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**Preliminary
oHMP/Ecology**

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Introduction

1. The HMP has been designed to ensure substantial overall net benefits for biodiversity in the form of an increase in the overall area of NI Priority Habitats on the site (i.e. blanket bog and wet/dry heathland).
2. This will be in the form of the restoration of a substantial area of former blanket bog within the LUAC as well as the active restoration of two adjacent area of peatland which have been under coniferous forestry for the previous few decades, and four additional blocks to be managed for Curlew. In addition, an area of semi-improved grassland

Background/Aims

3. This HMP aims to fulfil the requirement for an overall 'net gain' of biodiversity by outlining recommendations for compensatory habitat restoration and management to offset the loss of NI Priority Habitats that will result from the construction of the proposed Unshinagh windfarm.

Statement of Authority

4. This report was prepared by Mr Cormac Loughran (CEnv MCIEEM MSc). Cormac is a Chartered Environmentalist (CEnv), and a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM). He holds an MSc (Distinction) in Environmental Management from the University of Ulster. Cormac has worked as a consultant ecologist for over 17 years, and in the wider nature conservation sector for a further 9 years. He has extensive experience in ecological impact assessment and HMPs in particular; having undertaken and coordinated full EcIA's (including HMPs) and associated impact assessments for 25 major wind farm developments.

Habitat Management Block A – 49.9 ha

Description

5. This area consists of an extensive mosaic of wet heath, degraded blanket bog & rush pasture with drier pockets of acid/semi-improved grassland and small patches of gorse scrub.
6. Before enclosure this area would have been part of an extensive upland mosaic consisting primarily of upland blanket bog and wet heath. Since then, Block A has been exploited for peat and extensively drained for agricultural purposes (with both cattle and sheep grazing evident). This has resulted in much of the area becoming marshy/acid grassland with significant patches of rush pasture. However, due to its topography, much of the land remains wet and is therefore considered highly suitable for restoration.

Prescriptions

7. The area is currently heavily overgrazed and would therefore benefit from a moratorium on grazing for 12 - 24 months. After which it would be cattle grazing only (no sheep).
8. There will be no application of fertiliser (including farmyard manure or slurry), on areas

of wet grassland, degraded blanket bog, wet heath or PMGRP. This exclusion will not apply to the areas of semi-improved/improved grassland.

9. No supplementary feeding at any time;
10. Extensive and substantial drain-blocking will be implemented. Water levels will be maintained high across the entire year, not just seasonally);
11. Cut vertical banks of former peat cutting will be graded to a more natural angle and revegetated. Any excess peat can be used elsewhere in the Block for repairs. Bare areas that do not revegetate within 12-months will be covered with coir matting and seeded with material collected from within the Block.
12. Soft rush will be manged so as not to constitute more than 30% of the block.

Grazing

13. There will be no sheep grazing for the lifetime of the HMP;
14. Grazing with cattle at a moderate intensity is recommended; as this creates a mosaic of tussocks and short turf. This produces germinating pockets for native plants and also creates the necessary structure preferred by a range of nesting wader species. It also augments the invertebrate population through dunging.
15. To avoid poaching and allow for the restoration of a more biodiverse habitat (and to prevent trampling of nests), light grazing will be maintained between mid-March and June. Although stocking rates generally in the region of 0.75 livestock units per hectare are recommended, it is considered better to use habitat/species (i.e. blanket bog/curlew) objectives rather than set too many ridged prescriptions.
16. For Block A; approximately 75% is grassland and 25% is blanket bog/heath. Therefore, initially targets will be 40 livestock units (which can be adjusted based on habitat condition after each round of habitat monitoring).

Rush management

Management by topping and cattle grazing

17. Livestock tend not to graze rushes, but cattle can destroy tussocks by trampling. They can therefore be used to restore a heavily rush infested pasture to a more open grass dominated sward. This is especially effective after cutting the rush low to the ground as they may eat some of the young growth.
18. Rush cover will only be topped after the last wader chicks have fledged (August is a safe month to cut). Cattle can then be introduced to graze the aftermath. The stocking rate should be low enough to prevent poaching, as this will encourage the germination of rush seed.

Management by topping and flooding

19. Where the water level can be raised, cutting followed by flooding is a cheap and efficient method of killing the root ball of rushes. To be effective, the water level should be raised immediately after cutting. This could be used in parts of Block A where the local topography allows.

Management by topping and herbicides

20. Herbicide control will only be used as a last resort since the approved chemicals are all broad-spectrum herbicides that will also destroy other non-target plants.
21. The rushes will be cut and treated (by hand using a brushcutter and knapsack sprayer). The target will be between 10 – 30% in any year (and not as a single block). In flatter areas, and when the rush regrowth stands higher than the other vegetation in the field, then glyphosate could be applied using a weed-wiper (pulled by an ATV) and set above the height of the rest of the sward. Pesticides will only be used and applied by personnel with the proper Lantra approved training.

Water-control levels

22. Water control structures, such as sluices, enable the ability to control the inflow or outflow of water and thus the water level in the Block. These will be used in certain areas in the event that the rewetting is at risk of spilling over into adjacent areas of land outside of Block A.
23. This will also allow close control of water levels to prevent the grassland drying out too soon in early dry weather, while a wet spring may result in levels remaining too high.
24. Surface water will be re-directed from ditches or streams to desired locations in order to rewet as much of the Block as possible.
25. The most cost-effective sluice is likely to be constructed with a length of plastic piping, either rigid pipe with a swivel end or flexipipe, laid through an earth dam in the outflow ditch. Each end extends beyond the dam, and the upstream end is held at the desired level. Flexipipe will normally need weighting to keep the lip submerged and require a length of rope to hold the upstream end at the desired level. Adjusting the upstream end (by swivelling the pipe or raising or lowering the rope) will set the desired water levels.
26. A high-water table will be maintained from December to March (main growing season for sphagnum spp.) with splashy conditions over the whole field and/or shallow flooding from one to 30cm over up to 30 per cent of the field (for waders where possible).
27. Water levels will be allowed to naturally fluctuate to avoid stagnation.
28. From March to May a high water (but reduced, water table) level will be retained over 30 per cent of the field and/or shallow flooding on five to 10 per cent of the field.
29. From May to July, retain the water table within 20cm of field level on average, shallow pools will dry out, with muddy edges.
30. From July, water-levels can be reduced to at least 40cm below field level to enable management to be undertaken (as required). However, this will only occur if required.

Fencing

31. Internal fencing within the Block will be taken down for the lifetime of the management plan.

Outcomes/targets

32. An overall increase in area of blanket bog, wet heath and wet grassland over semi-improved areas. Increase in quality/species diversity of the habitats should be evident

over time with a concurrent increase in percentage cover of sphagnum.

Benefits

33. Additionally, these prescriptions will also benefit Irish hare, smooth newt, viviparous lizard and a wide range of dragonfly (and some butterfly species. As well as some hoverflies and lesser known invertebrate species.

Land Management for Curlew 147.6ha (Blocks A, D, E, F, G)

Overview of Key Points:

- The grazing regime is important and would aim to provide a mosaic of taller tussocks and short sward with a small amount of bare ground
- The timing of grass cutting and other related machinery operations is critical
- Areas of damp / wet ground or small, shallow pools should be provided

Detailed Specific Measures:

34. The application of lime and / or any organic or chemical fertilizer (with the exception of farmyard manure) is not permitted between 1st February and 15th July
35. From the end of March to the end of June stock density should be low and not exceed 0.75 LU/ha
36. After the end of June and during the winter period normal or higher density grazing can occur but it is still important not to overgraze
37. Cattle are the preferred livestock however the grazing density of livestock has a bigger influence on the vegetation than the type of livestock
38. Cattle should not be put onto land managed for curlew immediately after winter housing (this can increase nest damage)
39. Rushes should be cut if they become dense and tall over more than 50% of the field
40. If the fields are used for silage or hay (or if rushes need cut) then cutting should not be before mid-July; fields should if possible be cut from the centre outwards
41. Some scrub or tree management may be required and this should not be carried out during 1st March to 31st August inclusive; trees should not be planted close to fields managed for curlew
42. Wet, soft ground is important for curlews and drainage ditches and grips (where present) should be blocked using suitable piling dams and / or re-profiled to make them shallower; these operations should be done after mid-July
43. New field fences should be avoided and consideration given to removing existing fences if practicable

Restoration of former Forestry

44. As shown in Figure 6.10, two areas of former coniferous plantation forestry (Block B (7.5 ha) and Block C (5.9 ha)) are to be restored as part of this HMP. These areas will

have to be felled to facilitate the construction phase of the wind farm. In addition, the NIEA Environment Mapviewer also shows most of these areas' as former peatland or peat-cutting.

45. Therefore, most of these areas will require further maintenance to complete the reinstatement to peatland. Areas where plantation forestry still retain the ability to revert to semi-natural vegetation, as these still comprise peatland vegetation beneath the conifers. In order to facilitate the reestablishment of peatland vegetation within these areas and maintain an effective hydrological regime, the following measures are proposed in these areas:
- Treatment of brash from felled areas via off-site removal or chipping;
 - Drain blocking will be undertaken on a local scale in the immediate surroundings of felled plantation by installing plastic dams at drainage ditches (largely remnant semi-functioning conifer forest drains) to maintain, enhance and restore the favourable baseline hydrological and ecological conditions at each site location. Drains can be dammed using peat dams;
 - No grazing will be permitted for the lifetime of the Development on the restoration of former forestry areas (circa. 25-yrs);
 - No additional drainage to be installed in proximity to these habitat areas during the lifetime of the development;
 - No supplementary feeding at any time;
 - The use of off-road vehicles on the site will be restricted to the existing tracks post construction;
 - No application of chemical and organic fertilisers or herbicides and pesticides will be undertaken within areas of restored conifer plantation;
 - Self-seeded conifers will be cleared and removed (by hand or brushcutter) from the newly created peatland reinstatement areas on an ongoing basis (annually or bi-annually for 25 years) during the operational phase.

7. Monitoring

46. To confirm that habitat management and enhancement has been successful, all areas will be monitored post-construction, monitoring results reported and any criteria failures identified and corrective actions implemented as part of the annual monitoring report.
47. Botanical/vegetation monitoring will be carried out in years 1, 2, 3, 5 and 10 after restoration (with reports submitted to the Department within 6 months of the end of each monitoring year).
48. Monitoring will involve the following:

Vegetation sampling

- 150 fixed quadrat locations (i.e., permanent quadrats) will be set up in areas where active management is proposed. 90 quadrats will be spread across Blocks A, B, C. 60 quadrats will be spread across Blocks D, E, F, G (10 per D, G, F; 30 per E). . Baseline data will be recorded prior to the commencement of the habitat management activities set out in this outline plan. The character of each quadrat will be recorded (e.g. species proportions present, vegetation structure and height) and photographs will be taken of each quadrat from a fixed point. These quadrats will then be re-examined during years 1, 2, 3, 5 and 10 following management/restoration in order to establish the extent of habitat improvement resulting from management practices.

Hydrological monitoring

- Water levels within areas where drains are blocked will be recorded bi-annually for three years. A number of phreatic stand pipes will be installed (prior to restoration) to allow monitoring of water levels within both the restoration and enhancement areas. In this way, any positive impacts on the local hydrology can be verified and quantified.
49. The efficacy of the habitat rehabilitation and enhancement measures employed will be reviewed in years 1, 2, 3, 5 and 10 following commencement of the plan on the basis of the results of vegetation sampling and water level readings from the managed areas. Analysis of the data collected will be the basis for a review of the measures and techniques employed.

8. Criteria for success

Management & restoration of Blocks A, D-G

50. Correspondence, photographic & mapping evidence will be provided as part of the year 1 monitoring report as follows;
- Confirmation email/letter that the grazing prescription has been adhered too.
 - Installation of dams/slucices as per Figure 6.11).
 - 150 Fixed point quadrats should show the following changes over time;
 - Increase in species diversity;
 - 5% per annum for first five years.
 - Increase in sward height;
 - 5% per annum (from baseline).
 - Decrease in evidence of poaching/grazing (i.e. dunging);
 - 5% per annum for 3-years.
 - Increase in sphagnum cover;
 - 5% per annum (from baseline) for first 10 years;
 - Increase in pools/water cover.
 - Not specified.

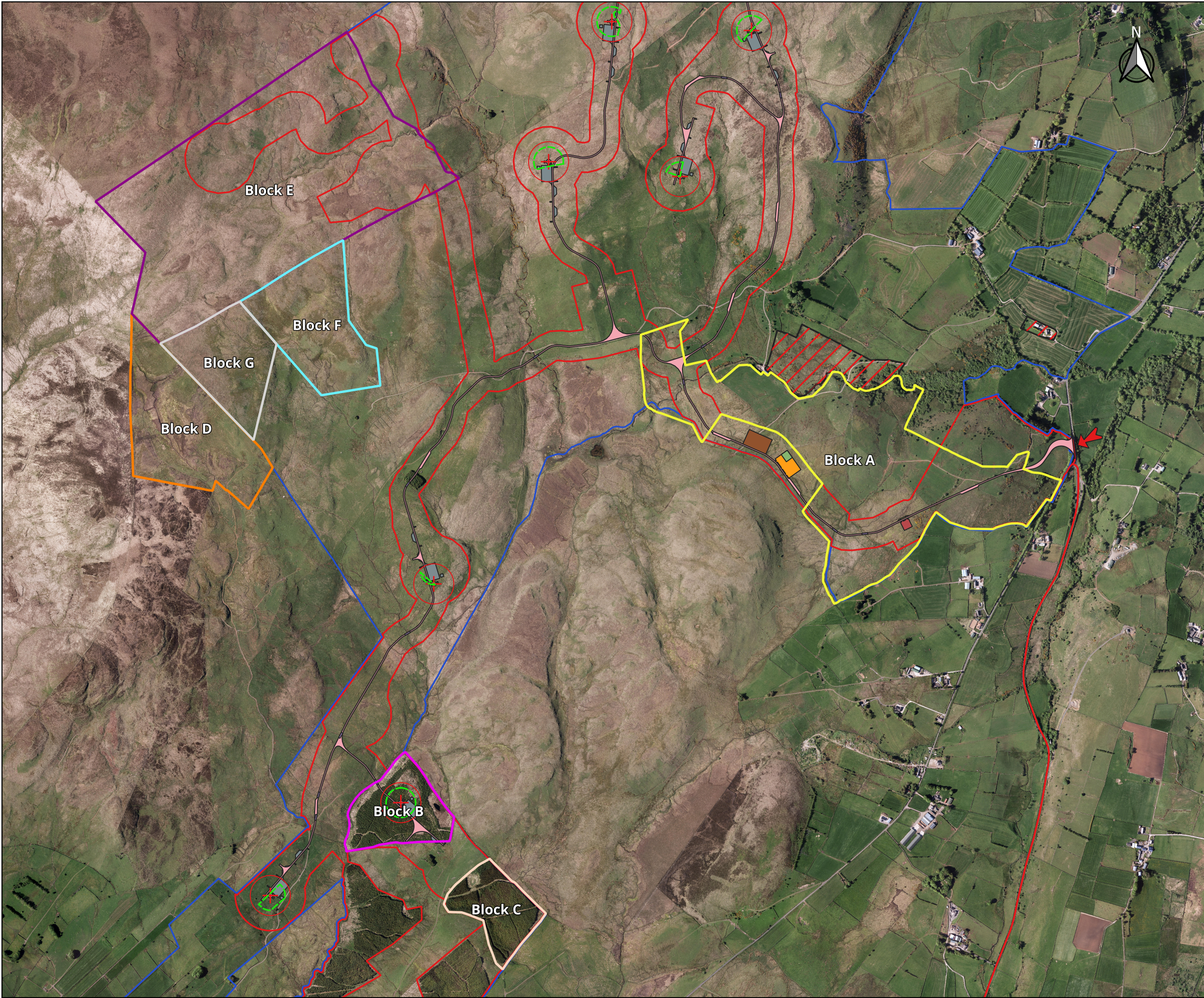
Restoration of former Forestry (10.1 ha)

51. The proposed forestry restoration areas (Blocks B & C) are relatively flat and the forestry drains so numerous as to make sheet dams impractical and also expensive. It is recommended that traditional dams are installed every 15 to 25m with the conifer stumps used to block the forestry drains every 2.5m. This is acceptable as the forestry drains are only around 30cm deep and the gradients are shallow.
52. The works on-site would be undertaken using a wide-tracked excavator. Works will involve blocking drainage channels by flipping the stumps of felled trees over into the channels and covering (but not smoothly out) the remnant peat. The aim is to restore the hydrology of the underlying peat bog to a near natural state, and recreate the conditions needed for peat forming plants to recolonise the site.
53. Photographic & mapping evidence will be provided as part of the year 1 monitoring report as follows;
- Treatment of harvesting brash
 - Photos of results
 - Fixed point photos from each quadrat (at each point of the compass)
 - Installation of dipwells (see Annex 1 – Hydrological Monitoring Protocol)
 - Photos of 60 dipwells along with fortnightly readings (along with commentary)

- Dipwells will be located within 5m of quadrat locations (Blocks B & C).
54. Depth to water table from the surface and its fluctuation will be implemented with the target of a stabilisation of the water table with fluctuation +/- 20cm above or below ground and a restored acrotelm for the restoration of peatland habitats. Should the target (on review of monitoring results) not be met then further drain blocking measures (and additional contingency measures) will be agreed with NIEA NED.
55. However, it is entirely possible that the restoration will result in a mosaic of blanket bog, and wet & dry heath. This is one possible outcome due to the damaged hydrology of the site and surrounding area. The resulting mosaic will likely include vegetation types which are all NI Priority Habitats and will still result in a net gain for biodiversity.

9. Reporting

56. Reports detailing the monitoring works carried out, the results obtained and a review of their success, along with any suggestions for amendments to the plan will be prepared in years 1, 3, 5 and 10; following commencement of the plan's implementation. Reports will be submitted within 6 months of each monitoring year.



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- KEY**
- Block A (44.9 ha)
 - Block B (7.5 ha)
 - Block C (5.9 ha)
 - Block D (15.9 ha)
 - Block E (59.9 ha)
 - Block F (12.7 ha)
 - Block G (9.2 ha)
 - Land Under Applicant Control
 - Planning Application Boundary
 - Turbine Location
 - Turbine Micrositing
 - New Site Tracks
 - Crane Hardstanding Area
 - Control Building & Substation Compound
 - Energy Storage Compound
 - Temporary Construction Compound
 - Temporary Enabling Works Compound
 - Waterless Wheel Wash
 - Watercourse Crossings
 - Site Entrance Location
 - Landowner Boundary Not Included

SURVEYORS

 **Blackstaff Ecology**

DRAWING NUMBER

COORDS

TM65 IRISH GRID

PURPOSE

ENVIRONMENTAL STATEMENT

SCALE	1:12000	ORIGINAL PLOT SIZE	A3
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PROJECT TITLE

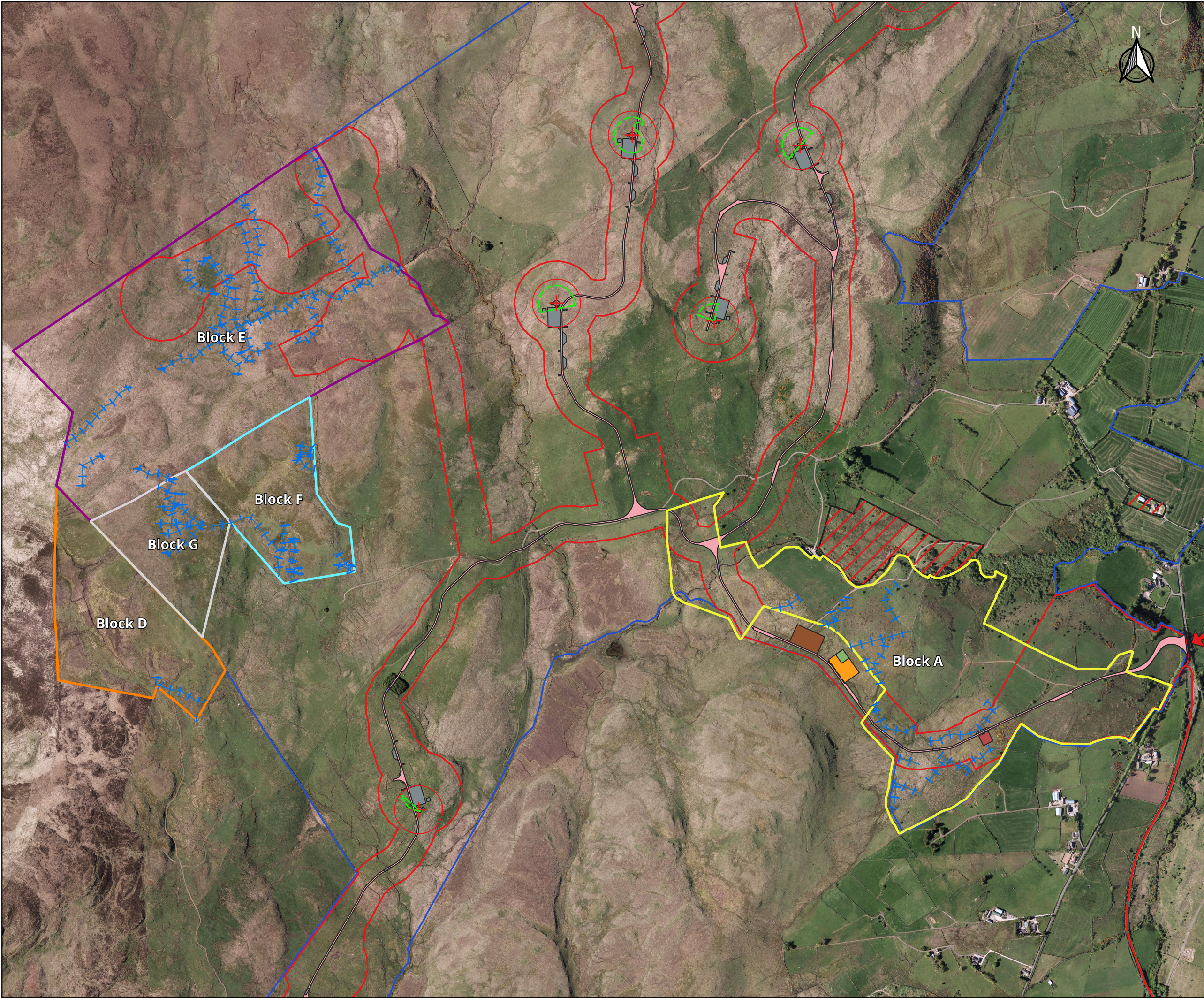
UNSHINAGH WIND FARM

FIGURE 6.10
HABITAT MANAGEMENT UNITS

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- KEY**
- Block A (44.9 ha)
 - Block D (15.9 ha)
 - Block E (59.9 ha)
 - Block F (12.7 ha)
 - Block G (9.2 ha)
 - Proposed Ditch Blocking
 - Land Under Applicant Control
 - Planning Application Boundary
 - Turbine Location
 - Turbine Micrositing
 - New Site Tracks
 - Crane Hardstanding Area
 - Control Building & Substation Compound
 - Energy Storage Compound
 - Temporary Construction Compound
 - Temporary Enabling Works Compound
 - Waterless Wheel Wash
 - Watercourse Crossings
 - Site Entrance Location
 - Landowner Boundary Not Included

SURVEYORS



DRAWING NUMBER

COORDS TM65 IRISH GRID

PURPOSE ENVIRONMENTAL STATEMENT

SCALE	1:10000	ORIGINAL PLOT SIZE	A3
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PROJECT TITLE

UNSHINAGH WIND FARM

FIGURE 6.11
PROPOSED DITCH BLOCKING

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