8 HYDROLOGY, GEOLOGY, HYDROGEOLOGY AND PEAT

8.1 Introduction

8.1.1 This chapter considers the potential effects of the Proposed Development on hydrology, geology, hydrogeology and peat. It details the current environmental baseline in relation to this topic and is then followed by the identification and assessment of potentially significant effects on each receptor based on the baseline and assessment methodology set out. The effects on each receptor in the surface water catchments containing proposed infrastructure are assessed, as hydrological effects from a group of structures are more relevant for individual catchments and potentially have greater effects than across the whole of the Site. These effects are then grouped for the assessment section which discusses the effects in the round. Where relevant, mitigation, management and monitoring measures are then discussed and the residual effects determined.

8.1.2 This chapter considers associated links to other environmental features such as terrestrial and aquatic ecology (**Chapter 6: Ecology**) due to their potential dependence on the water environment.

8.1.3 This assessment was undertaken by Fluid Environmental Consulting (Fluid) with inputs from East Point Geo in relation to the peat landslide hazard risk assessment (PLHRA) and the borrow pit assessment. Further details of which are provided in **Appendix 8.4: Peat Landslide Hazard Risk Assessment and Appendix 8.6 Borrow Pit Assessment**.

8.1.4 The following matter has been scoped out of the assessment following the scoping assessment and scoping opinion (consultation responses summarised in **Table** 8.1); impacts arising from former mine workings as non recorded within the application boundary.

8.1.5 The objectives of the chapter are to:

- Describe the baseline conditions;
- Describe the assessment methodology and significance criteria used in completing the assessment;
- Describe any embedded design mitigation or good practice measures which would be implemented, and which have informed the assessment;
- Assess the likely significant effects, including cumulative effects;
- Describe any additional mitigation measures proposed to address likely significant effects (if required); and,
- Assess the residual effects remaining following the implementation of mitigation (if required).

8.1.6 This chapter is supported by the following figures presented in **Volume 2a**:

- **Figure 8.1**: Hydrological Setting;
- **Figure 8.2**: National Soil Map of Scotland;

- **Figure 8.3**: SNH Carbon and Peatland Map;
- **Figure 8.4**: Superficial Geology;
- **Figure 8.5**: Bedrock Geology;
- **Figure 8.6**: Hydrology Features;
- **Figure 8.7**: Hydrogeological Regime;
- **Figure 8.8**: Ground Water Dependant Terrestrial Ecosystems;
- **Figure 8.9**: Depth of Penetration and Probe Locations;
- **Figure 8.10**: Estimated Peat Depth;
- **Figure 8.11**: Peat Reuse Areas; and
- **Figure 8.12:** Peat Restoration Areas.

8.1.7 This chapter is also supported by the following technical appendices, presented in **Volume 3** of the EIA Report:

- **Technical Appendix 8.1**: Good Practice Methods;
- **Technical Appendix 8.2**: Peat Survey Report;
- **Technical Appendix 8.3**: Outline Peat Management Plan (oPMP);
- **Technical Appendix 8.4**: Peat Landslide Hazard Risk Assessment (PLHRA);
- **Technical Appendix 8.5**: Watercourse Crossing and Infrastructure within 50 m of a Water Feature Inventory;
- **Technical Appendix 8.6**: Borrow Pit Assessment; and
- **Technical Appendix 8.7**: Groundwater Dependent Terrestrial Ecosystem (GWDTE) Assessment.

8.1.8 The following chapter specific terminology is referred to throughout the chapter:

- **GWDTE** – Groundwater Dependent Terrestrial Ecosystems are habitats that are dependent on groundwater. They are specifically protected under the Water Framework Directive (WFD).
- **PLHRA** – Peat Landslide Hazard Risk Assessment. Peat landslides are caused by a combination of factors. To assess the risk of a peat slide occurring in a particular location all of these factors must be determined and then combined into a model which enables a map of peat slide risk to be produced.
- **PWS** – Private Water Supplies are any water supplies to residents and their land that are not supplied through the public water mains system. PWS can be surface water or groundwater fed.
- **SW DWPA** – A Surface Water Drinking Water Protected Area is the surface water catchment associated with an abstraction for a public drinking water supply.
- **Hydrologically/Hydrogeologically Connected** – a receptor that is hydrologically or hydrogeologically connected to a source has potential surface water or groundwater pathways that directly link the two (e.g. the source is upgradient of the receptor in the same catchment).

8.2 Legislation, Policy and Guidance

8.2.1 There is a wide body of legislation, policy and guidance that has been used in relation to the assessment with key documents listed below.

Legislation

- Water Environment (Controlled Activities) (Scotland) Regulations (CAR) 2011 (as amended) A Practical Guide, Version 9.3 June 2023.
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 (amends and revokes the Private Water Supplies (Scotland) Regulations 2006).
- The Public Water Supplies (Scotland) Amendment Regulations 2017 (amends the Public Water Supplies (Scotland) Regulations 2014.
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
- The Water Framework Directive (WFD). This has been implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003 (WEWs Act) and the Water Environment (Controlled Activities) (Scotland) Regulations (CAR) 2011 (as amended in June 2023). The primary objective of the Directive is for all surface and coastal water bodies to achieve good chemical and ecological status, and groundwater bodies to achieve good quantitative and chemical status, by 2015 or 2021. This required assessment of a much wider set of water quality parameters than had previously been used. SEPA have published River Basin Management Plans (RBMPs) which detail the current and target status of water bodies, and the means of achieving these targets (as last assessed in 2014 and 2020).

Planning Policy

- National Planning Framework (NPF) 4: National Spatial Strategy for Scotland, adopted by Scottish Ministers on 13th February 2023 replaces NPF3 and Scottish Planning Policy. Approved by Scottish Parliament on 11 January 2023.

8.2.2 Some of the SEPA planning guidance is being reviewed and updated to reflect the NPF4 policies. For example, the Flood Risk Standing Advice and Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. It still provides useful and relevant information, but some parts may be updated further in the future.

Local Development Plan

8.2.3 The statutory Local Development Plans and related guidance applicable to hydrology, geology, hydrogeology and soils and adopted by The Highland Council ('the Council') are:

- Highland-wide Local development Plan (HwLDP) adopted April 2012.
- Inner Moray Firth Local Development Plan (IMFLDP) adopted 2015.
- WestPlan adopted 2018.
- The Onshore Wind Energy Supplementary Guidance (OWESDG) (2016) and its Addendum (2017).

SEPA Guidance

8.2.4 The Guidance for Pollution Prevention (GPP) includes the documents referred to below, which are the principal documents which establish best practice for preventing contamination of surface water from construction activities. Those relevant to the Proposed Development include:

- GPP1: Understanding your Environmental Responsibilities – Good Environmental Practices version 1.2 (SEPA, DAERA, NRW & NIEA, June 2021) replaces PPG1: General guide to the prevention of pollution (EA, SEPA & EHSNI, published 2013, withdrawn December 2015).
- GPP2: Above ground oil storage tanks (SEPA, NIEA & NRW, January 2018).
- GPP4: Treatment and disposal of sewage where no foul sewer is available (SEPA, DAERA, NRW & NIEA, 2021).
- GPP5: Works and maintenance in or near water (SEPA, DAERA, NRW & NIEA, January 2017).
- GPP6: Working at construction and demolition Sites, version 1 (EA, SEPA & NIEA, 2023).
- GPP8: Safe storage and disposal of used oils (SEPA, DAERA, NRW & NIEA, July 2017).
- GPP21: Pollution incidence response planning, version 1.1 (SEPA, DAERA, NRW & NIEAEA, June 2021).
- GPP26: Storage and handling of drums and intermediate bulk containers, version 1.2 (SEPA, DAERA, NRW & NIEA, 2017June 2021).

Additional SEPA Guidance

- SEPA Flood maps / Indicative River & Coastal Flood Map (Scotland) (SEPA January 2014, updated April 2018 and 2022).
- Temporary Construction Methods, Engineering in the Water Environment Good Practice Guide, WAT-SG-29 (SEPA; 2009).
- River Crossings, Engineering in the water environment, WAT-SG-25 (SEPA, 2010).
- Water Run-Off from Construction Sites, Sector Guidance, Sector Specific Guidance WAT-SG-75 (SEPA, 2021).
- SEPA Regulatory Position Statement – Developments on peat (SEPA, 2010).
- Land Use Planning System Guidance Note 4 (LUPS GU4) - Planning Guidance on On-shore Windfarm Developments (SEPA, September 2017).
- Land Use Planning System Guidance Note 2 (LUPS GU2) - Planning advice on Sustainable Drainage Systems (SUDS) (SEPA, August 2010).
- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, Land Use Planning System Guidance Note 31 (LUPS-GU31), version 3 (SEPA, 2017).
- SEPA Flood maps / Indicative River & Coastal Flood Map (Scotland) (SEPA January 2014, updated April 2018 and 2022).
- Temporary Construction Methods, Engineering in the Water Environment Good Practice Guide, WAT-SG-29 (SEPA; 2009).
- River Crossings, Engineering in the water environment, WAT-SG-25 (SEPA, 2010).

- Water Run-Off from Construction Sites, Sector Guidance, Sector Specific Guidance WAT-SG-75 (SEPA, 2021).
- SEPA Regulatory Position Statement – Developments on peat (SEPA, 2010).
- Land Use Planning System Guidance Note 4 (LUPS GU4) - Planning Guidance on On-shore Windfarm Developments (SEPA, September 2017).
- Land Use Planning System Guidance Note 2 (LUPS GU2) - Planning advice on Sustainable Drainage Systems (SUDS) (SEPA, August 2010).
- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, Land Use Planning System Guidance Note 31 (LUPS-GU31), version 3 (SEPA, 2017).
- Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems (SEPA, August 2024).
- International Union for Conservation of Nature (IUCN).

Other Relevant Guidance

- Advising on peatland, carbon-rich soils and priority peatland habitats in development management NPF4 (NatureScot, 2023, revised November 2023).
- Control of water pollution from constructions Sites. Guidance for consultants and contractors C532 (CIRIA, 2001).
- Environmental good practice on Site C650 2nd Edition (CIRIA, 2005).
- Control of water pollution from linear construction projects: technical guidance C648 (CIRIA, 2006).
- Good practice during windfarm construction (Scottish Renewables, SNH, SEPA & Forestry Commission Scotland, 4th Edition 2019).
- Good practice during wind farm construction (NatureScot, July 2024).
- Managing Forest Operations to Protect the Water Environment Practice Guide (Forestry Commission Scotland, 2019).
- Practice guide for forest managers to assess and protect Groundwater Dependent Terrestrial Ecosystems when preparing woodland creation proposals (Forestry and Water Scotland Initiative, January 2018).
- Planning Advice Note 50 Controlling the Environmental Effects of Surface Mineral Workings (1996).
- Planning Advice Note 79: Water and Drainage (2006).
- Guidance on Road Construction and Maintenance (Forests and Water Guidelines Fifth Edition 2011, Forestry Commission).
- A Handbook of Environmental Impact Assessment, 5th Edition (SNH, 2018).
- Design Guidance on River Crossings and Migratory Fish (Scottish Executive, 2000).
- Peatland Survey. Guidance on Developments on Peatland. Scottish Government, Scottish Natural Heritage (SEPA, 2017).
- Peat Landslide Hazard and Risk Assessments: Good practice Guide for Proposed Electricity Generation Developments (Scottish Government, Second Edition, 2017).

8.3 Consultation Undertaken

8.3.1 A scoping report was submitted by the Applicant in January 2024. The submission included the indicative eight proposed turbines (Scoping/Preapplication consultation layout) located on the Site. Further details are available in **Chapter 2**.

8.3.2 **Table** 8.1 summarises the scoping consultation responses regarding hydrology, geology, hydrogeology and peat matters, and provides information on where and/or how they have been addressed in this assessment. The following regulatory bodies made comment on the peat and hydrology that may be impacted on the Site.

Table 8.1: Hydrology, Geology, Hydrogeology and Peat Consultation Summary

Consultee and Date received	Summary of Key Comments	Action Taken
NatureScot Scoping Response - 5/3/2024	<u>Peat:</u> We would expect the Peat Landslide Hazard and Risk Assessment (PLHRA) to identify, and include proposed mitigation for, any risk of peat slide affecting watercourses connected to the SAC. EIAR to include the risk of non-peat sediment release due to the creation of unstable slopes on glacial deposits on the Site. Provide details of peat and soil management measures, and the Site-specific mitigation measures that would be in place to prevent and control erosion and surface water run-off should be provided, with particular attention to the period during and immediately after construction. PMP should include consideration of the extent of habitat loss, including direct, indirect, temporary and permanent as well as the associated suitable mitigation and / or restoration measures.	A PLHRA is provided in **Appendix 8.4**. Good Practice Methods are provided in **Appendix 8.1**. A Peat Survey Report is provided in **Appendix 8.2** and an Outline Peat Management Plan is provided in **Appendix 8.3**.
SEPA 29/5/2024	They advise the planning authority that EIA submission must contain a series of scale drawings of sensitivities, overlain with proposed development, including: Potential GWDTE. They have been identified in similar habitats in other Sites, SEPA welcome the commitment to undertake a National Vegetation Classification (NVC) survey.	**Figures 8.1 to 8.11** illustrate constraints relating to hydrology, geology, hydrogeology and soils. **Appendix 8.7** provides a GWDTE assessment, within this assessment **Figure 8.7.1** shows all potential GWDTEs and **Figure 8.8** summarises the actual GWDTEs. The GWDTE assessment concludes that most habitats on Site are not truly groundwater dependent.

Consultee and Date received	Summary of Key Comments	Action Taken
	It is unlikely that development will take place within 250m of a groundwater supply source; only one PWS is shown to be present on the Site.	However, there are some springheads that are groundwater dependent. One springhead is located approximately 25 m from T03. The risk to this GWDTE is low, however as a precautionary measure it is recommended that mitigation is undertaken.
The Highland Council 13/03/2024	<u>Private Water Supplies</u> An investigation to identify any private water supplies, including pipework, is required. A report should be produced which includes: • Details of proposed measures to prevent contamination or physical disruption; • Details of monitoring prior to, and during the proposed constructing; • If required, contingency measures in the event of an incident. An on Site survey will be required	A Freedom of Information request was made to the Council in December 2023. In response, the private water supply register was provided. A desk study was carried out which identified one private water supply connected to the Site, this is discussed **Section 8.5**. The area was visited during the Site walkover.
Scottish Water 11/03/2024	<u>Parts of the Site are within a Scottish Water surface water Drinking Water Protection Area from the Aldernaig Burn and the Loch Ness further downstream of the Site is used for a public water supply.</u>	These are discussed in **Section 8.5**. Infrastructure was designed to reduce the number of watercourse crossings and avoid being within 50 m of main watercourses. The abstractions are a significant distance downstream (>2 km), there would be dilution factor and therefore the risks to these supplies area scoped out.
SEPA 08/07/2024	Licensed Abstraction data request was made to SEPA and in response a list of licensed abstractions was provided.	Data reviewed and fed into the baseline assessment.

Consultee and Date received	Summary of Key Comments	Action Taken
		All abstractions located within separate sub catchments to infrastructure or over 1 km from proposed infrastructure. Discussed in **Section 8.5**.
The Highland Council 12/12/2023	A Freedom of Information request was made to the Council was carried out in December 2023. In response, the private water supply register was provided.	Data reviewed and fed into the baseline assessment. All abstractions located within separate sub catchments to infrastructure or over 1 km from proposed infrastructure, with the exception of one borehole used for Millenium wind farm substation. Discussed in **Section 8.5**.

8.4 Scope and Methodology

Scope of Assessment

8.4.1 The following effects were identified at the scoping stage for consideration in this assessment:

- Direct effects during construction on the peat resource, such as dewatering of peat due to excavation or pumping, as well as the removal of peat, and a change in the peat landslide risk;
- Direct effects during construction on the recharge and flow within shallow and deep groundwater systems, including GWDTE;
- Direct effects during construction on watercourses through the alteration of flow rates, geomorphology, and sediment loading;
- Direct effects during construction on local solid and superficial geology, including through direct removal or from erosion due to the infrastructure changing the hydrological environment;
- Direct effects during construction to surface or groundwater quality due to oil and fuel spills or leaks, other chemicals stored onSite and sediment release;
- Direct effects during construction on public or private water supply quality and quantity;
- Direct effects of sedimentation on surface water quality as a result of forestry felling during construction;
- Indirect effects during construction on the water environment including:
    - Watercourses through the alteration of flow rates, geomorphology, sediment loading and pollution;
    - PWS abstracting from either surface water or groundwater sources;
    - GWDTE; and
    - Cumulative effects on geology, hydrogeology, and hydrology because of other developments (either at the planning application stage, consented or under construction) that share the same catchments as the Proposed Development.

8.4.2 Based on the desk based and field survey work undertaken, the professional judgement of the EIA team, experience from other relevant projects and policy guidance or standards, and feedback received from consultees, the following topic areas have been 'scoped out' of detailed assessment:

- Effects during construction on any GWDTEs that are not hydrogeologically connected to the development, as discussed in **Appendix 8.7**;
- Effects during construction on any PWS that is not hydrologically or hydrogeologicaly connected to the development, as discussed in **Section 8.9**;
- Pollution of surface water during construction, assuming on the basis that best practice measures would be followed and all infrastructure is located at least 50 m from 1:25,000 OS mapped water features (i.e., the River Moriston, River Gary and the River Oich).
- Modifications to natural drainage patterns, changes to runoff rates and volumes, increase in flood risk, and potential reduction of the natural floodplain during both

construction and operation. Except for watercourse crossings, infrastructure, would be located outside of flood zones. Correct application of SuDS measures would prevent any increase in flood risk, and all watercourse crossings would be designed to accommodate a 1:200-year flow event plus climate change allowance;

- Impacts to deep groundwater, as the underlying bedrock is a low-permeability aquifer that does not support groundwater abstractions.
- Effects during the operation period as although it is recognised that effects would occur, these would be substantially less than during the construction period which represents a worst case; and
- Effects during the decommissioning phase as these would be similar, but of lower magnitude, to that of construction phase, and detailed plans and requirements would be agreed when required.

Baseline Methodology

The Study Area

8.4.3 The study area encompasses the whole of the Site and a wider area related to the surface water catchments connected to the Site. The hydrological setting is illustrated on **Figure 8.1**. It is assumed that hydrological effects are likely to have attenuated at distances in excess of 1 km from the proposed Site infrastructure, although if a direct pathway exists (e.g. a watercourse), these are also considered.

Desk Study

8.4.4 The baseline assessment was predominantly based on a desk study with Site visits for verification. The desk study involved collating and assessing the relevant information from the following sources:

- SLR 100 m grid Peat Probing Data, November 2021;
- Centre for Ecology and Hydrology (CEH): National River Flow Archive (NRFA) webSite for river flow data (accessed January 2025, http://www.ceh.ac.uk/data/nrfa/data/search.html);
- Meteorological Office webSite for rainfall data (accessed January 2025, http://www.metoffice.gov.uk/climate/uk/averages/);
- Ordinance Survey Mapping 1:25,000 map 68 and 1:50,000 map 356;
- Google Earth and Bing map aerial imagery (accessed January 2025);
- British Geological Survey Mapping 1:50,000 Sheet 12 Campbeltown Solid and Drift (1996) BGS Map Portal (Accessed January 2025, https://webapps.bgs.ac.uk/data/MapsPortal/map.html?id=10954300010954);
- British Geological Society GeoIndex Boreholes database, 1:50,000 (accessed January 2025, https://mapapps2.bgs.ac.uk/geoindex/home.html);
- British Geological Society Geology Viewer (accessed January 2025, https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/);
- National Soil Map of Scotland (accessed January 2025, https://map.environment.gov.scot/Soil_maps/?layer=1);

- SNH Carbon and Peatland Map 2016 (accessed January 2025://opendata.nature.scot/datasets/carbon-and-peatland-2016-map/explore?location=55.392037%2C-3.017924%2C8.94);
- SEPA Water Classification Hub (accessed January 2025, https://www.sepa.org.uk/data-visualisation/water-classification-hub/);
- Hydrogeological Map of Scotland (Scale 1:625,000, Institute of Geological Sciences, 1988);
- Groundwater Vulnerability Map of Scotland (accessed January 2025) https://nora.nerc.ac.uk/id/eprint/17084/1/OR11064.pdf));
- SEPA Indicative River and Coastal Flood Map (accessed January 2025, https://map.sepa.org.uk/floodmaps);
- Scottish Drinking Water Protected Area for surface water, Scottish Government WebSite Maps (accessed January 2025, https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/); and
- Multi-Agency Geographic Information for the Countryside (MAGIC) webSite (accessed January 2025, http://magic.defra.gov.uk/).

Field Study

8.4.5 The following field surveys were carried out to inform the assessment:

- Peat Surveys – An initial 10 0m grid was completed across the Site by SLR, November 2021; Phase I: Additional 100 m grid across the Study Area and cores undertaken by Fluid Environmental Consulting Ltd, April 2024; Phase 2: detailed probing and coring of initial layout undertaken by Fluid Environmental Consulting Ltd, July and August 2024; and Phase 3: further detailed probing following infrastructure adjustments undertaken by Fluid Environmental Consulting Ltd, October 2024 (see **Appendix 8.2**).
- PLHRA and borrow Pit Assessment Walkover, East Point Geo - a walkover of the proposed infrastructure area was completed in October 2024 (see **Appendix 8.4** and **Appendix 8.6**) to verify the Site geomorphology, other relevant mapping related to the assessment of peat slide risk, existing borrow pits and aggregate feasibility.
- Hydrology Walkover – visits for baseline familiarisation, key GWDTEs and Proposed Development design inspection of proposed watercourse crossings and features undertaken by Fluid Environmental Consulting Ltd between 22nd and 23rd October 2024 (see **Appendix 8.5** and **Appendix 8.7**).

Assessment Methodology

8.4.6 The significance of any effects of the Proposed Development on baseline conditions is assessed in this chapter. The combination of the sensitivity of the receptor and the magnitude of the potential effect combine to determine the significance of that effect.

8.4.7 There are no published guidelines or criteria for assessing and evaluating effects on hydrology, hydrogeology, geology or peat within the context of an EIA. The assessment is based on a methodology derived from EIA guidance, IEMA guidance, the SNH publication - A Handbook on Environmental Impact Assessment (SNH (now Nature Scot) 2018), and professional judgement and expertise. The methodology is also based upon relevant SEPA guidance including Assigning Groundwater Assessment Criteria for Pollutant Inputs (SEPA

2010). The methodology sets a list of criteria for evaluating the environmental effects, as follows:

- The type of effect (i.e. whether it is strongly positive, positive, strongly negative, negative, neutral or uncertain);
- The likelihood of the effect occurring based on the scale of certain, likely, or unlikely;
- Sensitivity criteria are based on both the likely effect on a receptor due to a particular activity, as well as the importance of the resource under consideration or designated value of the receptor; and
- The magnitude of change is the potential effect in relation to the resource that has been evaluated, quantified using the scale high, medium or low and included the consideration of timing, scale, size and duration of a potential impact.

8.4.8 The sensitivity and magnitude of potential effect criteria described in this section were considered appropriate for the conditions and environments prevailing at the Site.

Criteria for Assessing Sensitivity of Receptors

8.4.9 Sensitivity criteria are based on both the ability of a receptor to accommodate the anticipated impact of the likely changes, as well as the importance of the resource under consideration or designated value of the receptor (e.g. a designated area of international or national importance has a higher value and therefore higher sensitivity than other areas of lower status). Evaluation of sensitivity of geology, hydrology, hydrogeology and peat requires a considerable degree of judgement, based on defined characteristics and values and professional experience.

8.4.10 The sensitivity criteria used in this assessment is presented in **Table** 8.2.

Table 8.2: Sensitivity Criteria

Sensitivity of Environment	Definition
Very High	Private water supply abstraction for human or stock consumption (surface water or groundwater). Public drinking water supply abstraction (surface water or groundwater). Surface water classified under the WFD as 'high' (or equivalent older chemical or biological monitoring designation). Groundwater classified under the WFD as 'good'. Watercourse designated under the Freshwater Fish Directive or known to have fish spawning grounds. Groundwater vulnerability to pollution Class 5. Internationally or nationally designated Sites (e.g. Ramsar, SPA, SAC, SSSI, National Nature Reserves, Marine Nature Reserves). Habitats listed in Regional Biodiversity Action Plans or Annex I habitats that are groundwater dependent. Internationally important species sensitive to hydrological change. >25 % of the infrastructure is located on Peat >2 m in open terrain or >3 m in forestry, densely drained, eroded or gullied open terrain.
High	Private water supply abstraction not for human or stock consumption (surface water or groundwater). Public non-drinking water supply abstraction (surface water or groundwater). Surface water classified under the WFD as 'good' (or equivalent older chemical or biological monitoring designation). Watercourse known to support important fishery population. Groundwater vulnerability to pollution Class 4. Sites designated at a regional level. >25% of infrastructure is located on peat with depth between 1 m – 2 m in open and undegraded terrain or >2 m in forestry, densely drained, eroded or gullied open terrain. Other water dependent habitats.
Medium	Surface water classified under the WFD as 'moderate' (or equivalent older chemical or biological monitoring designation). Sites designated at a local level. >25% of infrastructure located on peat with depth between 0.5 m – 1 m in open and undegraded terrain or with depth between 1 m – 2 m in forestry, densely drained, eroded or gullied open terrain. Groundwater vulnerability to pollution Class 3 or 2.
Low	Surface water classified under the WFD as 'poor or bad' (or equivalent older chemical or biological monitoring designation).

Sensitivity of Environment	Definition
	Groundwater classified under the WFD as 'poor'. Groundwater vulnerability to pollution Class 1. >75% of the infrastructure is located on non-peat or peaty/organic rich soils less than <0.5 m in depth, or peat <1 m in depth that is in forestry, densely drained, eroded or gullied open terrain.

8.4.11 Any assessment regarding peat resource considers the peat as a carbon store. Therefore the following and **Plate 8-1** forms the basis for the assessment of sensitivity.

8.4.12 Assessment of sensitivity of peat is based on the degree by which the peatland in its baseline condition has been degraded by natural or man-made activities. Uneroded, open peatland without evidence of drainage is considered to be of highest sensitivity, while peatlands degraded by forestry, drainage or erosion are considered to have a poorer baseline condition.

8.4.13 A depth criterion is also applied, in which deeper peats are considered to hold more carbon (for which peat volume is a proxy) and more likely to exhibit a functional hydrological system, with associated flood regulation benefits.

8.4.14 Plate 8-1 illustrates this approach with the sensitivity for each peat degradation and peat depth combination with the image, coloured using RAG (Red-Amber-Green) styling to demonstrate the sensitivity. The assessment of sensitivity does not take into account vegetation, which is considered within the ecological impact assessment in **Chapter 6: Ecology**.

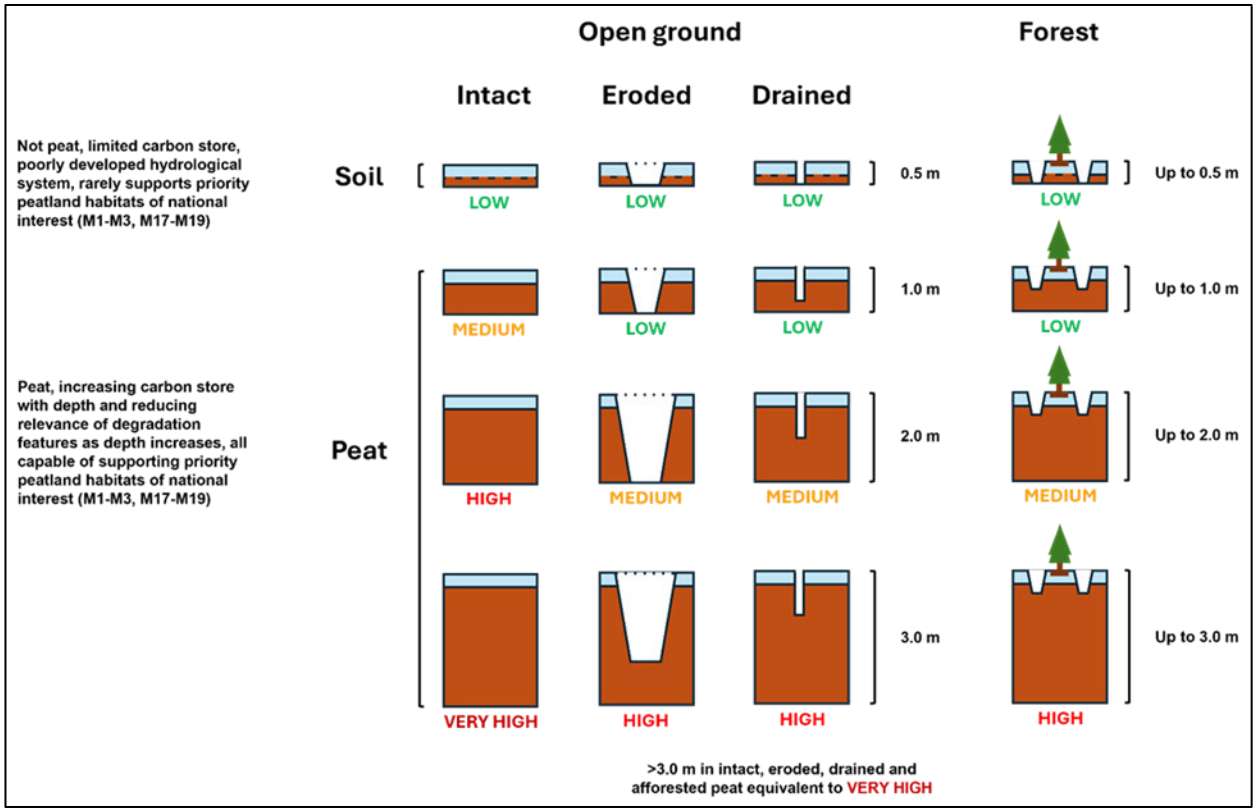

Plate 8-1: Peat Sensitivity

Criteria for Assessing Magnitude of Change

8.4.15 Magnitude of change is the potential effect in relation to the resource that has been quantified using the scale high, medium or low, and includes the consideration of timing, scale, size and duration of a potential impact.

8.4.16 The magnitude of the potential effect criteria used in this is presented in **Table** 8.3.

Table 8.3: Magnitude of Potential Effect Criteria

Magnitude of Potential Effects	Definition
Very High	Impact resulting in loss of feature or use. Fundamental (long-term or permanent) changes to surface water, groundwater and geology (in terms of quantity, quality and morphology). Excavated peat volume associated with the infrastructure footprint and associated earthworks is >10% of the peat volume across the peat survey area within the Site.
High	Impact resulting in loss of part (<10%) of feature or use. Substantial but non-fundamental and short to medium term changes to the surface water, groundwater and geology (in terms of quantity, quality and morphology). Excavated peat volume associated with the infrastructure footprint and associated earthworks is >5% and <10% of the peat volume across the peat survey area within the Site.
Medium	Impact on feature or use. Detectable but non-fundamental and temporary changes to the surface water, groundwater and geology (in terms of quantity, quality and morphology). Excavated peat volume associated with the infrastructure footprint and associated earthworks is >2% and <5% of the peat volume across the peat survey area within the Site.
Low	Impact but of insufficient magnitude to affect feature or use. No perceptible changes to the surface water, groundwater and geology (in terms of quantity, quality and morphology). Excavated peat volume associated with the infrastructure footprint and associated earthworks is <2% of the peat volume across the peat survey area within the Site.

8.4.17 The assessment of the magnitude of potential effects of the Proposed Development is based on the location of the receptor and the proximity of operational infrastructure or construction activity taking place. The magnitude of potential effect considers the good practice and standard embedded mitigation methods described in this chapter and **Technical Appendix 8.1.**

8.4.18 The assessment of magnitude in relation to peat disturbance is based on the absolute volume of peat calculated to be disturbed by the Proposed Development as a proportion of the total Site resource. This latter value is based on the full volume of peat calculated across the surveyed peat area. The threshold values (2%, 5% and 10%) reflect increasing magnitudes of impact. Importantly, for the assessment to be upheld, the assumption is that any excavated peat has an appropriate reuse specified within the Outline Peat Management Plan (oPMP),

Outline Biodiversity Enhancement Management Plan (oBEMP), or these documents in combination.

Criteria for Assessing Significance

8.4.19 The predicted significance of the effect is determined through a standard method of assessment based on professional judgement while considering sensitivity and magnitude of change as detailed in **Table** 8.4.

8.4.20 The combination of the sensitivity and magnitude of potential effect combine to provide a matrix categorisation of significance (major, moderate and minor), subject to professional judgement.

8.4.21 Major and Moderate effects are significant in the context of the EIA Regulations. Where the significance of effect is assessed as being moderate or above, additional Site-specific mitigation is required.

Table 8.4: Significance Criteria

Magnitude of Potential Effects	Sensitivity of Environment			
	Very High	**High**	**Medium**	**Low**
Very High	Major	Major	Moderate	Moderate
High	Major	Moderate	Moderate	Minor
Medium	Moderate	Moderate	Minor	Minor
Low	Minor	Minor	Minor	Minor

Nature of Effect

8.4.22 In addition to determining the significance of the effect, the assessment also includes a qualitative description regarding the nature of the effect. These terms, shown in **Table** 8.5 add information about how the effect would affect receptors.

Table 8.5: Nature of Effect

Term	Nature of Effect Descriptors
Adverse	An effect which has the potential to decrease receptor value or status relative to baseline conditions.
Beneficial	An effect which has the potential to increase receptor value or status relative to baseline conditions.
Short-term	Effects that persist only for a short time (e.g. during the construction (or decommissioning) phase only); includes reversible effects.
Medium-term	Effects that may persist until additional mitigation measures have been implemented and become effective.
Long-term	Effects that persist for a much longer time (e.g. for the duration of the operational phase essentially until the development ceases or is

Term	Nature of Effect Descriptors
	removed/ reinstated); includes effects which are permanent (irreversible) or which may decline over longer timescales.
Temporary	A reversible effect where recovery is possible and for which effects would persist only for a short or medium-term.
Frequent	Refers to a recurring effect that occurs repeatedly; in some cases a lower level of impact may occur with sufficient frequency to reduce the ability of a receptor to recover effectively.

8.4.23 Unless otherwise stated, identified potential effects are considered to be adverse.

Difficulties and Uncertainties

8.4.24 This section provides a description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

8.4.25 The nature of some hydrological features means that some may not manifest themselves at all times and may or may not be present as a result of extreme weather conditions. The fieldwork was undertaken in a range of weather conditions. However, it is possible that some small, minor features may have been missed because of their ephemeral or temporary nature.

8.4.26 PWS survey records were requested from the Council. Local Authority records are not always fully up to date and correct. Information received is discussed in **Section 8.5**.

8.4.27 Overall, it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental effects on hydrology, hydrogeology and geology (including peat).

Assumptions

8.4.28 In regard to hydrology, management of water-borne pollution and protection of natural heritage areas, SEPA has statutory obligations in terms of the management and control of pollution into water resources in Scotland. Where careful design has avoided sensitive receptors, it would be reasonable to assume that the adoption of SEPA's Best Practice Guidelines would, in general, prevent pollution to acceptable standards and make the majority of any 'significant' effects unlikely. Best practice assumed to be in place during construction, and which has been considered in the assessment of effects, is set out in **Appendix 8.1**. Specific 'additional' mitigation measures may be required in certain areas or at certain times of the Site development, and these are set out in the assessment where relevant.

8.4.29 The purpose of this assessment is to identify significant effects and the key areas of the Proposed Development infrastructure where specific additional mitigation and management measures are required to mitigate any significant effects. The assessment of effects has

been undertaken based on the assessment of baseline conditions across the study area with reference to the relevant sections in this chapter.

8.4.30 Additional assumptions that have been taken into consideration during the course of the assessment are as follows:

- Construction programme is anticipated to last 17 months;
- Micrositing of all infrastructure would be limited to 50 m;
- No forestry works would be required; and
- Any widening of existing tracks within 50 m of watercourses would be undertaken on the side furthest from the watercourse or water features.

Receptors / Matters Scoped Out of Assessment

8.4.31 On the basis of the desk based and field survey work undertaken, the professional judgement of the EIA team, experience from other relevant projects, policy guidance or standards, and feedback received from consultees, the following effects have been 'scoped out' of detailed assessment:

- Effects during construction and operation on Private Water Supplies and Public Water Supply Abstractions located over 2 km from the proposed infrastructure.
- Effects during construction and operation on the bedrock geology resource;
- Effects during the operational period for peat and hydrology, with the exception of drainage management, watercourse crossing and peatland restoration management and monitoring. Although it is recognised that effects would occur, these would be substantially less than during the construction period which represents a worst-case scenario; and
- Effects during the decommissioning phase as these would be similar, but of lower magnitude, to that of construction phase, and detailed plans and requirements would be agreed when required.

8.5 Existing Environment

8.5.1 The following section describes the existing hydrological, hydrogeological and geological conditions within and surrounding the Site. This includes the physical characteristics as well as designated Sites, waterbodies, groundwater dependent habitats, and includes their quality and their use from publicly available information and a Site walkover undertaken October 2024.

8.5.2 The hydrological context of the Site is shown in **Figures 8.1** and **8.6a-f.**

Topography, Land Cover and Land Use

8.5.3 The Site extends from the River Moriston along the northern boundary to a high altitude undulating ridgeline in the south and southwest. Access to the SSite is from the A887 public road in the north. The access track from the A887 uses the existing Millennium Wind Farm access track to traverse the ascent from around 132 m Above Ordnance Datum (AOD) to 584 m AOD.

8.5.4 The Development Area is adjacent to the operational Millennium Wind Farm. There are former borrow pits and construction areas of hardstanding on SSite and a substation at approximately NGR 226507 810666, adjacent to the existing wind farm track.

Meteorological Summary

8.5.5 The rainfall at Fort Augustus (the nearest Met Office station to Site), 5 km east, is greatest in January and lowest in April (1991-2020), being on average 191 mm and 67 mm respectively. Rainfall across the other months of the year changes by 10 – 30 mm each month between the highest and lowest values. The average annual rainfall (1991-2020) is 1359 mm, and the average annual rainfall across Scotland over the same time period is 1573 mm therefore the Site has very slightly below average rainfall compared to the rest of Scotland.

8.5.6 The yearly average maximum temperature at Fort Augustus is 12 °C, with maximum temperatures ranging, on average, from around 6.3°C January to 19°C in July. The Site is located at a higher elevation (129 m – 670 m AOD) to Fort Augustus (23 m) and is therefore expected to have lower average temperatures.

Soils

8.5.7 The distribution of soils over the Site is generally controlled by the underlying geology, the topography and the drainage regime. A review of the National Soil Map of Scotland (http://map.environment.gov.scot/Soil_maps/?layer=1 accessed May 2025) shows the Site consists of peaty podzols in the west, peat across the centre of the SSite and peaty gleys of the Arkaig Association on the eastern side of the Site Boundary.

8.5.8 The SNH Carbon and Peatlands 2016 mapping shows several different classes of peatland across the Site (**Figure 8.3**). It indicates that a large, central area of the Site is underlain by Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitats) and 2 (Peatland or areas with high potential to be restored) peatland which is described as nationally important carbon-rich soils and priority peatland habitat. On the south-western boundary, Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type) is seen and Class 5 (peat soil with no peatland vegetation) peat soils are also present within the Site, primarily in the west.

Peat

8.5.9 The peat probing and peat coring investigations showed peat cover is not continuous across the Site. Significant areas of the Site have no peat or peat <1 m depth, with large areas of deeper peat in the east. The surveys also investigated peat characteristics and underlying geological conditions.

8.5.10 Full results of the peat surveys are described within the Peat Survey Report, Outline Peat Management Plan and Peat Slide Risk Assessment presented in **Appendices 8.2**, **8.3** and **8.4** respectively. **Figures 8.9** and **8.10** show the peat depth distribution across the Site based on the quantitative data collected from the surveys.

8.5.11 The spatial occurrence and depth distribution of peat across the Site has been examined extensively based on the Developments on Peatland: Site Surveys guidance (SNH (now NatureScot), SEPA, Scottish Government and The James Hutton Institute) and high-density probing has taken place at all infrastructure locations to determine peat depth and facilitate appropriate and accurate minimisation.

8.5.12 The following summarises the results of the various phases of the peat survey campaigns and subsequent interpreted peat depth contouring across the Peat Survey Area:

- The first round of the peat survey campaign (April 2024) provided a 100 m grid coverage across the Peat Survey Area considered for development to inform layout design;
- Peat has subsequently been determined to be present up to a maximum depth of 3.5 m based on 3,223 depth of penetration probes and 25 cores across the Peat Survey Area. This maximum peat depth was encountered in the extreme eastern section of the Peat Survey Area;
- No amorphous peat was identified with the Peat Survey Area;
- Acrotelm thickness on average is 0.13 m across the Peat Survey Area.
- The mapping indicates that although very deep peat was present within the Peat Survey Area, it was not continuous and significant areas were devoid of peat, with 65.5% of the Peat Survey Area containing no peat. Peat greater than 1 m in depth occurs across 12.6% of the Peat Survey Area.
- There is no peat (0 – 0.5 m depth) at 65.5% of the infrastructure footprint, 27% of the infrastructure is on peat <1 m depth and peat >1 m depth across 7.5% of the infrastructure footprint.

8.5.13 **Figure 8.10** illustrates the variability in peat across the Site. Peat cover was generally concentrated in the east of the Site although areas of peat were present towards the centre and south of the Site.

8.5.14 Peat depth variation over the Site can be summarised as follows:

- Peat is of variable depth across the Site thinning to organic soil in a number of areas..
- Peat is generally shallow or absent in the west of the Site, particularly at higher elevations where it exists on pockets, typically between bedrock ridges.
- In the east, despite the gentle gradients on the ridge line (along which the existing access track is located), peat depths are very limited, deepening downslope towards the limits of the PLHRA study area.
- Where peat is present, it is typically shallow, c. 0.5 – 1.0 m, occurring more deeply over relatively small areas, and very deeply (>3.0 m) in very isolated pockets. The deepest being in the east of the Site.

8.5.15 The various iterations of the Proposed Development layout design have allowed areas of deeper peat to be avoided where possible (refer to **Chapter 2: Proposed Development**). The proposed infrastructure has generally been sited into the shallowest peat in any particular locality (within the limits imposed by other constraints such as watercourse buffers, turbine spacings and highest value habitats) avoiding deeper peat, bog pools and the best habitat where possible.

Peat Geomorphology

8.5.16 The presence, characteristics and distribution of these features are helpful in understanding the hydrological function of a peatland, the balance of erosion and peat accumulation (or condition), and the sensitivity of a peatland to potential land-use changes.

8.5.17 The geomorphology of the Site can be divided and summarised into three differing geomorphological settings:

- In the western half, elevations drop quickly over relatively steep slopes descending from Ceann a Mhaim via planar peatland and minor hagging, with minor tributaries breaking up the slope.
- South of Ceann a Mhaim, topography is more irregular, with numerous northeast-southwest aligned ridges with thin / no peat separated by flushy and occasionally peat filled hollows. Waterbodies are scattered amongst the floors between ridges.
- In the eastern area, peatland geomorphology is more prevalent with complex pool systems or areas of erosion, some active and some relict.
- Flushes occasionally drain the mid slopes. Nearer the ridge line, thinner peat or soil lies over areas of bedrock.

Peat Slide

8.5.18 Construction work on peat has the potential to cause peat instability, which may affect peat soils (and their inherent carbon stores), peatland habitats and nearby watercourses, infrastructure or land uses. A Peat Landslide Hazard and Risk Assessment (PLHRA) has been undertaken and is documented in **Appendix 8.4**. The PLHRA includes detailed site mapping verified by field walkover survey, qualitative and quantitative assessments of peat stability, identification of on and off-site receptors and calculation of risks associated with peat landslides through a combination of likelihood and consequence.

8.5.19 No evidence of peat instability was observed during the walkovers.

8.5.20 The landslide susceptibility approach for peat landslide likelihood results (shown on **Figure 8.4.8** of **Appendix 8.4**) indicates that most of the Site has a 'Very Low to Low' likelihood, with small localised areas of Moderate likelihoods in the eastern section of the Site associated with the deeper, wetter peat.

Geology

8.5.21 Digital solid and drift geological maps were sourced from the British Geological Survey Digimap (1:50,000 scale) webSite and reviewed to provide geological information on the Proposed Development. The geology was further reviewed using the British Geological Survey Bedrock and Superficial Deposits 1:50,000 scale map for Sheet 73W Invermoriston (1993).

Drift Geology

8.5.22 The BGS Superficial geology shows superficial or drift deposits consist mainly of peat in the centre of the Site (**Figure 8.4**), with some diamicton till and hummocky glacial deposits of rock debris, clayey till in the north-west and sand and gravel in the east (BGS, 2023).

Solid Geology

8.5.23 British Geological Survey (BGS) mapping indicates that the Site is predominantly underlain by bedrock from the Tarvie Psammite Formation, part of the Loch Eil Group. Dykes are present across the Site, including Microdiorite dykes of the Northern Britain Siluro-Devonian Dyke suite. Older Amphibolite and Horneblend. Dykes are also present on the Site in a north-west to south-east orientation. Faults are present to the east and west of the Site, mainly oriented south-west to northeast although some faults have an east-west alignment (**Figure 8.5**).

Borehole Records

8.5.24 Boreholes are present to the east of the Site, the majority are between 0-10 m in depth. A 14 m borehole, located at NGR 232845 810703 shows peat for 3.2 m, underlain by 3 m of gravelly sand, granite and psammite.

Quarries and Mining

8.5.25 Beinneun Forest Quarry is the only evidence of quarries and mining on the Site (BGS GeoIndex, 2024). It is the location of an existing borrow pit, to the west of the existing access track at NGR 226485 810477. Further minor borrow pits are present on Site and discussed in **Appendix 8.6**.

Groundwater Quantity

8.5.26 From reviewing The British Geological Survey Hydrogeological map (http://mapapps2.bgs.ac.uk/geoindex/home.html?layer=BGSHydroMap accessed May 2025), the Site is underlain by Northern Highlands aquifer (ID 150701), which is classified as a low productivity aquifer, having only small amounts of groundwater in near-surface weathered zone and secondary fractures.

Groundwater Quality

8.5.27 A search of the SEPA Water Environmental Hub (https://www.sepa.org.uk/data-visualisation/water-environment-hub/ accessed May 2025) and River Basement Management Plan (RBMP) GIS Database was undertaken to provide information on the groundwater body in the region of the Site. The database indicates that majority of the Site is underlain by the Northern Highlands aquifer (ID 150701, 2108 km^2 in area). The groundwater body is classified as “Good” quality by SEPA.

Vulnerability to Pollution

8.5.28 The bedrock on Site is classified as being groundwater vulnerability 4a (highly to moderately vulnerable based on a scale of 5 being the highest vulnerability and 1 the least vulnerable) equating to being vulnerable to those pollutants not readily adsorbed or transformed and that pollution incidents would have a rapid travel time through or over the rocks if a pathway is available.

Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

8.5.29 Since the Site is largely underlain by impermeable glacial till and peat deposits, it is unlikely that many significant actual groundwater dependent terrestrial ecosystems would be present. Furthermore, the bedrock beneath the Site is a low productivity aquifer with only localised groundwater predominantly within fractures or the weathered zone.

8.5.30 The ecology National Vegetation Survey (NVC) identified 148 potentially GWDTE polygons and 28 target notes associated with potentially GWD features within 250 m of the infrastructure that have the potential to be groundwater dependent (GWD).

8.5.31 These NVC categories allow those habitats that are assessed as potentially GWDTE on Site to be identified and their actual dependency of groundwater to be subsequently determined. The ecological NVC survey identified 81 habitats and 5 target notes that are potentially groundwater dependent in accordance with SEPA LUPs Guidance GU31 (2017).

8.5.32 The glacial till deposits present across the majority much of the Site are relatively impermeable and are unlikely to hold significant quantities of groundwater. Site investigation show that there are large amounts of peat onsite, which is also relatively impermeable and these superficial deposits are likely to act impermeable aquitard layer between the surface and true groundwater.

8.5.33 In summary, the results of this analysis are that there are few areas of truly groundwater dependent habitat when considering the hydrogeological regime (shown on **Figure 8.8**).

8.5.34 Of these, six polygons and four target notes were potentially highly GWD. With the exception of the springheads, all were determined to unlikely to be truly GWD and not connected to the Proposed Development based on the hydrogeological regime (presence of superficial deposits and topography).

8.5.35 The springheads (Target note 10, 30, 95 and 96) were concluded to be dependent on shallow groundwater.

8.5.36 GWDTEs are assessed in **Appendix 8.5**. No GWDTEs have been identified where there is either a requirement for the design of specific mitigation measures, or a residual risk of impact on potentially groundwater fed wetland features, with the exception of not micrositing T03 further south.

Hydrology

8.5.37 The Site lies across two main river catchment areas – the River Moriston to the north and the River Garry/River Oich system to the south. Both flow into the Loch Ness and River Ness before discharging into the sea at Inverness. The Hydrological Context is shown on **Figure 8.1.**Within the Site area, the main tributaries are the Allt Phocaichain, Allt a' Chàise, Allt a' Choire Bhuidhe, Allt na Criche and Allt an Eòin flowing northwards toward the River Moriston.

8.5.38 The River Garry/River Oich system to the south has been highly modified in relation to the construction of the Caledonian Canal. The River Garry forms a tributary to Loch Oich and the River Oich is the main downstream natural outflow from Loch Oich. A small area in the south-east of the Site is drained by the Allt na Graidhe, a tributary to the River Oich. The rest of this

area lies within the Invervigar Burn catchment, also a tributary to the River Oich. The south-west of the Site, around Allt Lundie, is drained by the Aldernaig Burn which flows into the River Garry. The Hydrological Features and these catchments are shown in **Figure 8.6.**

Table 8.6:Catchments within the Connected to the Site

Main Catchment	Sub-catchment	Site-sub catchments
Loch Ness / River Ness	River Moriston	Allt Phocaichain
		Allt a' Chàise
		Allt a' Choire Bhuidhe
		Allt na Criche
		Allt an Eòin
		Allt a' Ghoirtein
	River Garry	Allt Lundie
		Aldernaig Burn
	River Oich	Allt na Graidhe
		Invervigar Burn

Water Features

8.5.39 The 1:50,000 scale OS mapping shows twelve watercourses on Site. Eight flow north into the River Moriston. Three flow southeast to the Caledonian Canal, and the Allt Lundie flows south to the Loch Lundie.

8.5.40 Within the Site area, the main tributaries are the Allt Phocaichain, Allt a' Chàise, Allt a' Choire Bhuidhe, Allt na Criche and Allt an Eòin flowing north, the Allt na Graidhe and Allt Dail a' Chuirn to the south-east and Allt Lundie to the south.

8.5.41 There are numerous small lochans seen on the 1:10,000 and 1:25,000 scale OS mapping, particularly within 500 m north of the Mam a'Chroisg summit.

8.5.42 The Site drains north towards the River Moriston via two main tributaries, the Allt a' Chaise and Allt Phocaichain. These tributaries are fed by a number of very minor headwater channels which originate as gullies in the upper slopes below the ridge line. Below the 540 m contour, bog pools are relatively extensive shown both on Ordnance Survey base layers for the Site, visible on satellite imagery and confirmed during the Site walkover. Two large lochans are present to the northeast of T06 and T07, one named – Loch nam Faoileag. A number of diffuse flushes are present in the mid-slopes

8.5.43 Additional natural drainage lines and areas of bog pools were observed. These were mapped using aerial imagery and site visit observations and avoided by design where possible.

8.5.44 Made-made drainages associated with the existing wind farm and access track were observed and mapped where applicable to the Proposed Development.

8.5.45 An underground storage tank was observed at NGR 228358 808260 adjacent to the existing hardstanding of the proposed southern temporary construction compound area.

8.5.46 The water features are shown on **Figure 8.6**.

River Flows

8.5.47 Flow records for the Moriston at Levishie – station 6009 is available at the Centre of Ecology and Hydrology National River Flow Archive (NRFA) webSite (https://nrfa.ceh.ac.uk/data/search accessed May 2025). The station is approximately 11 km to the north-east of the Site and its catchment encompasses the northern area of the Site. The mean flow between 1994 and 2011 is 5.7 m^3/s, the flow rate with 5% exceedance 24.01 m^3/s, with the flow rate with 95% exceedance was 0.71 m^3/s. The base flow index (BFI) of the catchment is 0.42 indicating there is low groundwater influence. The River Moriston has a catchment 391 km^2 characterised by rugged peaks underlain by impermeable Pre-Cambrian rock, with small intrusive area around Loch Cluanie. It comprises predominantly moorland and rough grazing with substantial forestry below 400 m AOD.

8.5.48 The size, topography, land use and geology of the area suggest that the catchments on Site would be flashy. This means that flow in them would respond rapidly to rainfall and flood conditions could potentially occur with very little or no warning. Peatlands in the centre of the Site would sustain watercourses with some steady seepage from the low permeability deposits.

Flooding

8.5.49 A review of SEPA's flood risk mapping indicates flood risk for the Site and immediate area is low. There are no fluvial flood risk zones shown on Site as the catchments are small in area (< 10km^2). Areas of surface water flood risk zone are associated with watercourses.

8.5.50 The River Moriston, Allt an Eòin and Allt Phocaichain are indicated to have a high likelihood of associated fluvial flooding and a few small areas are noted to have a high risk of surface water flooding, particularly around Loch nam Faoileag. In all cases, flood risk areas are confined to channels or outlines of waterbodies. A high likelihood of flooding is defined as having a 10% chance of flooding each year (SEPA, 2023b).

8.5.51 The River Garry/River Oich system also has a high likelihood of flooding. Within proximity to the Site, the Allt Dail a' Chuirn (invervigar Burn) and Allt Lundie (Aldernaig Burn) both have a high risk of flooding in their lower sections.

8.5.52 There are no properties at risk of flooding within 2 km of the Site based on the SEPA Flood Maps.

Surface Water Quality

8.5.53 SEPA has introduced water monitoring and classification systems that would provide the data to support the aim of the Water Framework Directive (WFD) as transposed into domestic law: *'that all waterbodies are of good ecological status, or similar objective, by 2021, or by 2027 if earlier achievement would be disproportionately costly'*. The classification system covers all rivers, lochs, transitional, coastal and groundwater bodies, and is based on an ecological classification system with five quality classes (High, Good, Moderate, Poor and Bad). The classification system has been devised following EU and UK guidance and is underpinned by a range of biological quality elements, supported by measurements of chemistry, hydrology (changes to levels and flows) and morphology (changes to the shape and function

of water bodies). Small waterbodies (rivers with <10 km² catchment, lochs <0.5 km²) are not classified under the WFD and therefore do not have target objectives under the River Basin Management Plan (SEPA's interactive River Basin Management Plan (RBMP), accessed May 2025).

8.5.54 SEPA's interactive map was consulted to identify the status of the waters within and adjacent to the study area. River Moriston - Dundreggan Dam to Bun Loyne (ID: 23382) has a length of 17.7 km and an overall SEPA classification of Good, with a water quality rating of high. (SEPA, accessed June 2024). River Oich (ID: 20253) has a length of 9 km, has an overall status of Good and a water quality status of High. The River Oich then flows into Loch Ness which has an overall status of Good and Water Quality Status of Good.

Licenced Abstractions

8.5.55 Consultation was undertaken with SEPA July 2024 and there are several hydroscheme abstractions within the study area connected to the Site to the north and west. These include Allt an Eoin Hydro Scheme, Balnacarn Hydro Scheme, Allt Phocaichain Hydro Scheme, Balintombuie Hydro Scheme Achlean Chaitchinn Hydro Schemeand Alltan Eoin Hydro Scheme.

8.5.56 Balintombuie Hydro Scheme and Balnacarn Hydro Scheme are located north of the River Morrison and are not hydrologically connected to the Site.

8.5.57 Of the five hydroscheme abstraction locations within 1 km of the Site, the Allt an Eion abstractions are not hydrologically connected to the Proposed Infrastructure being within a separate subcatchment, Achlean Chaitchinn Hydro Scheme is over 1.5 km downstream of the existing track proposed to be re-used and Allt Phocaichain Hydro Scheme is over 4 km downstream of the nearest Proposed Infrastructure.

8.5.58 The Inchmore Hatchery abstraction is located over 2 km to the north of the Site and within a separate sub-catchment to the Proposed Development.

Table 8.7: Licensed Abstractions

Name	Location	NGR	Management	Licence Number	Associated Waters
Inchmore Abstraction Point A	Inchmore Hatchery	NH 3010 1260	Marine Harvest (Scotland) Limited	CAR/L/1 024870	River Moriston
Allt an Eoin Hydro Scheme	Achlain	NH 2522 0964	Dulas Hydro Generation Limited	CAR/L/1 089144	Allt an Easain
Allt an Eoin Hydro Scheme	Achlain	NH 2534 0965	Dulas Hydro Generation Limited	CAR/L/1 089144	Allt Coire na Gaolith an Ear
Allt an Eoin Hydro Scheme	Achlain	NH 2566 0963	Dulas Hydro Generation Limited	CAR/L/1 089144	Allt na Creige Deirge an Ear

Name	Location	NGR	Management	Licence Number	Associated Waters
Allt an Eoin Hydro Scheme	Achlain	NH 2507 1117	Dulas Hydro Generation Limited	CAR/L/1 089144	Allt an Eoin
Allt Phocaichain Hydro Scheme	Allt Phocaichain	NH 3243 1116	Allt Phocaichain LLP	CAR/L/1 112111	Allt Phocaichain
Allt Phocaichain Hydro Scheme	Allt Phocaichain	NH 3236 1240	Allt Phocaichain LLP	CAR/L/1 112111	Allt Phocaichain
Achlean Chaitchinn Hydro Scheme	Glenmoriston	NH 2764 1163	Highland Eco-Design Limited	CAR/L/1 144853	Allt a' Chaitchinn
Achlean Chaitchinn Hydro Scheme	Glenmoriston	NH 2745 1161	Highland Eco-Design Limited	CAR/L/1 144853	Allt a' Choire Bhuidhe
Achlean Chaitchinn Hydro Scheme	Glenmoriston	NH 2779 1226	Highland Eco-Design Limited	CAR/L/1 144853	Allt a' Chaitchinn

Public Water Supplies

8.5.59 A review of the Scottish Government's Surface Water Drinking Water Protection Area (DWPA) mapping (Scottish Government, 2014) shows southwestern section of the Site and an area to the south of the Site area as being within the Aldernaig Burn DWPA (**Figure 8.1).**

8.5.60 Consultation was undertaken with Scottish Water (March 2024) confirmed the Site was within the Aldernaig Burn DWPA and that Loch Ness, a significant distance downstream is also used as a public water supply source.

8.5.61 The Aldernaig Burn DWPA is a large catchment, it already has existing wind farm infrastructure within the catchment, the Proposed Development within the catchment is located at the top of the catchment system over 5 km upgradient of the abstraction point and there is the Loch Lundie in between which would allow dilution and attenuation of water. Therefore, potential effects on the Aldernaig Burn DWPA have been scoped out.

8.5.62 Loch Ness, further downstream of the Site is also used for a public water supply, however it is kilometres downstream and taking into account a significant diluting factor potential effect on this public water supply have been scoped out.

Private Water Supplies

8.5.63 Consultation regarding PWS was undertaken December 2023. The Council's PWS data indicates that one PWS is present within the Site boundary and several more are present within 5 km of the Site boundary. These are named as follows:

- Beinneun Sub Station;
- Achlain;
- Achlain Deer Larder;
- Inchmore Hatchery; andFaichemard Farm.

8.5.64 Three of the listed PWS are located over 2 km from the Site boundary, these are Achlain, Achlain Derr Larder, and Faichemard Farm. A fourth, Inchmore Hatchery is located over 2 km from any infrastructure and with a separate hydrological subcatchment. Therefore, due to the distance and catchments, these PWS have been scoped out of the assessment.

8.5.65 One identified PWS named Beinneun Sub Station (NGR 22647 81065) was described by The Council as being from a surface water for commercial use. Further investigation into this PWS indicated this PWS is a borehole source supplying the existing Millennium Wind Farm substation (BGS Geoindex boreholes and anecdotal information).

8.5.66 The BGS Geoindex records show the borehole (referenced NH21/3 Millenium Windgrid Invergarry) to be at NGR 226476 810655, installed in 2021 to a depth of 90 m. No strata description was provided with the records. The Millenium Windgrid PWS borehole is located approximately 160 m distance downgradient of the existing access track and 170 m distance downgradient of the former borrow pit and proposed northern temporary construction compound area.

Designated Sites

8.5.67 A review of NatureScot and mapping available on Magic (accessed 2025) shows that designated sites are present within the study area that have been designated for reasons associated with hydrology, hydrogeology, geology or peat;

- River Moriston Special Area of Conservation (SAC), designated for Atlantic Salmon and Freshwater Pearl Mussel (FWPM), within the northern section of Site and downstream of the Site. The River Moriston SAC is hydrologically connected to the Site.
- West Inverness-shire Lochs (SSSI) (SPA) designated for bird breeding (Black-throated diver and Common scoter), approximately 2.5 km south of the Site.

8.5.68 The designated Sites are shown in **Figure 8.1**.

8.5.69 At 10 km east beyond the Site is Fort Augustus Geological Conservation Review (GCR) area, near Fort Augustus, designated for kame and kettle topography, glacier flood deposits and lake shorelines.

Fish and Other Water Dependent Species

8.5.70 The River Moriston is and SAC for Atlantic Salmon and Freshwater Pearl Mussel (FWPM).

8.5.71 The review of fishing monitoring web sites suggests that Salmon is present in the River Garry (www.rivergarry.com, www.fishbrain.com - last accessed May 2025). Northern Pike and Brown Trout are commonly seen near Invergarry, with salmon and trout also seen downstream in River Oich near Fort Augustus (https://www.flyfishing.co.uk/threads/river-oich-fort-augustus.39320/ Last accessed May 2025). Loch Lundie and Loch Oich are used for brown trout fishing.

8.5.72 A search of freely available datasets from the Biological Records Centre (Database for the Atlas of Freshwater Fish) held within the National Biodiversity Network (NBN) gateway was undertaken. There are numerous existing records of Atlantic salmon (Salmo salar), European

Eel (Anguilla Anguilla), River Lamprey (Lampetra fluviatilis) and Brown/Sea Trout (Salmo trutta Linnaeus) and FWPM hydrologically connected to the Site.

8.5.73 The watercourse crossings (existing and the one new one proposed) on Site are mostly minor, steep watercourses that have existing track culvert crossings and obstructions downstream, therefore unlikely to be currently suitable for fish migration.

8.5.74 The ecological surveys undertaken (**Chapter 6**) found no evidence of water vole or otter on Site.

8.5.75 Fisheries, freshwater pearl mussel water vole and otter remain scoped out with regards potential effects as design and good practice mitigation measures would be included as standard to protect the aquatic environment. These ecological receptors were considered within the EIA process through the design of the Proposed Development and through best practice construction methods, and therefore it is considered that there are no likely significant effects. The following good practice measures are proposed in **Chapter 6:**

- Pre-construction surveys of all watercourse crossings during the survey season immediately prior to construction to assess use of the locations by otter.
- Pre-construction surveys of proposed infrastructure locations no more than six months prior to construction, to assess the current status with regards to pine marten.
- Pre-construction fish habitat surveys in the season prior, to micro-site the crossings away from potentially sensitive habitats wherever possible, and to confirm the habitat baseline within a buffer of up to 100 m upstream and downstream.
- Monitoring of a range of ecological features by the ECoW throughout construction of the Proposed Development.
- Post-construction fish habitat surveys and monitoring to ensure mitigation measures are effective, that crossings maintain fish passage, and that potentially sensitive habitats are retained, and to identify any requirement for improvements or remedial works.

General Site Conceptualisation

8.5.76 The Site is characterised by low permeability superficial deposits (extensive areas of peat and glacial till) over low permeability bedrock. The low permeability of both the superficial deposits and the low permeability of the bedrock would allow limited infiltration of rainfall and relatively high runoff rates. Groundwater movement within the superficial deposits is therefore also low, however there may be some groundwater flow in the very localised areas.

8.5.77 Based on the assessment criteria defined in **Table 8.4**, a summary of the Site sensitivities and rationale is presented in **Table 8.8**.

Table 8.8 Summary of Sensitivity of Receptors at the Site

Sensitive Receptors		Sensitivity	Rationale/Designations
Terrestrial	Non peaty or peaty / organic rich soils <0.5 m in depth	Low	Guidance on Developments on Peatland - Site Surveys

Sensitive Receptors		Sensitivity	Rationale/Designations
	Peat <1 m in depth in forestry or in densely drained, eroded or gullied open terrain		
	Peat >0.5 m to 1 m in depth in open terrain Peat >1 m to 2 m in depth in forestry or in densely drained, eroded or gullied open terrain	Medium	Guidance on Developments on Peatland - Site Surveys
	Peat >1 m in depth in open terrain Peat >2 m in depth in forestry or in densely drained, eroded or gullied open terrain	High	Guidance on Developments on Peatland - Site Surveys
Groundwater	Shallow Groundwater	Medium	Maintains water dependent habitats and peat saturation.
	Deep Groundwater	Low	Limited resource
	GWDTE and springs	High	SEPA guidance LUPS-GU31 and Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems (SEPA, August 2024)
Private Water Supplies	Millenium Windgrid Sub Station borehole	High	The Millenium Windgrid substation borehole considered to be at risk of contamination during construction activities.
Surface Watercourses and Waterbodies on Site	River Moriston Loch Ness Aldernaig Burn Loch Lundie	Very High	SAC for Atlantic salmon and FWPM Public water supply SPA/SSSI for breeding birds
	River Oich River Garry	High	Migratory fish
	Allt Phocaichain Allt a' Chàise Allt a' Choire Bhuidhe Allt na Criche Allt an Eòin,	Medium	The watercourses on-Site discharge into the River Moriston, the River Oich and the River Garry, all very high or high sensitivity waterbodies. While this connection elevates their

Sensitive Receptors		Sensitivity	Rationale/Designations
	Allt na Graidhe Allt Dail a' Chuirn Allt Lundie		importance, the potential for significant impact is mitigated by the distance of these rivers and other factors, such as being at the upper reaches of the catchments on Site and being barriers for fish migration downstream such as waterfalls and hydroschemes. Although any degradation in water quality could impact Loch Ness, the likelihood of significant change due to the low-flow nature of these watercourses and their relatively small size suggests a medium sensitivity. These watercourses likely have a lower capacity to support fish migration due to their size, flow regime, or other physical barriers. This reduces their sensitivity compared to watercourses that support direct migration or spawning activities. The watercourses' limited flow and size suggest they have a reduced capacity to transport pollutants or sediment, which lowers their overall sensitivity despite their hydrological link.
	Minor watercourses and un-named natural drains and man-made drains	Low	

Note: Receptors not potentially connected to the Proposed Development have been scoped out and therefore not included in this table.

8.5.78 On the basis of the baseline information and professional judgement, the key sensitive receptors identified for the Site and carried through to detailed assessment are:

- Peat deposits;
- Surface watercourses;
- Springheads;
- One PWS at Millenium substation; and
- River Moriston SAC downstream of the Site.

8.6 Implications of Climate Change

8.6.1 The summary of the relevant climate change projections using the UK Climate Change Projections 2018 (UKCP18) are:

- temperatures are projected to increase, particularly in summer;
- winter rainfall is projected to increase and summer rainfall is most likely to decrease;
- heavy rain days (rainfall greater than 25 mm) are projected to increase, particularly in winter;
- near surface wind speeds are expected to increase in the second half of the 21st century with winter months experiencing more significant effects of winds; however, the increase in wind speeds is projected to be modest; and
- an increase in frequency of winter storms over the UK.

8.6.2 **Chapter 13:** Climate Change Mitigation provides details of the climate change projections in Scotland for the 2060s, when the operational period of the Proposed Development is likely to end. In summary, the projections highlight that in the 2060s, summer and winter temperatures are likely to be greater than the current baseline (greater for summer), with winter rainfall increasing and summer rainfall decreasing.

8.6.3 The projected climate change scenario is likely to affect the baseline conditions in relations to the water and soil environment in the following ways:

- Deterioration in peatland habitat condition: Predicted changes in the pattern of rainfall would lead to a deterioration in the condition of the peatland habitats. Dry conditions in the summer period would draw down the water table, reducing the suitability of affected areas for sustaining peat-forming vegetation, such as abundant Sphagnum moss cover and increase drying rates at the exposed peat margins.
- Habitat loss for peatlands and other upland habitats: Increased winter rainfall may exacerbate existing erosion rates, leading to direct loss of peatland habitat.
- Habitat loss for wetlands: Drier conditions in summer may in the long-term result in the loss of these habitats.
- Increase in flooding in winter: Increased winter rainfall is likely to increase peak flows and therefore flooding extents.
- Higher potential erosion and therefore sediment transfer to watercourses due to increased winter rainfall.
- Water resources: Less snow on the ground in winter and drier summers would lead to a reduction in groundwater recharge for groundwater water supplies and reduction in water quantity and quality in summer months for surface water resources.
- Higher intensity rainfall events would increase runoff and potentially reduce water quality as water would have less time to filtrate through vegetation and shallow soils.
- Climate change would affect the water quantity and quality of water resources used for PWS and Scottish Water public drinking water supplies. Evidence of this was observed generally in parts of Scotland in summer 2021 and 2022 where river levels were very low with algal blooms present, and shallow springs used for generations experienced drought.

8.7 Future Baseline in the Absence of the Development

8.7.1 The predicted environmental conditions and potential changes which may occur in the absence of the Proposed Development are outlined below. This includes natural changes, including climate change (**Section 8.7**), land use practices and future developments:

- Continued deterioration of the peatland habitats through erosion, artificial drainage and drying out;
- Continuation of rough grazing in open moorland areas increasing erosion, drying and ground poaching;
- Continued impediment of natural water flows and fish migration by the use of culverted watercourse crossings within the catchments; and
- Continuation of commercial forestry activities and new commercial forestry activities on the lower catchment slopes, including tracking, borrow pits, drainage alteration, watercourse crossings, felling, ground disturbance and risks for sediment release and acidification of watercourses.

8.8 Site Embedded Design Mitigation

8.8.1 A number of embedded mitigation measures have already been applied as part of the iterative design process (see below and **Chapter 2**), to avoid the higher value areas of blanket bog, areas of deep peat, hydrological features and their associated buffers.

Design Considerations

8.8.2 The Proposed Development has been carefully designed to avoid watercourses and minimise peat disturbance within the catchment. The Proposed Development has undergone numerous design iterations to optimise the layout and reduce potential significant environmental effects. **Chapter 2** presents the full design and access statement for further information on the design considerations.

8.8.3 Where possible, the following principles have been adhered to in the design of the Proposed Development:

- All infrastructure associated with the Proposed Development has been sited with an objective of maintaining a minimum 50 m 'buffer zone' from water features (including bog pools and springs) shown on 1:50,000 scale and 1:25,000 scale Ordnance Survey mapping(where this has not been fully achieved, this is shown in **Figure 8.6** and **Figure 8.8**).
- Infrastructure, where possible, is located outside of flood zones, with the exception of watercourse crossings.
- Proposed Development infrastructure was designed to minimise the number of new watercourse crossings (as detailed in **Appendix 8.5** and shown in **Figure 8.6**) and existing access tracks have been utilised where possible.
- All infrastructure associated with the Proposed Development has been designed to avoid, where possible, peatland and deeper peat, as well as potential peat slide hazard risk areas, taking into consideration other constraints. Peat deposits were identified across 77% of the peat survey area during the peat depth surveys. The locations of turbines and infrastructure have been designed to avoid deeper peat

deposits where possible, considering the other constraints on the Site. Further investigation subsequent to planning approval on the ground conditions and micro-siting of the tracks and turbines would be undertaken to ensure the minimal amount of peat is disturbed and to identify detailed peat slide mitigation.

- All wind farm infrastructure has been designed, where possible, to avoid potential peat landslide hazard risk areas, and further investigation to identify detailed peat landslide mitigation would be undertaken post consent.
- Where feasible, and considering other constraints, floating tracks are proposed where tracks are located on peat >0.5 m depth and slopes are <5 degrees, to reduce peat excavation.
- Where possible, extracted peat would be appropriately reused and restored concurrently without storage, however where this is not feasible it would be stored appropriately in proximity to its reuse location.
- During the detailed design and construction phase, sections of track would be surveyed and micro-sited to optimise the distance from waterbodies, minimise peat disturbance and peat slide hazard.
- Concrete batching would be undertaken on Site which would require a water supply either from a waterbody on Site or imported in tankers and stored at the batching Site. Following confirmation of water supply arrangements, and completion of supporting investigations, the necessary licence would be obtained from SEPA.
- Concrete batching and washdown areas would be in a controlled areas of the central temporary construction area so that any leakage or spills can be captured and managed appropriately.

Good Practice Measures

8.8.4 **Appendix 8.1** details the good practice techniques that would be employed during construction and operation. These techniques are assumed to be in place for the purposes of the assessment, thus they are not considered as mitigation but as an inherent part of the construction process. The list in **Appendix 8.1** is not exhaustive and the latest guidance and good practice literature would be implemented when construction commences. Where required, additional mitigation measures would be identified which are specific to the source-pathway-receptor at risk to address likely significant effects.

8.8.5 To ensure all reasonable precautions are taken to avoid significant negative effects on habitats, protected species and aquatic interests, a suitably qualified EnvCoW would be appointed prior to the commencement of construction and they would advise the Applicant and the Principal Contractor on all ecological and hydrological matters. A Drainage Management Plan (DMP), Pollution Prevention Plan (PPP) and a Water Quality Management Plan (WQMP) would be implemented as part of the CEMP to address and reduce effects to the water environment.

8.8.6 The risk of peat slide can be mitigated through good engineering practice prior to construction, during construction, and post construction as set out in **Appendix 8.4**. All construction activities and operational decisions that involve disturbance to peat deposits would be overseen by an appropriately qualified geotechnical engineer with experience of construction on peat Sites.

8.8.7 Further good practice and enhancement measures in relation to peat re-use and further avoidance of deep peat are discussed in the assessment of effects section below.

Micrositing

8.8.8 Micrositing of infrastructure may be required to take account of local conditions. In the event that this is required, consideration would be given to the potential effects on hydrology, geology and peat, including proximity to watercourses, water features, the presence of peat and PLHRA.

8.8.9 Where micrositing is required, where possible, this would not increase proximity to the sensitive hydrological, hydrogeological, geological and peat features identified.

8.8.10 A suitably qualified EnvCoW and Geotechnical Engineer would be present on Site during the construction period to provide initial onsite advice for micrositing.

8.9 Assessment of Effects

8.9.1 The assessment of effects is based on the project description as outlined in **Chapter 2**. Unless otherwise stated, potential effects identified are considered to be adverse.

8.9.2 This section describes the potential effects of the Proposed Development during the construction phase in relation to the sensitive receptors of the Site highlighted in **Table** 8.8, prior to mitigation and management, and assuming that good practice methods are employed.

8.9.3 The purpose of this assessment is to identify key areas of the Proposed Development infrastructure where specific mitigation and management measures are required to mitigate any **Significant** (**Major** or **Moderate**) effects. The assessment of effect significance has been undertaken based on the assessment of baseline conditions across the Site and with reference to the significance criteria in **Table 8.5.**

8.9.4 The magnitude of the potential effects has been assigned based on the location of the receptor assessed in relation to the construction activity. This magnitude of potential effect takes into account the good practice and standard mitigation methods described in **Appendix 8.1**.

8.9.5 Where the significance of effect is assessed as being **Moderate** (**Significant**) or above with good practice and standard mitigation applied, further site-specific (additional) mitigation is required. Where applicable, the additional mitigation and the residual significance of effects are summarised and discussed below.

Construction Effects

8.9.6 Possible hydrological, hydrogeological and geological effects resulting from the construction of the Proposed Development are related to five main factors as detailed below:

- Erosion and Sedimentation Effects;
- Alteration of Flow, Natural Drainage Patterns/Runoff Volumes and Rates;
- Increase in the Magnitude or Frequency of Flooding Events;

- Potential Pollution events affecting Groundwater and Surface Water Quality; and
- Alteration of Geology, including impacts on peat resource.

Erosion and Sedimentation

8.9.7 Unmanaged erosion/sediment deposition and suspended solids generated from ground disturbance and new infrastructure, could be transported to receptors directly by surface run-off or could cause modification to stream channel morphology. This can result in smothering of habitats and effects on both terrestrial and aquatic flora and fauna, especially fish.

8.9.8 Construction may result in increased sediment loads observed in watercourses and waterbodies. Potential effects may occur from the following:

- Construction of access tracks (approximately 2.04 km of new tracks would be excavated, and approximately 0.25 km of tracks would be floated). The majority of new and upgraded site tracks would be constructed using a standard cut and fill method which would involve stripping and stockpiling of material to expose underlying soils or bedrock, potentially increasing runoff and the potential for transportation of sediment. Floating tracks would involve building the track on the existing surface vegetation mat with geotextile layers, minimising excavation of peat, however side slopes would be required.
- Construction of one new watercourse crossing increasing the potential for increased runoff of silt and debris and erosion.
- Removal and stockpiling of material for each turbine foundation base and crane hardstanding, which could result in increased silt run-off.
- Dewatering of shallow groundwater and direct rainfall into excavations (potentially containing silt and other debris), which may result in transportation of fine sediments into watercourses. This would be compounded by increased movement over and around these disturbed environments.
- Extending the existing borrow pit has the potential to increase runoff as soils are removed and increase silt laden runoff.
- Extreme rainfall events which could result in the overflowing of existing onSite drainage resulting in erosion and sediment transport, as well as the potential failure of pollution prevention measures to operate under high runoff flow conditions.
- Vehicle movements around the Site transporting silt off Site.
- Storage of rock, topsoil and peat and their reuse.
- Peat slides of materials into watercourses.

8.9.9 Effects on specific receptors are discussed and assessed in the relevant section below.

Alteration of Flow, Natural Drainage Patterns/Runoff Volumes and Rates

8.9.10 The development of tracks and cable trenches has the potential to alter natural drainage on the Site by the creation of altered preferential flow pathways. If constructed against the topographic gradient, roads could act as barriers to run-off resulting in the ponding of water. If constructed in line with the gradient, the development of preferential flow down the roadway could occur. This has been considered in the design where possible with other constraints.

8.9.11 Changes to the natural drainage and runoff rates could affect sensitive water dependent habitats, such as bog habitats, as well as fish and protected species habitats.

Potential Pollution Events Affecting Groundwater and Surface Water Quality

8.9.12 Pollution of watercourses could potentially occur through the following pathways:

- Oil and chemical spills from:
  - Oil leakages during vehicle movements or when on standby;
  - Refuelling areas such as the compound;
  - Chemical/fuel storage areas;
- Leakage of cement powder or liquid concrete during batching, transportation or pouring. Concrete is highly alkaline (high pH) and changes in the pH balance could affect the water quality and the species that depend on baseline conditions;
- Improper management of onSite waste;
- Poor sanitary plumbing;
- Poor water storage; and
- Sedimentation and erosion (as previously discussed above).

8.9.13 The construction compounds would be constructed with an impermeable membrane and any surface water runoff along with any pollutants would be routed through an oil/water separator as part of good practice procedures.

8.9.14 The concrete batching plant would also be located on an impermeable membrane within the construction compound, both for the area where batching occurs and the washout area.

8.9.15 Even taking into account the application of good practice there is still a small risk of potential fuel spillage onsite due to the number of vehicles, and the potential for leaks or accidents. The magnitude of effect of potential pollution from the above pathways is **Low** and the effects on specific receptors are discussed and assessed in the section below.

Increase in the Magnitude and Frequency of Flood Events

8.9.16 Impermeable areas of the Proposed Development could increase the runoff rates from the Site and drainage management is required to attenuate runoff.

8.9.17 The track network and turbine layout has been designed to avoid, as far as is practicable, areas that have been identified as at risk of flooding, with the exception of watercourse crossings. Therefore the flood hazard has been assessed to be Low for the majority of the Site.

8.9.18 The amount of infrastructure present in each catchment is a low percentage of the overall catchment's area; no greater than 1.5% and with the good practice methods employed for flow attenuation and SUDs along with the infrastructure having semi permeable surfaces, the magnitude of effect on runoff rates and flooding is assessed as **Low** and therefore the significance of effect would be **Minor**. Therefore, no additional mitigation above good practice methods, as presented in **Appendix 8.1**, are required.

Effects on Specific receptors

Infrastructure within 50 m of Watercourses and Water Features

8.9.19 Infrastructure within the Site has been located in so far as possible over 50 m from watercourses or waterbodies (shown on 1:50,000 scale and 1:25,000 scale OS mapping), with the exception of where tracks approach watercourse crossings at the locations presented in **Appendix 8.7** and on **Figure 8.6**.

8.9.20 The sensitivities of the watercourses and waterbodies within the catchments on the Site are Low to Medium. Those downstream of the Site where protected fish may be present are High and those within a designated area i.e. River Moriston SAC and Aldernaig Burn public water supply abstraction Very High.

8.9.21 There is no Infrastructure adjacent or within 50 m of Very High to High sensitivity watercourses or waterbody receptors.

8.9.22 Where existing or new infrastructure encroaches the 50 m buffer of a watercourse (see **Figure 8.6** sections labelled I1 to I5 and **Appendix 8.7 6**), these are all considered to be of Low sensitivity. Sections of new infrastructure within 50 m of Low sensitivity watercourses include:

- Turbine T03 spur track earthworks (197 m2) and existing track (I1) within 50 m of an unnamed tributary of Allt a' Chaise.
- Turbine T06 approach track earthworks (43 m2) (I2) within 50 m of an unnamed tributary of Allt Phocaichain.
- Turbines T06 to T07 track approach earthworks (897 m2) (I3) within 50 m unnamed tributary of Allt Phocaichain.
- Turbine T06 new track junction and earthworks (550 m2) (I4) adjacent to linearised drain along existing track.
- Southern temporary construction compound (895 m2) (I5), existing hardstanding within 50 m of Unnamed tributary of Allt Dail a' Chuirn.

8.9.23 It is noted that some of the infrastructure located within watercourse buffers is associated with upgrades to the existing access track and hardstanding areas, where possible these would be undertaken on the side of the existing infrastructure further from the watercourse using embedded water management and monitoring, as outlined in **Appendix 8.1**.

8.9.24 Any short-term impact from sediment or peaty debris entering the sensitive watercourses downstream via one of the hill tributaries would have negligible impacts the more sensitive watercourses downstream.

8.9.25 Some areas of peatland restoration would also be located within 50 m of watercourses. These are shown on **Figure 8.11** and adverse effects would be **Minor** (**Not Significant**) on watercourses.

8.9.26 The proposed infrastructure requires one new watercourse crossing for the track to T07, a crossing of a natural drainage line for T03 and T02, T01 requires a natural drainage line to be culverted or diverted and T08 and associated earthworks required the existing track drainage to be diverted.

8.9.27 It is noted that although careful design has avoided the best peatland and bog pool complexes, some of the infrastructure was unable to avoid all bog pools and does pass through areas of small bog pools:

- T04 was designed to avoid the large bog pools.
- T05 has been positioned to avoid most of the larger bog pools.
- The approach track towards T06 has some minor bog pools.
- The approach track towards T07 has some minor bog pools

8.9.28 The disturbance of this natural drainage and bog pools would have an adverse effect on the natural hydrology, however this is considered to be of Medium magnitude on low to Medium sensitivity receptors as bog pools are numerous over much of the Site and are of local importance within the ecological assessment (**Chapter 6**). Therefore, the significance is Minor (**Not Significant**).

8.9.29 Infrastructure within 50 m of watercourses and water features of Low to Medium sensitivity and of Low to Medium would result in Minor (not significant) effect based on a Low magnitude of change.

GWDTES

8.9.30 The assessment concluded that most of the potentially GWDTEs identified are not likely to be truly GWD based on the topography and hydrogeological regime. The springheads (target note 10, 30, 95 and 96) are considered to GWD. One springhead (Target Note 10) is within 25m of the proposed T03 earthworks.

8.9.31 With the implementation of best practice techniques, such as demarking the springs, tool box talks, dust suppression and drainage management any effect on these GWDTEs is unlikely to occur.

8.9.32 The sensitivity of these Springs is High and the magnitude of effect is Low, resulting in a Minor (not significant) effect.

8.9.33 Any micrositing T03 would not occur further to the south to prevent the disruption of Target Note 10 (spring).

8.9.34 GWDTEs are assessed in **Appendix 8.7**.

PWS

8.9.1 One identified PWS is sourced from a 90 m deep borehole for commercial use and named Millenium Windgrid (NGR 226476 810655) is located approximately 170 m distance downgradient of the northern temporary construction compound. There is unlikely to be a hydrological or hydrogeological pathway connection between the northern temporary construction compound due to the following reasons:

- the temporary construction compound is an existing former borrow pit area requiring no further deep excavation (excavations < 1 m depth).
- Distance between the northern temporary construction compound and borehole is > 100 m distance.

- The northern temporary construction compound would be fully lined with drainage management
- The borehole is located at 300 m AOD and abstracts deep groundwater at 90 m depth (or around 210 m AOD) and the northern temporary construction compound is at the surface at approximately 330 m AOD. Therefore there is unlikely to be a connection based on the hydrogeological regime.
- The existing access track and drainage would intercept and surface water flow

8.9.2 With best practice drainage management and chemical storage techniques, there is unlikely to be a risk of contamination of the borehole during construction activities.

8.9.3 As a precautionary measure an appropriate monitoring regime for this supply would be agreed with SEPA and the Council prior to commencement of construction works. In the unlikely event that construction works lead to the temporary deterioration of the supply, an alternative supply would be provided.

Effects on Geology and Peat

Peat Landslide Hazard Risk Assessment

8.9.4 Based on the PSHRA analysis presented in **Appendix 8.4**, peat slide risks are calculated to be "Low" or "Negligible" across the Site, and site-specific mitigation is not required to reduce risks pre-consent. This assumes that the best practice for peat slide outlined in **Appendix 8.4** is undertaken, which includes further ground investigation, geotechnical risk register and monitoring during construction.

Peat Resource

8.9.5 The sensitivity of peat to disturbance for this Site has the potential to be from Low to High based on the definitions presented in **Table** 8.2 and depicted on **Plate 8.1** in **Section 8.5**. Infrastructure is located in areas of degraded open peatland with depths between <1 m (Low sensitivity) and < 2 m (Medium sensitivity). The best quality unmodified peatland and bog pools have been avoided by design. The Peat Condition Assessment is presented in **Annex 9.3** of **Appendix 6.1.**

8.9.6 Although the deepest area of peat measured on the Site was at depths of 3.8 m, the Proposed Development is on areas < 2 m depth. More than 90% of the total proposed infrastructure (including earthworks) footprint is located on peat with depth of < 1 m and therefore, the proposed infrastructure footprint is classified as **Medium** sensitivity overall in accordance with **Table** 8.2.

8.9.7 The total volume of peat that is present across the peat survey area within the Site boundary has been calculated as 7,358,874 m^3. The total volume of peat that would be excavated for the construction of the infrastructure including associated earthworks is 36,425 m^3, as detailed below, which represents 0.5% of the peat volume within the peat survey area on Site. This is considered to be a **Low** magnitude of effect according to **Table** 8.3.

8.9.8 Over the whole of the Site, conservative estimates for the volume of peat that would be excavated (including footprints, a wider distance for slope batters, earthwork footprints and 10% bulking factor), as detailed in **Appendix 8.3** are:

- Total volume of peat excavated = 36,425 m^3;
- Total volume of acrotelm excavated = 5,778 m^3; and
- Total volume of catotelm excavated = 30,647 m^3.

8.9.9 Of these volumes, 24,967m^3 (of which 3,795m^3 is acrotelm and 21,173 m^3 is catotelm is estimated to be excavated within the earthworks footprint, representing an increase of ~68% in reported excavations from the infrastructure footprint alone.

8.9.10 Due to the presence of peat across the Site where new infrastructure is proposed, excavation volumes for the Proposed Development (36,425 m^3) are considered to be below average to average compared to other recent Scottish Wind Farm applications per turbine. This reflects both the number of turbines and the approach to capturing 'worst case' construction footprints, which include earthwork cut and fill surrounding infrastructure footprints (noting that previously the majority of applications for wind farms in Scotland have not included earthworks within their calculation volumes). The below average peat volume per turbine also reflects that a large section of existing wind farm access track could be re-used avoiding the amount of new access track required.

8.9.11 Where new roads are required, opportunities to use floating track (and therefore avoid peat excavation) have been used wherever possible. An important constraint on floating track construction is gradient, which must not exceed 5% (or 2.86°). All track located on peat (> 0.5 m depth) would be floating track, where possible, requiring no excavation of peat and therefore reducing the magnitude of effect.

8.9.12 The overall Medium sensitivity of peat resource across the Site combined with the Low magnitude of effect results in a **Minor** and **Not Significant** effect in relation to peat disturbance.

8.9.13 The Minor adverse effect on peat resource has the potential to become a Minor beneficial effect depending on the degree of success of both the translocation of peat for restoration as detailed in the oPMP (**Appendix 8.3**) and the oBEMP **(Appendix 6.7)** The translocated peat aims to recover the currently compromised, and essentially devoid of carbon, upper layer of peat in areas of erosions and aims to restore and enhance peatland habitat.

Summary of Significance of Effects during Construction Phase

8.9.14 The infrastructure, and associated construction activities would result in an overall significance of effect that is Minor and Not significant for erosion/sedimentation of watercourses, for alteration of natural drainage patterns, runoff volumes and rates, pollution and disturbance of geology and peat. As such, no further specific mitigation is required beyond the implementation of standard good practice measures (**Appendix 8.1**).

Potential Operational Effects

8.9.15 Effects during the operational period, with the exception of drainage management and watercourse crossing management, have been scoped out of the operational effects assessment, as although it is recognised that effects would occur, these would be substantially less than during the construction period which represents a worst-case scenario.

8.9.16 Possible hydrological, hydrogeological and geological effects resulting from the operation of the Proposed Development are related to three main factors as detailed below:

- Alteration of Flow, Natural Drainage Patterns/ Runoff Volumes and Rates, including flooding and geomorphology.
- Potential Pollution events affecting Groundwater and Surface Water Quality.
- Disturbance of Peat from peat landslide hazard risk.

8.9.17 Erosion and sedimentation effects and potential pollution events affecting groundwater and surface water quality are considered to be **Minor** and **Not Significant** as a result of careful design and construction, and committing to best practice embedded mitigation measures.

8.10 Additional Mitigation and Residual Effects

Additional Mitigation

8.10.1 There are no significant effects on hydrology and peat requiring additional mitigation beyond the embedded mitigation incorporated into the project design and the good practice measures outlined in **Appendix 8.1**. These measures are sufficient to manage potential effects, ensuring all impacts remain **Minor** and **Not Significant**. The following further good practice and enhancement measures would be employed to reduce effects where possible.

Water Features

8.10.2 The southern temporary construction (main) compound is proposed within a 50 m watercourse buffer, on an existing hardstanding. As a precautionary measure storage of any fuels, oils of chemicals would be restricted the eastern section of the compound, outwith the 50 m watercourse buffer.

8.10.3 The springs within 100 m of new proposed or existing infrastructure would be demarked and / or fenced off on Site for their protection.

8.10.4 All construction staff would be made aware of the sensitivity of the catchments downstream (surface water DWPA, fish and SAC for salmon and FWPM) and the peatland habitat as part of induction toolbox talks.

8.10.5 Watercourse crossing and drainage system conditions would be regularly monitored for blockages or signs of erosion - see **Appendix 8.1.**

8.10.6 A Water Quality Monitoring Plan (WQMP) would be produced and implemented as part of the CEMP and approved by SEPA and the Council as part of the planning conditions post consent. Water Quality Monitoring would be undertaken before, during and after construction

of sensitive watercourses downstream of the Site. A similar control catchment with no infrastructure would be monitored for comparison.

8.10.7 During the construction phase, an Environmental Clerk of Works (ECoW) would undertake observations and monitoring regarding drainage management during construction workings.

8.10.8 Further ecological surveys would be undertaken by an ECoW prior to earthworks in each area to check for protected species etc.

8.10.9 As part of the oBEMP (**Appendix 6.7**) riparian woodland planting is proposed along the lower reaches of the Allt an Eoin and River Moriston to create potential benefits to erosion and sediment management, and for improving fish habitats by providing shade and reducing river temperatures.

PWS

8.10.10 With best practice drainage management and chemical storage techniques, there is unlikely to be a risk of contamination of the borehole during construction activities.

8.10.11 As a precautionary measure an appropriate monitoring regime for this supply would be agreed with SEPA and the Council prior to commencement of construction works. In the unlikely event that construction works lead to the temporary deterioration of the supply, an alternative supply would be provided as mitigation.

GWDTE

8.10.12 T03 would not be microsited to the south due to the location of a spring supplying a GWDTE in this area. There is not considered to be any effect based on the current infrastructure layout, however the T03, any associated earthworks or construction activities would not be microsited towards the spring.

Peat Slide Risk

A geotechnical risk register and further peat landslide hazard risk assessment (PLHRA) would be undertaken following the review of further ground investigation information. Geotechnical monitoring would be undertaken in accordance with further detailed assessments as discussed in **Appendix 8.4**.

Peat Resource

8.10.13 Where possible, following further detailed ground investigations and subsequent detailed infrastructure specification and design post consent, micrositing of infrastructure to further reduce the amount of peat being disturbed would be undertaken. This is to be a particular focus on the infrastructure with peat depths approaching and exceeding 2 m. Micrositing would have cognisance of other sensitive hydrological, hydrogeological, geological and peat features identified.

8.10.14 The total volume of peat predicted to be excavated does not exceed the intended peat reuse volume on Site for infrastructure reinstatement and peat translocation for peatland restoration, so no disposal or relocation of excess peat off Site is expected.

8.10.15 On Site, there is an opportunity for the following volumes of peat to be re-used within temporary infrastructure areas (shown on **Figure 8.11**) and translocated to support peatland restoration (shown on **Figure 8.12**) which would be implemented through the oPMP (**Appendix 8.4**) and the oBEMP (**Appendix 6.7**):

- Total volume of peat that can potentially be reused on Site reinstating the new Proposed Development infrastructure = ~ 13,240 m^3 (acrotelm 3,17 7m^3, catotelm 10,681 m^3).
- Total peat reuse for peatland restoration area = ~ 28,217 m^3 (acrotelm 3,443 m^3, 20,593 catotelm m^3).

8.10.16 The translocation of peat would be used to restore existing wind farm infrastructure (existing southern temporary construction area and the central borrow pit area surrounding the proposed substation) to improve ground conditions and connectivity of peat areas. Additionally, the translocation of peat would be used to restore actively eroding and drying out peat gullies that have been identified that would benefit from restoration and that are close to the proposed infrastructure.

8.10.17 The peat balance for the Proposed Development (shown in **Table 7** of **Appendix 8.3**) indicates that there are sufficient opportunities within the Site to enable reuse of peat to support restoration and minimise the impacts of construction through infrastructure reinstatement.

8.10.18 The peat mass balance is c. 5,032m^3 in deficit, which means that slightly more peat is required to deliver the reuse and restoration proposals than is available from construction. Achieving further precision at the pre-consent stage is not considered appropriate given that micrositing may lead to adjustments in infrastructure positions, and the earthworks footprints included in the calculations are worst-case values to support the EIA.

8.10.19 It has been demonstrated that all excavated peat volumes can be appropriately re-used on Site. The peat restoration and reuse strategy for the excavated peat is focused on immediate reinstatement of peat around infrastructure and restoration through the translocation of peat to suitable areas such as eroded gulleys. This reduces potential degradation of peat through storage and links areas of peat together.

8.10.20 The restoration of the peatland and the reinstatement around the infrastructure would be a positive enhancement to the current peatland conditions on Site, reduce the impact on peat resource, and complement the additional peatland restoration measures proposed across the Site as a means of biodiversity enhancement (see **Appendix 8.3 and Appendix 6.7**).

8.10.21 Peat reinstatement, restoration and enhancements would be monitored during the lifetime of the development, with a higher frequency of monitoring during the construction and immediate period following this to ensure good peatland recovery. This monitoring is further detailed with **Chapter 6: Ecology.**

8.10.22 Peat restoration monitoring would be carried out for a minimum of five years after construction and reinstatement works have concluded and if required, further mitigation would be undertaken.

- Monitoring of the long-term mitigation for the construction effects - habitat restoration and the translocation of peat for habitat restoration. A long-term monitoring programme would be initiated once restoration and peat reinstatement works have been completed.
- Key to the success of the strategy for peat management would be careful monitoring of the post-construction works and any restoration activities. A monitoring programme would be initiated once restoration and peat reinstatement works have been completed, and would include:
    - Review of % vegetation cover and vegetation composition in areas of bare peat that have been reinstated or restored, or in any areas that have been seeded (due to a lack of available turfed material or harvested bog mosses).
    - Review of stability of deposits in their new locations by inspection and fixed point photography.
    - Fixed point photography of vegetation change in order to aid review over a series of monitoring intervals. All turbine locations and all translocation areas would be subject to a detailed monitoring programme until they are well established on a trajectory of recovery.
- If required, mitigation recommendations would follow from the monitoring and include:
    - Specification of seeding appropriate to the target vegetation or stabilisation with geotextile if revegetation is not occurring naturally (which would assist re-wetting and retention of moisture contents).
    - Construction of wood dams (or equivalent) if any creep of peat soils is evident at any restored or translocated location.
    - Monitoring would be carried out for a minimum of five years after construction and reinstatement works have concluded.
    - Restoration monitoring would be carried out for a minimum of five years after construction and reinstatement works have concluded.

8.11 Residual Effects

8.11.1 Following the implementation of embedded mitigation and good practice measures outlined in **Appendix 8.1**, all potential effects would remain **Minor** and **Not Significant**. No significant residual effects are anticipated.

8.12 Cumulative Assessment

8.12.1 This section considers the potential effects of the Proposed Development on the geology, hydrology and peat in combination with other wind farm developments The assessment considers operational, consented (including under construction), and in application wind farms within the same catchments and within 5 km of the Proposed Development. All of the listed schemes are within the Council's planning authority.

8.12.2 There are four operational wind farms within 5 km of the Proposed Development:

- Millennium Wind Farm (2008) and Millennium Extension Wind Farm a 26 turbine 65 MW;
- Beinnneun Wind Farm 32 turbine 109MW near Fort Augustus commissioned in 2017;
- Beinnneun Extension Wind Farm 7 turbine 23.8 MW, located northwest of Invergarry.

8.12.3 There are two consented or approved schemes within 5km of the Proposed Development:

- Tomchrasky revised 2020 Wind Farm 14 turbine 84 MW consented May 2025 located near Fort Augustus in Glenmoriston, Scotland;
- Bunloinn wind farm 10 turbines up to 66.6MW consented April 2025 to the south of Loch Cluanie, northwest of Invergarry.

8.12.4 There is one planning application within 5km of the Proposed Development:

- Beinnneun 2 Wind Farm 19 turbine 125 MW application to the west of Millennium wind farm.

8.12.5 Cumulative construction effects are only considered for those other wind farms (that may have construction phases which coincide with that of the Proposed Development) within 5 km of the Proposed Development which represents a realistic zone of influence for cumulative effects to occur and within the same hydrological catchment.

8.12.6 The installed and consented Millennium, Millennium Extension, Beinneun, Beinneun 2 and Bunloin wind farms have infrastructure within the same regional hydrological catchment as the Proposed Development. There were no significant residual impacts on hydrology or geology identified as part of these wind farm EIARs. Beinneun, Tomchrasky and Bunloin wind farms are located within separate localised hydrological catchments, therefore the potential for cumulative effects is reduced by natural distance and dilution effects. Owing to the non-significant residual effects of the Proposed Development following the implementation of good practice, embedded mitigation, and additional mitigations measures proposed, the cumulative effect with these wind farms on geology, hydrology, and peat are likely to be Minor (not significant).

8.12.7 The Beinneun 2, Tomchrasky and Bunloin wind farms report excavation of peat (modified bog; peatland) habitat. All schemes also provide commitments to reuse all peat excavated onsite and restore bog (peatland) habitat.

8.12.8 Habitat mitigation measures detailed for the Proposed Development, and enhancement measures proposed under **Appendix 8.3** and the **Appendix 6.7** would appropriately reuse excavated peat around infrastructure and for peatland restoration and result in an increase in the extent of better-quality peatland onsite.

8.12.9 Based on the above, it is predicted that cumulative adverse effects on peat during the construction phase will be **Minor** and **Not Significant**.

8.13 Summary of Effects

8.13.1 The infrastructure, and associated construction activities, would result in an overall significance of effect that is Minor (not significant) for erosion/sedimentation of watercourses,

for alteration of natural drainage patterns, runoff volumes and rates, pollution and disturbance of geology and peat:

- Alterations to natural drainage and runoff patterns could temporarily affect sensitive bog habitats and aquatic ecosystems, though these changes are assessed as Minor in significance.
- Pollution risks from oil spills, chemical leaks, concrete washout, and waste mismanagement exist but are minimized through embedded mitigation, resulting in a low likelihood of significant impact on water quality.
- Flood risk is also assessed as minor due to effective drainage management and limited impermeable surfaces.
- Peat slide risk is low and can be managed through best practice techniques including further ground investigation, a geotechnical register and monitoring on Site.
- Peat disturbance would be carefully managed, with minimal excavation (only 0.5% of Site peat volume) and plans to reuse excavated peat for restoration, potentially turning this into a minor beneficial effect if restoration succeeds.

Table 8.9 Summary of Hydrology, Geology, Hydrogeology and Peat Effects

Effect	Phase	Assessment Consequence	Assessment Consequence and Effect Significance
Alteration of flow, natural drainage patterns/ runoff volumes and rates, including flooding and geomorphology	Construction	Increased flooding, increased surface run off and higher levels of erosion.	Minor and Not Significant
	Operation		Minor and Not Significant
Potential pollution events affecting groundwater and surface water quality	Construction	Harm to fish and aquatic plants, leaching into the water table contaminating drinking water sources	Minor and Not Significant
	Operation		Minor and Not Significant
Peat disturbance including peat slide	Construction	Harm to sensitive peatland habitats and appropriate reuse of peat volumes	Minor and Not Significant
	Operation	Peatland restoration	Minor beneficial

8.14 References

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