Technical Appendix

Lairdmannoch Energy Park

Technical Appendix 6-6: Outline Habitat Management Plan

Lairdmannoch Energy Park Limited

May 2025

Contents

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Glossary of Terms

Acronym	Full Term
The Proposed Development	Lairdmannoch Energy Park
The Proposed Development Site	The full application boundary as per Figure 1-1
Habitats Directive	European Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (as amended)

List of Abbreviations

Acronym	Full Term
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
GWDTE	Ground Water Dependant Terrestrial Ecosystem
JNCC	Joint Nature Conservation Committee
km	Kilometre
LPA	Local Planning Authority
m	Metre
HS	Heavy Standards
EHS	Extra Heavy Standards
NVC	National Vegetation Classification
SBL	Scottish Biodiversity List
SEPA	Scottish Environment Protection Agency
TA	Technical Appendix

1 Introduction

1.1 Terms of Reference

This outline Habitat Management Plan (HMP) is provided in support of a Section 36 application for Lairdmannoch Energy Park, a proposed 9-turbine, solar and Battery Energy Storage System development (hereafter 'the Proposed Development') located approximately 10 km west of Castle Douglas in Dumfries and Galloway. The area contained within the red line boundary is termed 'the Proposed Development Site'. It was informed by the results of baseline ecology, ornithology and peat studies and by the Environmental Impact Assessment (EIA) undertaken.

This outline HMP forms part of Chapter 6: Ecology within which the figures cited herein are contained, if not located within Appendix A. Reference is made, where necessary, to information contained within the EIA Report which was submitted at the time of application and is hereafter called 'the EIAR'.

The HMP will be finalised following the completion of the planning process in collaboration with the Local Planning Authority, Applicant and landowner. As such it is regarded as an Outline HMP but hereon will be referred to as the HMP for the purposes of this report.

1.2 Site Details and Project Description

The Proposed Development Site is centred on National Grid Reference (NGR) NX 65917 61697. The Proposed Development Site occupies an area of approximately 402 ha and the land cover is predominantly upland bog with wet heath that was noted to be lightly grazed by sheep and cattle.

The Proposed Development has been subject to a pre-application enquiry, which at the time consisted of 12 wind turbines, at 150 m to tip; and other associated infrastructure, with no attached solar development (Planning Application Reference: 20/04174/PREMAJ). The Proposed Development has since been reduced to 9 turbines at 180m to tip, with the inclusion of a solar array and battery energy storage system (Figure 1-2: Site Layout).

Associated infrastructure includes hard standing areas for erecting cranes at each turbine location, on-site access tracks and turning heads, an on-site substation and control building, and a temporary construction compound. The Proposed Development would be time limited to 40 years from the date of final commission.

Both access options are included within habitat calculations which underpin the basis for assessment for habitats. All habitat loss is assumed as permanent.

It should be read in conjunction with the following Technical Appendices:

- Technical Appendix 6-1: Extended Phase 1 Habitat Survey;
- Technical Appendix 6-2: National Vegetation Classification Survey;
- Technical Appendix 6-3: Bat Surveys (automated static);
- Technical Appendix 6-4: Protected Mammal Surveys; and
- Technical Appendix 6-5: Confidential Ecology.

The proposed erosion features on which compensation/enhancement will be undertaken are shown on Figures 6-8 and 6-9.

1.3 Aims and Objectives

The main objective of the HMP is to compensate and enhance for loss of priority peatland habitats in line with guidance (NatureScot, 2023). Priority peatland habitats present on the Proposed Development Site are:

- M17 and M18; and
- M15 and M25 when on deep peat (50 cm or more).

Compensation is based on a programme of detailed habitat management prescriptions as shown on Figures 6-8 and 6-9.

Other objectives relate to additional habitat and faunal enhancements plus the creation of a Habitat Management Group to oversee the peatland restoration proposals and restoration progress through the 40-year lifespan of the Proposed Development. Bat and ornithological monitoring requirements are also included.

1.4 Scope of the Habitat Management Plan

The HMP is an iterative document which will be revised, updated, and re-issued throughout the development, construction and operational phases of the Proposed Development. In this way, the HMP, through an agreed monitoring programme, will take account of the successes and failures of the proposed management measures and modifications to the management regime can then be proposed as necessary. The mechanism for communicating results and proposed adaptive actions, would be clarified through planning condition. This could be through a Habitat Management Group of stakeholders, or updates provided on request or at chosen intervals.

The HMP considers the specific features of the Proposed Development Site, the local area, existing and future land use, and the Proposed Development, in making recommendations based on best information currently available. If aspects relating to the Proposed Development are altered, or new ecological information emerges, then the HMP will be required to be adapted accordingly.

The HMP considers the management of the habitats and species over the expected 40-year lifespan of the Proposed Development.

The reader should note that the management and monitoring of any ecological impacts associated with the construction of the Proposed Development, and any immediate re-instatement of habitats post-construction, will also be covered within the Construction Environmental Management Plan (CEMP). The CEMP will be produced in accordance with SEPA guidance[1] and include site-specific measures to avoid risk of impacts on habitats and species identified on the Proposed Development Site.

[1] https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/ (accessed 11/04/24).

1.5 Roles and Responsibilities

As the developer, the Applicant is ultimately responsible for meeting the commitments made in this HMP. The HMP would be implemented (subject to the HMP being approved by the planning authority) via a suitable planning condition, overseen by a suitably qualified person or persons, appointed by the Applicant. All management tasks defined within the HMP would be carried out by suitably experienced contractors and all monitoring would be conducted by suitably qualified and experienced ecologists and/or hydrologists.

2 Surveys and Methodology

2.1 Scope

The following surveys and resources have been utilised in the formation of this plan:

- NVC survey;
- Phase 1 peat probing;
- Phase 2 peat probing;
- Peat depth mapping;
- Peat condition assessments;
- IUCN grazing and stocking guidance;
- Pilkington et al. (2021);
- Mills and Rushton (2023);
- NatureScot (NS) guidance; and
- SEPA GWTDE guidance (SEPA, 2024).

2.2 Methodology

2.2.1 NVC

Phase 2 habitat surveys were conducted in the form of a National Vegetation Classification (NVC) survey. This survey was completed on 4th – 8th September 2023.

The vegetation was surveyed by two suitably qualified and experienced botanical surveyors in accordance with NVC survey guidelines (Rodwell, 2006) and with reference to the NVC texts (Rodwell, 1991 – 2000, 5 volumes). The NVC scheme provides a standardised system for classifying and mapping semi-natural habitats and ensures that surveys are carried out to a consistent level of detail and accuracy.

Homogenous stands and mosaics of vegetation were identified and mapped by eye, drawn as areas onto field maps; these areas were surveyed qualitatively to record dominant and constant species, sub-dominant species and other species present. In practice the vegetation was mapped progressively across the Proposed Development Site to ensure that no areas were missed and that mapping was accurate. An aerial photograph of the Proposed Development Site was also used to aid accurate mapping of vegetation boundaries.

NVC communities were attributed to the mapped areas using surveyor experience and matching field data against published floristic tables (Rodwell, 1991 – 2000). Stands were classified to sub-community where possible. Woodland quadrats were adapted to the size of the community and were preferentially 10 m by 10 m for assessment of the tree canopy and 2 m by 2 m for the ground flora. Small areas of interest and general descriptions of features were made using target notes following Phase 1 survey methodology (JNCC, 2010).

Higher plant nomenclature follows that of Stace (2020) and bryophyte nomenclature follows that of the Hill *et al*. (2008). For every species recorded, an estimate was made of its quantitative contribution to the habitat. When quadrats were completed this abundance was estimated using the DOMIN scale:

- Cover of 91-100% given a score of 10;
- Cover of 76-90% given a score of 9;
- Cover of 51-75% given a score of 8;
- Cover of 34-50% given a score of 7;
- Cover of 26-33% given a score of 6;
- Cover of 11-25% given a score of 5;
- Cover of 4-10% given a score of 4;
- <4% (many individuals) given a score of 3;
- <4% (several individuals) given a score of 2; and
- <4% (few individuals) given a score of 1.

Data recorded outside of quadrats used the DAFOR scale when recording species composition, which stands for dominant (51-100%), abundant (31-50%), frequent (16-30%), occasional (6-15%) and rare (1-5%).

3 Ecological Features on the Proposed Development Site

The background information presented in this section has been sourced from Chapter 6: Ecology and Chapter 7: Ornithology and associated appendices and relates to features relevant to the HMP Objectives specifically. Information on other receptors, not pertinent to these objectives, are not included here.

3.1 Habitats

3.1.1 Overview

The survey recorded vegetation communities that are considered to be of potential conservation interest or potential Ground Water Dependant Terrestrial Ecosystem (GWDTE). Where these communities were floristically distinct, they were assigned into corresponding sub-communities. The communities recorded during the survey were:

- Mires, springs and flushes: M15, M17, M18, M23, M25;
- Swamps and tall-herb fens: S8 and S9;
- Calcifugous grasslands and montane communities: U4 and U5; and
- Woodland: W9 and W15.

The communities MG7 and U20 also occurred on the site. MG7 is an improved and poor semi-improved pasture type and U20 is continuous bracken. These have limited conservation value and are not ground water dependent.

A map, namely Figure 6-4, containing all the recorded NVC communities and their locations is shown at Appendix A. A low stocking density of cattle and sheep was present across the Proposed Development Site.

NatureScot (2023) guidance states: *"Peatlands are areas of land containing peat which support a variety of habitats. Peatlands in Scotland are dominated by blanket bog and montane bog (blanket bog above 600m) with some upland flushes, fens and swamps, with raised bogs and fens in the lowlands….Blanket bog (including montane bog) is identified as a priority habitat in the UK BAP, Scottish Biodiversity List and Annex 1 of the 'Habitats Directive'."* The following priority peatland communities where impacts have the potential to raise issues of national interest, according to NatureScot, were identified during the NVC survey, namely M17 and M18. M15 and M25 were also recorded however these communities fall under priority peatland communities that are unlikely to raise issues of national interest; according to NatureScot.

Following review of potential GWDTE by the hydrologist undertaking that assessment, the potential GWDTE were confirmed not to be GWDTE (Chapter 8: Hydrology, Geology and Hydrogeology).

3.1.2 NVC

M25 Purple moor-grass *Molinia caerulea* – Tormentil *Potentilla erecta* mire

This mire community was found widely across the Proposed Development Site, with two sub-communities occurring namely M25a cross-leaved heath *Erica tetralix* sub-community and M25c wild angelica *Angelica sylvestris* sub-community.

Table 6.6.1 Results from quadrat surveys undertaken within M25a (abundance using DOMIN).

Quadrat	4	8	10	17
Date	04/09/23	05/09/23	05/09/23	06/09/23
Easting, Northing	264585, 561263	264765, 561973	263368, 562621	265247, 564974
Species				
Molinia caerulea	8	9	5	7
Potentilla erecta	3	1	1	Not present
Calluna vulgaris	5	4	Not present	6
Caltha palustris	Not present	Not present	2	Not present
Cirsium palustre	Not present	Not present	4	Not present
Erica tetralix	2	2	Not present	1
Equisetum fluvitale	Not present	Not present	1	Not present
Juncus acutiflloris	3	3	5	Not present
Juncus conglomeratus	Not present	3	Not present	Not present
Kindbergia praelonga	1	Not present	5	Not present
Lophocolea bidentata	1	Not present	Not present	Not present
Menyanthes trifoliata	Not present	Not present	4	Not present
Myrica gale	Not present	4	Not present	Not present
Phragmites australis	Not present	5	Not present	Not present
Polytrichum commune	Not present	Not present	Not present	7
Pseudoscleropodium purum	1	Not present	Not present	Not present
Ranunculus flammula	Not present	Not present	1	Not present
Ranunculus repens	Not present	Not present	1	Not present
Rhytidiadelphus squarrosus	Not present	Not present	Not present	1
Sphagnum capillifolium	Not present	3	Not present	Not present
Sphagnum girgensohnii	Not present	Not present	2	Not present
Sphagnum palustre	Not present	3	Not present	Not present
Succisa pratensis	Not present	2	4	Not present
Vaccinium myrtillus	3	Not present	Not present	Not present
Viola palustris	Not present	Not present	1	Not present

The M25a *Molinia caerulea - Potentilla erecta* mire, *Erica tetralix* sub-community dominates the Site. M25a is typically the wetter form typified by species such as red bog-moss *Sphagnum capillifolium*, blunt-leaved bog-moss *Sphagnum palustre*, bog myrtle *Myrica gale* and *Erica tetralix*, albeit in reduced proportions to the *Molinia caerulea* which was dominant.

Quadrats taken recorded purple moor-grass as the main constant with other dwarf shrubs comprising heather *Calluna vulgaris* and bilberry *Vaccinium myrtillus,* although as a much smaller proportion of the habitat overall. The presence of large *Molinia*-stools indicated that this habitat was well established in what was difficult terrain to cross. Species diversity was low with forbs dominated by tormentil *Potentilla erecta* and, to a lesser extent creeping buttercup *Ranunculus repens*, devil's-bit scabious *Succisa pratensis* (c. <5% abundance per quadrat), field buttercup *Ranunculus acris* (c. <2%) and marsh violet *Viola palustris* (c. <1%).

Several areas of M25 *Molinia caerulea – Potentilla erecta* mire that did not fit any sub-community were recorded across the Site, shown on Figure 6-4. These areas were dominated by purple moor-grass with occasional sharp-flowered rush *Juncus acutiflorus*, common feather-moss *Kindbergia praelonga* and marsh thistle *Cirsium palustre*.

Other species noted include cypress-leaved plait-moss *Hypnum cupressiforme*, creeping buttercup *Ranunculus repens*, Yorkshire fog Holcus lanatus, velvet bent *Agrostis canina*, marsh marigold *Caltha palustris*, sorrel *Rumex acetosa*, marsh willowherb *Epilobium palustre*, meadow buttercup *Ranunculus acris*, tormentil, flat-topped bog-moss *Sphagnum fallax*, broad buckler-fern *Dryopteris dilatate*, blunt-leaved bog-moss, neat feather-moss *Pseudoscleropodium purum* and spring turf-moss *Rhytidiadelphus squarrosus*.

Across all M25 types the potential value of the habitats will align more closely with peat depth, rather than floristic community composition. M25 is considered to be Annex I habitat when on deep peat (≥ 50 cm) H7130 Blanket bog.

This theme is discussed further within the **EIAR, Chapter 6**.

MG7 Perennial rye-grass *Lolium perenne* leys and related grasslands

The eastern parcel of the Proposed Development Site, where solar panels are proposed, was dominated by MG7 perennial rye-grass *Lolium perenne* leys and related grasslands. This habitat was noted to contain short sward grassland dominated by perennial rye-grass with other species recorded including crested dog's-tail *Cynosurus cristatus*, Yorkshire fog, creeping thistle *Cirsium arvense*, common bent *Agrostis capillaris*, creeping buttercup, sorrel, white clover *Trifolium repens* and soft rush *Juncus effusus*, with bracken *Pteridium aquilinum* and common nettle *Urtica dioica* also noted in some areas.

U20 Bracken *Pteridium aquilinum* - Heath bedstraw *Galium saxatile*

Large stands of habitats dominated by bracken are present within the Proposed Development Site, as shown on Figure 6-4, with the majority of these areas not being affiliated with any sub-community. Two stands of U20c species-poor sub-community were also noted, adjacent to the south-western Proposed Development Site boundary. Within areas of U20c sub-community, bracken grows densely forming a thick litter layer; preventing herbs establishing.

M15 Deergrass *Trichophorum germanicum* – Cross-leaved heath *Erica tetralix* wet heath

M15b deergrass *Trichophorum germanicum* – cross-leaved heath *Erica tetralix* wet heath, typical sub-community was the most prevalent on the proposed wind farm part of the Proposed Development Site. A large area of which was found in the far south of this western parcel, in the vicinity of turbine 4 and associated infrastructure. An area was also found in the far west, abutting the plantation, where the ground drops from the drier M25 *Molinia caerulea – Potentilla erecta* grassland in the vicinity of a burn.

Table 6.6.2 Results from quadrat surveys undertaken within M15b (abundance using DOMIN).

Quadrat	2	5
Date	04/09/23	04/09/23
Easting, Northing	264753, 561112	265058, 561636
Species		
Molinia caerulea	9	5
Potentilla erecta	3	Not present
Calluna vulgaris	Not present	7
Carex flacca	3	Not present
Erica cinerea	4	Not present
Erica tetralix	3	4
Eriophorum vaginatum	Not present	3
Festuca ovina	3	Not present
Hypnum jutlandicum	Not present	3
Myrica gale	5	Not present
Narthecium ossifragum	2	7
Pleurozium schreberi	3	Not present
Polytrichum strictum	Not present	3
Pseudoscleropodium purum	1	Not present
Rhytidiadelphus squarrosus	3	Not present
Sphagnum capillifolium	Not present	3
Sphagnum fallax	Not present	3
Trichophorum germanicum	3	Not present

As is typical with M15, overall there was much variation within a wet-dry gradient. This was present in both M15b (the typical sub-community) and where more pronounced, could be split out into other sub-communities defined by the degree of wetness (as typified by grasses at one end of the spectrum, and *Sphagnum* moss the other). Cross-leaved heath was a constant across all M15 types recorded.

Much smaller amounts of the grassier M15d *Trichophorum germanicum - Erica tetralix* wet heath, bilberry *Vaccinium myrtillus* sub-community were found on higher areas as this is a drier sub-community. Mat-grass *Nardus stricta*, sheep's fescue *Festuca ovina* and heather were more common, as was the ubiquitous springy turf-moss.

Table 6.6.3 Results from quadrat surveys undertaken within M15d (abundance using DOMIN).

Quadrat	1
Date	04/09/23
Easting, Northing	264937, 561250
Species	
Molinia caerulea	7
Potentilla erecta	2
Agrostis vinealis	3
Calluna vulgaris	6
Cerastium fontanum	1
Festuca ovina	4
Galium saxatile	4
Kindbergia praelonga	4
Nardus stricta	4
Pleurozium schreberi	5
Pseudoscleropodium purum	3
Rhytidiadelphus squarrosus	4
Sorbus aucuparia	1
Trichophorum germanicum	4
Vaccinium myrtillus	4

The M15a *Trichophorum germanicum - Erica tetralix* wet heath, carnation sedge *Carex panicea* sub-community was highly localised, situated in one small patch south-east of turbine 1. Differentiating species to M15a included blunt-leaved bog-moss, bog asphodel *Narthecium ossifragum* and star sedge *Carex echinata*.

Table 6.6.4 Results from quadrat surveys undertaken within M15a (abundance using DOMIN).

Quadrat	14
Date	06/09/23
Easting, Northing	265459, 562336
Species	
Molinia caerulea	5
Potentilla erecta	4
Calluna vulgaris	5
Carex binervis	1
Carex echinata	5
Chiloscyphus polyanthos	1
Drosera rotundifolia	1
Erica tetralix	4
Juncus acutiflorus	1
Narthecium ossifragum	4
Pinguicula vulgaris	1
Polytrichum stricta	1
Rhytidiadelphus squarrosus	2

Quadrat	14
Date	06/09/23
Easting, Northing	265459, 562336
Species	
Sphagnum capillifolium	5
Sphagnum palustre	3
Succisa pratensis	3

M15 is considered Annex I M15 - 4010 N Atlantic wet heaths with *Erica tetralix* or, when on deep peat (≥ 50 cm), 7130 Blanket bogs. M15 is also a Scottish Biodiversity List habitat.

M23 Soft/sharp-flowered rush *Juncus effusus/acutiflorus* – Marsh bedstraw *Galium palustre* rush-pasture

The majority of M23 was found in the far south of the Proposed Development Site within the Solar Development. Much of it appeared to be of the more common, less species-rich M23b *Juncus effusus/acutiflorus - Galium palustre* rush-pasture, *Juncus effusus* sub-community. In some instances it was not possible to assign to a sub-community as quadrats returned a poor goodness of fit. The prevalence of smooth rush *Juncus effusus* and grasses including tufted hair-grass *Deschampsia cespitosa*, false oat-grass *Arrhenantherum elatius* and species associated with disturbance (or tolerance of) including common nettle and foxglove *Digitalis purpurea;* further indicate the less sensitive M23b sub-community. The topographical position further tends toward the less flush-influenced M23b sub-community (and less likely to be GWDTE) as stands were typically in depressions in agricultural fields.

U4 Sheep's- fescue *Festuca ovina* - Common bent-heath bedstraw *Agrostis capillaris-Galium saxatile* acid grassland

U4 is a pasture type found on base-poor but well-drained mineral soils in the upland fringes of north and west Britain. Across the survey area this habitat was found on high ground where rock outcrops occurred; largely occurring where U20 *Pteridium aquilinum - Galium saxatile* was found. The majority of this type was the U4a typical sub-community, which is species poor and has no distinguishing features of its own (JNCC, 2004).

The U4a sub-community was characterised by a co-dominance of sheep's fescue, common bent and sweet vernal grass *Anthoxanthum odoratum* with mosses including mountain fern-moss *Hylocomium splendens*, spring turf-moss and heath plait-moss *Hypnum jutlandicum*.

The U4b sub-community occurred in closer proximity to agricultural pasture (MG7 type) as evidenced by species indicating improvement such as rank grasses including Yorkshire fog, false oat-grass and cock's-foot *Dactylis glomerata* but also forbs such as yarrow *Achillea millefolium* and ribwort plantain *Plantago lanceolata*.

The surveyed U4 grasslands have low conservation interest.

U5 Mat grass *Nardus stricta* – Heath bedstraw *Galium saxatile* acid grassland

An area of U5d *Nardus stricta –Galium* saxatile grassland, *Calluna vulgaris* – heath-grass *Danthonia decumbens* sub-community is present in the southern central portion of the Proposed Development Site, situated between the intended wind and solar areas. The classification at U5d is based on the consistent presence of mat-grass in tandem with the dominant grasses sheep's fescue, common bent and sweet vernal grass. The presence of mat-grass was considered the differentiating factor between U5d and the U4a.

This grassland is considered to have low conservation interest.

W23 Common gorse *Ulex europaeus* – Bramble *Rubus fruticosus* scrub

Stands of W23 *Ulex europaeus - Rubus fruticosus* scrub were noted within the east of the Site, as shown on Figure 6-4.

This habitat is considered to have low-moderate conservation interest.

M17 Deergrass *Trichophorum germanicum* – Hare's-tail cottongrass *Eriophorum vaginatum* blanket mire

M17a *Trichophorum germanicum –Eriophorum vaginatum* blanket mire, round-leaved sundew *Drosera rotundifolia - Sphagnum* spp. sub-community was found in one discrete location in the north of the Proposed Development Site (cantered at NGR NX 63586 62683). The area was dominated by red bog-moss, purple moor-grass, common cottongrass *Eriophorum angustifolium* and papillose bog-moss *Sphagnum papillosum*. Bog asphodel was present in addition to the notable species round-leaved sundew; the presence of the latter species indicates an affinity with M18 raised mire and it is noted that the area sits within a depression as the land descends to the edge of the plantation.

Table 6.6.5 Results from quadrat surveys undertaken within M17a (abundance using DOMIN).

Quadrat	**9**
Date	**05/09/23**
Easting, Northing	**263604, 562717**
Species	
Molinia caerulea	5
Carex flacca	3
Drosera rotundifolia	1
Eriophorum angustifolium	4
Juncus acutiflorus	1
Menyanthes trifoliata	3
Narthecium ossifragum	1
Potamogeton polygonifolius	1
Sphagnum capillifolium	5
Sphagnum papillosum	3
Succisa pratensis	4

M17 blanket bog is an Annex I and Scottish Biodiversity List habitat.

M18 Cross-leaved heath *Erica tetralix* – Papillose bog-moss *Sphagnum papillosum* raised and blanket mire

A single area of M18a *Erica tetralix* – *Sphagnum papillosum* raised and blanket mire, magellanic bog-moss *Sphagnum magellanicum* – bog rosemary *Andromeda polifolia* sub-community is present at the north-eastern edge of the Proposed Development Site towards the solar area (NGR NX 66465 62224). M18 is a community found on waterlogged, ombrogenous peats where the mire surface is rain-water fed rather than being influenced by ground water. Located within a small depression with a domed profile the discreet location was dominated by heather, cross-leaved heath and hare's tail cotton-grass *Eriophorum vaginatum*. Cranberry *Vaccinium oxycoccus* was present and is regarded as a strong indicator of raised bog as is, although to a lesser extent, round-leaved sundew and papillose bog-moss. Other species included bog asphodel, red bog-moss and bog-bead moss *Aulacomnium palustre*.

Table 6.6.6 Results from quadrat surveys undertaken within M18a (abundance using DOMIN).

Quadrat	20
Date	07/09/23
Easting, Northing	266465, 562224
Species	
Aulacomnium palustre	1
Calluna vulgaris	7
Drosera rotundifolia	1
Eriophorum vaginatum	4
Erica tetralix	5
Hypnum jutlandicum	1
Juncus squarrosus	1
Narthecium ossifragum	4
Sphagnum capillifolium	3
Sphagnum palustre	1
Sphagnum papillosum	4
Vaccinium oxycoccus	1

M18 bog is an Annex I habitat.

W9 Ash *Fraxinus excelsior* – Rowan–dog's mercury *Sorbus aucuparia - Mercurialis perennis* woodland

A single patch of W9b *Fraxinus excelsior - Sorbus aucuparia-Mercurialis perennis* woodland, marsh hawk's-beard *Crepis paludosa* sub-community is present on the eastern boundary.

The woodland was dominated by hazel *Corylus avellana* and downy birch *Betula pubescens*, whilst the understorey contained a 70% cover of broad-buckler fern *Dryopteris dilatata*, 70% of the ground flora dominated by common tamarisk moss *Thuidium tamariscidium*. Other ferns included scaly male-fern *Dryopteris affinis* and bracken.

Whilst W9b can be of conservation interest, based on uncommon plants and presence of lichens (JNCC, 2004), this example is not considered to meet that threshold based on

the low species diversity and lack of lichens. This example is therefore not considered to comprise the 9180 Mixed woodland on base-rich soils associated with rocky slope habitat.

S8 Common club-rush *Scirpus lacustris* ssp. *lacustris* swamp

At the edge of Loch Mannoch at the boundary of the Proposed Development Site a small area of S8 common club-rush *Scirpus lacustris* ssp. *lacustris* swamp was found, with common club-rush being the only species present throughout this habitat. This abuts the S9 bottle sedge *Carex rostrata* swamp. S8 is further into Loch Mannoch than S9 as the former represents the deep water limit of swamp vegetation in Britain (Rodwell, 1995).

S8 is a Scottish Biodiversity List (SBL) habitat.

S9 Bottle sedge *Carex rostrata* swamp

S9 *Carex rostrata* swamp was dominated by bottle sedge with broad-leaved pondweed *Potamogeton natans* covering less than 5% of this habitat. The remaining area within the quadrat was open water. Yellow iris *Iris pseudocorus* was present at the edge of the area suggesting a transition to M28 *Iris pseudacorus* - Meadowsweet *Filipendula ulmaria* mire but which was too small to map.

S9 is an SBL habitat.

Other Habitats

Other habitats present across the Proposed Development Site include the following:

- Coniferous woodland – plantation;
- Coniferous woodland – recently felled; and
- Bare ground.

3.1.3 Summary

A number of the recorded communities are considered to have conservation value at a European level (Annex I) (European Commission, 2013) or at a national level (Scottish Biodiversity List). A summary of habitats and their designations are found in the table below.

Table 6.6.7 Annex I, Scottish Biodiversity List Habitats and Priority Peatland.

NVC Code	Annex I	SBL Habitats	Priority Peatland
M25 *Molinia caerulea – Potentilla erecta* mire	7130 Blanket bogs (only applicable on peat >50 cm deep)	Blanket Bog	On 50 cm or more
M15 *Trichophorum germanicum – Erica tetralix* wet heath	4010 Northern Atlantic wet heaths with *Erica tetralix* 7120 Degraded raised bogs still capable of natural regeneration 7130 Blanket bogs (only applicable on peat >50 cm deep)	Blanket Bog Upland heathland	On 50 cm or more
M23 *Juncus effusus/acutiflorus-*	None	Purple moor-grass and rush pastures	No

NVC Code	Annex I	SBL Habitats	Priority Peatland
Galium palustre rush-pasture		Upland flushes, fens and swamps	
M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire	7130 Blanket bogs	Blanket Bog	Yes
M18 *Erica tetralix – Sphagnum papillosum* raised and blanket mire	7110 Active raised bogs 7130 Blanket bogs	N/A	Yes
S8 *Scirpus lacustris ssp. lacustris* swamp	N/A	Upland flushes, fens and swamps	No
S9 *Carex rostrata* swamp	N/A	Upland flushes, fens and swamps	No

With regards M15 and M25 peatland habitats as part of the Annex I 7130 designation, these communities are only classed as Annex I quality if they adhere to certain criteria. For the 7130 Annex I classification the peat layer should be greater than 50 cm in depth and be capable of regeneration within a period of 30 years (European Commission, 2013). For the community to regenerate within a period of 30 years there needs to be a *Sphagnum* assemblage capable of generating a peat layer.

The main peat building *Sphagnum* species that form the bulk of the peat layer are *S. medium*, *S. papillosum* and to a lesser extent *S. capillifolium*. Of the recorded communities within the survey area M17 and M18 exhibited this suite of species. As such, in terms of Blanket Bog only M17 and M18 communities are considered to be classed as Annex I habitats.

M15 is considered an Annex I habitat under the 4010 (Wet heathland with cross-leaved heath) designation.

The W9b *Fraxinus excelsior - Sorbus aucuparia-Mercurialis perennis* woodland, *Crepis paludosa* sub-community woodland is not considered to comprise the 9180 Mixed woodland on base-rich soils associated with rocky slope habitat.

Whilst M23 may form part of the SBL Upland flushes, fens and swamps, the type encountered was that commonly found within agricultural settings and did not align with the species rich, M23a community, which is more likely to have a groundwater influence. A hydrologist subsequently undertook a hydrogeological risk assessment on the GWDTE status of M23 habitats identified in this survey and found none to be GWDTE. See **Chapter 8: Hydrology, Geology and Hydrogeology** for more information.

GWDTE Survey Results

Table 6.6.8 lists habitats in the context of recent guidance from SEPA (2024) in respect of GWDTE.

Table 6.6.8 Ecological importance criteria from SEPA (2024) for potential GWDTEs.

Community code	Community name	SBL, UKBAP, Annex I	Designated nature conservation site feature	Habitat connectivity	Ecosystem services provided	Relative extent in Scotland	Significant decline / unfavourable condition	Importance for supporting species
M15	*Trichophorum germanicum – Erica tetralix* wet heath	SBL/Annex I	-	Limited as surrounded by poor quality M25 Molinia grassland, commercial forestry and lowland habitats to the east	Carbon storage, water attenuation	Widespread	Yes (as per SBL)	Yes (as per SBL)
M23	*Juncus effusus'/acutiflorus - Galium palustre* rush-pasture	-	-	Limited. Small areas in lowland agricultural areas.	Water attenuation, Nutrient capture	Widespread	-	-

In addition to the above communities, W4 *Betula pubescens - Molinia caerulea* woodland, which was recorded within the Proposed Development Site, is also listed as high potential for groundwater dependency (dependent on the hydrogeological setting), as defined by SEPA (2012).

Losses to Priority Habitats

A summary of the NVC vegetation communities recorded within the Proposed Development Site is detailed in Table 6.6.10 and can be seen on Figure 6-4. The 2023 survey focused on infrastructure +250 m with detailed assessment on priority peatland locations at infrastructure +10 m.

Temporary habitat loss, which is due to temporary infrastructure such as crane platforms, material storage, etc. has been classified as permanent loss where it occurs in areas of priority peatland. This is due to the sensitive nature of Peatland habitats and the potentially long regeneration periods that would be required for full restoration of these habitats in the event of any damage or degradation.

A temporary compound and area of track was added in January 2025, which is not covered by the NVC survey as the extents of the Proposed Development Site were smaller at the time of the NVC survey (September 2023). As Phase 1 habitat data from 2020 was available (the boundary was larger at that time) only Phase 1 data is available for the compound and track. A 1.25 ha area of wet modified bog is lost in this area. As NVC mapping shows M15b, M25b and U20 to the north and satellite imagery to the south of that is very much in keeping with those mapped areas, in addition to grassland. The wet modified bog is therefore assumed be M25a on peat ≥ 50 cm as this is the prevailing habitat on the Proposed Development Site. This number is factored into table 6-6-9.

There may be minor discrepancies between totals due to rounding. Figures are to two decimal places.

Table 6.6.9 Priority peatland communities lost within infrastructure buffers in Hectares with total area within the Site.

NVC Vegetation Community	Direct loss (ha)	Indirect loss (ha)	Total loss (ha)	Total area within Site (ha)
M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire	0	0	**0**	0.79
M15 *Trichophorum germanicum – Erica tetralix* wet heath, sub-community b	0.60	0.65	**1.42**	14.54
M18 *Erica tetralix – Sphagnum papillosum* raised and blanket mire, sub-community a	0	0	**0**	0.24
M25 *Molinia caerulea – Potentilla erecta* mire, sub-community a	2.39	4.29	**7.52**	89.48
M25 *Molinia caerulea – Potentilla erecta* mire	0.17	0.28	**0.45**	7.52

NVC Vegetation Community	Direct loss (ha)	Indirect loss (ha)	Total loss (ha)	Total area within Site (ha)
TOTAL	3.16	5.22	9.39	110.41

3.1.4 Habitat Condition

As a whole, the moorland habitats within the Proposed Development Site and on a wider scale are considered to be sub-optimal and degraded.

The NVC surveys confirmed that whilst there are communities that indicate presence of blanket bog and mire habitat, these are in a degraded state. Much of the moorland is not species diverse, and in many cases, the habitats identified are low quality examples of these communities.

Bog-mosses are sparse across the area, which is a sign of degraded active bog habitat. Rodwell (1998) states that reduced density of bog-moss in blanket bog reduces the hydrological capabilities of the bog and leads to less water being held. The combination of low levels of bog-moss along with ubiquitous active drains is likely causing the surface of the bog to dry out and further degrade.

Purple moor-grass is present on almost all of the proposed wind farm section of the Proposed Development Site, and this again indicates degradation of these habitats. Rodwell (1998) considers purple moor-grass as an invasive species within these types of habitats due to the negative impacts it causes on the functionality of the bog habitats. The drains will be contributing to water moving from the Proposed Development Site, decreasing the level of the water-table, and thereby favouring conditions for *Molinia* spread at the expense of active peat-forming species such as bog-mosses.

In summary, the NVC surveys have highlighted that the Proposed Development Site lacks species diversity and contains large areas dominated by purple moor-grass.

3.2 Fauna

3.2.1 Terrestrial Mammals

No evidence of wildcat *Felis silvestris* or pine marten *Martes martes* was recorded during surveys.

Information on badger is regarded as confidential and therefore included in TA 6-5: Confidential Ecology.

Two squirrel dreys, potentially created by red squirrel *Sciurus vulgaris*, were noted during the protected species survey at NGR NX 66960 61598 and NX 67028 61596, both in a small area of plantation forestry in the centre of the Proposed Development Site. This plantation does not comprise part of the Proposed Development but is enclosed by it and the dreys lie within a 30 m buffer of the boundary.

3.2.2 Riparian Mammals

Two otter *Lutra lutra* field signs were found within the Proposed Development Site, namely an otter spraint beside the Tarff Water at NGR NX 67690 60689 and an otter print also beside the Tarff Water at NX 67704 60880. There were no signs of water vole *Arvicola amphibius* recorded during the protected species surveys.

3.2.3 Bats

Four potential bat roost sites were found, with three lying within the Proposed Development Site. Three were assessed as having moderate bat roost potential and were located at NX 67641 61256 (several old oak trees), at NX 67708 61118 (old ash tree) and at NX 67726 61061 (old ash tree). An old dead oak tree was assessed as having high bat roost potential located at NX 67369 60315 just outside the line of the Proposed Development Site. These potential roosts are indicated in Figure 6-4-1. Furthermore, the Proposed Development Site is bordered on its northern and western edges by mature plantation which has potential to contain further bat roosts not identified during the survey.

The combination of watercourses and ditches crossing the Proposed Development Site allow for bat foraging opportunities, as does the large waterbody of Loch Mannoch, and the Proposed Development Site is connected to the wider landscape by both watercourses and mature hedges. The wider landscape surrounding the Proposed Development Site contains large areas of mature plantation (to the north and west) and to the south-east, mature broadleaved woodland, with further potential for bat roosts. Please refer to TA 6-3: Bat Surveys (automated static) for information on bat survey results and mitigation recommendations.

3.2.4 Birds

Numerous bird species were observed during ornithology surveys undertaken between September 2019 and July 2023. These included black grouse *Lyrurus tetrix*, golden plover *Pluvialis apricaria*, greenshank *Tringa nebularia*, greylag goose *Anser anser*, hen harrier *Circus cyaneus*, merlin *Falco columbarius*, red kite *Milvus milvus* and snipe *Gallinago gallinago*. The ornithological baseline is presented in TA 7.1: Ornithology, whilst an assessment of effects on ornithological receptors is presented in the EIAR, Chapter 7: Ornithology.

Surveys for black grouse have taken place in 2020 and 2021 and, although some of the survey area was identified as being potentially suitable habitat for this species, none were observed during the 2020 dedicated surveys.

In 2021, two heard-only records of black grouse were recorded outside of accessible areas in forestry to the south-west of the original Proposed Development Site and an incidental recording of grouse droppings found within the Proposed Development Site.

Grouse are considered to be in the area even though no leks were identified on or close to the Proposed Development Site. In addition to the heard record and the droppings, there were two sightings during Vantage Point surveys; one standard record in November 2020 and the other was an incidental record of a black grouse flushed from the Proposed Development Site as the surveyor was walking past in December 2020.

3.2.5 Herpetofauna

No reptiles or amphibians were recorded during the protected species surveys, although two potential reptile/amphibian hibernacula were noted, at NGR NX 67592 61318 and NX 67716 61087. Given the habitats on the Proposed Development Site, the presence of reptiles and amphibians cannot be scoped out.

4 HMP

4.1 HMP Area

HMP Areas are shown on Figure 6-9: Habitat Enhancement Areas.

NatureScot guidance states that a 1:10 loss to compensation ratio of priority peatland should be undertaken plus 10% of the 'baseline assessment' of peatland within the Proposed Development Site should be covered by enhancement measures.

It is noted that the priority peatland loss accounts for 9.39 ha and, on a x10 basis, 93.9 ha should therefore be targeted as compensation under NatureScot (2023) guidance. For enhancement, an additional 10% of potential National interest priority peatlands is required, which amounts to 0.12 ha based on the 1.02 ha of these types within the Proposed Development Site (Figure 6-4). As such, 95.10 ha is required in total under guidance and 88 ha has been identified under the current restoration plan.

This is less than the target under guidance as several areas containing cultural heritage assets have been removed from earlier restoration proposals. It is however considered a significant enhancement given the 1/9.25 loss/compensation ratio when considered in the context that guidance defines priority peatlands as peatlands which show 'evidence of being undisturbed and actively forming peat.'

A single area proposed for increasing broad-leaved woodland is located to the east of the existing broad-leaved plantation within the proposed solar farm (Figure 6-9). Furthermore various areas are suggested for scrub thickening within this solar farm area in addition to enhancing the existing improved grassland into wildflower areas.

Black grouse habitat enhancements include softening of woodland edges around the turbine areas to create a graded ecotone of ruderal woodland, scrub and marshy grassland.

In terms of enhancement for species, areas around the existing plantation woodland where further woodland planting is proposed has been identified as suitable for bat box installation. Installing bat boxes increases the number of potential roost sites away from the Proposed Development and helps to keep bats away from wind turbines, reducing collision risk and barometric trauma. Additionally, bird boxes will also be installed within this woodland area, whilst hibernacula will be placed within the area of marshy grassland surrounding Lake Mannoch (Figure 6-9).

4.2 Outline HMP Heads of Terms

With consideration of the habitats present, and to a lesser degree species, the aim for to achieve a significant biodiversity gain, primarily through compensation and enhancement of priority peatland. To facilitate this the following broad heads of terms are identified and outline prescriptions are allocated a unique identifier in the following text, consisting of the text Laird followed by the prescription number. Outline prescriptions are summarised in Table 6.6.10.

4.3 Reduce Peatland Degradation

4.3.1 Aim

To increase the extent and diversity of blanket bog habitat in areas where suitable hydrological regimes can be created to support bog habitat. The aim is to increase blanket bog extent and provide opportunities for expansion of peatland floral species, whilst reducing the dominance of purple moor-grass.

4.3.2 Background and Justification

Blanket bog is a priority habitat under Annex I of the EU Habitats Directive. Blanket bog also has priority status in the UK Biodiversity Action Plan.

Whilst much of the area within the Proposed Development Site has been identified as active blanket bog, there is evidence that areas identified for restoration are degraded and are capable of reverting back to active bog under the correct hydrological regimes. Some peatlands have been identified as being actively drained so by targeting these areas it is possible to restore peatland hydrology (see Figures 6-8 and 6-9 which shows all drains present and which of these erosion features will be used for restoration, respectively).

The Joint Nature Conservation Committee (JNCC) define 'active' blanket bog as supporting a significant area of vegetation that is normally peat-forming. Typical species include the important peat-forming species, such as bog-mosses *Sphagnum* spp. and cotton-grasses *Eriophorum* spp., or purple moor-grass in certain circumstances, together with heather and other ericaceous species. It is worth noting that the assessments of habitats being capable of reverting to bog are made within the context of the lifespan of the wind farm or potentially longer.

4.3.3 Outline Prescriptions

Laird1: Peatland restoration through increasing water levels.

Prior to commencement of the restoration strategy this plan will be communicated to all landholders to ensure that works within this plan do not conflict with other activities such as intended drainage, grazing rights etc. For example, there are many drains in the proposed wind farm area (Figure 6-8) and most of these will be blocked under this HMP (Figure 6-9). However, where drains abut the adjacent wind farm, or where any restoration measures abut land not directly connected with the Proposed Development, drains will be bunded (hydrologically sealed) to not affect the hydrology within those areas.

Peatland restoration will be achieved through utilisation of methods including ditch blocking and artificial dams. The number and type of dams installed and intervals between them will be dependent upon the ditch gradient, width, depth, flow, best practice guidance published by NatureScot (www.nature.scot/climate-change/taking-action/peatland-action/peatland-action-project-resources / www.nature.scot/sites/default/files/2019-03/Guidance-Peatland-Action-installing-peat-dams.pdf) and the professional judgement of the experienced staff who undertake the work and techniques will be informed by best practice as per the Peatland Action Technical Compendium (NatureScot, 2022).

The buffers surrounding ditches vary depending on the habitat they are located within and align with indirect loss buffers as NatureScot expects equivalence in this respect. The following buffers are applied to different tiers of priority peatland present on the Proposed Development Site based on their quality as reflected in the 2023 guidance:

- M15 and M25 on 50cm or more peat – 10 m.

88 ha of restoration will result from ditch blocking and hagg across the habitats described above. This 88ha area was calculated by assuming that all drains on 50 cm or more peat and within shallower organic soil >0.3 m (i.e. with the potential for priority habitat) will be blocked; excluding areas within the infrastructure footprint. This area also avoided any cultural heritage constraints identified and private water supplies.

It should be noted that understanding of best practice peatland restoration techniques continues to evolve and as such best practice guidance at the time of work being carried out will be taken into account. Restoration will focus on the most eroded areas first but will extend into the entire compensation/enhancement area in order to meet the requirements required under NatureScot (2023) guidance as shown on Figures 6-8 and 6-9. Whilst works will be undertaken outside periods of peak flow, the capacity of drains will be considered on a winter-basis as a precaution.

Ditch Blocking

Throughout the process, hydrological management techniques will be assessed for their effectiveness through water table monitoring and, if required, strategies may be redesigned to increase rate and / or coverage of water table recovery.

Ditch blocking will be utilised to encourage rewetting of the drained areas of peatland. Figures 6-8 and 6-9 include locations of the ditches on the Proposed Development Site which will be blocked.

This will comprise blocking of drainage ditches to slow down the seepage of water from the system, encourage rewetting of the adjacent peat mass, and encourage restoration of the peatland habitats via the colonisation and/or expansion of bog-mosses and other peat-forming species. The blocking must start from the highest point of the peatland and work successively downwards. Distance between blocks should be spaced (up to 3m) or spaced farther apart (up to 15m), with spacing reducing as slope severity increases to allow more effective retention of water and to decrease the flow at each block or dam (Mills and Rushton, 2023).

- For drain blocking, each restoration location will be assessed individually on the ground by the Ecological Clerk of Works (ECoW) and Peat Specialist;
- Toe protection measures will be required to hold in the peat (to include peat dams, sheet piles, coir rolls, timber dams and/or stone dams). Heather bales will be avoided because of their short lifespan. Dams will be c.40 cm above the surface level of the ditch and keyed-in to the ditch (stepped perpendicular to the ditch to secure the dam); and
- The difference in water levels downstream and upstream should be limited to less than 30 cm to reduce pressure and keep the water table sufficiently high.

The need for surface protection such as biodegradable geotextile materials or the spreading of heather rich brash will be reviewed onsite.

For this rewetting to be successful, the water flow must be dispersed over a large area, and not concentrated into concentrated areas which could cause local erosion.

Backfilling

Backfilling is an alternative to the dam / blocking process described above. Backfilling involves instead of blocking or creating dams at certain points, entirely filling in a ditch. It is the most effective method for rewetting peatland but should only be done in areas of significant drying. The best methodology to complete an entire ditch backfill is to use a large quantity of peat and lay turves on top.

Backfilling or gully blocking can also be used in areas of eroded peat to slow down and stop further erosions.

Peatland Turve reuse

Peatland habitats will be affected by the Proposed Development through direct loss under the Proposed Development footprint and through potential for indirect disturbance within infrastructure buffers. Habitats will be either permanently lost (buried under floating infrastructure), removed from under non-floating permanent infrastructure and used for reinstatement elsewhere on the Proposed Development Site or removed from under temporary infrastructure, stored locally and reinstated following construction.

A Peat Management Plan (PMP) has been prepared to support the Proposed Development (Technical Appendix 8-2). The PMP provides detailed information on avoidance of peat through design, excavation of peat and reuse of peat in relation to the amended development. This PMP has identified peat areas which are suitable for restoration and this activity also forms part of the requirements of this HMP in order to facilitate retention of sensitive blanket bog vegetation for reuse in restoration.

In order to retain important peatland habitat features wherever possible on the Proposed Development Site, the following measures will be undertaken:

- Further survey of vegetation within infrastructure micro siting allowances will be undertaken prior to construction in order to identify and if possible, avoid areas of sensitive habitat and sensitive plant species;
- Where it is not possible to avoid areas of sensitive habitat and sensitive plant species then vegetation from these areas will be translocated for use in restoration of peat on Site and as identified in the PMP;
- A translocation methodology will be produced as part of the final HMP which will draw on the measures detailed in the PMP and best practice information available at the time. This will include, but not be limited to, the following outline steps:
  - Methods for collection of material from the donor site, such as cutting turves to 0.3 m thickness and ensuring sufficient peat soil to hold the roots in place;
  - Methods of material and vegetation storage prior to reinstatement at receptor sites, ensuring the minimum time period for storage and that conditions appropriate to viability of translocated material are in place;
  - Actions to prepare the receptor site to receive translocated vegetation; and
  - Monitoring of translocated vegetation to assess translocation success.

Several fixed monitoring locations will be established within blanket bog communities within the HMP Area, including within restored areas, with the aim being to monitor the long-term condition of the HMP Area through a programme of annual fixed-point photography and quadrat monitoring.

This prescription method is counted as reinstatement instead of restoration but is still an essential prescription for this HMP as the methods of enhancing or restoring peatlands without existing peatland turves are limited and generally less successful.

Peat Reuse / Reinstatement Methodology

Peat reuse will be undertaken in the correct sequence to recreate the in-situ peat stratigraphy, with acrotelmic peat placed on top of catotelmic peat. Where excavated levels require, catotelmic peat will be placed first to form a surface lower than the proposed final ground level to accord with the thickness of turves available.

The acrotelm turves will then be placed, with their edges butted together to avoid bare peat sections. Protruding edges will be levelled, ensuring that the vegetation recovered with the turves forms a continuous surface.

The excavator forks will be used to press the turves into place to minimise the potential for voids to remain under the turves.

Following completion of turf replacement any gaps between turf edges will be filled with acrotelm peat which has been dislodged from the base of turves in storage areas and or vehicles. This will be undertaken by hand to avoid the need for placed turves to be tracked over.

Recreated slopes will be of a gradient of 1:3 or less. Peat will be restored to form a surface that interacts with the groundwater in a similar way to adjacent in situ peat by not being significantly raised above adjacent surfaces.

Reinstatement of vegetation will be focused on natural regeneration utilising vegetated turves and the existing seed bank. If the quantity of excavated vegetated acrotelm turves is not sufficient, seed from locally growing grass and rush species will be spread over these areas as a nurse crop.

Seeds will be gathered between May and July when they are most abundant. Local provenance will be used wherever possible but, as a last resort, regional provenance seed will be purchased.

Seed will be spread manually where the areas are small or through the use of spreaders mounted on all-terrain vehicles (ATVs) as agreed with the ECoW.

It is likely that a biodegradable geotextile will be required to stabilise the bare peat surface and allow the seeds to geminate and establish. GeoJute or similar material will be used.

4.4 Increasing *Sphagnum* Diversity

4.4.1 Aim

To reduce the dominance of purple moor-grass across the Proposed Development Site and increase the presence and diversity of bog-mosses *Sphagnum* species.

4.4.2 Background and Justification

Pilkington *et al.* (2021) state that *"Blanket bogs are globally rare and a nationally protected UK Biodiversity Action Plan (BAP) priority habitat; increasing levels of domination by Molinia on these sites is a growing concern for conservationists because it can displace or exclude species, especially but not exclusively Sphagnum species,*

which are indicative of bog in 'favourable' and actively peat-building condition." Their study examined whether the active planting of *Sphagnum* propagules reduced the dominance of purple moor-grass across three sites, whilst simultaneously increasing *Sphagnum* diversity. Furthermore, they compared the cover of purple moor-grass and *Sphagnum* when only plug planting was used in addition to the combined effects from plug planting with purple moor-grass flailing and flailing followed by windrowing.

The study found that plug planting did lead to an initial increase in *Sphagnum* cover from 1% to 16% within the first year; however, their research did show a plateauing in later years. Their conclusions stressed the importance of increasing the water table to facilitate successful propagation of *Sphagnum*; highlighting the necessity of combining plug planting with the methods detailed in Section 4.3 above.

Pilkington *et al*. (2021) did not find conclusive evidence that flailing or windrowing reduced the cover of purple moor-grass beyond a temporary setback, and there is currently no known effective measure for controlling this species in blanket bog habitat. Therefore a combined approach is proposed utilising the drainage measures within Section 4.3 along with plug planting, flailing and windrowing.

4.4.3 Outline Prescriptions

Laird2: Increasing the cover and diversity of *Sphagnum* species through controlling purple moor-grass and undergoing plug planting.

Following the methods detailed within Pilkington *et al.* (2021), *Sphagnum* propagules in the form of plugs will be hand planted in mid-summer within the flattest areas (<3°) found in the priority peatland restoration areas shown on Figure 6-8 and 6-9; totalling 8.50 ha. A mix of species will be used, with suggested *Sphagnum* species provided at Appendix D.

It should be noted that it can take approximately 12-24 months to grow to order *Sphagnum* plugs, particularly if deriving these plugs from local seed stock, thus this delay must be considered in the programme. However, where local stock is available earlier, this would be used wherever practical. Consideration of the amount of available stock at a given point, in tandem with identification of an ecologically coherent area to restore, would be required when considering this phased approach.

Each plug will be planted using a long-handled dibber to make a hole that will be subsequently closed around the plug to ensure that each plug is anchored and in contact with moist peat.

Flailing and windrowing should be completed in autumn, with flailing done by using a mechanically powered and rapidly rotating system of metal scallops which will be set low enough to cut the vegetation as well as the surface rooting structure. Windrowing should be achieved by hand-raking the flailed material (mulch) into lines approximately 5m apart immediately after flailing.

4.5 Natural Regeneration of Vegetation

4.5.1 Aim

To enable natural regeneration of vegetation with particular focus on active blanket bog species such as heather and bog mosses.

4.5.2 Background and Justification

The blanket bog currently has a very low species diversity and is dominated by purple moor-grass which is limiting the growth of other key moorland species. In restoration areas, the moorland will be protected to allow natural regeneration of vegetation by excluding stock and vehicle access.

4.5.3 Outline Prescriptions

Laird3: Natural regeneration of vegetation.

To enable natural regeneration of vegetation on the Proposed Development Site it will be necessary to implement an exclusion for stock in the controlled restoration areas. This would include stock proof fencing around these areas.

In areas where the species diversity is low, seeding and plug plants may be used in protected areas, with the use of heather brash on bare peat. Appendix C provides an indicative list of species that could be utilised. Ideally, these should be of local provenance or where this is not possible, Scotland/UK provenance.

Securing enhancement locations

If site clearance and construction activities are required to take place during the main nesting bird season, between March to August inclusive, pre-commencement survey work would be undertaken to ensure no nest destruction and disturbance to sensitive bird species. Nest searches will also be completed on a rolling programme by the ECoW to provide the most up-to-date information in all areas where development works are being undertaken that could impact nesting birds.

Prior to construction, Heras fencing will be erected to ensure that no works or grazing occurs within the area in order to facilitate *Sphagnum* establishment. Fencing should remain in place for the entire construction period or, if construction is completed in under a year, for at least one year and then removed, subject to approval by the ECoW.

Grazing and farmland operations

Whilst it is understood that there is a low stocking density of cattle and sheep, the timing of grazing could have a significant impact on restoration areas. For example, grazing in the winter months can be particularly deleterious to some bog and heath vegetation and result in compositional change in the plant community, especially at high stocking rates.

The restoration strategy will have an impact on grazing levels within restoration areas as recommended stocking densities for target blanket bog are low, at less than 0.02 Livestock Units (LUs)/Ha/Yr. *Sphagnum* plug planting in tandem with ditch blocking is vulnerable to grazing and trampling. Livestock will be excluded from restoration areas

and annual monitoring undertaken to determine success within the first 5 years. If the habitat is successfully establishing, livestock would be reintroduced at that time to increase the density of grazing. Grazing levels will be low during the operational lifespan of the Proposed Development in these areas, only up to 0.4 sheep per ha (IUCN UK Committee Peatland Programme: briefing Note 7: Grazing and Trampling). These levels could be varied following an Herbivore Impact Assessment in a future version of the HMP.

Whilst restoration areas will be clearly fenced off, outside of these areas stock on *Molinia* grasslands could remain higher at 0.25 LU/ha/yr and higher still during March, April and May (0.5 to 1 head cattle/ha or 6 ewes/ha) to reduce the cover of *Molinia*. *Molinia* is indicative of drying out, lowering of water tables, is not actively peat-forming and its spread therefore limits carbon sequestration capacity (unlike active bog) so this measure will be incorporated into future management and repeated each year, outwith restoration areas.

4.6 Grassland & Wildflower Planting

4.6.1 Aim

Enhance the areas of improved grassland surrounding the proposed solar area, increasing habitat diversity and providing foraging opportunities for invertebrates.

4.6.2 Background and Justification

The current improved grassland dominating the eastern half of the Proposed Development Site provides limited ecological value; however, increasing wildflower cover will increase foraging resource for a wide range of invertebrates, birds and small mammals.

4.6.3 Outline Prescriptions

Laird4: Increase wildflower planting within solar farm section of the Proposed Development Site (10.29 ha).

Grassland Creation

Soil Preparation

All topsoil will be stripped in dry weather conditions, stored in heaps not exceeding 2 m high and maintained weed free using compaction and/or tarpaulin for re-use across the Proposed Development Site. Any imported topsoil will possess a medium texture, neutral pH value and contain no stones over 20 mm in size; adhering to BS3882 'Specification for topsoil'.

Prior to placing topsoil, subsoil is to be ripped to alleviate any compaction and ensure free drainage to the minimum rooting depths of 450 mm. Soils for use in large areas of open grassland will be spread mechanically, working out from one corner to minimise compaction. A minimum topsoil depth of 150 mm for grass areas will be achieved.

All wildflower areas will be sown onto subsoil, not topsoil, for the best chance of establishment. Areas for planting and habitat creation will be protected from compaction via exclusion fencing as far as possible.

Low Flowering Grassland Seed Mix

The areas of improved grassland that will be underneath solar panels will be sown with a low-growing species-rich mix of grasses, such as Flowering Lawn Mix (SCM6) (available at https://www.scotiaseeds.co.uk/shop/flowering-lawn-mix/) or equivalent.

Prior to sowing, a fine seedbed will, be created from topsoil, prepared as per the specification set out above. Seeds will be sown in the subsoil at a rate of 2-3 g/m2 to a depth of 10 mm at diagonals to the main axis in two equal sowings to ensure good distribution. Following sowing, the ground will be rolled to ensure good seed contact.

Following on from sowing, seedlings are expected to appear within 2 weeks depending on local conditions.

Wildflower Seed Mix

Bee, Bird & Butterfly Mix (SCF13) 100% Wildflower Mix (available at https://www.scotiaseeds.co.uk/shop/bee-bird-butterfly-mix/), or similar, will be sown across the solar area of the Proposed Development Site, particularly along the margins surrounding solar panels and within 11.20 ha of improved grassland currently proposed to be retained and unaltered by the development.

In the first instance, any existing vegetation will be cut back to a ground level. Following this cut, the cuttings will be removed offsite. Any remaining surface vegetation will then be dug in using a hand-operated rotovator (where possible). Should any weed species persist, this process will be repeated, or (where appropriate), spot treatment of weeds will be carried out.

Prior to seeding, these areas will be treated with a non-selective, non-persistent herbicide, if required, to reduce any colonising plants or scrub growth. Any surface vegetation will then be dug in using a rotavator, followed by harrowing or raking to produce a medium tilth, and rolling or treading to produce a firm surface.

Sowing of grassland will not be carried out during periods when the ground is dry, waterlogged or frozen. Sowing of the area of grassland will occur in Spring or Autumn. Autumn is preferred because seeds of some species require the winter chilling for good germination, whilst these timescales will also enable a high proportion of seeds to flower the following year (which a spring sowing would not achieve). Seeds should be sown at a rate of 5 g/m2 by machine or hand and firmed in with a roller or treading, in accordance with suppliers recommendations.

Grassland Management

Low Flowering Grassland Seed Mix

The grassland will be managed by light grazing or cutting several times in the first year to reduce competition from annual weeds and allow the ground cover to become established. The cutting regime for the grassland aims to promote the development of a perennial, predominantly summer-flowering sward. From the second year onwards, one cut to 10cm will be undertaken in August; with arisings to be left to shed seed and then removed from site. A further cut can be undertaken in October and April, if required.

Grass cuttings will be collected and composted onsite or taken off-site to an appropriate waste facility. Treatment of weeds will be limited to hand pulling or spot

treatment with an appropriate herbicide. The use of fungicide, herbicide and chemicals will be avoided where possible.

Wildflower Seed Mix

The wildflower species in this mix are biennial and perennial; thus they will be slow to germinate and grow and will not usually flower in their first growing season. Therefore, there will be a proportion of bare ground before fully established which may mean annual weeds occur in the first growing season.

Throughout the first year of establishment, newly sown flowering areas should be mown in the Spring, again in late July/August (after flowering), and again in November. This is to a height of 40-60 mm, removing cuttings if dense. This will gradually develop a good sward structure and control annual weeds. Tractors should not be used in Year 1 and hand pulling or other manual control (e.g. strimming) would be implemented if weeds were considered too dominant. The largest machine to which will be used in the Spring of Year 1 would be hand-held mower, to avoid destroying target species.

From Year 2 a single cut in late summer (to 10cm) will suffice.

The cutting regime for these grasslands aims to promote the development of a perennial/biennial, predominantly summer-flowering sward. From the second year onwards, one cut will be undertaken in August; with arisings to be left to shed seed and then removed from site. A further cut can be undertaken in October and April, if required.

It is beneficial to leave uncut strips along the edges of the wildflower areas as a foraging resource for insects, enabling late flowering species to set seed and to provide shelter for other wildlife.

Any loss of planting which occurs within 5 years of the initial planting as a result of plant failure will be replaced with the same plant species.

4.7 Tree and Scrub Planting

4.7.1 Aim

Plant a range of tree species with diverse structure for the enhancement of biodiversity within the proposed solar area in the eastern half of the Proposed Development Site.

4.7.2 Background and Justification

Scotland has much less woodland compared to other European countries and native tree and shrub species provide much of our native wildlife with its natural habitats (NatureScot, 2024). With regards to species, increasing the scrub cover surrounding Loch Mannoch would provide additional habitat for sheltering herpetofauna and potentially provide suitable opportunities for otter holts.

Furthermore, **Chapter 5: Landscape and Visual** suggests the use of tree and scrub planting to screen the solar panels, and their waterside planting mix along the watercourses will increase the available habitat for otter holt creation. Overall scrub thickening and tree planting in the eastern half of the Proposed Development Site will increase the available wooded habitat for nesting birds, small mammals, herpetofauna, otter holts and badger sett creation.

4.7.3 Outline Prescriptions

Laird5: Woodland and scrub thickening up to 10.58 ha total.

HMP areas proposed for woodland and scrub planting are shown on Figure 6-9 at Appendix A, whilst the landscape proposals incorporate tree planting around the panels and margins of this eastern area for screening purposes; with suggested species lists provided at Appendix B. The expansion of the broadleaved woodland will total 1.84 ha, with scrub thickening totalling 4.97 ha whilst the landscape proposals will add an additional 1.73 ha for lowland/waterside trees plus 2.06 ha for their upland tree mix.

Tree and Scrub Planting

Native trees and shrubs will be planted into tree pits 2-3 times the width of root spread and to the depth of root spread. The tree pit sides are to be loosened, base aerated and later backfilled with the existing excavated subsoil and topsoil. All trees to be supported with a suitable tree guard and staked with adjustable tree ties. All shrubs to be staked and protected with rabbit guards.

Planting will take place between November and February. A range of ages/heights will be planted from whips at 40-60 cm and 80-100 cm transplants to heavy standards (HS) and extra heavy standards (EHS).

Tree Management

Trees to be managed to maintain their health and safety, including crown thinning and pruning where necessary. Pruning will be avoided during late winter/early spring period of sap flow and damaged and diseased limbs will be removed.

Successfully established trees will require minimal maintenance going forward. The specification of many of the trees as HS or EHS means they have already developed a desirable growth habit. Therefore, no specific shaping is required.

As the trees grow, the tree guards may need replacing with larger diameter guards to ensure growth is not restricted. Ties will also need loosening between the tree and the stakes. Any failed stakes or guards are to be replaced. Any dead limbs will be removed promptly by hand loppers or a chainsaw to minimise risk of injury. Any removed wood will be stored in the wildflower grassland areas or the margins of Loch Mannoch in log piles to provide shelter for herpetofauna and invertebrates.

Where tree replacement is required, species to reflect original planting plan will be planted, unless species-specific issues or disease have been identified.

4.8 Black Grouse Habitat Enhancement

4.8.1 Aim

Black grouse is the fastest declining bird species in the UK (Forestry & Land Scotland, 2025) and is on the Red List of most endangered species. Therefore, based on the presence of low numbers of a probable relict black grouse population, enhancements will be made to encourage the use of the Proposed Development Site. Black grouse are birds of edge habitats and the transitional nature between forestry and moorland

makes the Proposed Development Site suitable for an opportunity to bolster the population in the area.

4.8.2 Background and Justification

Black grouse typically prefer habitats transitional between forest and open heath, marginal cultivation, bog or fen. The presence of trees is essential but must not be in dense stands or form a closed canopy and should preferably be in scattered groups of no great height, and adjoin open glades, clearings, burnt patches or fringes in the course of encroachment by natural regeneration.

Diverse requirements for availability of preferred food plants, open bare or sparsely vegetated land for display, good shelter for roosting, and arboreal perches close together lead to a concentration on mixed terrain. Transitional character of such habitats often renders them less suitable over time as the character of the habitat alters, which means black grouse may be mobile in the wider environment in response to changing habitats.

4.8.3 Outline Prescriptions

Laird6: Creation of 23.64 ha of transitional habitat mosaic comprising select broad-leaved tree species, ericaceous ground flora, acid grassland, rushes and wet flushes.

As shown on Figure 6-4, this part of the Proposed Development Site is comprised of M25 *Molinia caerulea – Potentilla erecta* mire grassland and is therefore easier to 'progress' to the desired habitat rage suitable for black grouse.

The HMA shown on Figure 6-9 comprises 23.64 ha of proposed planting, the exact proportions of which will be determined by the ECoW and developed within future iterations of this HMP. At the west of the HMA, where it abuts adjacent conifer plantation, the woodland edge will be extended, using native broad-leaved tree species grading into shrub and rushes to create an ecotone.

Should any fences be present within the vicinity, on agreement with landowners, these will be removed to reduce the risk of black grouse fatalities. Should fence removal not be an option, in case stock or deer fencing is deemed necessary for example, measures to make fencing more visible will be developed.

The 23.64 ha area will comprise the following components:

- Limited felling along the edges of the surrounding conifer plantation to create variations in age and structure where plantation has self-seeded within the Proposed Development Site;
- Where appropriate, selective planting of broad-leaved tree and shrub species of a variety of ages to improve species and structural diversity of the woodland edge habitat (species to include birch, Scots pine, juniper *Juniperus communis*, rowan, hawthorn and larch *Larix decidua*), canopy cover of the 23.64 ha will be between 20-40% with trees 5-8 m high; and
- Black grouse like shoots, flowers, and seed heads, whereas a thick grass dominated sward is less suitable. Furthermore as heather ages and becomes woody grouse cease feeding on it, and historically heather has been burnt in strips and patches when the plants are 15-20 cm high to produce fresh new growth to manage land

for grouse. As an alternative to burning, mechanical strimming, hand-held tools and/or grazing will be used to reduce the height and dominance of grasses and allow a shift towards more ericoid and bryophyte species resulting in a balanced habitat with a mix of species. Cutting is best done in late Autumn or early Spring along the edge of forests and the cut stems should be removed or they will inhibit regeneration.

4.9 Enhance wider habitat for local bat, bird and herpetofauna populations.

4.9.1 Aim

Increase local bat and bird populations away from the Proposed Development Site to avoid an increase in mortality/injury risk, plus increase potential available habitat for amphibians and reptiles.

4.9.2 Background and Justification

As per requirements under NPF4 (NatureScot, 2023b), include appropriate measures to conserve, restore and enhance biodiversity in relation to opportunities for species.

4.9.3 Outline Prescriptions

Laird7: Installation of bat and bird boxes plus creation of hibernacula.

Three bat boxes will be affixed to suitable mature retained trees across the Proposed Development Site situated away from turbine locations. These should be of a type similar to '1FF Schwegler Bat Box', which are suitable for crevice dwelling species, such as common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus,* plus these boxes are suitable for use by noctule *Nyctalus noctula*, which was the most common species recorded by bat static detectors accounting for 64.5% and 39.4% of registrations in 2023 and 2024, respectively (see TA 6-3: Bat Surveys (automated static)). The boxes will be placed on the south, south-western or south-eastern aspect of the trees, at least 2.8 m from the ground, and protected from direct rainfall and artificial light.

These types of bat boxes require no maintenance because they are open at the bottom, allowing droppings to fall out with no cleaning necessary, and will not be disturbed. Management is not required to check occupation as these serve as enhancement as opposed to mitigation for habitat or roost loss.

Three bird boxes will be affixed to suitable trees around the Proposed Development Site. These will be woodcrete or a similar durable material, with 32 mm and 26 mm diameter holes, such as the Schwegler 1B Nestbox or a type similar to this style. These will be attached around 3 m from the ground on northern and eastern aspects.

Bird boxes will be cleaned out each autumn. This is the optimum period between the end of the breeding season (August) and the start of winter roosting periods. Contents will be removed, and any debris fully cleared out. Bird boxes should be left undisturbed during the bird breeding season (March-August, inclusive).

In addition, two hibernacula will be created surrounding the edge of Loch Mannoch. Hibernacula should be checked prior to the start of the hibernation period (before November) and any damage or wear identified. Hibernacula that are damaged will be repaired or replaced. Hibernacula should be left undisturbed during the reptile and amphibian hibernation period (November-February, inclusive).

4.10 Habitat Management Group

4.10.1 Aim

Provision of oversight mechanism and peer review opportunities to discuss the need for corrective actions (e.g. changes to current measures), how and when to implement them.

4.10.2 Background and Justification

Following consent, a Habitat Management Group (HMG) will be established. It is envisaged that this would be done by condition of the consent.

The HMG will be responsible for reviewing the findings of the habitat management programme and for refining the implementation of the plan if required. The developer or operator of the wind farm will be responsible for its funding and implementation.

4.10.3 Outline Prescriptions

Laird8: Establishment of a Habitat Management Group.

An ECoW will oversee all operations and initially facilitate the creation of which would include representatives from DGC, NS (if they indicate they wish to be involved), the Applicant and any landholders with vested interests.

In accordance with good land management practice, a register of management works undertaken on Proposed Development Site will be maintained to monitor that such works are consistent with the agreed objectives of the HMP. A technical report will be produced at the end of each year in which habitat management prescriptions have been undertaken. This will be submitted to the HMG for review.

The HMG will be established by the Applicant prior to construction commencing and will ensure that prescriptions are enacted in a timely manner and the results communicated back to stakeholders. The HMG will be responsible for reviewing the findings of all prescribed monitoring as part of the habitat management programme and for refining the implementation of the plan if required.

The Applicant or operator of the Proposed Development Site will be responsible for its funding and implementation. Ad hoc communication with the HMG including the distribution of any interim or monthly reports would be undertaken by email.

The HMG will meet annually for the first 5 years to ensure that the aims are progressing and to assess if any other factors have had an adverse or positive effect on the Site that were not considered. The minutes of these meetings will be communicated back to stakeholders. After the initial 5-year period, results from monitoring carried out in years 10 and 15 will be communicated to the HMG.

4.11 Monitoring the Effect of the Proposed Development

4.11.1 Aim

To ensure the effect of the Proposed Development is measured and that prescriptions in this plan, and any subsequent, relevant planning conditions, are adhered to.

4.11.2 Background and Justification

To ensure that the basis for consent is discharged and that an enhancement and significant biodiversity net gain is achieved.

4.11.3 Outline Prescriptions

Laird9: Monitoring during construction to operation to document habitat restoration and bird populations plus reviewing black grouse uptake of enhancement areas and use of faunal enhancements by relevant species groups.

Peat Habitat

In order to assess the effectiveness of the habitat restoration post construction, with the aim being to monitor the long-term condition of the Proposed Development, a programme of fixed-point photography and quadrat monitoring in Years 1, 3 and 5 will be in place. It is suggested that between 30-40 quadrats are used. The monitoring will be used to assess the effectiveness of the HMP, which can be updated to reflect this survey data. Following Year 5 the need for, and frequency of, further monitoring will be agreed with the HMG – see prescription 8; the frequency of surveys, which will be dependent on factors including how successful establishment has been and other land-use pressures, such as grazing densities.

Habitat monitoring will apply to 'drains' (i.e. bog) and bog restoration/creation areas as shown on Figure 6-9 considering the following criteria, as derived from McDonald *et al.* (1998), collecting a number of quantitative measures based upon that methodology namely:

- Common heather cover;
- Heath cover *Erica spp.* cover;
- Bilberry cover;
- Sphagnum/bryophyte cover;
- Intensity of common heather & bilberry browsing (recorded using classification categories of Low/Med/High);
- Stem breakage;
- Bryophyte depth;
- Trampled bare ground;
- Dung presence (from large herbivores);
- Dung pellets per 100 m^2;
- Average height of dwarf shrubs;
- Common heather age class;
- National Vegetation Classification (NVC) community; and

- Evidence of herbivores, such as burrows, warrens, runs, prints, etc.

In addition, a dipwell will be placed into each of the 30-40 quadrats to measure the water table.

Monitoring of the actual peatland restoration features will also be undertaken to check the integrity of the features and record any issues of further work requirements. If features are not performing correctly, remedial measures may be required e.g. increasing dam frequency.

Control of natural regeneration from adjacent plantation woodland

The regeneration of Sitka spruce and other invasive conifer trees will be controlled within the HMP areas.

Due to the presence of Sitka spruce trees around the margins of the HMP area, it is considered that unwanted Sitka spruce regeneration will take place on the open ground as it is likely to colonise at a quicker rate than ericaceous species. If left unchecked, the trees will again become dominant through the shading and drying out of lower growing species.

The Sitka spruce regeneration will be controlled through a regular programme of intervention and this is recommended to take place annually for the first five years of the HMP. Depending on the amount and age of the regeneration that occurs, appropriate removal operations will take place including hand pulling of seedlings or cutting of larger trees.

Non-Peat Habitat

Grasslands

In Year 1 following creation of the grasslands, an ecological walkover will be undertaken by a suitably qualified ecologist in early summer (i.e. June). It is important to note that the wildflower grassland habitats will support gradually growing perennials which may not be fully in evidence in Year 1.

This will record the following details:

- Species present;
- Coverage of grass and wildflower species (using the DAFOR scale);
- Evidence of seedlings and rosettes of wildflower species;
- Presence of any annual or perennial weeds;
- Coverage of bare ground or any stones; and
- Evidence of any negative effects e.g. browsing, trampling.

The results will be compared against the following targets:

- Coverage of wildflower and fine grasses as per seed mixes provided at Appendix B to be at least 'Occasional';
- Bare ground to be no more than 'Frequent', with no large stones and a good spread of desirable seedlings indicating the bare ground area will reduce over time;
- Annual or perennial weeds absent or 'Rare'; and
- No evidence of browsing or trampling.

If the above targets are not met for one or more of the habitat areas on the Year 1 walkover, remedial actions will be put into place. The remedial actions will be advised

by the Ecologist as appropriate at the time, but may include the following measures as an indication.

Poor establishment of seed mix

Identify whether this may be due to some species being slower to establish, or if this is likely to be due to unsuccessful sowing.

If other signs are positive, no remedial action needs to be taken and a re-survey will be undertaken in the following spring when more species may be in evidence.

If other signs are negative (e.g. large areas of bare ground/trampling/weeds etc), remedial action may be required. This may include:

- Re-sowing at a suitable time of year;
- Weed removal by hand or mechanically (no weed killer to be used); and
- Watering to aid seed establishment.

Coverage of weeds

If weed coverage is greater than 'Rare', remedial action will be required. Action should be taken before late summer to prevent the weeds from setting seed. Actions will be advised as appropriate and can include:

- Hand pulling of weeds;
- Strimming; and
- Mowing.

Coverage of bare ground

If bare ground coverage is greater than 'Frequent' and/or the soil texture is clumpy or many stones are present, remedial action may be required. This could include:

- Re-sowing of seeds; and
- Localised harrowing to reduce the size of the soil clumps and remove stones.

Evidence of negative effects

If evidence of negative pressures are found which may be affecting the establishment of the grasslands, remedial action will be required.

- Browsing/grazing – this is likely to be by rabbits or deer. Rabbit/deer control recommended as well as improved fencing, if appropriate; and
- Trampling – possibly caused by informal use of shortcuts or creation of desire lines by employees operating/maintaining the solar farm across grassed areas. Fencing likely to be most appropriate remedial measure

Trees and scrub

The provider of the tree stock will be required to check and replace any failed stock within the first year. It is therefore considered that specific monitoring of trees within Year 1 is already addressed via the landscaping contractors.

Long-term monitoring

From Years 2 – 40 onwards, the majority of the management of the Proposed Development is envisaged to be undertaken by landscape contractors and thus a programme will be worked up with them based on this HMP.

Aside from the routine management and maintenance, in terms of the biodiversity value of the Site, walkovers by an Ecologist of the natural habitat areas will occur in Years 2, 5, 10, 15, 25 and 40, between May and August.

These will record the criteria listed above, with the aim that by Year 5, cover of desirable species (as per the species mixes provided at Appendix B) will be 'Dominant' and habitats will be reaching their intended target condition.

Following the walkover in Year 1 and subsequent years, a report will be prepared with findings, recommendations and timescales for remedial action. This will be provided to the Applicant, the landscape contractors and DGC for information.

Birds

Although the effect of wind farms on flora and fauna is relatively well understood, it is important that models and understanding of the effect is continuously refined in order to inform future developments.

Ornithological post-construction monitoring will be undertaken in Years 1, 3 and 5 following the commencement of operation, with a review being undertaken as to the need for any further monitoring following Year 5.

The aim of monitoring will be to monitor bird populations within the Proposed Development Site to ensure that the wind farm is not having unpredicted adverse effects on the bird populations present, and to ensure that the HMP is effective in supporting the bird populations utilising the Proposed Development Site.

Although the detailed scope of the monitoring will be agreed with the DGC, NatureScot and RSPB Scotland, the following surveys will be carried out:

- Breeding bird surveys using a Brown and Shepherd approach (Brown, 1993) to allow breeding waders to be monitored across the Proposed Development Site and 500m buffer; and
- Breeding raptor surveys within the Proposed Development Site and where access permits to a distance of 2 km from the boundary.

Planting in black grouse HMAs will be checked at 6 months intervals in Years 1-2, and annually from Year 3 until Year 5. In addition, every 2 years from operation start until Year 8, and as per recommendations in Forestry Commission (1993), fixed point photography should be erected in HMAs areas to check for presence along with a detailed survey to check for droppings.

Bats

A mitigation strategy has been defined in response to the discovery of high concentrations of *Nyctalus* sp. bats within the Proposed Development Site during the summer and autumn of 2023. It is recommended that during the first year of operation, a tiered approach to mitigation is implemented, whereby, weather conditions and time periods dictate curtailment.

Post-construction monitoring is recommended for a minimum of the first 5 years of operation in order to adjust the mitigation strategy iteratively during Years 2 to 5; it is assumed that by Year 5 an optimum level of avoidance will have been determined and would be perpetuated for the lifetime of the Proposed Development.

Surveys would take place from 1st June until 31st October for the first 5 years of operation and will consist of the following:

- Nightly recording of bat activity at each turbine location by static detectors (30 nights July to mid-August and 30 nights mid-August to October); and
- and
- Monthly carcass searches around each turbine location.

Further curtailment and post-construction monitoring details can be found within TA 6-3: Bat Surveys (automated static).

Faunal Enhancements

The bird and bat boxes will be checked externally for signs of damage or wear annually. If any boxes are identified as being damaged or unfit for purpose, then they will be repaired or replaced with the same or similar type. In terms of monitoring the bat boxes non-invasive checks can be done without needing a licence.

However, prior to the interior of the box being checked, if field signs (dropping, staining, prey remains) indicate presence, or if bats are found within the box (no field signs observed beforehand) a Suitably Qualified Ecologist with a bat licence will be required to perform the check.

Hibernacula should be checked annually prior to the start of the hibernation period (before November) and any damage or wear identified. Hibernacula that are damaged will be repaired or replaced.

Outline Prescription Summary

Table 6.6.10 summarises the outline prescriptions and proposed monitoring schedules.

Table 6.6.10 Outline Prescriptions and Proposed Monitoring Schedules.

ID	Target Feature	Survey Type	Timing	Programme	Responsibility
Laird1	Restoration of peatland habitats	Plot Monitoring	Summer	During construction	Applicant / Suitably Qualified Ecologist
Laird2	Increasing *Sphagnum* diversity	Fixed point photography and quadrat monitoring/Plot monitoring	Summer	Throughout lifespan of project	Applicant / Suitably Qualified Ecologist
Laird3	Peatland habitat enhancement through natural regeneration	Fixed point photography and quadrat monitoring/Plot monitoring	Summer	Throughout lifespan of project	Applicant / Suitably Qualified Ecologist
Laird3	Peatland habitat enhancement through natural regeneration	Habitat management via tree cutting/sapling pulling	Summer	Annually Years 1- 5, 10, 15, 25 and 40	Applicant / Suitably Qualified Ecologist
Laird4	Grassland	Initial planting	Sowing will	Years 1, 2, 5,	Applicant /

ID	Target Feature	Survey Type	Timing	Programme	Responsibility
	planting	Checks to confirm planting condition	occur in Spring or ideally Autumn. Monitoring May – August	10, 15, 25 and 40	Suitably Qualified Ecologist
Laird5	Tree and scrub planting	Initial planting Checks to confirm planting condition	Planting in Winter (November - February). Monitoring May – August	Years 1, 2, 5, 10, 15, 25 and 40	Applicant / Suitably Qualified Ecologist
Laird6	Black grouse habitat enhancement	Checks to confirm planting condition. Fixed point photography and dropping checks.	Summer (April – June)	Planting checks at 6 months intervals in Years 1-2, and annually from Year 3 until Year 5. Fixed point photography and dropping checks Year 2 and every 2nd year until Year 8	Applicant / Suitably Qualified Ecologist
Laird7	Habitat enhancement for bats and birds through provision of c. three bat boxes and three bird boxes	Annual monitoring (one check)	November - February	Annually throughout lifespan of project	Suitably Qualified Ecologist/ SQE with bat licence
Laird7	Habitat enhancement for herpetofauna through provision of c. two hibernacula	Annual monitoring (one check)	March - October	Annually throughout lifespan of project	Applicant / Suitably Qualified Ecologist
Laird8	Habitat Management Group	Meetings with concerned parties	-	Annually Years 1- 5	Applicant / Suitably Qualified Ecologist
Laird9	Across	Breeding birds	April - July	Years 1, 3, 5,	Applicant /

ID	Target Feature	Survey Type	Timing	Programme	Responsibility
	Proposed Development Site and 500 m buffer	(Brown and Shepherd)		10 and 15	Suitably Qualified Ecologist
Laird9	Across Proposed Development Site and 2 km buffer	Raptor Monitoring	March - July	Years 1, 3, 5, 10 and 15	Applicant / Suitably Qualified Ecologist
Laird9	Around turbines	Bat monitoring including use of static detectors to monitor activity plus monthly carcass searches around each turbine location	1st June - 31st October	Annually Years 1-5	Applicant / Suitably Qualified Ecologist

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Appendix A. Figures

See Next Page

Lairdmannoch Energy Park

wind2

Figure 6-4
NVC Overview

Key

- Site boundary
- Turbine Location
- Survey Area
- Proposed infrastructure, including earthworks
- Watercourse crossing

NVC Community

MG7	S8
M15a	S9a
M15b	U4
M15d	U4b
M17a	U5d
M18a	U20
M23	U20c
M23b	W9b
M25	W23
M25a	Non-NVC

atmos CONSULTING

0 200 400 800
Metres

N

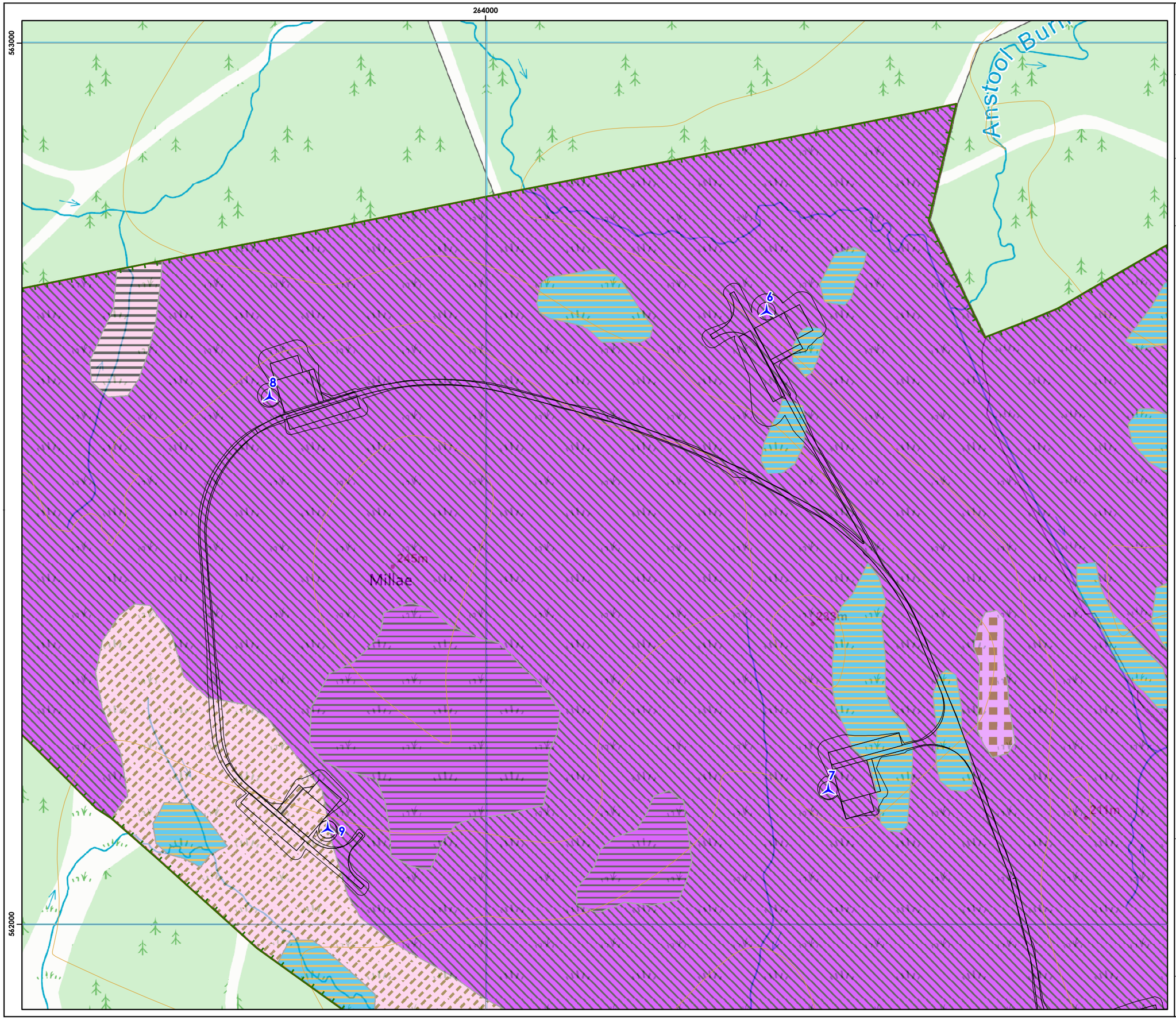
Scale @ A3:
1:16,000

19/03/2025 TL010 40418/HB/047d
Drawn by: LB Checked by: TH Approved by: SM

Lairdmannoch Energy Park

wind2

Figure 6-4
NVC Map 1



Key

- Site boundary
- Turbine Location
- Survey Area
- Proposed infrastructure, including earthworks
- Watercourse crossing

NVC Community

- M15b
- M17a
- M25
- M25a
- U5d
- U20

atmos CONSULTING

0 50 100 200
Metres

N

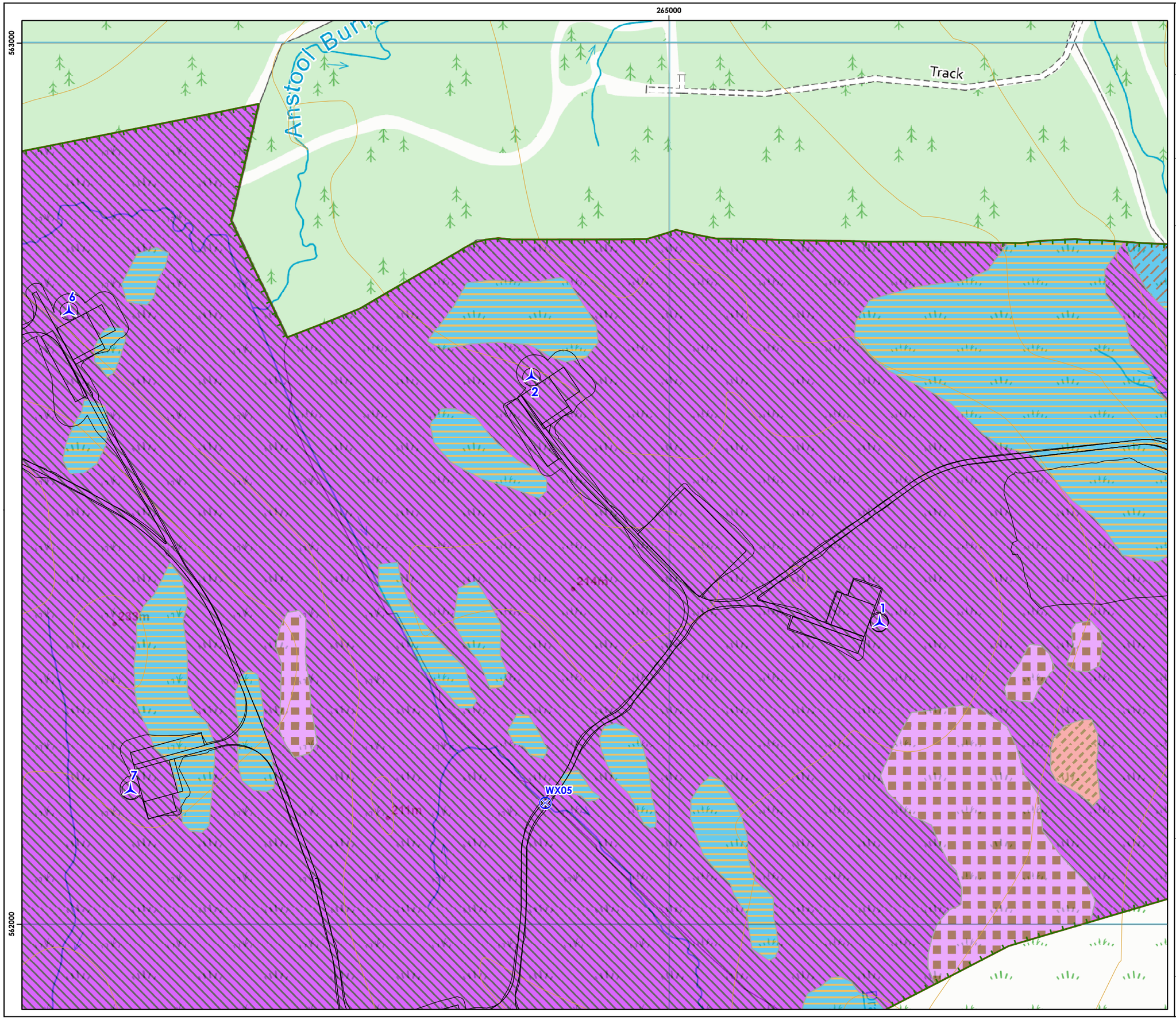
Scale @ A3:
1:4,000

19/03/2025	TL010	40418/HB/047d
Drawn by: LB	Checked by: TH	Approved by: SM

Lairdmannoch Energy Park

wind2

Figure 6-4
NVC Map 2



Key

- Site boundary
- Turbine Location
- Survey Area
- Proposed infrastructure, including earthworks
- Watercourse crossing

NVC Community

- M15a
- M25a
- U5d
- U20
- Non-NVC

atmos CONSULTING

0 50 100 200

Metres

N

Scale @ A3:
1:4,000

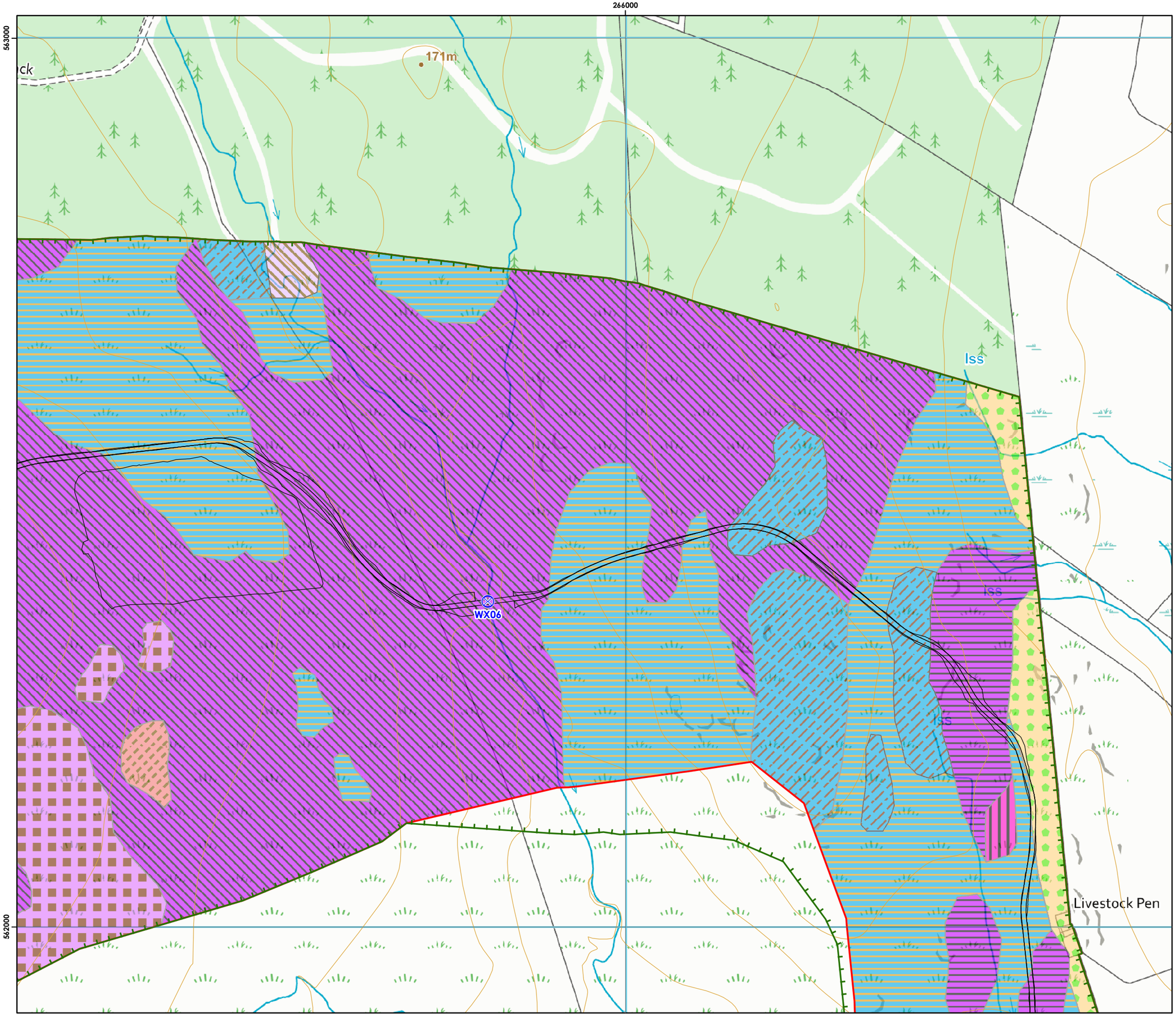
19/03/2025 TL010 40418/HB/047d

Drawn by: LB Checked by: TH Approved by: SM

Lairdmannoch Energy Park

wind2

Figure 6-4
NVC Map 3



Key

- Site boundary
- Turbine Location
- Survey Area
- Proposed infrastructure, including earthworks
- Watercourse crossing

NVC Community

- M15a
- M18a
- M23
- M23b
- M25
- M25a
- U4
- U5d
- U20
- W23
- Non-NVC

atmos CONSULTING

0 50 100 200
Metres

N

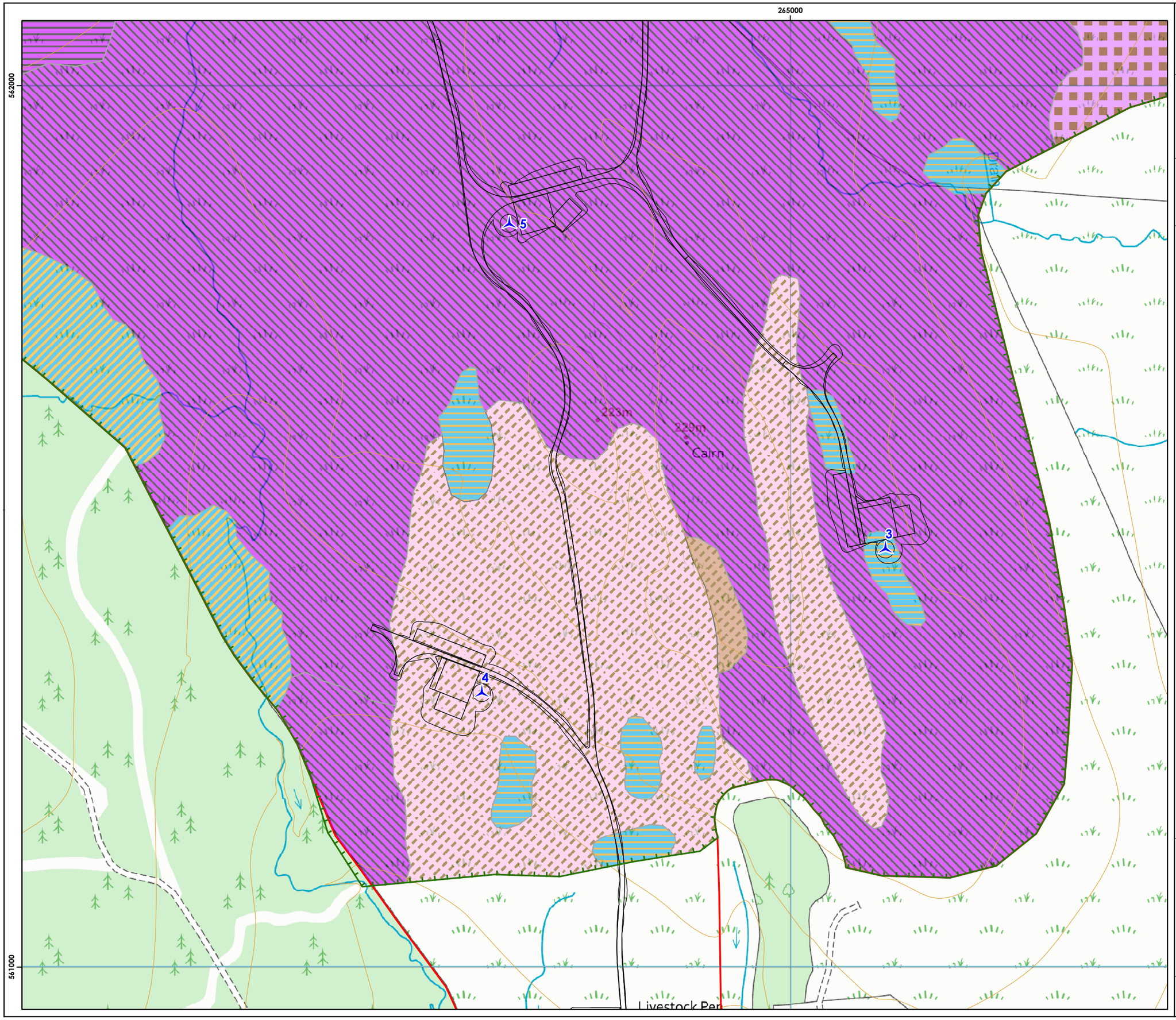
Scale @ A3:
1:4,000

19/03/2025 TL010 40418/HB/047d
Drawn by: LB Checked by: TH Approved by: SM

Lairdmannoch Energy Park

wind2

Figure 6-4
NVC Map 4



Key

- Site boundary
- Turbine Location
- Survey Area
- Proposed infrastructure, including earthworks
- Watercourse crossing

NVC Community

- M15b
- M15d
- M25a
- U5d
- U20
- U20c

atmos CONSULTING

0 50 100 200
Metres

N

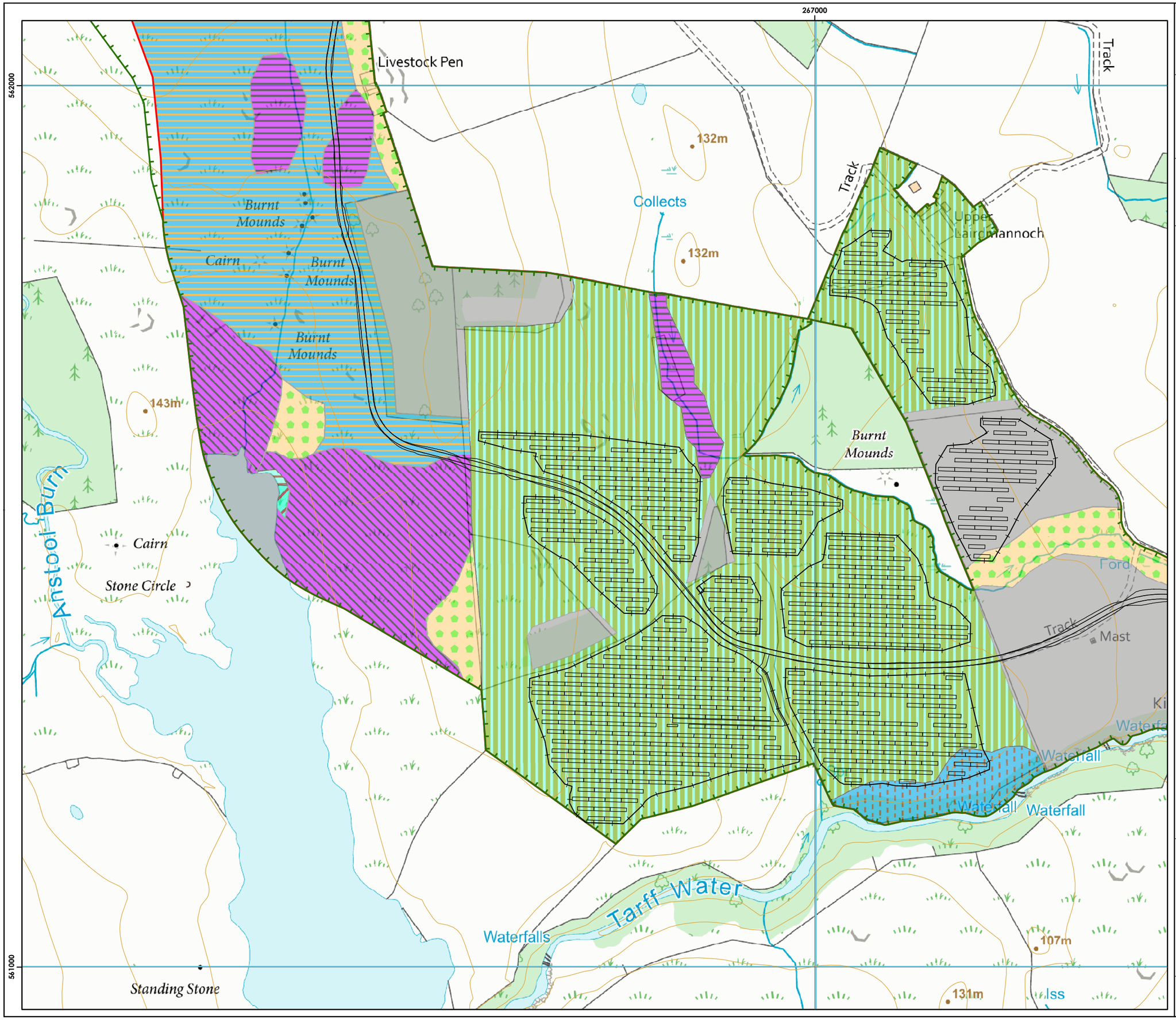
Scale @ A3:
1:4,000

19/03/2025 TL010 40418/HB/047d
Drawn by: LB Checked by: TH Approved by: SM

Lairdmannoch Energy Park

wind2

Figure 6-4
NVC Map 5



Key

- Site boundary
- Turbine Location
- Survey Area
- Proposed infrastructure, including earthworks
- Watercourse crossing

NVC Community

- MG7
- M25
- M25a
- S8
- S9a
- U4b
- U20
- W23
- Non-NVC

atmos CONSULTING

0 50 100 200
Metres

N

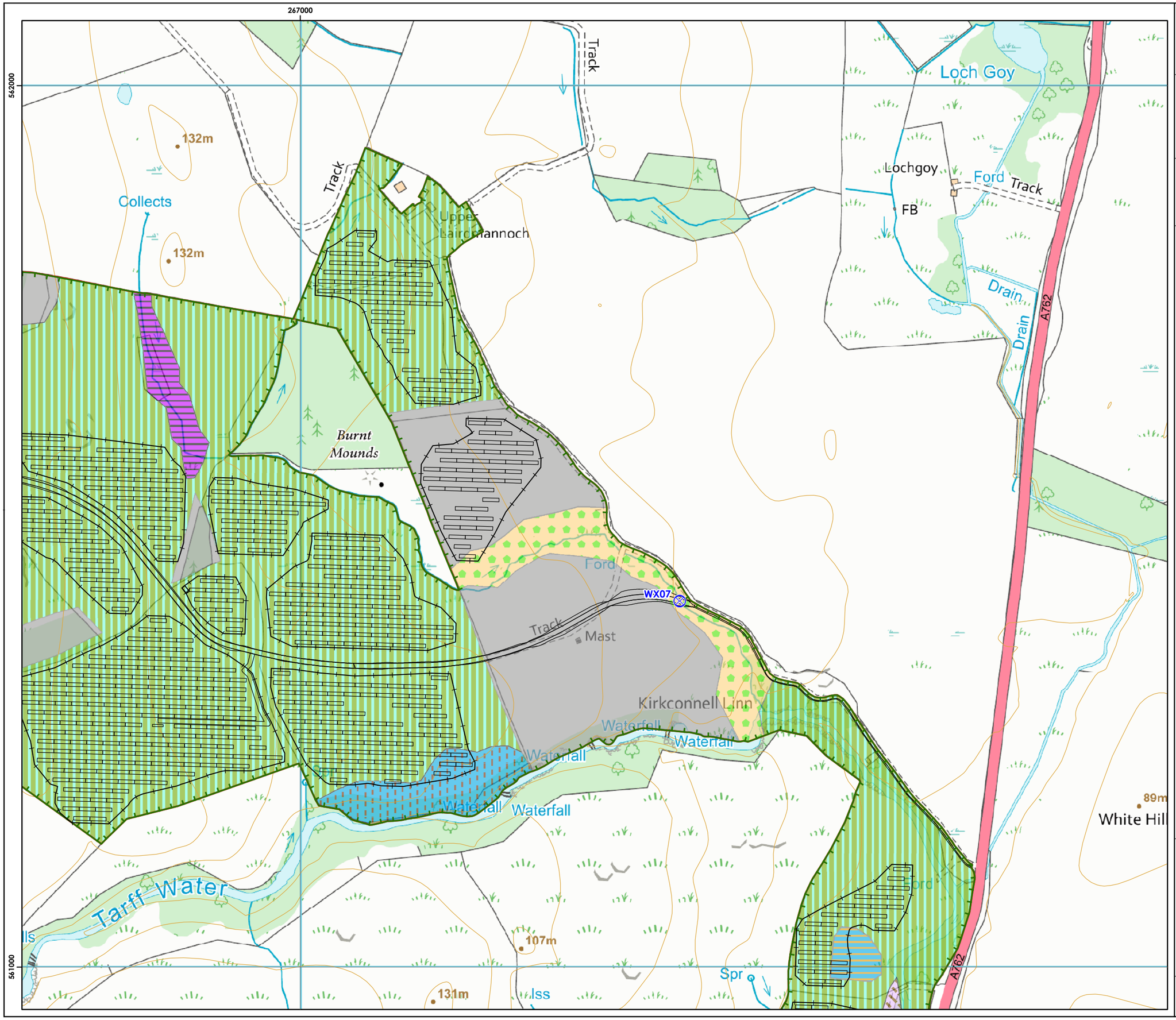
Scale @ A3:
1:4,000

19/03/2025 TL010 40418/HB/047d
Drawn by: LB Checked by: TH Approved by: SM

Lairdmannoch Energy Park

wind2

Figure 6-4
NVC Map 6



Key

- Site boundary
- Turbine Location
- Survey Area
- Proposed infrastructure, including earthworks
- Watercourse crossing

NVC Community

- MG7
- M25
- U4b
- U20
- W23
- Non-NVC

atmos CONSULTING

0 50 100 200
Metres

N

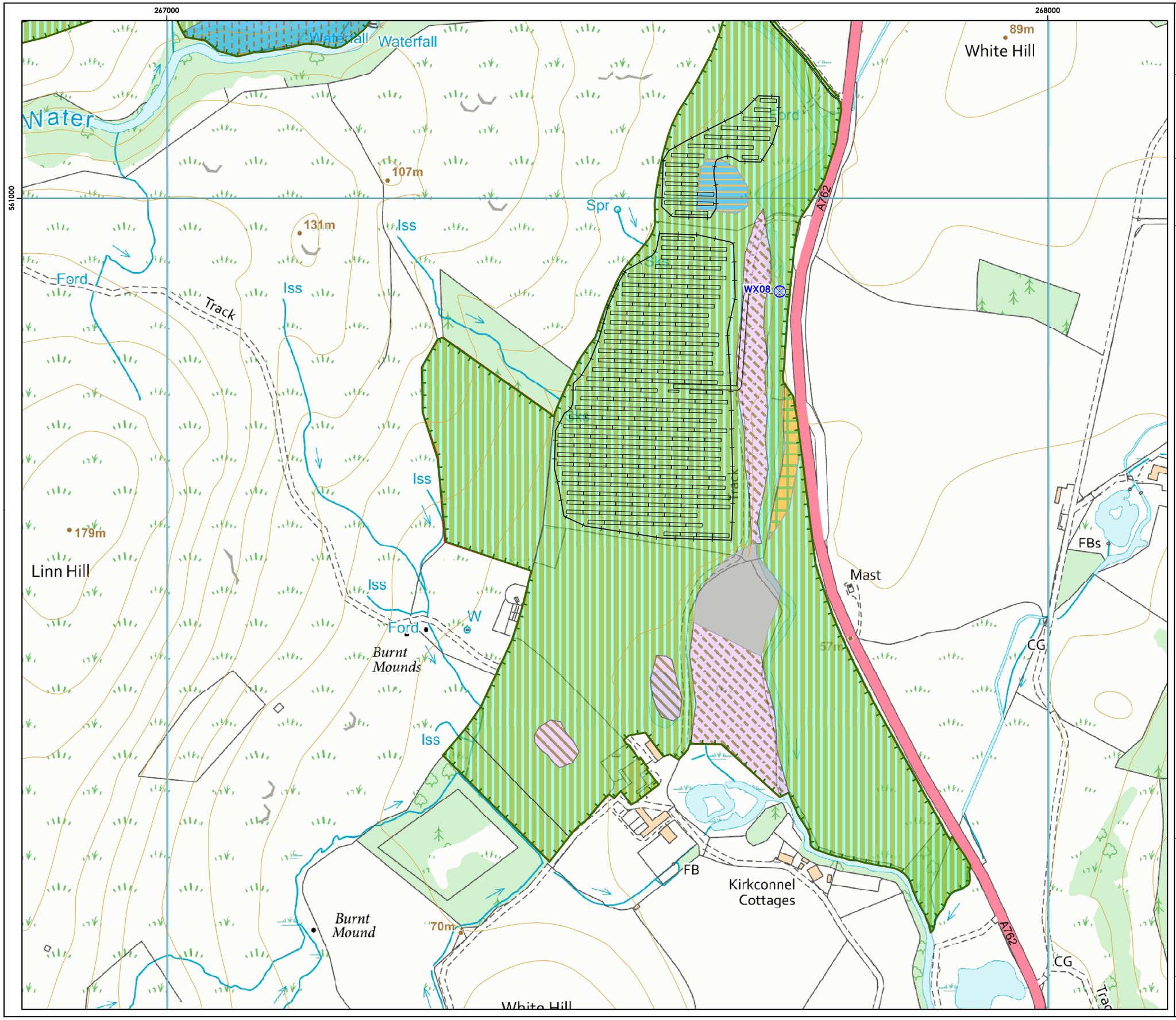
Scale @ A3:
1:4,000

19/03/2025 TL010 40418/HB/047d
Drawn by: LB Checked by: TH Approved by: SM

Lairdmannoch Energy Park

wind2

Figure 6-4
NVC Map 7



Key

- Site boundary
- Turbine Location
- Survey Area
- Proposed infrastructure, including earthworks
- Watercourse crossing

NVC Community

- MG7
- M23
- M23b
- U20
- W9b
- Non-NVC

atmos CONSULTING

0 50 100 200
Metres

N

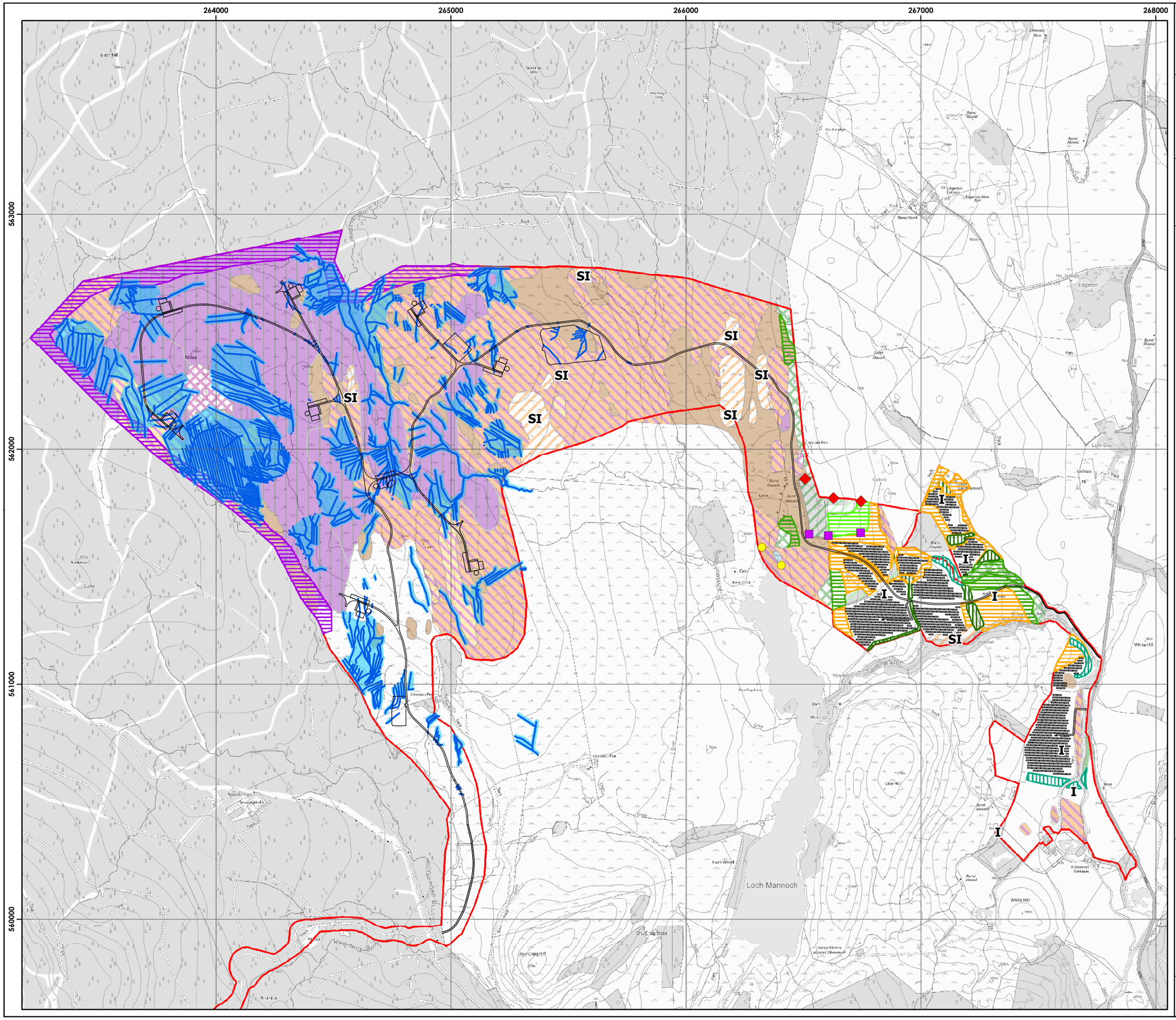
Scale @ A3:
1:4,000

19/03/2025 TL010 40418/HB/047d
Drawn by: LB Checked by: TH Approved by: SM

Lairdmannoch Energy Park

wind2

Figure 6-9
HMP enhancement areas



Key

- Site boundary
- Proposed infrastructure

Phase 1 habitat

- Broadleaved woodland - semi-natural
- Broadleaved woodland - plantation
- Coniferous woodland - plantation
- Scrub - dense/continuous
- SI Acid grassland - semi-improved
- I Improved grassland
- Marsh/marshy grassland
- Bracken - continuous
- Wet dwarf shrub heath
- Wet heath/acid grassland
- Bog
- Blanket sphagnum bog
- Wet modified bog
- Swamp

Potential enhancement features

- Bat box
- Bird box
- Hibernaculum
- Feathering of adjacent conifer plantation for black grouse
- Scrub thickening
- Native tree planting - upland mix
- Native tree planting - lowland mix
- Wildflower planting
- Broadleaf woodland expansion

Peat enhancement

- Drains to be blocked
- Maximum peat enhancement area

atmos CONSULTING

0 200 400 800
Metres

N

Scale @ A3:
1:15,000

01/05/2025 TL010 40418/EC/094c
Drawn by: AF Checked by: SM Approved by: JG

Appendix B. Planting List

Table 6.6.11 Suggested Species Mixes.

Landscape Type	Species	% Cover
Low Flowering Grassland - Flowering Lawn Mix (SCM6)	Yarrow *Achillea millefolium*	1.5
	Bugle *Ajuga reptans*	0.7
	Kidney Vetch *Anthyllis vulneraria*	1.6
	Daisy *Bellis perennis*	0.4
	Wild Strawberry *Fragaria vesca*	0.2
	Lady's Bedstraw *Galium verum*	2.5
	Rock Rose *Helianthemum nummularium*	0.4
	Cat's Ear *Hypochaeris radicata*	0.5
	Wild Marjoram *Origanum vulgare*	0.1
	Burnet Saxifrage *Pimpinella saxifraga*	0.1
	Ribwort Plantain *Plantago lanceolata*	0.2
	Cowslip *Primula veris*	1
	Selfheal *Prunella vulgaris*	2.5
	Meadow Buttercup *Ranunculus acris*	2.5
	Sheeps Sorell *Rumex acetosella*	1.1
	Autumn Hawkbit *Scorzoneroides autumnalis*	0.5
	Bladder Campion *Silene vulgaris*	0.5
	Lesser Stitchwort *Stellaria graminea*	0.5
	Devils-bit Scabious *Succisa pratensis*	0.5
	Dandelion *Taraxacum officinalis*	0.5
	Wild Thyme *Thymus polytrichus*	1
	White Clover *Trifolium repens*	0.5
	Germander Speedwell *Veronica chamaedrys*	0.1
	Common Speedwell *Veronica officinalis*	0.2
	Common Dog Violet *Viola riviniana*	0.5
	Common Bent *Agrostis capillaris*	9
	Sweet Vernal Grass *Anthoxanthum odoratum*	1
	Chewings Fescue *Festuca rubra ssp. Commutata*	36
	Smooth-stalked Meadow Grass *Poa pratensis*	34
Wildflower Grassland - Bee, Bird & Butterfly Mix (SCF13) 100% Wildflower Mix	Yarrow *Achillea millefolium*	3
	Cow Parsley *Anthriscus sylvestris*	5
	Lesser Burdock *Arctium minus*	4
	Clustered Bellflower *Campanula glomerata*	1
	Crosswort *Cruciata laevipes*	2
	Wild Carrot *Daucus carota*	3
	Foxglove *Digitalis purpurea*	3
	Teasel *Dipsacus fullonum*	3.6
	Vipers Bugloss *Echium vulgare*	12
	Hemp Agrimony *Eupatorium cannabinum*	0.5
	Meadowsweet *Filipendula ulmaria*	9
	Lady's Bedstraw *Galium verum*	5
	Meadow Cranesbill *Geranium pratense*	1

	Wood Cranesbill *Geranium sylvaticum*	2
	Herb Bennet *Geum urbanum*	3
	Imperforate St John's Wort *Hypericum maculatum*	1
	Common St John's Wort *Hypericum perforatum*	1
	Field Scabious *Knautia arvensis*	2
	Meadow Vetchling *Lathyrus pratensis*	1
	Musk Mallow *Malva moschata*	1
	Selfheal *Prunella vulgaris*	6
	Meadow Buttercup *Ranunculus acris*	7
	Red Campion *Silene dioica*	9
	White Campion *Silene latifolia*	5
	Hedge Woundwort *Stachys sylvatica*	0.2
	Devils-bit Scabious *Succisa pratensis*	0.2
	Tansy *Tanacetum vulgare*	3
	Wild Thyme *Thymus polytrichus*	1
	Upright Hedge Parsley *Torilis japonica*	5
	Goatsbeard *Tragopogon pratensis*	0.5
Tree Planting	Ash *Fraxinus excelsior*	10
	Wild cherry *Prunus avium*	15
	Aspen *Populus tremula*	15
	Hawthorn *Crataegus monogyna*	5
	Crab apple *Malus sylvestris*	5
	Wych elm *Ulmus glabra*	5
	Scots pine *Pinus sylvestris*	5
	Pedunculate oak *Quercus robur*	15
	Elder *Sambucus nigra*	15
	Rowan *Sorbus aucuparia*	10
	Upland Mix for Landscape Screening:	
	Silver birch *Betula pendula*	20
	Scots pine *Pinus sylvestris*	60
	Sessile oak *Quercus petraea*	10
	Rowan *Sorbus aucuparia*	10
Scrub Planting	Rowan *Sorbus aucuparia*	20
	Hazel *Corylus avellana*	15
	Hawthorn *Crataegus monogyna*	15
	Dogwood *Cornus sanguinea*	10
	Bramble *Rubus fruticosus*	5
	Downy birch *Betula pubescens*	5
	Blackthorn *Prunus spinosa*	5
	Holly *Ilex aquifolium*	5
	Elder *Sambucus nigra*	5
	Gorse *Ulex europaeus*	5
	Silver birch *Betula pendula*	5
	Guelder rose *viburnum opulus*	5

	Waterside Mix for Landscape Screening:	
	Alder *Alnus glutinosa*	10
	Silver birch *Betula pendula*	20
	Hawthorn *Crataegus monogyna*	10
	Whie willow *Salix alba*	20
	Goat willow *Salix caprea*	20
	Common sallow *Salix cinerea*	20

Source: https://www.scotiaseeds.co.uk/seed-mixtures/

Appendix C. Moorland Planting List.

Table 6.6.12 Moorland Suggested Species List.

Species	Guidance / target location
Bell heather *Erica cinerea*	Dry areas in target locations
Bilberry *Vaccinium myrtillus*	Ideal species to plant in areas of soil erosion
Bog Asphodel *Narthecium ossifragum*	Wet areas with high levels of peat in the soil
Bog myrtle *Myrica gale*	Wet areas
Common Cotton-grass *Eriophorum angustifolium*	Wet areas
Common Heather *Calluna vulgaris*	All areas
Cowberry *Vaccinium vitis-idea*	All areas
Cross-Leaved Heath *Erica tetralix*	Wet areas
Crowberry *Empetrum nigrum*	Wet areas where peat soils are prevalent (ideal species to remediate areas of erosion)
Hare's-tail Cotton-grass *Eriophorum vaginatum*	Wet areas
Heath bedstraw *Galium saxatile*	All areas
Heath Rush *Juncus squarrosus*	All areas
Heath violet *Viola riviniana*	All areas
Jointed Rush *Juncus articulatus*	Wet areas
Marsh Violet *Viola palustris*	All areas
Sharp-Flowered Rush *Juncus acutiflorus*	All areas
Sheep's Sorrel *Rumex acetosella*	All areas
Compact Bog-moss *Sphagnum compactum*	Wet areas with high levels of peat in the soil
Pale Bog-moss *Sphagnum strictum*	Wet areas with high levels of peat in the soil
Tormentil *Potentilla erecta*	All areas

Appendix D. Suggested proportions of *Sphagnum* species for plug planting

Table 6.6.13 Proportions of Sphagnum species to be used in plugs.

Sphagnum Species	Proportion (%)
S. fallax	30-50
S. palustre	20-40
S. papillosum	20-40
S. capillifolium	10
S. cuspidatum	10
S. fimbriatum	5-10
S. subnitens	5-10
S. denticulatum	1
S. squarrosum	1
S. tenellum	1
S. medium	1
S. russowi	1

Source: Pilkington et al. (2021)