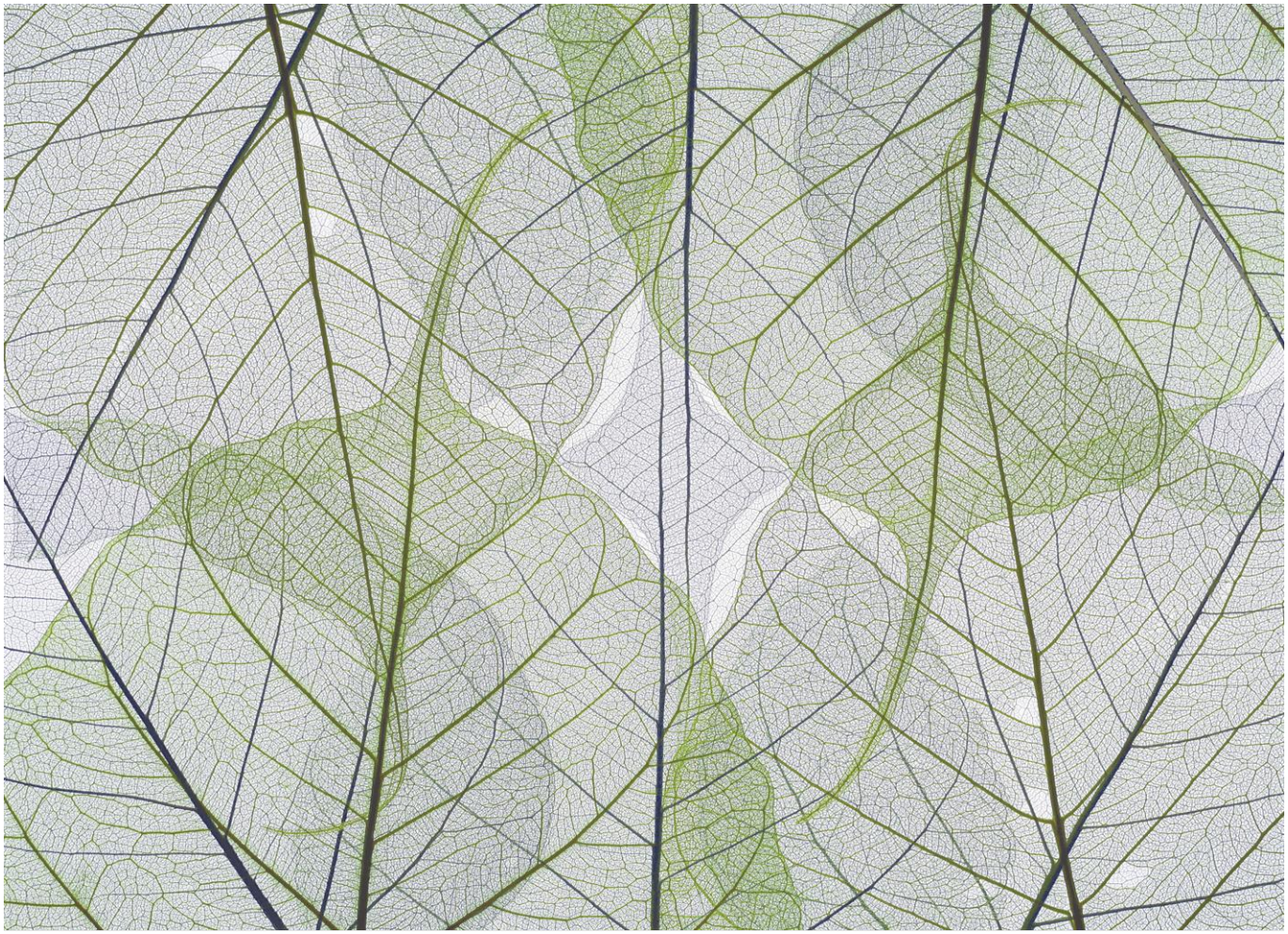

ScottishPower Renewables

Hollandmey Renewable Energy Development: Groundwater-Dependent Terrestrial Ecosystems Assessment

Technical Appendix 10.4

655098-P10.4 (04)

NOVEMBER 2021

RSK GENERAL NOTES

Project No.: 655098-P10.4 (04)

Title: Hollandmey RED: Groundwater-Dependent Terrestrial Ecosystems Assessment

Client: ScottishPower Renewables

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1 INTRODUCTION

1.1 This report provides a Groundwater-Dependent Terrestrial Ecosystem (GWDTE) Assessment for Hollandmey Renewable Energy Development (RED), hereafter the 'proposed Development', and associated development infrastructure.

1.2 The report forms a Technical Appendix to the Environmental Impact Assessment Report (EIA Report) for Hollandmey RED and should be read in conjunction with this document. It has been produced in response to concerns over development in areas with, or that have potential to affect, sensitive groundwater-dependent habitats raised by NatureScot (formerly SNH) and the Scottish Environment Protection Agency (SEPA).

1.3 GWDTE are protected under the Water Framework Directive and are potentially sensitive receptors to the impacts of development. This report identifies the potentially groundwater-dependent habitats present at the Site and identifies and assesses the potential impacts of the proposed Development on these habitats. Design and mitigation methods to avoid or minimise these risks are set out, along with good construction practices that would be employed during all site works.

Location

1.4 The Site, defined as the area within the application boundary, is located approximately 8 km south west of John o' Groats and 16 km east of Thurso, within the north-eastern part of the Caithness and Sutherland area of the Highlands. The Site is privately owned. The Site lies within a Sweeping Moorland and Flows Landscape Character Area (LCA), which is described as a flat to gently undulating and smooth landform. The Site contains sections of agriculture and coniferous woodland plantation and is located within an area of carbon-rich soils. The Philips Mains Mire Site of Special Scientific Interest (SSSI), an area of Class 1 Peatland, is in the north-east part of the Site. The Site area is 1,149 hectares (ha) on total and the current land use is classified as agricultural, moorland and forestry.

Development proposals

1.1 The proposed Development includes the following key elements:

- ten wind turbines of up to 5 MW capacity and maximum tip height of 149.9 m;
- hardstanding areas and crane pads at the base of each turbine, with a maximum combined area of 3,146 m^2;
- 15 MW ground mounted solar arrays;
- 15 MW battery energy storage system (BESS);
- transformer/switchgear housings located adjacent to turbines & solar panels;
- 12.01 km of access tracks (8.93 km of which is new (6.18 km normal track and 2.75 km floating track), 2.71 is upgraded existing track and 0.37 km is existing access track), including passing places and turning heads;
- watercourse crossings (upgrade of existing or new as required);
- underground electrical cabling;

- permanent met mast and LIDAR compound;
- up to two temporary Power Performance Masts (PPM);
- a temporary windfarm construction compound area and a temporary solar construction compound area;
- a control compound comprising a permanent control building, substation and BESS;
- closed-circuit television mast(s);
- communication mast(s);
- permanent control building;
- up to three borrow pit search areas; and
- health & safety and other directional site signage.

1.2 In addition, felling of approximately 24 ha of commercial tree planting would be required to accommodate access for the turbines.

1.3 Full details of the proposed Development design are provided in **Chapter 2: Site Description and Design Evolution** of the EIA Report.

Aims

1.4 This report aims to undertake a review of relevant baseline information, including all habitat and vegetation data and hydrogeological details, in order to provide an assessment of the risk to groundwater-dependent habitats. Recommendations will be made for mitigation measures and construction methods that should be implemented to minimise the risk of disturbance or damage to sensitive habitats during construction works and ongoing site operations.

Assessment method

1.5 This assessment has involved the following stages:

- Desk study;
- Vegetation mapping;
- Hydrogeological assessment;
- Detailed assessment of sensitive habitats; and
- Identification of protection and mitigation measures.

2 DESK STUDY

Information sources

2.1 The desk study involved a review of available relevant information sources on the ground conditions on the Site. Information sources included:

- Ordnance Survey mapping at 1:50,000, 1:25,000 and VectorMap Local raster mapping, Terrain 5 digital terrain model contours and OpenData mapping;
- High-resolution orthorectified aerial imagery;
- British Geological Survey digital geological mapping, 1:50,000 scale;
- Scotland's Soils digital soil mapping, 1:250,000 scale;
- Flood Estimation Handbook Web Service;
- Data provided by the client, including turbine foundation and track design specifications; and
- Archive and extensive site data held by RSK Group.

Climate and Topography

2.2 The proposed Development is located within the UK Meteorological (Met) Office's Northern Scotland regional climatic area. Much of Northern Scotland is exposed to the rain-bearing westerly winds, particularly along the west coast. The proposed Development's location towards the eastern part of the region means it is slightly drier than western areas, but still maintains a relatively wet and humid climate. Rainfall is generally well-distributed throughout the year, but normally greatest in the autumn and winter.

2.3 Average annual rainfall for the Site catchments varies between 888 mm and 894 mm (CEH, 2020), indicating that the Site is in a relatively dry region of the Northern Scotland climatic area. Average annual rainfall for the climate monitoring station at Wick John o' Groats Airport is 814.3 mm (Met Office, 2020).

2.4 The Site is gently undulating and low-lying, with most of the Site having an elevation between 45 and 55 m above Ordnance Datum (AOD). The highest ground is located on isolated low hills in the north-east, south-east and south-west of the study area. The highest elevation is 80 m AOD at the Hill of Rigifa', just north of the application boundary. In the southern part of the Site, the Hill of Slickly reaches an elevation of 74 m AOD.

Geology

2.5 Geological information is derived from the BGS GeoIndex online geological mapping bedrock and superficial geology 1:50,000 mapping (BGS, 2020) and the Geological Survey of Scotland 1:63,360/1:50,000 geological map series (Mykura, 1986; Peach *et al.,* 1914).

Bedrock geology

2.6 The Site is underlain by bedrock of the Middle Old Red Sandstone group of Early-Middle Devonian age, part of the Old Red Sandstone Supergroup. Two distinct formations have been identified within the Site. The south-east, south-west and north-western quarters of

the Site are underlain by the Spital Flagstone Formation, described as sedimentary rocks comprising siltstone, mudstone and sandstone. The north-eastern quarter of the Site is underlain by the younger Mey Flagstone Formation, described as sedimentary rocks comprising sandstone, siltstone and mudstone.

2.7 There are no mapped dykes or faults within the Site.

Superficial geology

2.8 The majority of the Site is overlain by peat of Quaternary age. Parts of the Site (particularly in the middle and southern regions) are overlain by Devensian till, comprising diamicton deposited during the last glacial period. Diamicton is a very variable glacial sediment consisting of unsorted material ranging in size from clay to boulders, usually with a matrix of clay to sand.

2.9 Small areas of alluvium and river terrace deposits are present along the south western boundary of the Site, loosely following but extending beyond the present-day river valley of the Link Burn. Alluvium is also present within the present-day river valley of the Gill Burn. Alluvium is a sorted or semi-sorted mixture of clay, silt, sand and gravel of fluvial origin deposited in the Holocene. This alluvium is bordered in some areas by river terrace deposits of gravel, sand, silt and clay of Quaternary age.

Soils and peat

2.10 The Soil Survey of Scotland digital soils mapping shows Site soils mainly consist of blanket peat and noncalcareous gleys, with a small area of alluvial soils (Soil Survey of Scotland, 1981). Soil mapping identifies extensive blanket peat within the Site, with deep blanket peat covering much of the area, particularly in the north-east and north-west regions, surrounding a central strip of noncalcareous gleys. Several phases of peat depth surveying have been undertaken by RSK; details are provided in **Technical Appendix 10.1 Peat Slide Risk Assessment.**

2.11 Noncalcareous gleys extend from the northern to central Site and also cover a number of small areas to the east of the Site. Alluvial soils cover a small area on the south west boundary of the Site.

2.12 The peat depth survey (detailed in **Technical Appendix 10.1 Peat Slide Risk Assessment**) confirms that peat is present within the application boundary and has broad coverage. There are two main areas of extensive peat in the western and eastern parts of the application boundary, surrounded with areas of shallow peat or topsoil. The areas of deepest peat form well-defined basins with recorded peat depths in excess of 8 m in places.

Hydrogeology

2.13 The Site is entirely underlain by bedrock classed as having moderately productive fracture flow. The bedrock forms part of the Caithness groundwater body, classed as a 2B moderately productive aquifer (Scottish Government, 2020; BGS, 2020), comprising sandstones, in places flaggy, with siltstones, mudstones and conglomerates, and interbedded lavas, locally yielding small amounts of groundwater. Groundwater flow is virtually all through fractures and other discontinuities.

2.14 The superficial deposits covering most of the Site have a range of potential permeabilities, and their productivity will depend on their local composition and connectivity. Any pockets of sand and gravel-rich material within the till and alluvium are likely to have higher permeability, whereas areas of clay and silt will have low or negligible permeability.

2.15 The peat bodies in the area will also hold significant amounts of groundwater; however, flow within peat is extremely slow and likely to contribute only limited baseflow to local burns. The main areas of peat on site are located in the western and eastern parts of the Site, surrounded with areas of shallow peat or topsoil. These areas will provide some input to watercourse headwaters, in particular helping to maintain baseflow during dry periods.

2.16 Regional groundwater flow will tend to mimic the natural topography, flowing north and west towards the sea.

2.17 No springs or seepages have been identified within the Site or immediate surroundings.

Hydrology

2.18 The Site lies across five watercourse catchments:

- the Burn of Rattar;
- the Burn of Horsegrow;
- the West Burn of Gills;
- the Gill Burn; and
- the Burn of Lyth.

2.19 Nearly 70% the Site is located within the Burn of Rattar catchment. This catchment covers an area of approximately 20 km^2. The Burn of Hollandmey, Link Burn and Burn of Ormigill are all tributaries to the Burn of Rattar and provide the main drainage to the Site, draining broadly west and north into the Pentland Firth.

2.20 The Burn of Horsegrow catchment, spanning a total area of 3.4 km^2 and covering 11.5% of the Site drains part of the northern Site.

2.21 The north-easternmost part of the Site is drained north-eastward into Gills Bay by the West Burn of Gills; this catchment covers a total area of 3.1 km^2 and covers 9.9% of the Site.

2.22 The south-eastern part of the Site is drained eastwards into Freswick Bay by the Gill Burn; this catchment covers a total area of 9.8 km^2 and covers 5.5% of the Site.

2.23 Two areas of the southern part of the Site fall into the Burn of Lyth catchment. This catchment, covering an area of 36 km^2 and 5.1% of the Site, drains south and south-west into the North Sea.

2.24 The catchment wetness index (PROPWET) for the three main site catchments (Burn of Rattar, Burn of Horsegrow and West Burn of Gills) is 0.500, indicating the Site is wet for 50% of the time (CEH, 2020). The area has a relatively low base flow index (BFI HOST19), indicating that groundwater contribution is of limited importance to site watercourses. The standard percentage runoff (SPR HOST) is 50-55%, indicating that this percentage of site rainfall is converted into surface runoff from rainfall events. This is a high runoff risk. Soils have a limited capacity to store rainfall or to allow water to infiltrate;

thus, soils with a high standard percentage runoff will quickly saturate, leading to rapid runoff.

Groundwater abstractions

2.25 There are no confirmed groundwater abstractions located within the Site. The Environmental Health Department of the Highland Council was contacted to request any information that they hold regarding private water supplies (PWS) within 5 km of the application boundary. A response was received on 18 September 2020 confirming that their records do not indicate any PWS within this area.

2.26 The owners of Philips Mains Farm confirmed that their property is on mains water.

2.27 It remains possible that some local properties rely on a PWS, although none have been identified within the Site or the immediate surroundings.

3 VEGETATION AND GROUNDWATER DEPENDENCY

3.1 Groundwater-dependent terrestrial ecosystems (GWDTE) are defined by the UK Technical Advisory Group (UKTAG) (2004) as:

> *"A terrestrial ecosystem of importance at Member State level that is directly dependent on the water level in or flow of water from a groundwater body (that is, in or from the saturated zone). Such an ecosystem may also be dependent on the concentrations of substances (and potential pollutants) within that groundwater body, but there must be a direct hydraulic connection with the groundwater body."*

3.2 In line with the guidance provided in UKTAG (2004), a dual ecological and hydrogeological approach to identifying GWDTE has been used. This involves a detailed study of vegetation communities in order to determine the potential level of groundwater dependency, combined with a detailed hydrogeological study in order to identify locations where groundwater reaches the surface and is therefore able to provide a source of water to terrestrial ecosystems.

3.3 Determining groundwater dependency is complex as most water-dependent terrestrial ecosystems rely on a combination of groundwater, surface water and rainwater, and many vegetation communities will use whatever source of water is available. In some topographical and hydrogeological conditions, a particular ecosystem can be groundwater-dependent whereas in others the same ecosystem is surface water-dependent. Seasonal patterns of water availability influence water use, providing an additional level of complexity; groundwater reliance is typically greater in the summer when rainfall and surface water are less available (Isherwood, 2013).

Vegetation mapping

3.4 The Site vegetation has been surveyed using a combined Phase 1 habitat and National Vegetation Classification (NVC) survey method and is reported in full in **Chapter 8 Ecology and Biodiversity**, with mapping provided in **Figure 8.3**. NVC mapping was confined to areas outwith planted forestry. The key findings relating to groundwater dependency are summarised below.

3.5 NVC communities identified by SEPA as likely highly or moderately groundwater dependent, depending on the hydrogeological setting, are listed in SEPA's publication *"Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems"* (SEPA, 2017). Within the application boundary, the potentially groundwater-dependent NVC communities identified are:

- M6 – *Carex echinata – Sphagnum recurvum/auriculatum* mire
- M15 – *Scirpus cespitosus – Erica tetralix* wet heath;
- M23 - *Juncus effusus/acutiflorus - Galium palustre* rush-pasture;
- M25 – *Molinia caerulea – Potentilla erecta* mire; and
- M27 – *Filipendula ulmaria – Angelica sylvestris* mire.

3.6 The list of NVC communities provided in the update annex (UKTAG, 2009) indicates that M6 has high groundwater dependency, M15, M23 and M27 have moderate groundwater dependency and M25 has low groundwater dependency in Scottish situations.

4 DETAILED ASSESSMENT

4.1 The study area, which consists of the application boundary and a 250 m buffer zone around this, has been reviewed to identify areas of M6, M15, M23, M25 and M27 habitats that require assessment.

4.2 Detailed consideration is required for sensitive habitats that lie within 100 m of access tracks or within 250 m of excavations such as turbine foundations and borrow pits (SEPA, 2017). The combined infrastructure buffer is provided as a green dashed line in the figures provided, for reference purposes. An overview map of the Site showing the areas of M6, M15, M23, M25 and M27 habitats is provided in **Figure 10.4.6**.

4.3 All of the identified potentially groundwater-dependent habitats are located alongside the public road sections, apart from one small area of M6 which is present at the southern margin of the Site.

Conceptual Site Model

4.4 SEPA (2017) identifies M6 as a community *"… likely to be … highly groundwater dependent … depending on the hydrogeological setting".* The updated UKTAG Annex 1 table (UKTAG, 2009) identified M6 as class 1 (high), where class 1 is highly groundwater-dependent, class 2 is moderately groundwater-dependent and class 3 is low groundwater-dependency.

4.5 SEPA (2017) identifies M15, M25 and M27 as communities *"… likely to be … moderately groundwater dependent … depending on the hydrogeological setting"*. The updated UKTAG Annex 1 table (UKTAG, 2009) identified M15 and M27 as class 2 (moderate). UKTAG (2009) identified M25 as class 3 (low).

4.6 SEPA (2017) identifies M23 as *"… likely to be … highly groundwater dependent … depending on the hydrogeological setting"*. The updated UKTAG Annex 1 table (UKTAG, 2009) identified M23 as class 2 (moderate) in Scottish settings.

4.7 In this sense, potential habitat sensitivities have been ranked as follows:

- Highest sensitivity: M6
- M23
- M15 and M27
- Lowest sensitivity: M25

Habitats on peat

4.8 Some parts of the areas of identified potentially groundwater-dependent habitats are on areas of confirmed peat over 0.5 m in depth. As noted above, water flow through peat does occur but is very slow except in areas with peat pipes or conduits to allow focused flow.

4.9 Blanket peat, such as is present in the Site, is generally considered to be ombrotrophic (JNCC, 2020) and receives all of its nutrients from rainwater. Localised flushing can occur adjacent to watercourses but is rarely extensive away from the watercourse channel. It is recognised that the blanket peat present within the Site has been extensively modified as

a result of forestry plantation and associated drainage infrastructure, but it remains likely that the dominant water source for these habitats is rainwater with shallow through-flow within the uppermost vegetated layer.

4.10 Although the Site bedrock is classed as moderately productive, at a depth of at least 0.5 m below ground surface within these areas it is unlikely that any groundwater present within the shallow bedrock is accessible to surface habitats.

4.11 In some areas, ditch excavations expose superficial material below the surface peat layer. In these settings, the material visible was exclusively very clay-rich and typically soft and moist. The clay material would provide an impermeable barrier layer between the peat deposit and the bedrock, effectively preventing groundwater from the bedrock from reaching the ground surface.

4.12 No springs or seepage features were identified within the Site or immediate surroundings and no springs are indicated on topographical mapping within the area.

4.13 It is concluded, therefore, that occurrence of potentially groundwater-dependent habitats on peat preclude them from being groundwater-dependent as there is no groundwater source available to them.

Habitats not on peat

4.14 Some areas of potentially groundwater-dependent habitats are located in areas with no identified peat, or where peat coverage is sparse and patchy. In these areas, the nature of the underlying substrate requires assessment.

4.15 Much of the remaining M15 and M23 habitats away from peatland are in areas with mapped superficial deposits. These mostly comprise diamicton till, which is a naturally variable material.

4.16 Within the Site, exposed diamicton takes two forms. In recently-cut exposures such as in new drainage ditches, the diamicton appears as a soft, moist and pliable clay-dominated material with a minor silt and sand component and occasional cobbles (**Figure 10.4.1**). Where it has been exposed at surface for a period of time, the clay material dries to become a very hard, dry material that is difficult to penetrate with hand tools (**Figure 10.4.2**).

4.17 No springs or seepage features were identified within the Site or immediate surroundings and no springs are indicated on topographical mapping within the area.

4.18 Some areas underlain by diamicton are described as boggy or marshy. This is most likely to relate to ponding surface water collecting on the impermeable clay layer, leading to surface waterlogging. This is made more likely as the surface topography of these areas is typically almost flat with minor surface irregularities, which would tend to encourage ponding in the natural hollows. None of these boggy or marshy areas had any indication of groundwater seep or spring features.

Figure 10.4.1: Recently exposed diamicton till underlying surface peat, NGR ND 2921 6863. Peat in this location is approximately 0.6 m in thickness.

Figure 10.4.2: Hard and dry exposed diamicton till above flaggy sandstone bedrock, NGR ND 2939 7042. Exposed bank is approximately 1.4 m high.

4.19 It is concluded that none of the habitats within the Site can truly be described as groundwater-dependent as there is no reliably available source of groundwater on which they are able to depend. They are likely to rely on a combination of rainfall and surface runoff, with some direct surface water in areas adjacent to watercourses and waterbodies.

4.20 Nevertheless, these habitats are considered to be sensitive, and a level of protection is required to minimise and, if necessary, mitigate any impacts that may occur. Three areas

of sensitive habitat have been identified within the combined infrastructure buffer and are discussed individually in the following sections.

4.21 In each figure, M23 habitat areas are coloured orange and M25 areas are coloured green. The areas of M6, M15 and M27 are all located outwith the construction area buffer zones.

4.22 The infrastructure buffer is shown as a green dashed line.

Area 1

4.23 Area 1 is alongside the Charleston Farm road and the C1033 Everley to Crockster Toll road (**Figure 10.4.3**). An area of M23 rush-pasture is present within the fields to the north of the C1033 and east of the Charleston Farm road, with a further section south of the C1033. One of the proposed access routes to the Site is located within this area.

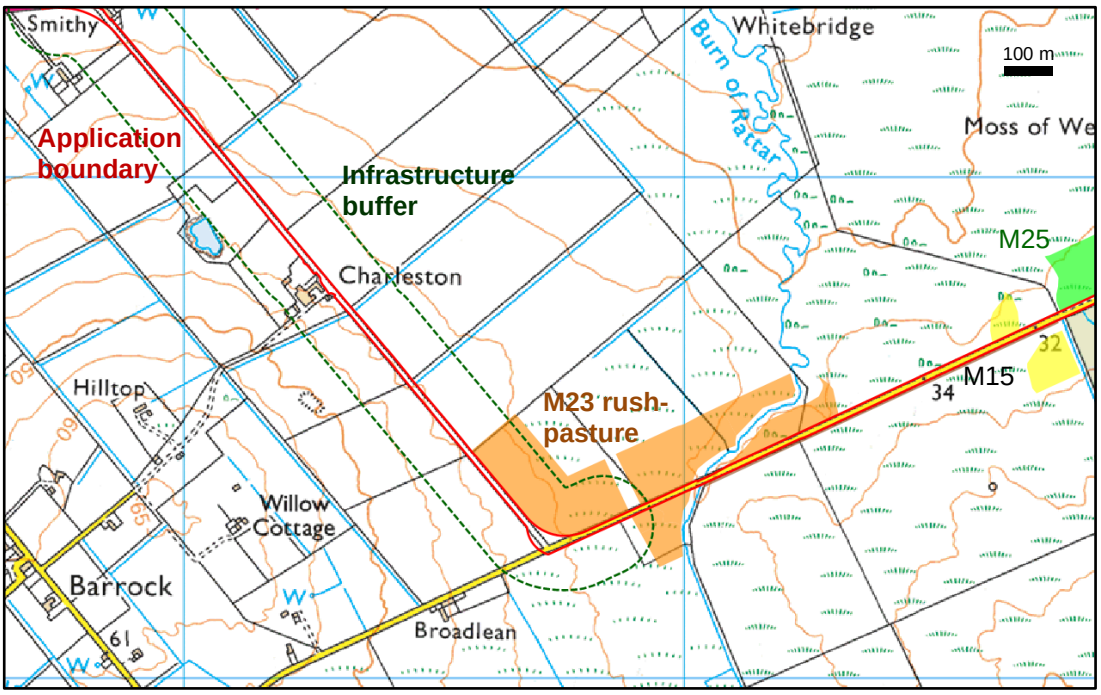

Figure 10.4.3: Area 1

4.24 This area lies entirely within the Spital Flagstone Formation area. Peat deposits are largely absent, although some peat has been identified on the eastern side of the Burn of Rattar. Superficial deposits are mainly diamicton till, with alluvium along the Burn of Rattar channel.

4.25 Drainage is provided by the Burn of Rattar main channel and a number of drainage ditches within the field areas.

4.26 Infrastructure development in this area is restricted to a widening of the existing Charleston Farm road and a small area of overrun on the north side of the Charleston Farm road-C1033 road junction.

4.27 The Charleston Farm road would be widened within the existing paired fence line and would not directly affect the area of rush-pasture. The overrun area may extend a small distance into the area of rush-pasture, although most of the works are anticipated to be within the existing boundary wall and fence. Roadside drainage would be kept to a

practical minimum to ensure a dry running surface and runoff would not be directed into the area of rush-pasture, to avoid nutrient flushing.

Area 2

4.28 Area 2 covers the entrance from the public road C1033 into the main Site (**Figure 10.4.4**). An area of M25 mire/M23 rush-pasture mosaic is located to the south of the C1033 and west of the main access track, with part of this area located within the 100 m infrastructure buffer. Some areas of M23 rush-pasture are located to the north of the C1033 but are outwith the infrastructure construction buffer so would be unaffected by any works. An additional area of M25 mire/M19 blanket mire mosaic is present to the north of the C1033 but is also outwith the infrastructure construction buffer.

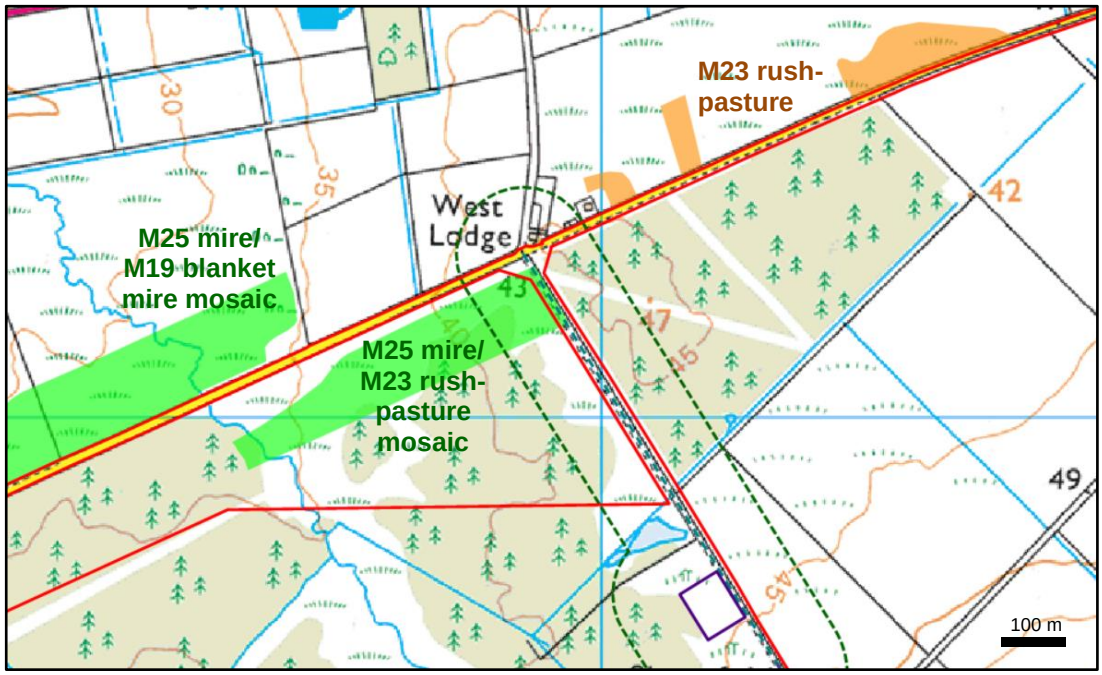

Figure 10.4.4: Area 2

4.29 This area lies across the boundary between the Spital Flagstone and the Mey Flagstone. The area is largely without peat, although some shallow peat (up to 1.0 m deep) has been identified in parts of this area. All proposed works in this area make use of existing infrastructure. The western part of the habitat mosaic is located on shallow peat (up to 1.0 m deep), but the majority of the area is on diamicton till.

4.30 The area of M25 mire/M23 rush-pasture mosaic is set back from the C1033 and occupies an area between the road and the forestry. Indications of tree planting within the mire area suggest that tree growth has been restricted, probably as a result of the wet ground. The forestry planting is associated with planting furrows and drainage ditches. No indications of groundwater seepages or springs were identified within this area.

4.31 The habitat mosaic area is likely to be reliant on rainwater as the main water source, with additional water provided by shallow through-flow within the vegetated layer. Some drainage may be directed into the area by local drainage ditches.

4.32 The access track into the Site from the C1033 would be widened within the existing paired fence line and would not directly affect the area of mire/rush-pasture mosaic. It is considered to be the least environmentally impacting option to make use of an existing track rather than construct a wholly new track. Trackside drainage would not be directed into the area of mire/rush-pasture mosaic, to avoid nutrient flushing.

Area 3

4.33 Area 3 covers the proposed overrun area at the junction between the C1033 and East Lodge road (**Figure 10.4.5**). An area of M25 mire/U4 grassland/MG9 grassland mosaic is present to the north of the C1033 and west of East Lodge road.

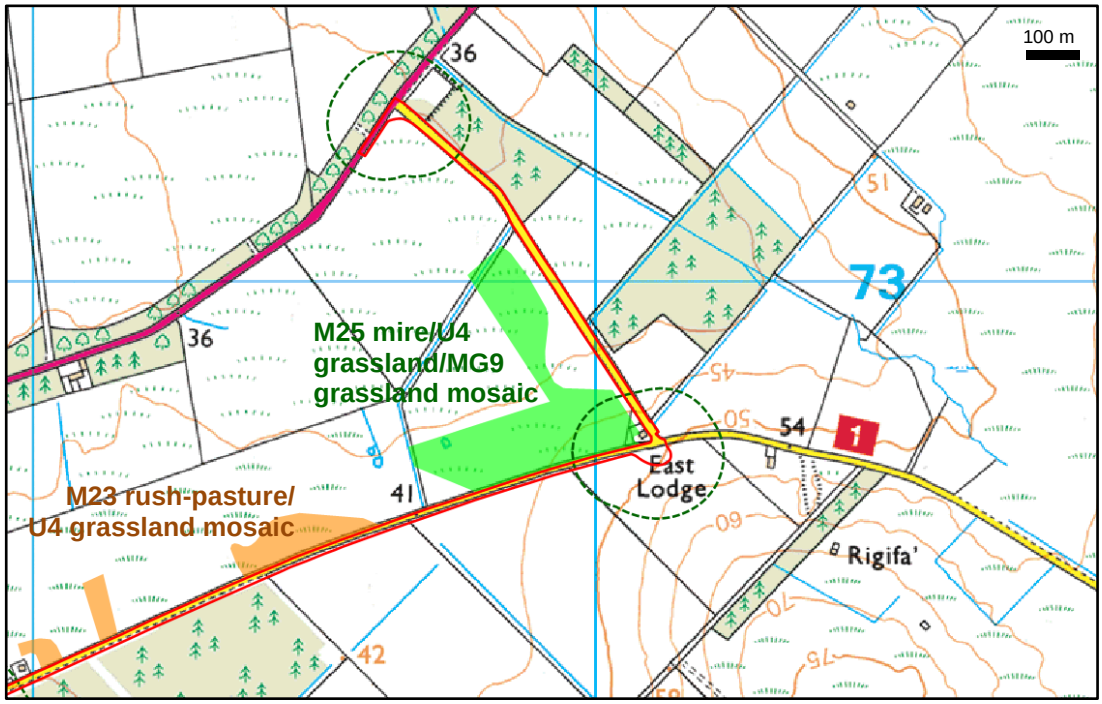

Figure 10.4.5: Area 3

4.34 This area is underlain entirely by the Mey Flagstone Formation with superficial diamicton till. There is no peat in this area, although some soil measurements in excess of 0.5 m were recorded. Soil cores confirmed that this area is characterised by noncalcareous gleys and brown forest soils. Drainage is provided by a number of artificial drainage ditches within the field areas.

4.35 The habitat mosaic area is likely to be reliant on rainwater as the main water source, with additional water provided by shallow through-flow within the vegetated layer. Some drainage may be directed into the area by local drainage ditches.

4.36 Works in this area are confined to ground improvement at the overrun area at the road junction. These works would be very limited in extent and are confined to the south side of the C1033, across the road from the habitat mosaic area. Any required drainage for the overrun area would be linked into the existing roadside drainage and would not be directed into the habitat mosaic area, to avoid nutrient flushing.

5 PROTECTION AND MITIGATION

Design and mitigation

5.1 Wetland habitats are known to be sensitive to changes in their water supply, whether this is from groundwater, surface water or rainwater. With this in mind, the following good practice construction methods would be used for all development on or adjacent to wetland or bog areas:

- Where cut track sections cross wetland or bog areas, cross-drainage would be provided within the track construction to ensure continuity of flow. This may take the form of a drainage layer within the track, suitably closely spaced drainage pipes, or both as appropriate. These would be determined on a case-by-case basis to suit each individual area;
- Removing protective layers of soil and superficial deposits makes groundwater vulnerable to pollution from leaks or spills from vehicles or equipment used during construction. Earthworks would be kept to a practical minimum within wetland areas, to reduce the area of wetland affected by the construction works;
- Trackside drainage would be kept to a practical minimum and would only be installed where required to protect the track from erosion. When excavating new ditches after construction of a floating road, any intercepting ditches should be installed sufficiently far away from the road to minimise any drawdown of the water table below the road and any consequential settlement. This would ensure the load on the peat would not increase (SNH and FCS, 2010);
- All works through and adjacent to wetland areas would be supervised by the Environmental Clerk of Works;
- Site-specific mitigation, including track drainage segregation to avoid 'flushing' from excavation works, and micrositing to avoid specific higher sensitivity areas, would be identified and established where appropriate;
- Water would not be discharged directly into watercourses. Additional protection, in terms of sediment traps using silt fencing, straw bales or suitable alternative, would be put in place between the water discharge location and watercourses. Sediment trap installation would be overseen by the Environmental Clerk of Works; and
- Tree felling in this area would be kept to a practical minimum in order to minimise mobilisation of sediment and would only be undertaken once sediment protection has been established.

Monitoring

5.2 Targeted monitoring would be put in place to provide a check on the identified wetland areas and to ensure that mitigation and protection measures are in place and effective.

5.3 The monitoring programme would include establishment of groundwater monitoring boreholes within the three borrow pit areas to a depth at least 1 m below the deepest expected excavation. Groundwater level monitoring would be undertaken to determine whether groundwater is present within the borrow pit areas and, if it is, at what level the

seasonally highest groundwater table stands. Any groundwater within the borrow pit area would be managed in line with best practice, with discharge via a settlement pond to allow any entrained sediment to be removed prior to discharge. Any required discharge licence would be obtained prior to excavation commencing.

5.4 Surface water monitoring would be established within the existing watercourse network. Details are provided in **Technical Appendix 10.5 Drainage Impact & Watercourse Crossing Assessment.**

5.5 All areas of sensitive habitat would be visited and assessed prior to any construction work by the Environmental Clerk of Works. Assessment would include collection of representative photographs of the areas most likely to be affected by the works. Regular assessment visits would be undertaken throughout the construction period to ensure that habitat protection is effective. A post-construction monitoring assessment would also be undertaken to check that the restoration and recovery works have become established.

6 CONCLUSIONS

6.1 A detailed assessment of the interaction between the proposed works for the proposed Hollandmey Renewable Energy Development and potentially groundwater-dependent terrestrial ecosystems has been undertaken.

6.2 Five potentially groundwater-dependent NVC communities have been identified within or adjacent to the Site: M6 mire; M15 wet heath; M23 rush-pasture; M25 mire and M27 mire. M6 mire has potential high groundwater dependency in Scottish situations; M15, M23 and M27 have potential moderate groundwater dependency; and M25 has potential low groundwater dependency.

6.3 Some of the M23 and M25 habitats are in the form of mosaics with other habitats, including U4 grassland and MG9 grassland. Both of these habitats are not considered to be groundwater-dependent.

6.4 A total of three areas of potentially groundwater-dependent wetland habitats have been identified within 100 m of excavations less than 1 m in depth or within 250 m of excavations deeper than 1 m.

6.5 The potentially groundwater-dependent habitats have been assessed specifically within the context of the proposed Development, taking into account the local bedrock and superficial geology, peat distribution and site observations. No groundwater discharges were identified at any location within the Site. The superficial deposits, consisting of peat and clay-dominated diamicton till, would act to insulate the groundwater in the bedrock from the ground surface, effectively preventing groundwater discharge at surface. It is determined as a result that none of the five potentially groundwater-dependent communities within the Site are actually groundwater-dependent in this area but rely on a mix of surface water, shallow throughflow in surface vegetation and rainwater.

6.6 Impacts to wetland habitats and watercourses would be kept to a practical minimum through use of best practice construction and mitigation measures. Specific mitigation measures, to avoid changes to the watercourse hydrochemistry through ‘flushing’ of excavated material in surface runoff, have been set out and would be adhered to during all site works. Careful construction to ensure suitable continuity of flow across site tracks would help to minimise any potential impacts to the wetland habitats present within the Site.

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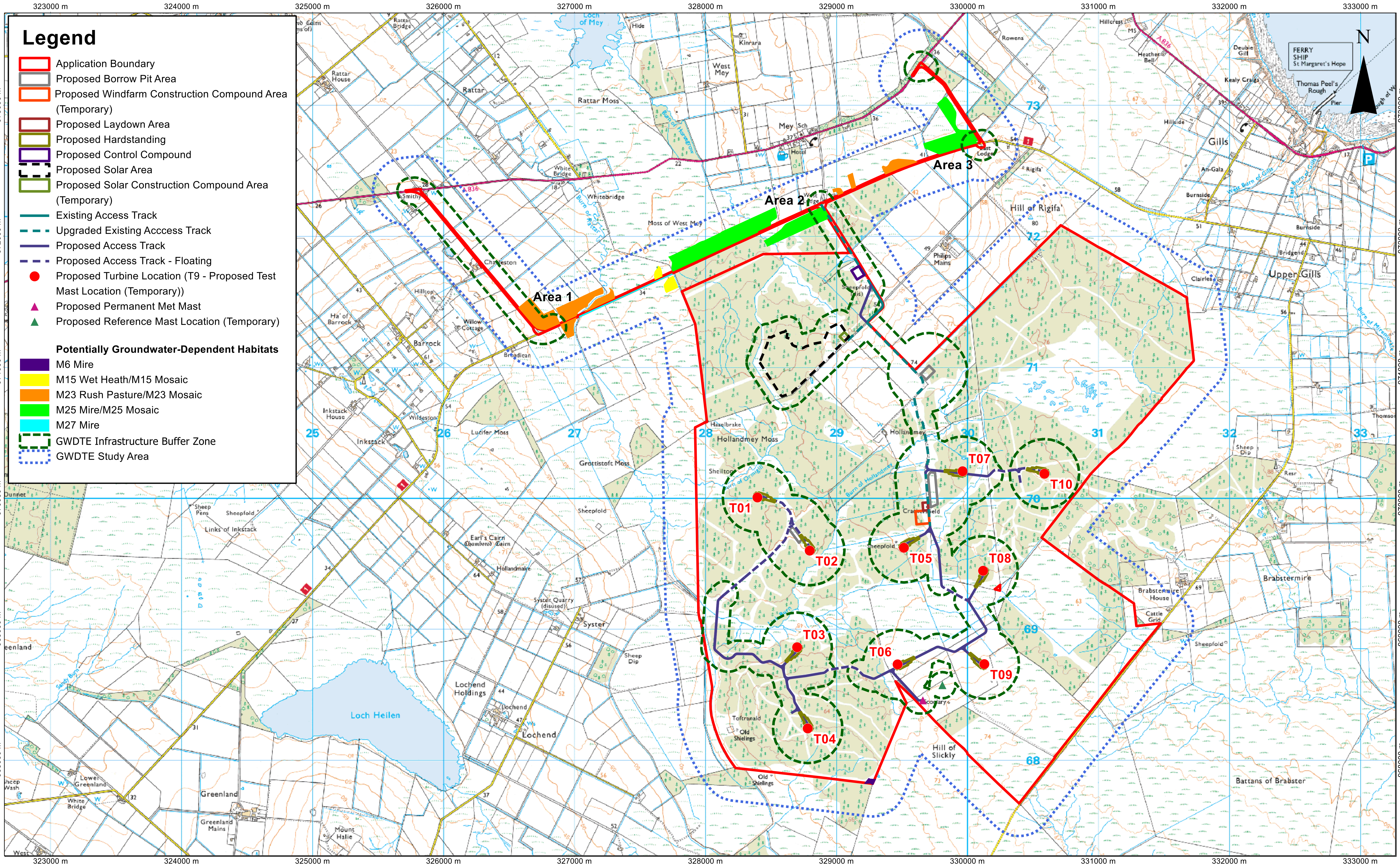

SCOTTISHPOWER RENEWABLES

Rev	Date	By	Comment
E	09/11/2021	CI	Layout change
D	02/11/2021	CI	Infrastructure & boundary update
C	19/08/2021	CI	Infrastructure update

1:27,500 Scale @ A3

0 1 km

Hollandmey Renewable Energy Development

Figure 10.4.6: Potentially Groundwater-Dependent Habitats

Drg No	HMY_Geo_CI
Rev	E
Date	09/11/2021
Figure	10.4.6

Datum: OSGB36
Projection: TM