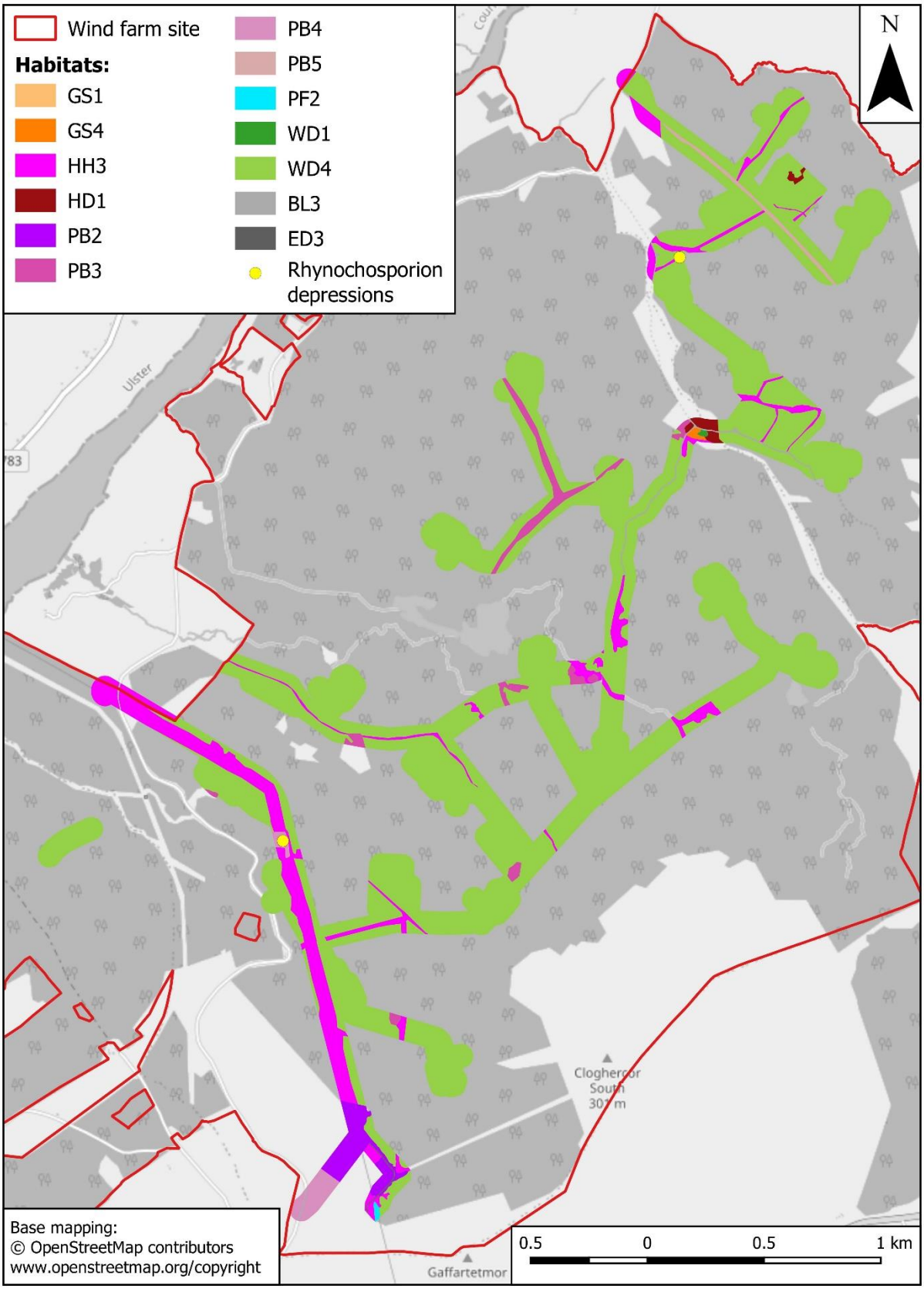

Figure 6-8 – Habitat map of the infrastructure buffer.

Eroding blanket bog (PB5)

A section of open habitat between conifer plantation blocks has become heavily eroded at the northern end of the infrastructure buffer. It is not clear as to why but one possibility is that Red Deer, which are frequent throughout the wind farm site, are causing the high level of bare ground/exposed peat in this area through grazing and movement. The habitat has abundant Heather and frequent Purple Moor-grass with areas of bare peat and exposed rock frequent throughout.

Poor fen and flush (PF2)

A small area of poor flush habitat occurs in the infrastructure buffer at the southern end of the grid connection route. The vegetation was dominated by Soft-rush with typical mosses and liverworts including *Sphagnum* mosses, *Hylocomium splendens* and *Polytrichum commune*.

Other habitats

Small areas of wet grassland (GS4) and modified broad-leaved woodland (WD1) and patches of dense bracken (HD1) occur where the infrastructure buffer crosses an existing forest road in the northern part of the wind farm site.

The wet grassland is dominated by Soft-rush, with abundant Purple Moor-grass, frequent Sharp-flowered Rush and occasional Bog-myrtle. The vegetation was very overgrown and rank, and the overall species diversity was low.

The modified broad-leaved woodland is dominated by Sycamore with some Alder, Downy Birch, Hawthorn and Holly. It was heavily grazed and lacked a woodland ground flora.

The dense bracken occurs where Bracken has invaded patches of wet heath habitat. Remnant heathland vegetation was still present below the bracken.

6.3.2.4 Aquatic habitats

Lakes

There are three lakes and four smaller ponds within the development site. The lakes were classified as acid oligotrophic lake (FW2) habitat, while the ponds were classified as dystrophic lake (FL1) habitat. One of the lakes (Lough Aneane More) contained an area of reed and large sedge swamp (FS1) habitat.

Lough Aneane More is the largest of the lakes with a waterbody area of around 3.5 ha. This is a nutrient poor acid lake which had a brown colour due to it being surrounded by peat-based habitats and having an underlying granite bedrock. A stream flows into the lake from its northern end. The water quality in the lake appears to have been significantly degraded by run-off from the forestry and eroded bogs. A stream flows out of the lake at its westernmost point. The substrate around the margin was a mixture of rocks and organic lake sediment. Its eastern banks were shallower and notably rockier whereas the western banks had a steeper gradient and the substrate was not visible in most instances.

The open water in Lough Aneane More was largely devoid of vegetation. However, a narrow strip of floating and submerged plants was recorded in places along the lakes margins. The south-western corner, where the lake was shallowest with abundant emergent rocks, had the best developed submerged/floating flora. This included Jointed Rush, Bulbous Rush, Intermediate Bladderwort and *Sphagnum* mosses. Floating Club-rush, Broad-leaved Pondweed,

Common Spike-rush, Common Sedge were occasional, and Common Cottongrass and Floating Bur-reed were rare.

The eastern third of Lough Aneane More was occupied by reedswamp habitat and a smaller stand occurred in the south-western corner of the lake. This had abundant Common Reed and Common Club-rush with elements of the lake margin vegetation mixed in.

Lough Aneane Beg is connected to Lough Aneane More by a short stream. This lake was surveyed as part of the general habitat surveys in 2020 and 2021. It was generally similar to Lough Aneane More. It has a waterbody area of around 1.3 ha.

Lough Sallagh is the smallest of the three lakes with a waterbody area of around 0.5 ha. This lake was heavily vegetated with abundant *Sphagnum* mosses and frequent Bogbean and pondweeds.

Three of the small ponds occur in fragmented areas of lowland blanket bog habitat in the south-western part of the development site. These ponds have waterbody areas of around 0.05-0.2 ha. The easternmost of these ponds appears to be a natural pond, while the other two ponds may be of artificial origin as there is evidence of old peat cuttings. The vegetation of these ponds was not surveyed due the difficulty of accessing the ponds over quaking bog habitat.

The fourth small pond occurs in another isolated patch of lowland blanket bog habitat in the centre of the development site. This pond has a waterbody area of less than 0.1 ha.

Rivers and streams

The wind farm site is located within the Gweebarra River catchment. The River Barra rises between the Glendowan and Derryveagh mountains and flows for approximately 32 km in a south westerly direction through Lough Barra. The Gweebarra River flows out of Lough Barra and continues in a south westerly direction through the village of Doocharry. Below Doocharry it becomes the Gweebarra Estuary and then meets the sea at Gweebarra Bay. The geology of the catchment is a mixture of granite, slate, shale and schist, with rough pasture and blanket bog as the dominant land uses. The river receives a good run of Salmon and Sea Trout and is well regarded as an angling river. A large proportion of the upper catchment forms part of the Cloghernagore Bog and Glenveagh National Park Special Area of Conservation while the lower part of the catchment is situated within the West of Ardara/Maas Road Special Area of Conservation.

There are two monitoring stations located on the Gweebarra River before it enters the Gweebarra Estuary. According to the Environmental Protection Agency, the biological water quality at these stations during was Q3-4 and Q4 in 2021. The Environmental Protection Agency has assigned Water Framework Directive River Waterbody Approved Risks to the Gweebarra River and listed it listed as “Not at risk”. The River Waterbody Status of the Gweebarra Estuary is ‘Good’ in the vicinity of the proposed project site. The Water Framework Directive Risk status is currently “At Risk”.

There are two watercourse systems draining the wind farm site towards the Gweebarra Estuary: the Mulnamin Beg_010 (waterbody code: IE_NW_38M290990) and Glenleheen Stream_010 (waterbody code: IE_NW_38G070300). These watercourses are part of the Gweebarra_SC_010 sub-catchment.

Most of the site is drained by the Mulnamin Beg watercourses, which flow north-west directly into the Gweebarra Estuary. The Glenleheen Stream watercourses drain the eastern corner of the wind farm site via a circuitous route into the Gweebarra River above Doochary.

There are no Water Framework Directive monitoring stations located along the Mulnamin Beg watercourses close to the development site. The River Waterbody Status of the Mulnamin Beg_010 is 'Good' in the vicinity of the development site. The Water Framework Directive risk status is currently unknown. No other biological water quality data is available for the Mulnamin Beg watercourses in the vicinity of the development site.

All of the watercourses within the development site have steep gradients and high flow rates, representing natural watercourses typical of upland streams and rivers that are actively eroding, unstable, and with little or no deposition of fine sediment. These streams are largely unaltered and do not suffer from urban encroachment and associated point sources of pollution.

The aquatic survey sites (Figure 6-9) were all small eroding/upland river (FW1) habitat, with widths of 0.3-6 m and average depths of 2-28 cm. The substrates mainly comprised mixtures of boulders and cobbles with some gravel. The river habitats comprised mixtures of glides and pools and riffles. Apart from a small amount of pondweed at Site 1, the aquatic vegetation was limited to algae, mosses and liverworts. At Site 5, there was a large amount of filamentous algae indicating nutrient enrichment from the conifer plantation.

Further details of the characteristics of the Gweebarra River catchment, and of the riparian habitats within the development site, are included in the Aquatic Ecology Report (Appendix 6-2).

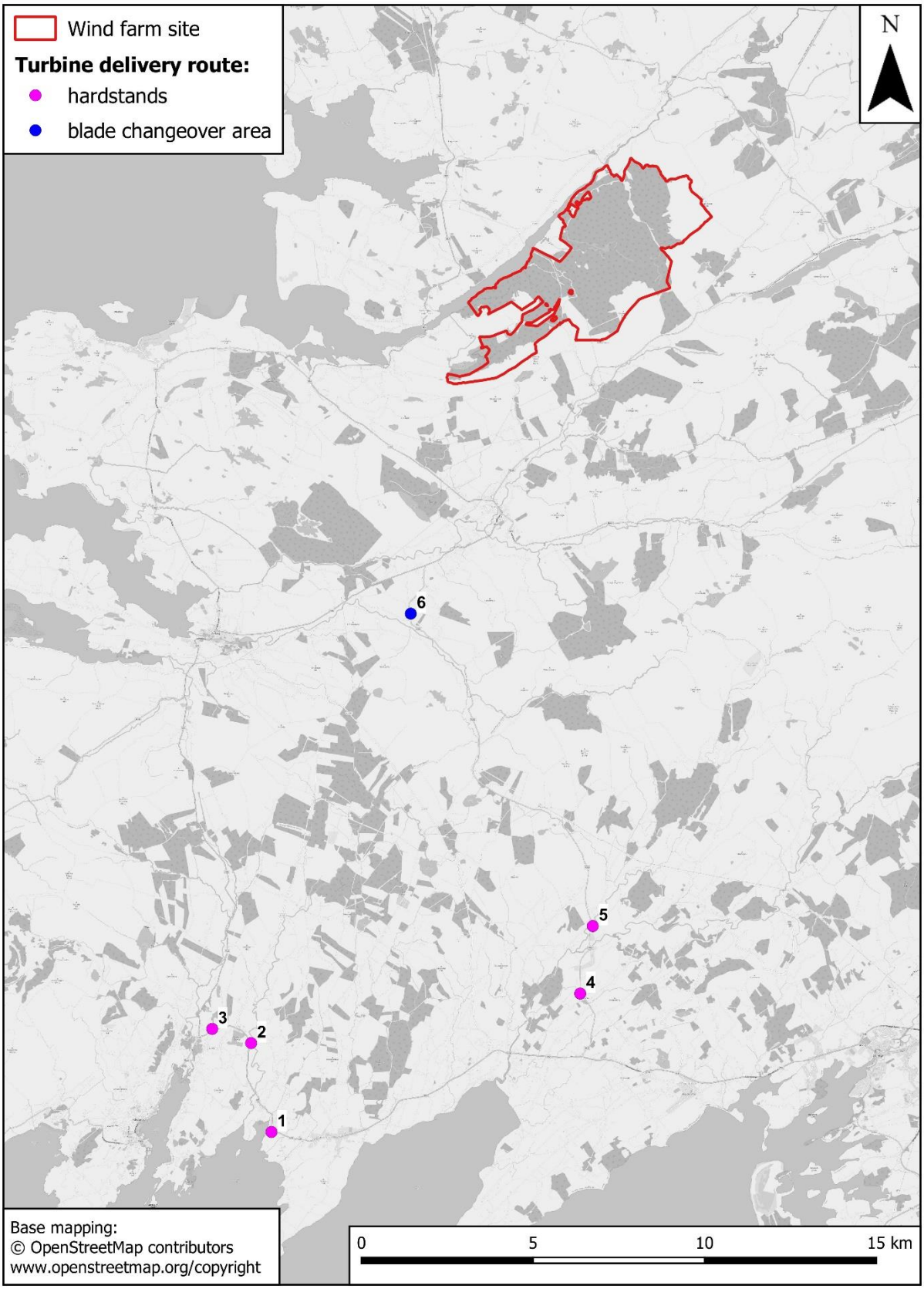

Figure 6-9 – Turbine delivery route hardstands and blade changeover location.

6.3.2.5 *Turbine delivery route hardstand areas*

The habitat characteristics of the turbine delivery route hardstands and blade changeover area areas are described in Table 6-3 and their locations are shown in Figure 6-9.

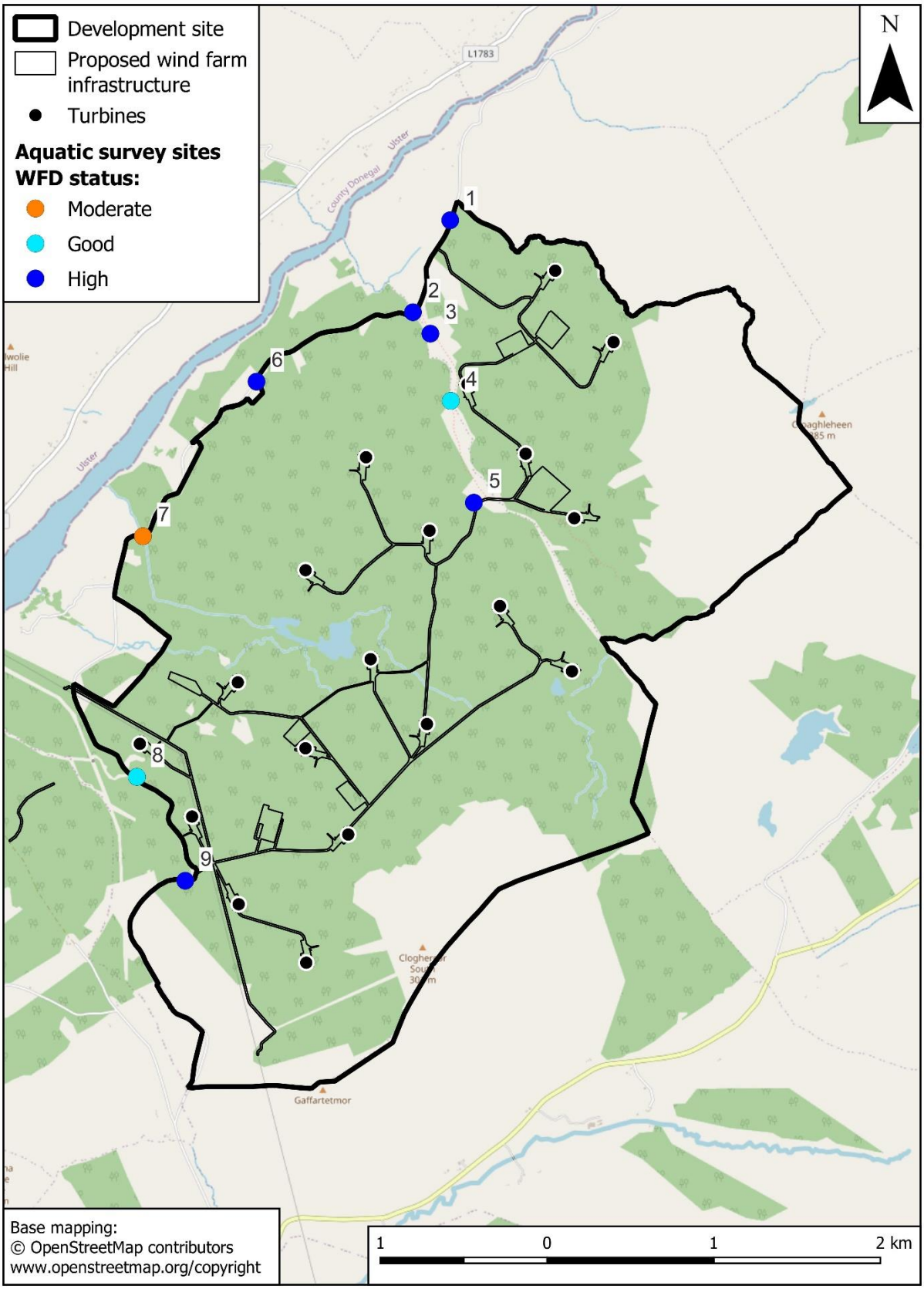

Figure 6-10 – Aquatic survey sites.

Table 6-3: Habitat characteristics of the turbine delivery route hardstands and blade changeover area.

Location	Description	Area (ha)
1	This location is fully covered in amenity grassland (GA2).	0.03
2	This is partly amenity grassland (GA2) and partly grassy verge (GS2).	0.02
3	This is a grassy verge (GS2) with a few shrubs (mostly gorse, occasional willow) on the field boundary which don't quite form a hedgerow. Inside this is improved agricultural grassland (GA1).	0.01
4	Grassy verge (GS2) with a wire fence and a wet grassland (GS4)/improved grassland (GA1) matrix inside this.	0.01
5	This is a thin grassy verge with a low narrow hedgerow (Bramble, Blackthorn, Hawthorn, Holly, etc.). Wet grassland is inside this (the hardstand should be only slightly impacting this).	0.01
6	Blade changeover location: This is an old cutover peatland site (PB4). The area of the work footprint is mostly covered in wet grassland vegetation with plenty of Soft-rush. It is now grazed regularly. Soil is mostly thin peat (up to 1m in places) with no drains present. It would appear that the peat in the area has not been cut in a long time (based on the revegetation). The work footprint stays away from the uncut areas. There is an area reclaimed on the southern half of the site with a track going through – this is a mix of bare ground (ED2) and recolonising bare ground (ED3). There is a grassy verge alongside the road. There is a relatively new electric fence between the road and the site – no hedgerow, though there is a narrow grassy verge (GS2) between the road and the fence.	0.3

6.3.3 Notable plant species

The threatened, near-threatened and protected plant species recorded from the hectads (10 km squares) containing the wind farm site are listed in Table 6-4. Most of these species are unlikely to occur in the infrastructure buffer due to their habitat requirements, although there is potentially suitable habitat for some of these species in the upland sections of the wind farm site, away from any of the proposed project.

Heath Cudweed can occur in a variety of situations including sand pits, gravel quarries and forestry tracks. Therefore, potential habitat for this species does occur in the infrastructure buffer. However, it was not recorded during the detailed habitat and vegetation survey, which was carried out in mid-August, during its flowering period.

No other rare or notable plant species were recorded during the detailed habitat and vegetation survey, or during other survey work carried out in the wind farm site.

Table 6-4: Threatened, near-threatened and protected plant species recorded from the hectads (10 km squares) containing the wind farm site.

Group	Scientific name	Common name	Typical habitat	Red list	Other status	Most recent record
Mosses and liverworts	*Abietinella abietina var. hystricosa*	Prickly Tamarisk-moss	Ancient limestone grassland	NT		2002
	Petalophyllum ralfsii	Petalwort	Dune slacks	LC	Annex II; FPO	2002
	Schistidium strictum	Upright Brown Grimmia	Exposed rock faces on upland crags	NT		2008
Ferns	*Pilularia globulifera*	Pillwort	Lake and river margins	VU		1998
	Trichomanes speciosum	Killarney Fern		LC	Annex II; Annex IV; FPO	1993
Flowering plants	*Hammarbya paludosa*	Bog Orchid	Wet, spongy bogs	NT	FPO	1990
	Najas flexilis	Slender Naiad		NT	Annex II; Annex IV; FPO	1939
	Omalotheca sylvatica	Heath Cudweed	Upland pastures and damp sandy places	EN	FPO	1952
	Pseudorchis albida	Small-White Orchid	Upland pastures and heaths	VU	FPO	1903
	Saussurea alpina	Alpine Saw-wort	Mountain cliffs and ledges above 300 m	VU		1898

Red list: EN = endangered; VU = vulnerable; NT = near-threatened; LC = least concern. Other status: Annex II = Annex II of the Habitats Directive; Annex IV = Annex IV of the Habitats Directive; FPO = Flora Protection Order

6.3.4 Invasive species

The invasive species stands that were recorded in the wind farm site are shown in Figure 6-11. This map also shows the infrastructure buffer, which was thoroughly surveyed for invasive species. This is the area where potential disturbance from construction work could cause spread of invasive species. Additional invasive species stands were also mapped outside the infrastructure buffer.

Rhododendron was widely distributed across the wind farm site and a total of 35 stands were mapped, including 27 within the infrastructure buffer. These were mainly single bushes, or groups of a few bushes. Most stands were in open areas along rides, etc., but a few stands were recorded under the canopy. Rhododendron is listed in the third schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

Two stands of Japanese Knotweed were recorded. One was in the northern part of the infrastructure buffer close to turbine T9. This was a large stand, around 8 x 8 m in size. The other was on the public road to the west of turbines T16 and T17. Japanese Knotweed is listed in the third schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

One stand of Montbretia was recorded. This comprised two plants in the power line wayleave near turbine T17. Montbretia is not a scheduled species but is included (as an invasive species) in the *Guidelines for the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (NRA, 2010).

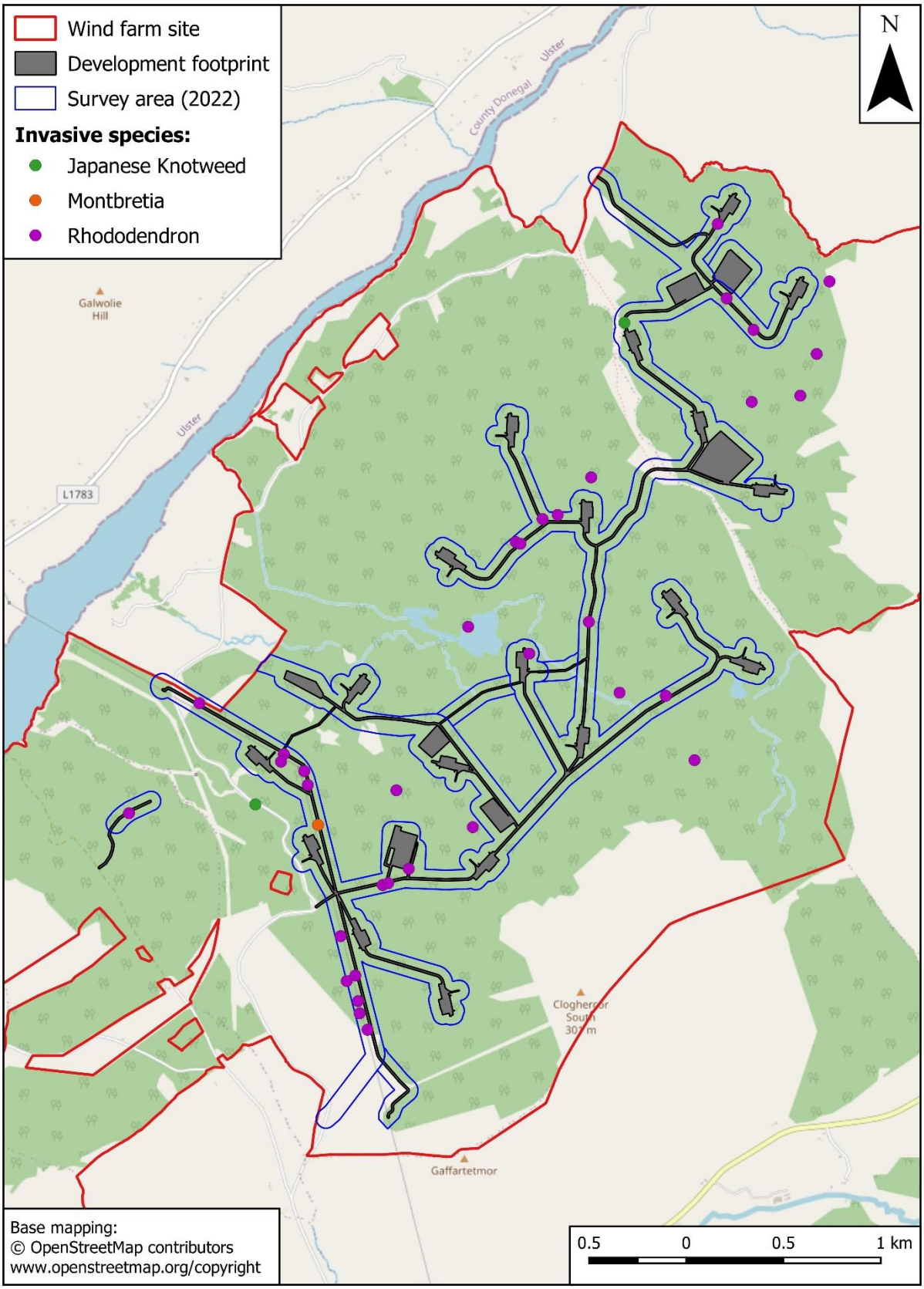

Figure 6-11 – Invasive species map.

6.3.5 Aquatic fauna

Full details of the desk review information and survey data relating to aquatic fauna are included in Appendix 6-2.

6.3.5.1 Aquatic invertebrates

The surveys recorded low numbers of aquatic invertebrates at the aquatic survey sites (see Appendix 6-2.). The taxa recorded were mainly representative of unpolluted rivers with good or high ecological status under the Water Framework Directive. However, Site 7 was classified as moderately polluted and of moderate ecological status. All the sites were evaluated as "At Risk" of failing to meet "Good" ecological status due to the low number of species present.

6.3.5.2 Freshwater Pearl Mussel

The Owenea catchment, to the south of the wind farm site, is a *Margaritifera* Sensitive Area. Freshwater Pearl Mussel has been recorded from several locations in this catchment and these populations are a Qualifying Interest of the West of Ardara/Maas Road SAC. No part of the development site drains to this catchment, although the turbine delivery route crosses watercourses in this catchment. The status of Freshwater Pearl Mussel in this catchment is reviewed in the Natura Impact Statement.

There are no records of Freshwater Pearl Mussel from any part of the Gweebarra River catchment downstream of the wind farm site.

All the proposed infrastructure development is within the catchment of the Mulnamin Beg watercourses. The Mulnamin Beg watercourses in the development site were assessed during the aquatic survey and none of these watercourses were considered to have suitable habitat for Freshwater Pearl Mussel (Appendix 6-2). These watercourses drain directly from the wind farm site to the Gweebarra Estuary, so there is no potential for Freshwater Pearl Mussel habitat to occur on these watercourses downstream of the development site.

6.3.5.3 Salmonids

Previous data on salmonid fish in the Gweebarra River catchment is reviewed in Appendix 6-2. There is no previous data for the watercourses within the wind farm site.

These aquatic survey sites had little value as salmonid habitat due to the upland, high energy nature of the watercourses. There was very little spawning gravel present across all nine sites, with the largest percentage of gravels being 20% at Sites 1 and 5.

There was no visual evidence of fish present within any of the nine sites surveyed. Fish access was poor due to the upland location. While trout can sometimes occur at steep gradients, the small size of the cascading boulder-pool profile within these streams was not considered suitable for resident fish. There was limited holding habitat due to the high energy flows of the streams. Site 4 had a large percentage of holding pool (40%), but the site was dominated by large boulders. Access for salmonids from downstream was difficult given the natural high gradients and large boulders preventing migration upstream. Spawning and nursery habitat in the lower reaches, for example at Site 1, was impacted by siltation, filamentous algae and bedded gravels due to the adjacent peat and forestry influences.

Overall, the upland eroding streams located with the development site hold poor quality spawning and nursery habitat for salmonids. There was no evidence of good spawning habitat that would be found in deeper glides and in pools where mixed gravels and small cobbles would be present. There was no evidence of holding pools or suitable boulders for larger fish.

Based on the very low numbers of macroinvertebrates present within these streams, there is a low abundance of fish food present within these streams to sustain salmonid populations.

6.3.5.4 Lamprey

No evidence of any lamprey species was recorded at any of the aquatic survey sites.

Lamprey spawning and nursery habitat was absent in all nine sites. Suitable spawning habitat by way of finer, unbedded gravels was absent from all sites. Fine sediment accumulations suitable for larval settlement were absent due to the high-energy nature of the sites. The majority of sites represented upland eroding watercourses and naturally such sites do not encourage the deposition of fine, organic rich sediment required by larval lamprey.

6.3.5.5 European Eel

No evidence of European Eel was recorded at any of the survey sites.

While eels are known for their remarkable ability to often climb and navigate even near-vertical structures as juveniles (glass eels), the survey sites were considered sub-optimal or even unsuitable for the species given the often high gradients, high-energy profiles and typically upland nature of the channels.

6.3.6 Bats

Full details of the results of the bat surveys are included in Appendix 6-4. The following sections provide a summary of these results.

6.3.6.1 Bat roosts

There is one set of buildings located within the proposed project area. These are some stone ruins located adjacent to the weather mast. This structure is surrounded by mature trees which provide shelter and therefore increase the roosting potential of this structure. This building was assessed as having medium suitability for roosting bats. The majority of the trees surrounding this building have a Potential Bat Roost value for local bat populations. Dusk bat detector surveys were carried out on seven dates between April 2020 and June 2022. No emerging bats were detected during any of these surveys, and no bats were recorded in endoscope inspections before each of the surveys. Foraging and commuting Soprano Pipistrelles and *Myotis* species were recorded occasionally.

Dusk / dawn bat detector surveys were also carried out at another ten buildings around the margins of the wind farm site. No emerging or returning bats were recorded on any of these surveys.

6.3.6.2 Bat species

Eight bat species were recorded within the development site: Soprano Pipistrelle, Common Pipistrelle, Leisler's Bat, Daubenton's Bat, Nathusius' Pipistrelle, Natterer's Bat, Whiskered Bat and Brown Long-eared Bat.

While a large array of night-time surveys were undertaken, an overall low level of bat activity was recorded during dusk and dawn surveys and walking/driving transects. For less common bat species, the bat encounters recorded were primarily on static units as these were left in the "field" for a minimum of ten days and therefore provided a greater opportunity to record bat species.

Soprano Pipistrelle, Common Pipistrelle, Leisler's Bat, Daubenton's Bat, Natterer's Bat, and Brown Long-eared Bat were recorded throughout the survey area, including at 77, 87, 71, 52, 40, and 73, respectively, of the 102 static unit locations. Nathusius' Pipistrelle was recorded at 11 static unit locations, while Whiskered Bat was recorded at 23 of the static unit locations.

Analyses of the static surveillance results using the EcoBat tool indicated that, in general, the level of bat activity varied greatly between the static locations and that there was not a consistent level of bat species activity from night to night.

Out of the 102 static unit locations surveyed, the EcoBat analyses identified 17 with High EcoBat Activity values, and another 14 with Moderate to High EcoBat Activity values. In most cases, the bat species involved were Soprano Pipistrelle and/or Common Pipistrelle, with Leisler's Bat, Daubenton's Bat, Whiskered Bat and *Myotis* species involved at one or two locations each. Soprano Pipistrelle, Common Pipistrelle and Leisler's Bat are high risk species. Eight of the static unit locations with High EcoBat Activity values were located within 300 m of a proposed turbine location, while nine of the static unit locations with Moderate to High EcoBat Activity values were also located within 300 m of a proposed turbine location. Therefore, the following proposed turbine locations are considered to be important in relation to level of bat activity recorded during the static surveillance and their potential impact on local bat populations: T1, T3, T6, T9, T11, T12, T16 and T19.

6.3.7 Other fauna

6.3.7.1 Marsh Fritillary

The All Ireland Marsh Fritillary Database holds records of Marsh Fritillary from two locations around the northern edge of the wind farm site (Figure 6-12). Both locations are 100 m grid squares that are close to, or partially overlap, the wind farm boundary. The records from both locations are of adult Marsh Fritillaries that were recorded in 2012-2014. The habitat to the north of the public road in this area is grazed rough grassland / heath and may be suitable Marsh Fritillary breeding habitat.

Potentially suitable Marsh Fritillary habitat has at least 20% frequency of Devil's-bit Scabious growing in densities of at least 3 plants/m^2, while for the habitat to be in good condition, the scabious has to be growing in swards that are 12-25 cm tall (NBDC, undated).

The assessments carried out during the habitat surveys in 2020 and 2021 did not identify any potential Marsh Fritillary breeding habitat within the development site. This reflects the lack of grazing in the remnant open habitats in the lowland sections of the site. Grazing is generally required to create suitable vegetation structure for Marsh Fritillary. The Marsh Fritillary's

foodplant (Devil's-bit Scabious) was generally scarce in the development site and was not noted as frequent, or abundant in any of the habitats surveyed.

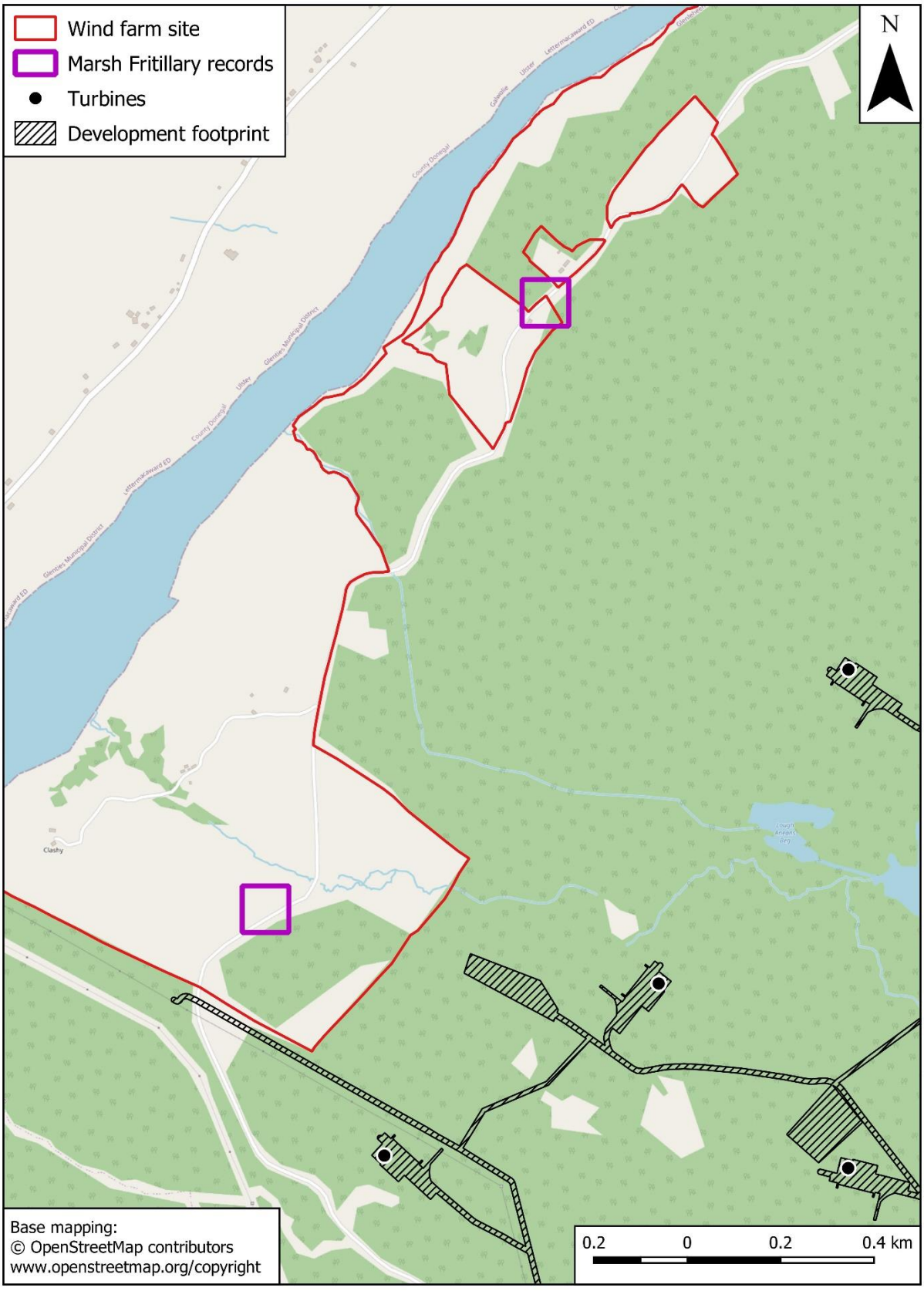

Figure 6-12 – Marsh Fritillary records.

6.3.7.2 Other invertebrates

No habitat features that are scarce / rare in the local area, and that are likely to be important for invertebrate biodiversity were recorded in the infrastructure buffer.

6.3.7.3 Amphibians and reptiles

Incidental records of Common Frog were made at a few locations within the wind farm site (Appendix 6-5). No significant areas of potential Common Frog breeding habitat were identified within the infrastructure buffer.

There were four sightings of Common Lizards that were made during various survey work within the wind farm site. Three of these sightings were in open bog / heath habitat in the eastern part of the site, while the fourth sighting was along a track close to the northern boundary of the site.

6.3.7.4 Mammals (excluding bats)

Otter

There is an old Otter record from Doo Lough in the western part of the wind farm site in 1980 (NPWS records). Otters have also been recorded at three locations along the Gweebarra Estuary between Gweebarra Bridge and Doochary Bridge (NBDC records). Details of these records are included in Appendix 6-5.

During the aquatic survey, Otter signs were searched for along the streams and drainage ditches within the development site, where accessible. No Otter signs (tracks, slides and spraints) or holts/resting sites were found. No Otter signs were recorded in the protected species survey of the infrastructure buffer and Lough Aneane More in August 2022. There were no incidental records of Otter signs or sightings during other survey carried out for the wind farm project.

It is likely that there is an Otter population in the Gweebarra Estuary, and they may use watercourses and other habitats within the wind farm site at times. However, the low productivity of the aquatic habitats in the wind farm site and the lack of significant fish populations are likely to limit Otter usage of the site.

Badger

There was a Badger sighting from Cleengort Hill in the western part of the wind farm site in 2015 (NBDC records) and other records close to the southern shore of the Gweebarra Estuary, just outside the north-western boundary of the wind farm site (NBDC and NPWS records).

Badger signs or sightings were recorded at two locations in open bog / heath habitat around the edges of the wind farm site during survey work for this project. However, no Badger signs were found during the protected species survey of the infrastructure buffer in August 2022.

Details of these records are included in Appendix 6-5.

Other species

Other protected mammal species recorded within the wind farm site were Red Squirrel, Pine Marten, Irish Hare and Red Deer. Details of these records are included in Appendix 6-5.

Red Deer were widely recorded throughout the wind farm site and there is clearly a large deer population in the site. There were occasional records of Irish Hares from the open bog / heath habitats and there is likely to be an established population in these habitats. There were a few scattered records of Pine Martens and Red Squirrels from various locations within the wind farm site, but both species are likely to have established populations in the site.

Other protected native / naturalised mammal species that are likely to occur within the wind farm site are Hedgehog, Pygmy Shrew and Irish Stoat. There are records of Hedgehog and Irish Stoat from the vicinity of the wind farm site, while Pygmy Shrew is a widespread and abundant species in Ireland (outside the range of the introduced Greater White-toothed Shrew).

6.3.8 Evaluation

6.3.8.1 Annex I habitats

Under the NRA Guidelines (NRA, 2009), Annex I habitats can be classified as: of international importance if they are part of a Special Area of Conservation or considered to be a "best example" of the habitat type; or of national importance if they are considered to be a "viable area" of the habitat type. A "viable area" is defined by the guidelines as "an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation)". All examples of Annex I habitats that do not qualify for international or national importance are classified as of county importance under the NRA Guidelines.

Lake habitats

Most of the ponds and lakes within the wind farm site correspond to, or are likely to correspond to, Annex I habitats.

Lough Aneane More was assessed as corresponding to the Annex I habitat: oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) (3110). The physical and chemical characteristics of the lake fit the description given by O Connor (2015) for this Annex I habitat as occurring "in soft-water, nutrient poor…. lakes frequently associated with acid bedrock catchments (notably granite and old red sandstone) overlain by peatland". The lake margin vegetation was also characteristic of this Annex I habitat.

Acid oligotrophic lake (FL2) habitats can also have affinities with another Annex I habitat type: oligotrophic to mesotrophic standing waters with vegetation of the Littorelletalia uniflorae and/or of the Isoeto-Nanojuncetea (3130). However, the absence of Slender Naiad, which is characteristic of the latter Annex I type, and the relatively species poor nature of the lake suggest a better fit with the 3110 Annex I type.

While detailed surveys were not carried out, Lough Aneane Beg and Lough Sallagh are also likely to correspond to the Annex I habitat: oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) (3110).

The small ponds are dystrophic lake (FL1) habitats. This habitat type shows affinities with the Annex I habitat: natural dystrophic lakes and ponds (3160). The small pond in the high quality lowland blanket bog habitat to the south-east of T13 appears to be a natural pond so is likely to qualify as the Annex I habitat. The other small ponds to the south of T13 appear to be artificial ponds that have developed in old peat cuttings, so may not qualify as the Annex I habitat type.

The potential Annex I dystrophic lake habitats occur within small fragments of bog habitat surrounded by forestry. Therefore, they are probably not "viable", as defined in the NRA Guidelines (NRA, 2009), and do not qualify for national importance rating. Instead, they are rated as of county importance.

The Annex I oligotrophic lake habitats are also surrounded by forestry. The water quality in Lough Aneane More appears to have been significantly degraded by the forestry, and by eroded bog habitat above the forestry. Given the situation of Lough Aneane Beg and Lough Sallagh, they are also likely to have been similarly affected. Therefore, they are probably not "viable", as defined in the NRA Guidelines (NRA, 2009), and do not qualify for national importance rating. Instead, they are rated as of county importance.

Peatland habitats

The dry siliceous heath (HH1) habitats correspond to the Annex I habitat: European dry heaths (4030). The wet heath (HH3) habitat corresponds to the Annex I habitat: northern Atlantic wet heaths with Erica tetralix (4010). The upland blanket bog (PB2) and lowland blanket bog (PB3) correspond to the Annex I habitat: blanket bog (7130). Areas of these habitats that are peat-forming (e.g., with high levels of *Sphagnum* mosses) correspond to the priority variant of this Annex I type.

The areas of these habitats within the wind farm site form part of a larger complex of peatland habitats extending along the ridge from Gaffaretcor to Croaghleheen and down the slopes on the southern and eastern sides of the ridge. Therefore, the overall complex of these habitats can be considered to be a "viable area", as defined in the NRA Guidelines (NRA, 2009), and qualifies for rating as of national importance. However, the fragments of these habitats along rides and in small open areas within the forestry plantation sections of the wind farm site are not "viable areas" so are only of county importance.

The upland blanket bog habitat in the south-east corner of the wind farm site is within the Meenmore West NHA. This NHA was designated for its blanket bog habitat. Therefore, this is an additional qualification for national importance rating.

The cutover bog within the infrastructure buffer contains two areas of an Annex I habitat: depressions on peat substrates of the Rhynchosporion. This Annex I habitat typically occurs within large areas of blanket bog. As the examples with the infrastructure buffer occur within habitats that are not considered to be "viable areas" of bog habitat, these examples also cannot be considered to be "viable area". Therefore, they are rated as of county importance.

Other potential Annex I habitats

Most eroding / upland river (FW2) habitat in Ireland is likely to correspond to the Annex I habitat: Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (3260). However, this habitat is very common and widespread in Ireland. Its current distribution has been assessed by NPWS (2019) as occurring in every hectad (10 km square) in Ireland, apart from offshore islands. The eroding / upland river habitat in the wind farm site mainly has good or high ecological status and, therefore, should probably be considered "viable" in the context of the NRA Guidelines. However, given the ubiquity of this habitat in Ireland, it would not be appropriate to rate it as of national importance, or county importance. Therefore, it is rated as of local importance (higher value)

Wet grassland with Purple Moor-grass can show affinities to the Annex I habitat: *Molinia* meadows on calcareous, peaty or clayey-silt laden soils (Molinion caeruleae) (6410). The wet grassland along the forest road in the northern section of the development site contained a

high component of Purple Moor-grass. However, it was species-poor and rank and lacked the characteristics of high quality Annex I *Molinia* meadow habitat as defined by Martin *et al.* (2018).

6.3.8.2 Non-Annex I habitats

None of the other habitats within the development site are of more than local importance.

6.3.8.3 Rare / scarce plants

No rare / scarce plant species were identified in the surveys of the infrastructure buffer.

6.3.8.4 Bats

Eight bat species of bat and additional records of the *Myotis* species group were recorded during the bat surveys. This represents all eight bat species know to be resident in County Donegal. The table below provides an ecological valuation of each bat species and the collision risk factor in relation to wind farms. Three of the bat species recorded is considered to be High risk.

Table 6-5: Evaluation of the bat species recorded during the bat survey.

Bat Species	Evaluation	Irish Status	Bat Risk	Population Numbers / Core Area
Leisler's Bat	International	Least Concern	High	Common
Natterer's Bat	County	Least Concern	Low	Widespread
Whiskered Bat	Regional	Least Concern	Low	Rare
Nathusius' Pipistrelle	Regional	Least Concern	High	Rare
Daubenton's Bat	County	Least Concern	Low	Common
Brown Long-eared Bat	County	Least Concern	Low	Widespread
Common Pipistrelle	Local	Least Concern	High	Common
Soprano Pipistrelle	Local	Least Concern	High	Common

The evaluation refers to the ecological value / geographical scale of importance. This tables uses CIEEM (2016) for the evaluation, SNH (2021) for the bat risk in relation to wind turbines (SNH, 2021) and refers to Wray et al. (2010; Table 2 in SNH, 2021) in relation to level of potential vulnerability of populations extrapolated for Irish bat species. The Irish status is from Marnell et al. (2019) and the population numbers / core area from Roche et al. (2014).

6.3.8.5 Other fauna

The conifer plantation habitat in the development site comprises around 2% of the total area of the CORINE landcover categories of coniferous forest, transitional woodland-shrub and broad-leaved forest mapped in Donegal. Red Squirrel populations in Donegal are likely to be largely dependent on these habitats, so the development site is likely to hold over 1% of the Donegal population of this species. Therefore, the Red Squirrel population in the development site was evaluated as being of county importance.

The other protected amphibian, reptile and mammal species that occur, or are likely to occur, in the wind farm site are less dependent on conifer plantation habitat or are non-forest species. The development site populations of these species were evaluated as being of local importance (higher value).

6.4 IMPACTS

6.4.1 Project description

A full description of the proposed project is included within Chapter 2 (Description of the Proposed Project) of this EIAR.

A range of turbine models are being considered for this wind farm. These turbine models have rotor diameters ranging from 149-164 m, hub heights ranging from 112-125 m and tip heights ranging from 194-200 m. The bat assessment includes calculations of forestry clearance requirements for all eight turbine models. The assessment of habitat impacts includes assessments of the impacts of these forestry clearance requirements for all eight turbine models. Apart from the forestry clearance requirements, the choice of turbine model will not affect the development footprint. The choice of turbine model will not significantly affect any other aspect of the proposed project relevant to potential biodiversity impacts.

A 10-year planning permission and 35-year operational life from the date of commissioning of the entire wind farm is being sought.

A detailed project description is included in Chapter 4 of this Environmental Impact Assessment Report.

6.4.2 Designated sites

6.4.2.1 Statutory designations

Special Areas of Conservation and Special Protection Areas

The Natura Impact Statement identified potential connectivity between the wind farm site and the West of Ardara/Maas Road SAC, Derryveagh and Glendowan Mountains SPA, Inishbofin, Inishdooey and Inishbeg SPA, Inishmurray SPA, Roaninish SPA, West Donegal Coast SPA and West Donegal Islands SPA. It concluded that the wind farm development will not cause significant impacts to any of the Qualifying Interests of these sites. No other Special Areas of Conservation or Special Protection Areas have potential connectivity with the wind farm site.

Natural Heritage Areas / proposed Natural Heritage Areas

There are four Natural Heritage Areas / proposed Natural Heritage Areas in the vicinity of the wind farm site. One of these (Derkmore Wood) is also a Nature Reserve.

The proposed wind farm infrastructure is over 1 km from the nearest points of the Meenmore West NHA and the Coolvoy Bog pNHA, and over 2 km from the nearest point of the Derkmore Wood pNHA / Nature Reserve. These sites are all in separate watersheds from the wind farm infrastructure. Therefore, the wind farm development will have no impacts on these sites.

The proposed wind farm infrastructure is around 500 m from the nearest point of the West of Ardara/Maas Road pNHA. However, several streams from the wind farm site drain into the proposed Natural Heritage Area. This proposed Natural Heritage Area is included within the

West of Ardara/Maas Road SAC. The only potential impacts to this proposed Natural Heritage Area from the wind farm development are water quality impacts to the Gweebarra Estuary. No significant water quality impacts from the wind farm development to the Gweebarra Estuary are predicted (see Chapter 9).

The wind farm has potential connectivity with important bird populations associated with the Cloghernagore Bog and Glenveagh National Park pNHA and the Lough Finn pNHA. These proposed Natural Heritage Areas are included within the Derryveagh and Glendowan Mountains SPA. The potential impact on the Qualifying Interests of that Special Protection Area are assessed in the Natura Impact Statement, while the potential impact on other important bird populations associated with those proposed Natural Heritage Areas are assessed in the Chapter 7 (Ornithology).

There are no other Natural Heritage Areas, proposed Natural Heritage Areas or Nature Reserves with potential connectivity with the proposed wind farm development.

6.4.2.2 Coillte BioClass sites

None of the proposed wind farm infrastructure is located within, or adjacent to, any of the Coillte BioClass sites, apart from the southern end of the grid connection route, which runs along the edge of BioClass site DL14B0007 (Appendix 6-5).

The grid connection route is outside a strip of disturbed ground that separates the blanket bog habitat in BioClass site DL14B0007 from the adjacent forestry plantation. Therefore, installation of the underground cable will not cause physical impacts to the blanket bog habitat in the interior of the BioClass site. There is potential for secondary hydrological impacts through alteration of drainage patterns caused by excavation works. However, any such impacts will be very localised and will not have a significant impact on the integrity of the BioClass site.

The hardstand for Turbine T3 is 80 m from BioClass site DL14B0017, while clearance of forestry to create a bat mitigation buffer around this turbine could extend to within around 50 m of the site (Figure 6-5). The hardstand is too far from the BioClass site for any secondary dewatering impacts to occur (see Section 6.4.2.2), while 50 m is a sufficient buffer to prevent any disturbance during tree felling.

6.4.3 Habitats

6.4.3.1 Habitat removal

The areas of habitat that will be removed by the wind farm construction are shown in Table 6-6 and are shown in Figure 6-13. These are based on the habitat map from the infrastructure buffer survey. A few small parts of the proposed layout, which are mainly occupied by conifer plantation habitat, were not covered by the infrastructure buffer survey (total area of 0.7 ha). The habitat removal figures for these parts are based on the September 2021 survey and interpretation of aerial imagery.

Table 6-6. Habitat impact.

Habitat code	Habitat	Habitat areas ha)		
		Development site	Infrastructure buffer	Habitat impact
GS4	Wet grassland	0.9	0.3	0.1
HH3	Wet heath	112	28	6.1
HD1	Dense bracken	7.5	1.1	0.2
PB2	Upland blanket bog	141	5.0	0.6
PB3	Lowland blanket bog	11	5.0	1.2
PB4	Cutover bog	45	3.1	0.01
PB5	Eroding bog	16	1.4	0.8
PF2	Acid fen / flush	8.3	0.2	0.02
WD1	Modified broad-leaved woodland	0.1	0.1	0.02
WD4	Conifer plantation	973	193	57 - 78

The development site is the section of the wind farm site south / east of the public road (Figure 6-13) while the infrastructure buffer is the 50 m buffer around the proposed wind farm infrastructure. Habitat classification follows Fossitt (2000). The impact for the woodland habitats includes felling of a 20 m corridor along the access roads, and a 74-99 m buffer around the turbines.

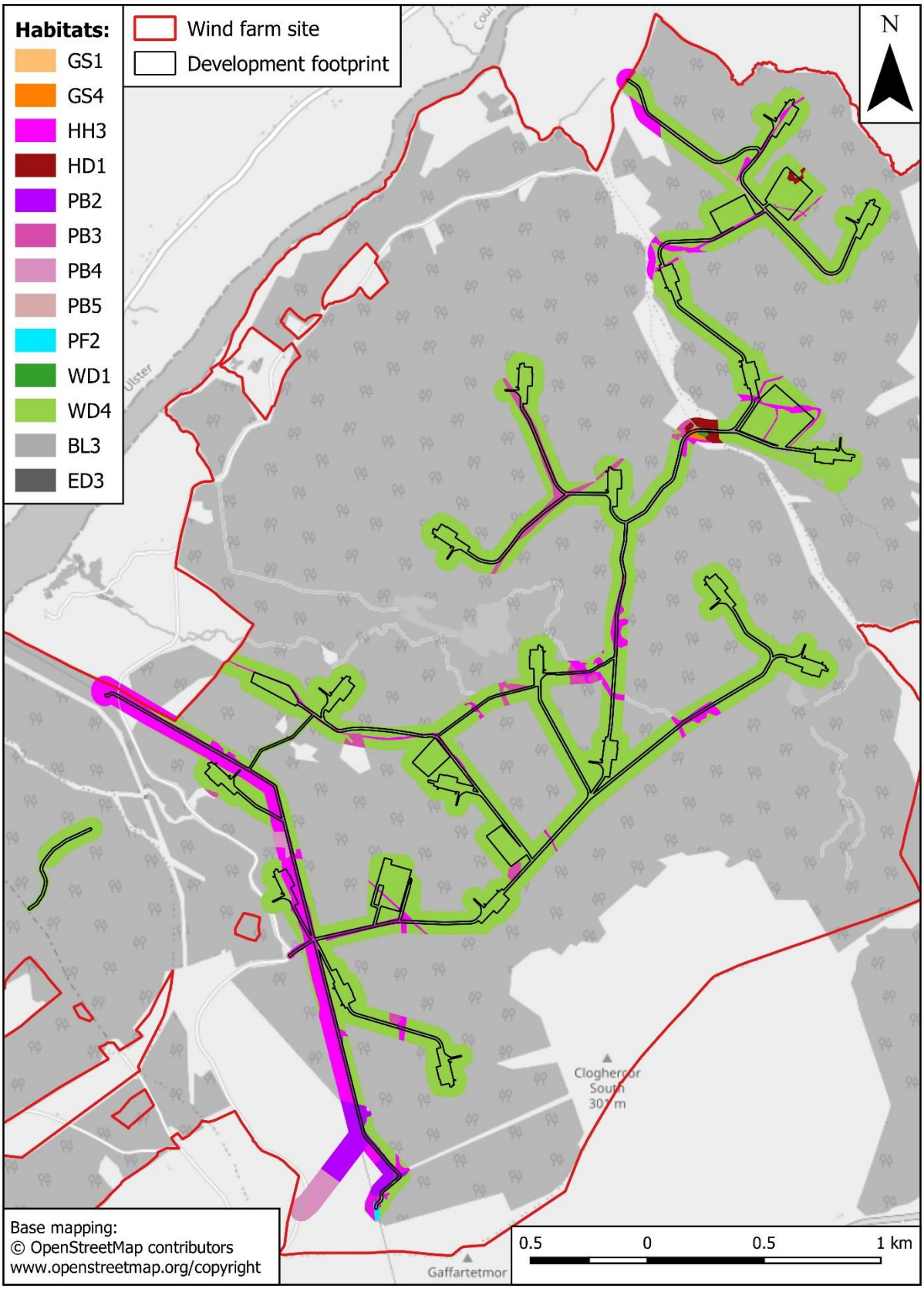

Figure 6-13 – Habitat impacts.

Peatland habitats

The construction of the wind farm will remove a total of around 8.7 ha of peatland habitats (heath and bog). This is around 0.2% of the total extent of peatland habitats in the local area, based on the areas classified as peat bogs in the CORINE landcover mapping.

The areas of wet heath (HH3) habitat that will be removed are all within the forest plantation: linear strips along forest roads, rides and stream corridors, and small patches in open spaces within the forestry. None of these areas are high quality examples of wet heath habitat or would be viable areas of the habitat in the context of the NRA Guidelines (NRA, 2009).

The upland blanket bog (PB2) habitat that will be removed is in the Coillte BioClass site DL14B0007 (see Section 6.4.2.2).

The areas of lowland blanket bog (PB3) habitat are all within the forest plantation, in similar situations to the wet heath habitat. Given the small size and fragmented nature of the lowland blanket bog habitats within the forest plantation, none of these would be considered to be viable areas of the habitat in the context of the NRA Guidelines (NRA, 2009).

The eroded bog (PB5) habitat that will be removed is along a ride in the northern section of the site.

New wet heath and bog habitat is likely to develop in the areas that are felled to create 20 m wide corridors along the access roads and bat mitigation buffers around the turbines, and there is likely to be a net gain in the overall area of these habitats. However, the new wet heath and bog habitat may be slow to develop and of lower quality than the habitat that will be removed. Therefore, the assessment of impact significance is based on the area of habitat removed.

The overall complex of wet heath, upland blanket bog and lowland blanket bog habitats in the open part of the wind farm site was rated as being of national importance as they form part of viable areas of Annex I habitats in the local area. The small area of upland blanket bog habitat that will be removed is assessed as a very slight permanent negative impact at the national scale.

The fragmented patches of wet heath and lowland blanket bog within the forestry plantation were rated at being of county importance as they are not viable areas of Annex I habitats. The removal of around 6.1 ha of wet heath and 1.2 ha of lowland blanket bog from these fragmented patches is assessed as a very slight permanent negative impact at the county scale.

Forestry habitat

Around 80% of the habitats removed will be conifer plantation (WD4) habitats. This includes 39 ha that will be under the footprint of the infrastructure, and another 18-39 ha (depending on the turbine model) that will be felled to create 20 m wide corridors along the access roads and bat mitigation buffers around the turbines.

The conifer plantation habitat that will be removed or felled is around 5-10% of the total area of this habitat in the development site, and 2-4% of the total area of coniferous forest and transitional woodland-shrub in the local area.

The areas that will be felled to create 20 m wide corridors along the access road, and bat mitigation buffers, will be maintained as open vegetated habitats. Therefore, in common with the existing rides and clearing within the forestry, most of these areas are likely to develop into

wet heath or bog-type vegetation. Therefore, the net habitat impact in these areas is likely to be positive as blanket bog and wet heath are more valuable habitats than conifer plantations.

More generally, open habitats within forestry plantations generally have significant positive effects on the overall biodiversity of the plantation (Gittings *et al.* 2006 ; Iremonger *et al.*, 2006; Oxbrough *et al.*, 2006; Wilson *et al.*, 2010). This can include positive effects on forest species, such as hoverflies whose larvae develop in the forest canopy, but whose adults exploit herbs and shrubs in the open spaces for pollen and nectar (Gittings *et al.* 2006).

Therefore, while the loss of forestry habitat to hard surfaces will have a minor negative impact, the overall net impact on the habitat value of the forestry plantation is likely to be positive.

Aquatic habitats

The proposed project will include the construction of an access road and access tracks, and excavation of borrow pits, within an area of mainly conifer plantation habitat. Vegetation will be removed to facilitate road crossings and road expansion and some river bank will be removed to facilitate clear span bridge installations to allow for water crossing. This will result in a permanent loss in bankside vegetation.

There will be instream works on the streams within the wind farm site to allow for the placement of culverts and clear span bridges. There will be permanent loss of aquatic habitat at the culvert locations, but no loss of instream substrate at the bridge locations.

The habitats within the tributaries were identified as not being suitable spawning habitat for Atlantic Salmon, Brown Trout or Lamprey due to the high attitude and lack of spawning gravels. There will be no loss of instream vegetation within any watercourse. The overall effect on aquatic habitats is assessed as a permanent, slight negative impact at the county scale.

Other habitats

The other habitats that will be affected by habitat removal are wet grassland (GS4), dense bracken (HD1) and modified broad-leaved woodland (WD1).

The areas of wet grassland and modified broad-leaved woodland habitats that will be removed are small fragments next to existing forest roads. Dense bracken is a habitat of low ecological value. Therefore, these impacts are negligible permanent negative impacts at the local scale.

6.4.3.2 Water quality impacts (construction phase)

Watercourses

Surface water runoff from the wind farm development will drain to the Mulnamin Beg watercourses. None of the proposed infrastructure is within the catchment of the Glenheleen Stream watercourses.

During the construction phase, site clearance, excavation activities, instalment of clear span bridges, culverts and the stockpiling of material have the potential to result in sediment laden runoff, if not appropriately managed. The runoff of sediment can result in the sedimentation of nearby watercourses. Excavation works along the riverbanks will be undertaken when installing the bridges. Increased silt loading in watercourses can stunt aquatic plant growth, limit dissolved oxygen capacity and reduce the overall ecological quality of watercourses, with the most critical period associated with low flow conditions.

There is potential for the release of sediment and pollutants to surface water via surface water runoff from the proposed project site during soil stripping and installation of access routes, fencing and bridges during the construction phase, rainfall events or accidental release/mobilisation of pollutants during the operation phase. The concentration of suspended solids and nutrients in the water column could increase and cause excessive fine silt deposition and degrade water quality of these rivers.

Movement and maintenance of vehicles and machinery associated with the construction work has the potential for spillages of oils, fuels or other pollutants which could be transported to surface water, particularly during high rainfall events. The surface water runoff of contaminated surface water can result in the degradation of water quality and impacts to aquatic fauna and flora, particularly when concrete is present.

The storage of materials adjacent to any dry or wet surface water drainage features also has the risk for of run-off or slippage during rainfall events.

The pouring of concrete will be required to facilitate the foundation works associated with the development. The transportation, pouring of concrete onsite and washing of concrete lorry flume creates a risk for entry into ground and surface water. Flooding of the construction site has potential to result in the release of increased volumes of pollutants, particularly suspended solids.

Water quality impacts during the construction phase to the Mulnamin Beg watercourses could result in short-term, negative impacts on aquatic biodiversity at the county scale that will not be significant.

Further details about the assessment of construction phase water quality impacts are included in the Aquatic Report (Appendix 6-2) and in Chapter 9.

Lakes and ponds

The lakes and ponds in the development site are all at least 55 m from the nearest points of the development footprint (Table 6-7).

Lough Sallagh and the four ponds are not likely to be affected by run-off from construction work as they are outside the catchments of the nearby wind farm infrastructure: e.g., the infrastructure around T17 will be downslope from the three ponds to the south of T17.

Turbines T10 to T12 are located in the catchment area of Lough Aneane More and Lough Aneane Beg.

Excavation and disturbance of soils, subsoils and peat could result in changes in the chemistry of surface water runoff including colour, dissolved organic carbon (DOC), turbidity and nutrients. As with erosion and sedimentation, this can have implications on both the quality of the aquatic habitat and also the resource potential of these lakes. Baseline water quality in the Lough Aneane More is moderate with high level of colour, sediment and low concentrations of nutrients. Construction activities in the catchment area to Lough Aneane More and Lough Aneane Beg has the potential to alter with water quality and flows during the construction phase. The potential impacts are short term, slight to moderate and negative.

Table 6-7:Distances of the nearest points of the development footprint to the lakes and ponds within the development site.

Lake / pond	Habitat type	Distance from nearest point of development footprint	Distance from nearest turbine base or borrow pit
Lough Aneane More	Acid oligotrophic lake (FL2)	85 m	85 m
Lough Aneane Beg	Acid oligotrophic lake (FL2)	180 m	180 m
Lough Sallagh	Acid oligotrophic lake (FL2)	55 m	55 m
Unnamed pond to south of T7	Dystrophic lake (FL1)	100 m	115 m
Unnamed pond to south-east of T13	Dystrophic lake (FL1)	75 m	200 m
Unnamed pond to south-west of T13	Dystrophic lake (FL1)	105 m	160 m
Unnamed pond to west-south-west of T13	Dystrophic lake (FL1)	90 m	90 m

6.4.3.3 *Water quality impacts (operational phase)*

There will be no significant direct discharges to surface waters during the operational phase due to the nature of the development. Occasional vehicle access will be required which may lead to occasional accidental emissions, in the form of oil, petrol or diesel leaks, which could cause localised contamination of site drainage channels. However, due to the periodic nature of visits, the risk of surface water pollution during operation is considered to be low (see Chapter 9).

The presence of occasional maintenance workers at the proposed substation will lead to the generation of foul sewage from toilets and washing facilities. This foul sewage will be collected and tankered off-site for disposal at a licensed wastewater treatment facility (see Chapter 9).

6.4.3.4 *Dewatering impacts to habitats*

During excavation of the borrow pits and the turbine bases, groundwater inflows may need to be pumped. This has the potential to locally depress groundwater levels by 0.1 m within 25 m of the pumping regime (see Chapter 9). This could cause temporary drying of some sections of lowland blanket bog and wet heath habitats close to the borrow pits and turbine bases. However, the larger patches of lowland blanket bog and associated dystrophic lake habitat near T7 and T13 are too distant from the nearest borrow pits or turbine hardstands to be affected by dewatering impacts.

The overall potential dewatering impact to lowland blanket bog and wet heath habitats is a very slight short-term negative impact at the county scale.

6.4.3.5 *Air quality impacts to habitats*

The Institute of Air Quality Management provide guidelines (Holman *et al.*, 2014) which prescribes potential dust emission risk classes to ecological receptors. Following the guidelines and considering the size of the proposed project, the scale of the earthworks were considered large (total site area >10,000 m²). The guidelines specify that receptor sensitivity is 'High' up to 20 m from the source and reduces to 'Medium' at 50 m. Dust may also be generated from trackout due to heavy duty vehicle movements from the site entrances. It is anticipated that heavy duty vehicle movement will range between 10-50 outward movements a day which equates to 'Medium' trackout movement. The guidelines indicate that Medium trackout equates to dust occurring between 50-100 m from the site. The construction works associated with the access road and network infrastructure will be at a much smaller scale. The generation of dust is likely to range between 25-50m from the works area.

The above assessment indicates that dust emission during construction work may affect the habitats within the infrastructure buffer. The magnitude of the impact is likely to be relatively minor: i.e., the habitats will not be blanketed in dust. Therefore, the impact is not likely to change the overall character of the habitats. The impact to the Annex I habitats within the infrastructure buffer (lowland blanket bog, upland blanket bog and wet heath) is assessed as a very slight short-term negative impact at the county scale, while the impact to the other habitats is assessed as a very slight short-term negative impact at the local scale. The dystrophic lakes and acid oligotrophic lake habitats are all more than 50 m from the development footprint and are, therefore, not likely to be affected by dust emission impacts.

6.4.3.6 *Habitat fragmentation*

The development will cause fragmentation of the conifer plantation habitat by introducing clearings around the turbines and construction of new access roads, etc. However, Irish plantation forests are by their nature fragmented habitats due to forest road networks and the periodic clear-felling of large sections of the plantation. The fragmentation of the conifer plantation habitat caused by the proposed wind farm development is not likely to significantly affect the ecological functioning of the habitat.

The development will also cause additional fragmentation of the already fragmented wet heath and lowland blanket bog habitats within the forestry plantation. For example, the access road between T6, T7 and T10 will divide the continuous linear strip of lowland blanket bog habitat along its route into small fragments. The impact of habitat fragmentation on the wet heath and lowland blanket bog habitats is assessed as a long-term very slight negative impact at the county scale.

6.4.3.7 *Turbine delivery route impacts to habitats*

Habitat removal

The locations that will be affected by the turbine delivery route hardstands are very small areas (0.01-0.03 ha) of roadside verges, with some just extending into the adjacent fields. None of the affected areas have habitats of significant value.

The blade changeover location is an old cutover peatland site. The area of the work footprint is mostly covered in wet grassland vegetation and the work footprint will not affect any areas of uncut peatland.

Note, there will be some vegetation clearance required at the wind farm site entrance to allow for the required sightlines (see attached). This includes felling a small number of individual conifers near the site entrance as well as trimming back some smaller scrub there and elsewhere.

Vegetation (hedges/protruding tree branches, etc.) trimming will be carried out along the turbine delivery route in the winter where it is found to be needed.

Water quality impacts

No in-stream or riparian works are required for the turbine delivery route road/junction accommodation works. Where any works are proposed within 50 m of a watercourse, there is an increased potential for sediment release to the watercourse. The small scale and temporary nature of these works will result in ground conditions similar to agricultural cultivation at these locations. Overall, without mitigation, these works have the potential to have a slight negative short-term effect on the surface water environment (see Chapter 9).

6.4.3.8 Golden Eagle Habitat Management Plan impacts to habitats

The Golden Eagle Habitat Management Plan (see Chapter 7) will include management of 189 ha of blanket bog and wet heath habitat. Successful implementation of the plan will result in significant improvements to the quality of at least two Annex I habitats in the local area: northern Atlantic wet heaths with *Erica tetralix* (4010) and blanket bog (7130).

6.4.3.9 Decommissioning impacts to habitats

The restoration of habitats in the areas that were occupied by hard infrastructure will cause some minor positive impacts, although the nature and scale of these positive impacts will depend on the details of the restoration programme.

6.4.3.10 Cumulative impacts to habitats

The habitat impacts are all assessed as, at most, slight or very slight negative impacts, so the cumulative assessment was carried out at the local scale of 10km study area reviewing applications presented within Appendix 4-1.

The planning applications within the 10km study area mainly comprise construction, or extension of one-off houses, minor agricultural developments and other small-scale projects. These will have, at most, very small impacts on sensitive habitats. Therefore, they will not cause significant cumulative impacts on sensitive habitats in combination with the Cloghercor Wind Farm project.

A planning application site for an extension to an existing quarry near Glenties (planning reference 1103440 and 1230019) includes around 10 ha of bog/heath habitat. If all this habitat is removed, the cumulative impact, in combination with the Cloghercor Wind Farm, on the bog/heath habitat in the local area would still only affect less than 0.5% of the peatland habitat in the local area.

The hydrological assessment (Chapter 9) did not identify any significant cumulative impacts to water quality.

Forestry operations will continue within the forestry plantation sections of the wind farm site during the construction period and throughout the lifespan of the wind farm. The cumulative impact of these forestry operations in combination with the wind farm development will not cause significant increases to any of the impacts identified above.

6.4.4 Aquatic fauna

No sensitive aquatic fauna receptors, such as populations of Freshwater Pearl Mussel, salmonid fish or lamprey, were identified along the Mulnamin Beg watercourses that will drain the wind farm infrastructure footprint.

The Natura Impact Statement concluded that the turbine delivery route road/junction accommodation works would not have any impacts on the Freshwater Pearl Mussel and Atlantic Salmon populations in the Owenea catchment, which are Qualifying Interest of the West of Ardara/Maas Road SAC.

6.4.5 Bats

6.4.5.1 Scope of impact assessment

The impact assessment took into consideration the following:

- Eight bat species were recorded during the 2020 bat surveys of the proposed wind farm site.
- Four of these species are considered to be High Risk bat species in relation to wind turbines: Leisler's Bat, Common Pipistrelle, Soprano Pipistrelle and Nathusius' Pipistrelle.
- The remaining four species are Low Risk: Natterer's Bat, Daubenton's Bat, Whiskered Bat and Brown Long-eared Bat.
- Eco Bat Analysis results highlighted turbine locations with High Risk and Medium Risk for Leisler's Bats, Common Pipistrelle and Soprano Pipistrelle.
- Spread of bat encounter records within the proposed wind farm site, particularly, in relation to infrastructure.
- Bat habitats present within 200 m of turbine locations and along infrastructure routes.

Full details of the assessment of impacts to bat populations is included in Appendix 6-4. The following sections provide a summary of the findings of the impact assessment.

6.4.5.2 Core Sustenance Zones

The Bat Conservation Trust has defined Core Sustenance Zones for different bat species. A Core Sustenance Zone refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost. With reference to development, the Core Sustenance Zone can indicate:

- The area surrounding a communal roost within which development work may impact the commuting and foraging habitat of bats using that roost.
- The area within which it may be necessary to ensure no net reduction in the quality and availability of foraging habitat for the colony.

No bat roosts were recorded within the proposed wind farm area or in the adjacent buildings that were surveyed.

There are three known bat roosts for Brown Long-eared Bat or Soprano Pipistrelle within 10 km of the wind farm site (Bat Conservation Ireland database). These roosts are 3.5-3.9 km from the wind farm site. The Core Sustenance Zone for both these species is 3 km. Therefore, the proposed wind farm is located outside the Core Sustenance Zone for the known bat roosts recorded on the Bat Conservation Ireland database.

6.4.5.3 Potential impact on local bat populations

One set of buildings is located within the proposed wind farm area, but no bats were recorded roosting in them. These stone ruins are surrounded by mature trees that were identified as Potential Bat Roosts. However, neither these ruins or the mature trees will be impacted by the proposed wind farm. Therefore, there will be no loss of Potential Bat Roosts.

An impact assessment was carried out for each of the proposed turbine locations. This included assessment of bat activity from the static location surveys for the three high risk species, the occurrence of other species within 200 m of the turbine locations, and the presence of bat habitat around the turbine locations and along access tracks. This assessment concluded that, if no mitigation measures are implemented, there are four High Risk turbines: T3, T9, T15 and T19. The impact levels for the other turbine locations were mainly classified as moderate, apart fromT7, T14 and T18, which were classified as low.

6.4.5.4 Turbine delivery route

None of the turbine delivery route hardstands, or the blade changeover, locations have mature trees, or other potential bat roosting habitat that would be affected by the proposed works.

6.4.5.5 Cumulative impacts

The Core Sustenance Zone for Natterer's Bat is 4 km. This is the highest Core Sustenance Zone value for the eight bat species recorded during the surveys for the Cloghercor Wind Farm project.

There are no permitted or proposed wind farm developments within 4 km of the wind farm site. The closest existing wind farm to the proposed project is the Loughderryduff (Maas) Wind Farm, located c. 5 km southwest of the proposed wind farm site. The shortest turbine to turbine distance between the Loughderryduff (Maas) Wind Farm and the proposed project is approximately 8.5 km. The proposed Graffy Wind Farm is around 5km to the south of the wind farm site. Therefore, there are no cumulative impacts of additional wind farm planning applications in relation to local bat populations.

Forestry operations will continue within sections of the proposed project site during the construction phase and throughout the life span of the proposed project. Such operations include clear felling and new planting. The cumulative impact of these forestry operations in combination with the proposed project will not cause a significant increase to potential impacts of the proposed project identified above.

6.4.6 Other fauna

6.4.6.1 Habitat loss impacts to other fauna

The wind farm development will cause the loss of around 2-4% of the total area of coniferous forest and transitional woodland-shrub in the local area. Red Squirrels are largely dependent

on forest habitats. Therefore, the loss of conifer plantation habitat is assessed as a permanent slight negative impact on the Red Squirrel population at the county scale.

The other protected amphibian, reptile and mammal species are either only partially dependent on forest habitats (e.g., Pine Marten and Red Deer) or associated with non-forest habitats (e.g., Common Lizard and Irish Hare).

For the species, that are partially dependent on forest habitats, the loss of forest habitat is likely to be mitigated by development of a more diverse mixture of forest and open space habitat. For example, forest hoverfly species are likely to benefit from creation of more open space and edge habitat, if regeneration of broad-leaved trees and shrubs occur in these areas (Gittings et al., 2006).

The impact on some of the non-forest species may be positive. In particular, Common Lizard is likely to benefit from the net gain in wet heath and bog habitat. While, the wet heath and bog habitat that develops in the 20 m wide buffers along the access roads and in bat mitigation buffers around the turbines, may be of lower intrinsic habitat quality (see above), it is likely to provide suitable habitat for Common Lizards, which are often associated with edges of conifer plantations (NRA, 2008).

No significant areas of potential Common Frog breeding habitat were identified in the infrastructure buffer. However, it is possible that Common Frogs may attempt to breed in small drains, etc., although in forest plantations these often dry up before the tadpoles have completed their development. The Biodiversity Management Plan (Section 6.5.6) includes creation of small ponds which may provide new breeding habitat for Common Frogs.

The net gain in wet heath and bog habitat will also cause positive impacts to the invertebrate fauna associated with these habitats, which is of higher conservation importance than the invertebrate fauna associated with conifer plantations.

6.4.6.2 Habitat fragmentation impacts to other fauna

The development will cause fragmentation of the conifer plantation habitat by introducing clearings around the turbines and construction of new access roads, etc. However, Irish plantation forests are by their nature fragmented habitats due to forest road networks and the periodic clear-felling of large sections of the plantation. The fragmentation of the conifer plantation habitat caused by the proposed wind farm development is not likely to significantly affect the populations of forest-associated protected species that occur in the wind farm site.

6.4.6.3 Construction disturbance impacts to other fauna

The proposed construction works will result in an increase in noise levels during the construction phase due to the presence of construction vehicles and machinery. In general, plant machinery will be designed to ensure that the maximum noise level 10 m outside the site boundary do not exceed an equivalent continuous sound level beyond what is recommended in the BSI British Standards (BS5228-1:2009+A1:2014). The construction phase of the proposed project is anticipated to generate relatively low levels of noise, and only during permitted construction hours. Rock breaking and potentially blasting will be undertaken during the construction phase.

A temporary increase in noise levels within the site will result in disturbance to wildlife within the immediate vicinity of the construction work. The presence of construction personnel,

machinery and traffic movement will also cause visual disturbance to wildlife. It should be noted that no night works are anticipated.

The surveys found no evidence of Otters or Badgers in the infrastructure buffer, or along watercourses and around lake margins in the development site. However, populations of other protected mammal species, including Red Squirrel, Pine Marten and Red Deer are likely to occur in the vicinity of the proposed wind farm infrastructure and could be affected by disturbance impacts from construction work. The likely impact on the Red Squirrel population, which is dependent on the conifer plantation habitat, is assessed as a short-term moderate negative impact at the county scale. The impact on the Pine Marten and Red Deer populations, which are less dependent of the conifer plantation habitat, is assessed as a short-term, slight negative impact at the local scale.

6.4.6.4 Operational disturbance impacts to other fauna

During the operational phase, the proposed project will function as a wind farm and thus will not emit direct noise related to the operation of the site. Minor noise disturbance may arise from traffic relating to site visitations and the maintenance of the site. The presence of operational personnel and of people walking along the recreational trails will also cause some visual disturbance. There is no artificial lighting proposed for the proposed project.

The impact of operational disturbance on the Red Squirrel population is assessed as a long-term very slight negative impact at the county scale. The impact of operational disturbance on the Pine Marten and Red Deer populations is assessed as a long-term very slight negative impact at the local scale.

6.4.6.5 Turbine delivery route impacts to fauna

No sightings or signs of protected species were recorded during the survey of the turbine delivery route hardstands and blade changeover location.

6.4.6.6 Golden Eagle Habitat Management Plan impacts to fauna

The Golden Eagle Habitat Management Plan (see Chapter 7) will include management of 189 ha of blanket bog and wet heath habitat, 40 ha of unimproved grassland habitats and 30 ha of improved grassland habitats.

One of the aims of this management will be to improve habitats for Irish Hares. Therefore, successful implementation of the plan will have a significant positive impact on the local Irish Hare population.

Implementation of the plan will not have negative impacts on other protected fauna.

Reduction in grazing pressure and rehabilitation of overgrazed / eroding bog and heath habitats is likely to have net positive impacts on the invertebrate fauna.

6.4.6.7 Decommissioning impacts to other fauna

The decommissioning phase will cause similar types of disturbance impacts to the construction phase. The magnitude and duration of these impacts will depend on the details of the decommissioning works, but they will be smaller in scale than the construction impacts.

The restoration of habitats in the decommissioning phase will cause some minor positive impacts.

6.4.6.8 Cumulative impacts to other fauna

Red Squirrel

The construction phase impact to the Red Squirrel population was assessed as a moderate negative impact at the county scale. Therefore, a cumulative assessment is required of the potential impacts to the Donegal Red Squirrel population from the Cloghercor Wind Farm in combination with other projects.

Construction work can potentially cause disturbance to breeding Red Squirrel when it occurs within 50 m of their dreys (SNH, undated). The potential cumulative impact of construction disturbance to Red Squirrel populations was assessed using 200 m buffers around all operational turbines in Donegal. The 200 m buffer distance was chosen to allow for the impacts from the additional wind farm infrastructure that is not included in the mapping of the operational turbines: at Cloghercor, the total area of the 50 m infrastructure buffer is approximately the same as the total area of 200 m buffers around all the turbines.

The 200 m buffers around all the operational turbines in Donegal includes around 2% of all the woodland habitat in Donegal (the areas classified as Corine landcover types 311, 312, 313 and 324). These turbines have been developed over a period of around 20 years, so the potential cumulative impact of construction disturbance at any one time will have been much lower.

More generally, the main factors affecting the conservation status of Red Squirrel in Donegal are the development and management of forest habitats, and the potential spread of the Grey Squirrel.

There has been a large increase in forest cover in Ireland over the past few decades, which is largely due to commercial afforestation. Any loss of conifer plantation habitat to wind farm development, or other developments, will have been negligible compared to the scale of this increase.

The Grey Squirrel is a non-native invasive species, which causes severe negative impacts to Red Squirrel populations through competition and spread of disease. It is widely distributed in eastern Donegal, and has spread as far west as Gaugin Mountain, which is around 10 km south-east of Lough Finn (NBDC data). However, in recent years the spread of Grey Squirrels in Ireland appears to have been checked by predation from the increasing Pine Marten population.

Other species

The impact to other protected amphibian, reptile and mammal species are all assessed as, at most, slight or very slight negative impacts. Therefore, the cumulative assessment was carried out at the local scale.

The planning applications within the local area mainly comprise construction, or extension of one-off houses, minor agricultural developments and other small-scale projects. These will have, at most, very small impacts on protected fauna. Therefore, they will not cause significant cumulative impacts on protected fauna in combination with the Cloghercor Wind Farm project.

A planning application site for an extension to an existing quarry near Glenties (planning reference 1103440 and 1230019) includes around 10 ha of bog/heath habitat, which is potential Irish Hare habitat. If all this habitat is removed, the cumulative impact, in combination with the Cloghercor Wind Farm, on the bog/heath habitat in the local area would still only affect less than 0.5% of the peatland habitat in the local area. Therefore, this development will not cause significant cumulative impacts on Irish Hares in combination with the Cloghercor Wind Farm project.

Forestry operations

Forestry operations will continue within the forestry plantation sections of the wind farm site during the construction period and throughout the lifespan of the wind farm. The cumulative impact of these forestry operations in combination with the wind farm development will not cause significant increases to any of the impacts identified above.

6.4.7 Replacement of turbine blades

If replacement of turbine blades is required during the operational phase, the work would take approximately one month on-site with the work occurring intermittently throughout that month and likely intensifying for one week where the majority of the changeover work would take place. The work would be localised to a specific turbine. Any impacts from replacement of turbine blades would similar in nature to the construction phase impacts but much smaller in magnitude.

6.5 MITIGATION AND MONITORING

6.5.1 General

In this section, the mitigation measures for habitats, water quality and most species are described collectively, to avoid excessive repetition. These are subdivided into the mitigation measures required for the construction (Section 6.5.2), operational (Section 6.5.3) and decommissioning phases (Section 6.5.4). The bat mitigation measures are described separately (Section 6.5.5), as these measures are specific to bats.

This section also includes details of a Biodiversity Management Plan that will be implemented to manage and enhance habitats in the wind farm site (Section 6.5.6).

The final part of this section describes the monitoring work that will be required to assist in the implementation of the mitigation measures and Biodiversity Management Plan.

Additional ecological mitigation measures are included in the ornithological assessment (Chapter 7). Chapter 18 includes a schedule of all mitigation and monitoring measures.

6.5.2 Construction phase mitigation measures

6.5.2.1 Construction Environmental Management Plan

A Construction Environmental Management Plan has been prepared (Appendix 2-2), covering the potential environmental risks and the proposed environmental construction strategies that will to be carried out before and during the construction phase. It includes all the construction mitigation measures prescribed in the EIAR and Natura Impact Statement, as well as scheduling of works and best practice measures to prevent environmental impacts. The Construction Environmental Management Plan will be a live document that will be updated according to

changing circumstances on the project and to reflect activities on site. It is intended that this Construction Environmental Management Plan will be further updated by the appointed contractor prior to commencement of construction.

6.5.2.2 Ecological Clerk of Works

A suitably qualified Ecological Clerk of Works will be appointed by the contractor for the duration of the construction period. The Ecological Clerk of Works will ensure that all the mitigation measures in the Construction Environmental Management Plan are implemented. The duties of the Ecological Clerk of Works will include review of method statements; supervision of the installation, operation, and removal of construction phase mitigation measures such as sediment control traps; supervision of the implementation of the Invasive Species Management Plan (Appendix 6-6), compliance checks; supervision of the peat replacement plan; and liaison with relevant statutory bodies.

6.5.2.3 Mitigation of construction phase water quality impacts

Details of the mitigation measures that will be implemented to prevent negative water quality impacts during the construction phase are included in Chapter 9 of this EIAR. All mitigation and management measures outlined in that chapter will be incorporated into the Surface Water Management Plan, which forms part of the Construction Environmental Management Plan (Appendix 2-2).

6.5.2.4 Invasive Species Management Plan

An Invasive Species Management Plan has been prepared (see Appendix 6-6) and will be implemented to prevent the construction work from causing the introduction and / or spread of invasive species. Implementation of the plan will include a resurvey of the infrastructure buffer to identify any additional invasive species stands, or spread of existing invasive species stands, that may have developed since the August 2022 survey. The plan will include the measures described below.

Invasive species stands

All invasive species stands will be securely fenced with warning signs and access to these areas will only be permitted for designated personnel. The fencing will be a minimum of 7 m from the invasive species plants. No construction work will take place until an inspection by the Ecological Clerk of Works has confirmed that all the relevant invasive species stands are adequately fenced.

The removal of the Rhododendron, Japanese Knotweed and Montbretia stands identified in this EIAR, and any additional invasive species stands identified from the resurvey will use appropriate methods based on the National Roads Authority's *Guidelines for the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (NRA, 2010). This will include either chemical treatment or physical removal.

Any invasive species material removed will be either buried on site at a depth of 5 m, incinerated, or disposed of to an appropriately licensed landfill. Storage of contaminated soil will only take place in designated storage areas. These storage areas will be securely fenced with warning signs and access to these areas will only be permitted for designated personnel.

Appropriate biosecurity measures will be applied to all personnel and machinery involved in the invasive species control work. A designated wash-down area will be created, where material from a power-washed vehicle can be effectively contained, collected and buried/removed off-site along with other contaminated material. The area will have a washable membrane or hard surface.

No construction work will take place within, or adjacent to, areas with invasive species stands until the above measures have been implemented, and the removal has been verified by an inspection by the Ecological Clerk of Works.

General biosecurity protocols

An Invasive Species Risk Assessment Method Statement will be provided by the contractor prior to commencement of any works. This will include: procedures for inspection and decontamination of vehicles and equipment working in areas with risk of contamination by invasive species, prior to arrival and on departure from the site; designation and management of wash-down areas; procedures for checking materials entering the site; and biosecurity measures for construction works associated with the drainage ditch instream works. Details of site hygiene measures can be found within the CEMP, in Appendix 2-2.

6.5.2.5 Coillte BioClass sites

The Construction Environmental Management Plan includes specific measures to protect Coillte BioClass site DL14B0007 from disturbance during installation of the underground cable along the grid connection route, and to protect Coillte BioClass site DL14B0017 from disturbance during construction of Turbine T3 and associated infrastructure.

6.5.3 Operational phase mitigation

Details of the mitigation measures that will be implemented to prevent negative water quality impacts during the operational phase are included in Chapter 9 of this Environmental Impact Assessment Report.

6.5.4 Decommissioning phase mitigation

The potential water quality and disturbance impacts from the proposed project's decommissioning phase will be similar to those from the construction phase. Therefore, the mitigation measures for the construction phase (Section 6.5.2) and Invasive Species Management Plan measures (Section 6.5.2.4 and Appendix 6-6) will also be applied to the decommissioning phase.

In addition, all structures proposed to be removed, will be removed offsite, while below ground structures filled with clean and free from invasive species material. Hardstanding areas will be rehabilitated by covering with local topsoil and allowed to revegetate.

6.5.5 Bat mitigation

6.5.5.1 Buffer zones

To reduce the collision risk to bat populations, buffer zones will be established around each turbine within which all trees and other tall woody vegetation will be cleared. These buffer zones will be maintained as bog / heath type vegetation dominated by low-growing dwarf

shrubs and grasses. Annual inspections of each buffer zone will be carried out and any regenerating trees or tall shrubs will be cut back.

The radius of the buffer zone required is given by the following formula from Natural England (2014):

$$Buffer\ distance = \sqrt{(50 + bl)^2 - (hh - fh)^2}$$

where bl = blade length, hh = hub height, fh = feature height

The buffer distances required for the turbine models under consideration for this project range from 74.2 m for the Nordex N149 to 99.3 m for the GE GE-164 (Table 6-8). The turbine model with the minimum hub height has the maximum blade length, while the model with the maximum hub height has the minimum blade length. Therefore, all potential scenarios within the turbine range are included in the range of buffer distances that has been considered.

At turbine T19, a buffer distance of at least 100 m will be required, regardless of the turbine model, due to the high level of Leisler's Bat activity that was recorded at this location.

Table 6-8: Bat mitigation buffer zones required for each turbine model.

Turbine	Hub height (m)	Blade length (m)	Buffer distance (m)	Buffer area / turbine (ha)
GE GE-164	112	82	99.3	3.09
Nordex N163	118	81.5	93.0	2.71
Vestas V162	119	81	91.2	2.61
Enercon E160	120	80	88.7	2.47
GE GE-158	121	79	86.2	2.33
SG SG155-6.6	122.5	77.5	82.2	2.12
Vestas V150	125	75	75.0	1.77
Nordex N149	125	74.5	74.2	1.73

The feature height was taken as 25 m, which is the maximum height of the forest canopy.

Studies have shown that bats are attracted to clear felled forestry areas due to increased insect loadings. This has been shown to occur for a period of 3-6 months before the insect loading reduces to pre-cleared felled levels. Therefore, the initial clearance work in each buffer zone will be completed at least six months prior to the installation of the turbines.

The ruins and mature deciduous trees surrounding the ruins will not be removed during construction of the proposed project. This area will be protected from any construction works proposed to be undertaken in vicinity of this area. This area will also be protected during the operation of the proposed project.

6.5.5.2 Turbine operation

Feathering of blades

In low wind conditions, turbine blades can often be freewheeling (spinning) but not generating electricity. But freewheeling blades can still kill bats while non-spinning blades (feathering) do not kill bats. Therefore, the turbine blades will be prevented from freewheeling (idling/spinning) by feathering of the blades during low wind conditions. The combination of feathering of the blades during low wind conditions and raising turbine cut-in speeds (see

below) has been shown to reduce bat fatalities from 30% to 90% (Arnett *et al.*, 2008, 2011; Baerwald *et al.*, 2009).

Turbine cut-in speeds

The cut-in speed is the minimum wind speed at which the turbine starts to operate. As bat activity is generally higher at lower wind speeds, raising the cut-in speed above that set by the manufacturer can reduce the impact of the wind turbine on bats. Arnett *et al.* (2011) showed that a 50% decrease in bat fatality can be achieved by increasing the cut-in speed by 1.5 m/s with similar results achieved at European sites.

Due to the high levels of bat activity, increased cut-in speeds may be required at T1, T3, T6, T9, T10, T11, T15 and T19. This would help protect High Risk species (Leisler's Bat, Soprano and Common Pipistrelle) foraging/commuting in vicinity of these turbine locations. The increased cut-in speeds will be applied at these turbine locations from the start of their operation.

Surveillance will be carried out at these turbines over first three years of operation. If the Leisler's Bat and pipistrelle bat activity remains high at these turbines, then the increased cut-in speeds (coupled with carcass search results) will be maintained. For all the other turbines, operation will take place without increases in cut-in speeds coupled with three years of post-construction monitoring.

The surveys carried out for this assessment found that the bat activity was highest at wind speeds of less than 5.5 m/s. Therefore, where increases in cut-in speed are required, the speed will be raised to 5.5 m/s from 30 minutes prior to sunset to 30 minutes after sunrise. The duration required will depend on the level of bat mitigation required for individual turbine sites. This will be either the full bat activity season, or confined to the spring and autumn months, and will be determined by the first year of surveillance.

Increases in cut-in speeds may not be required when the air temperature is low. In the surveys carried out for this assessment, no bat activity was recorded when the air temperature was lower than 7°C.

Curtailment monitoring will take place at all the turbines where increases in cut-in speeds are applied.

6.5.6 Biodiversity Management Plan

A Biodiversity Management Plan will be implemented as part of the development and operation of the wind farm. This Biodiversity Management Plan will include: creation of a wetland buffer zone around Lough Aneane More; protection / restoration of four areas of lowland blanket bog habitat; and management of the corridor of open grassland / heath along the forest road in the northern part of the site (Figure 6-14). Additional general biodiversity management measures will be implemented throughout the site.

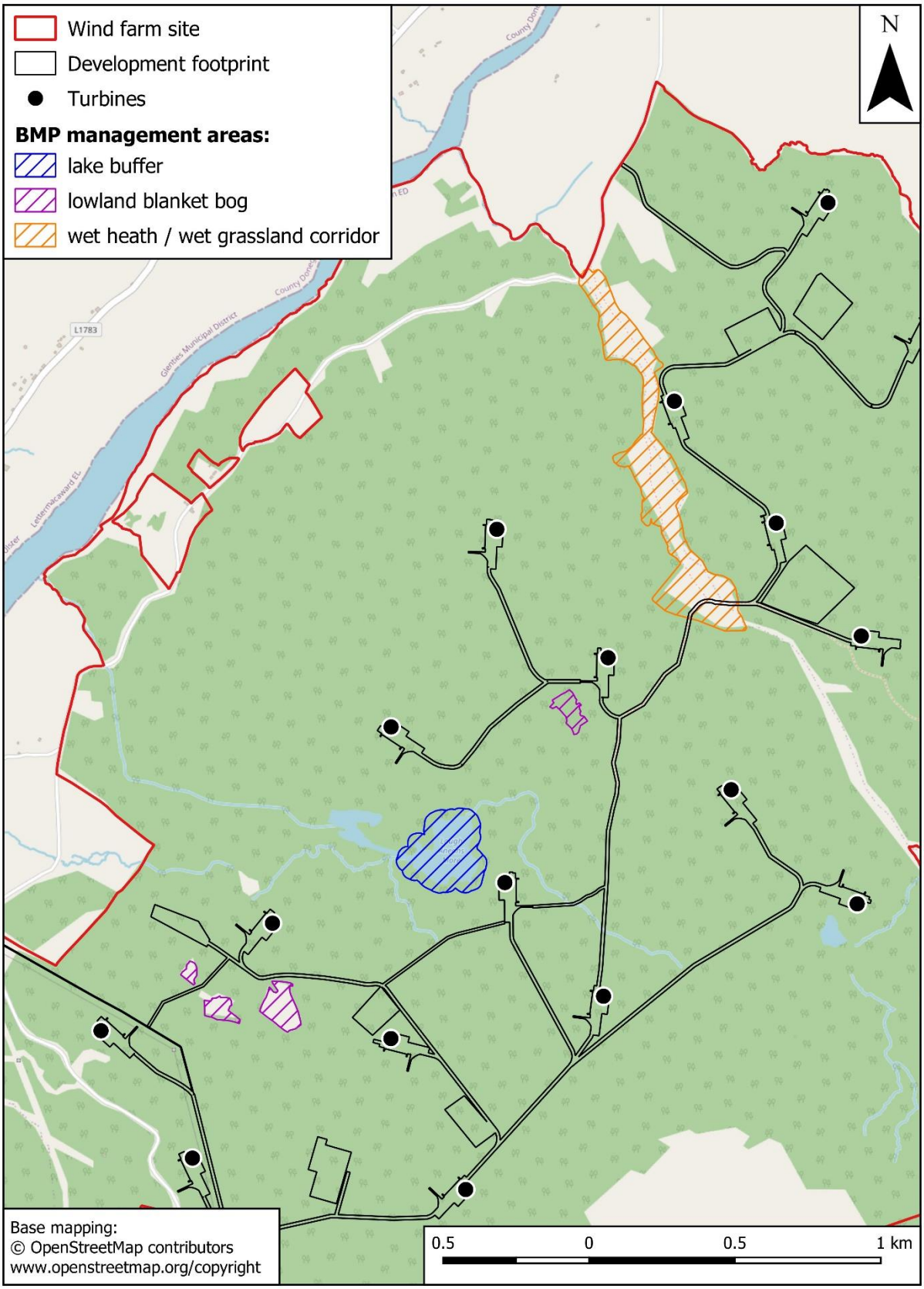

Figure 6-14 – Biodiversity Management Plan management areas.

6.5.6.1 Wetland buffer zone around Loughs Aneane More

Lough Aneane More is an acid oligotrophic lake and has been assessed as qualifying as an Annex I habitat: oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) (3110). In addition to the open water habitat, there is an extensive area of reedswamp habitat in the western part of the lake. However, the lake has been assessed as having poor water quality due to inputs from forestry and eroding peat bogs.

A 30 m wide buffer zone will be established around the lake. This buffer will be created by felling the existing areas of conifer plantation within the buffer zone, and by blocking drains to raise the water table. The buffer zone habitats will then be left to develop through vegetation succession. It is anticipated that the buffer zone will develop into a mixture of reedswamp and wet woodland habitat. The development of the habitat will be monitored and interventions will be carried out if required: e.g., removal of regenerating conifers and / or invasive Rhododendron.

As well as creating a new area of semi-natural wet woodland / swamp habitat, this buffer zone will help to protect the lake from water quality impacts when adjacent areas of forestry are felled.

6.5.6.2 Protection / restoration of lowland blanket bog habitat

There are four small areas of lowland blanket bog habitat with small ponds containing dystrophic lake habitat in unplanted areas within the forest plantation. Three of these are to the south of T15, while the fourth is to the south of T7. This includes one area of high quality lowland blanket bog habitat with high levels of *Sphagnum* mosses, indicating that it is active (peat-forming). Part of the lowland blanket bog habitat near T7 has old forestry drains, indicating that it was prepared for planting, but never planted.

The lowland blanket bog habitat qualifies as the blanket bogs (7130) Annex I habitat, while the high quality example may qualify as the priority variant of this Annex I type. The dystrophic lake habitat in the high quality lowland blanket bog may qualify as another Annex I habitat: natural dystrophic lakes and ponds (3160). The other dystrophic lake habitats appear to be of artificial origin, as they show signs of old peat cuttings.

These areas of lowland blanket bog and dystrophic lake habitat will be designated as biodiversity areas. The old forestry drains in the lowland blanket bog habitat near T7 will be filled in. These areas will be maintained as open lowland blanket bog habitat. They will be monitored, and any regenerating conifer, or invading Rhododendron will be removed.

6.5.6.3 Grassland / heath corridor

A corridor of open grassland / heath occurs along the forest road in the northern section of the development site. This mainly comprises areas of wet heath, with some areas of lowland blanket bog and wet grassland (Figure 6-15). The wet heath is being invaded by bracken, with some areas now covered by dense bracken, and there is also some spruce regeneration taking place. The wet grassland is very overgrown and rank, with low species diversity. Parts of this corridor appear to have been grazed in the recent past.

This corridor will be managed to maintain and enhance the wet heath, lowland blanket bog and wet grassland habitats. The regenerating conifers will be removed. The dense bracken habitat will be restored to wet heath by implementing an appropriate cutting regime (see Natural

England, 2018). Annual mowing of the wet grassland each autumn, with removal of the cut material, will be carried out to increase the diversity of the wet grassland habitat.

Monitoring of the development of the wet grassland and wet heath habitat will be carried out and the management regime will be adapted as required, based on the monitoring results (e.g., by changing the frequency of the cutting and mowing regimes). Any new regenerating conifers and/or invading Rhododendron will be removed.

These measures will result in the restoration of around 3.5 ha of wet heath habitat in the areas currently occupied by dense bracken, protection of the existing wet heath and lowland blanket bog habitat from bracken, conifer and Rhododendron invasion, and increased species diversity in the wet grassland habitat.

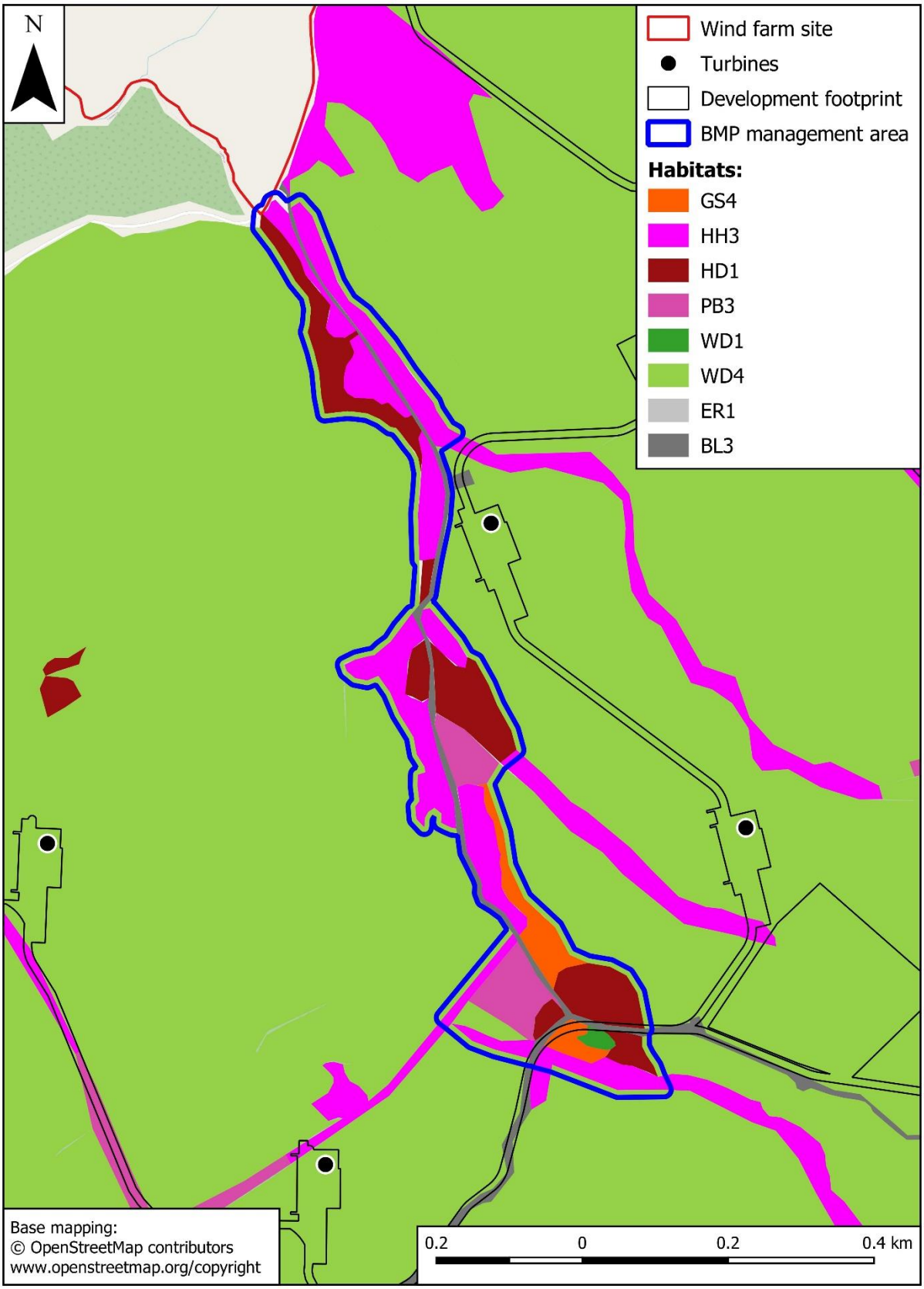

Figure 6-15 – Habitat map of the Biodiversity Management Plan wet heath / wet grassland corridor.

6.5.6.4 General biodiversity management measures

The following general biodiversity management / enhancement measures will be implemented throughout the wind farm site where feasible and appropriate:

- Measures to improve water quality generally - Non-intervention buffer zones around lakes and along riparian corridors - uninterrupted setback zones will be created along streams and around lakes. Drainage and cultivation operations associated with reforestation will be planned and implemented to minimise flow rates after rainfall. The standards set out in Section 3.7.1 of the Environmental Requirements for Afforestation and in the Forestry Standards Manual apply. Where site conditions allow, localised areas where water collects naturally, will be incorporated into the drainage system, left unplanted and allowed to develop as pocket wetland habitats.
- Forest road margins, turbine hardstandings, and other vegetated infrastructure - subsoil, rather than topsoil, will be used and appropriate cutting regimes will be implemented to promote plant diversity and provide floral resources for pollinators.
- Landscape planting - pollinator-friendly native hedgerows / shrubs will be planted, where landscape planting is required.
- Bee scrapes - bee scrapes will be established and managed on south-facing banks to provide nesting habitat for solitary bees.
- Pond creation – small ponds will be created at suitable locations within the infrastructure buffer, where they will not affect existing habitats of conservation value. These small ponds will be designed to create suitable breeding habitat for Common Frogs. They will also incorporate marginal areas of marsh and swamp for wetland invertebrates.

These include measures recommended by the All-Ireland Pollinator Plan's guidance of *Pollinator-friendly Management of Wind Farms* (NBDC, 2021).

6.5.7 Monitoring

6.5.7.1 Habitats

The development of woody vegetation in the bat mitigation buffers around the turbines will be monitored by annual inspections to identify any regenerating trees or shrubs that need to be cut back.

The lowland blanket bog and wet heath habitats included in the Biodiversity Management Plan will be monitored by annual inspections to identify any regenerating conifers or invading Rhododendron that need to be removed.

The development of vegetation in the wet grassland and areas of dense bracken that are being restored to wet heath included in the Biodiversity Management Plan (Section 6.5.6) will be monitored by annual vegetation surveys. These will be carried out by a competent botanist and take place for the first five years after the start of implementing the Biodiversity Management Plan measures.

6.5.7.2 Bats

Full details of the bat monitoring programme are included in Appendix 6-4.

Pre-construction phase

If more than three years pass between the pre-construction surveys and the construction of the wind turbines, the adequacy of the pre-construction surveys will be reviewed and they will be repeated if necessary (EUROBATS, 2014).

Operational phase

A surveillance programme will be implemented for the first three years of operation of the wind farm. This surveillance will then be repeated at Year 10 and Year 20 of the operation of the wind farm. The surveillance programme will include bat activity surveillance, carcass searches and curtailment monitoring.

The surveillance will be carried out within zones to determine the potential cluster effect of wind turbines. The number of turbines in a particular area has been shown to effect the degree of impact on bat populations. Therefore, in order to understand the potential results from surveillance, surveying for each zone will be completed within the same surveillance period.

The bat activity surveillance will involve monitoring the level of bat activity for a minimum of ten nights at each turbine location during three survey periods: spring (April/May), summer (June/July) and autumn (August/September). Monitoring will be carried out at ground level and at height. The monitoring at height is required because bat passes from Leisler's Bats are made only at heights beyond the acoustic range of the ground-based detector.

Carcass searches will be carried out for a minimum of one morning per turbine per surveillance period: i.e., 3/4 mornings per turbine per year. For each turbine, the search area will be a 100 m radius after ideal bat foraging weather conditions. A scavenger trial will be carried out to facilitate analysis (as per SNH, 2021 guidelines).

Curtailment monitoring will take place at the turbines where curtailment is applied, following the SNH guidelines (SNH, 2021). It will aim to assess changes in bat activity patterns and the efficacy of mitigation to inform any changes to curtailment. The monitoring will take place for at least three years post-construction, but the effects of habitat modification and off-site enhancements on bat activity may require monitoring over a longer period.

The surveillance protocols will be based on the SNH (2021) guidelines, or on the most up-date best practice guidelines that has superseded those guidelines. The assessment of static data will be completed using the online tool Ecobat (http://www.mammal.org.uk/science-research/ecostat/) or other equivalent tool.

6.5.8 Other fauna

A pre-construction protected species survey of the infrastructure buffer will be carried out.

6.6 RESIDUAL IMPACTS

6.6.1 Habitats

The development of wet heath / bog habitat in the buffers along the access roads and around the turbines, the management and restoration of 3 ha of lowland blanket bog and 3.5 ha of wet heath habitat in the development site as part of the Biodiversity Management Plan, and the management of 189 ha of blanket bog and wet heath habitat as part of the Golden Eagle Habitat Management Plan, means that the overall residual impacts on wet heath and blanket bog habitat are likely to be positive.

With the implementation of the construction phase mitigation measures the project is predicted to cause very slight[1] temporary and occasional residual water quality impacts to the development site watercourses and to Lough Aneane More (Chapter 9) during construction. With the implementation of the decommissioning phase mitigation measures, decommissioning is predicted to cause very slight long term and rare residual impacts to the development site watercourses and to Lough Aneane More (Chapter 9).

6.6.2 Bats

There will be no significant impacts on local bat populations if bat the mitigation measures are strictly implemented.

6.6.3 Other fauna

The residual impact to the Red Squirrel population is assessed as a short-term moderate negative impact at the county scale during the construction phase. The residual impact of habitat loss to the Red Squirrel population is a permanent slight negative impact at the county scale. The residual impact of disturbance during the operational phase is a long-term very slight negative impact at the county scale.

The implementation of the Golden Eagle Habitat Management Plan is likely to result in a long-term positive impact to the local Irish Hare population.

The management of the buffer zones along the access roads and around the turbines, and the implementation of the Biodiversity Management Plan may also result in long-term positive impacts to the local Common Frog and Common Lizard populations.

The residual impacts to the other protected amphibian and mammal species are assessed as, at most, slight negative impacts at the local scale.

[1] In Chapter 9, the significance is described as *not significant* using the Environmental Protection Agency significance scale, but in this chapter the *not significant* category in the Environmental Protection Agency significance scale has been renamed as *very slight* for the reasons explained in Section 6.2.7.

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