Galileo 05 Limited

Lynemore Wind Farm

Environmental Impact Assessment Report (Volume 1)

Chapter 8 – Hydrology, Geology, Hydrogeology, and Peat

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Table of Contents

TABLES

FIGURES

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 chapters such as terrestrial and aquatic ecology (**Chapter 6: Ecology and Biodiversity**) 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). Further details are provided in **Appendix 8.4: Peat Landslide Hazard Risk Assessment**.

8.1.4 The objectives of the chapter are to:

- Describe the baseline;
- Describe the assessment methodology and significance criteria used in completing the assessment;
- Describe any embedded design mitigation or good practice measures which will 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).

8.1.5 This chapter is supported by **Figures 8.1** to **8.11** which are referenced throughout the text.

8.1.6 The technical appendices referred to in the Chapter are as follows:

- **Technical Appendix 8.1: Good Practice Methods;**
- **Technical Appendix 8.2: Peat Survey Report;**
- **Technical Appendix 8.3: Outline Peat Management Plan;**
- **Technical Appendix 8.4: Peat Landslide Hazard Risk Assessment;**
- **Technical Appendix 8.5: Watercourse Crossing Inventory;**

- **Technical Appendix 8.6: Private Water Supply Assessment;**
- **Technical Appendix 8.7: Groundwater Dependent Terrestrial Ecosystem (GWDTE) Assessment.**

8.1.7 The following chapter specific terminology will be referred to throughout:

- **GWDTE** – Groundwater Dependent Terrestrial Ecosystems are habitats that are dependent on groundwater. They are specifically protected under the Water framework Directive.
- **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 Statutory and Planning Context

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

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.

8.3 Consultation Undertaken

8.3.1 A scoping report was submitted by the Applicant on 10th April 2024. Following the submission, scoping responses and further site surveys the proposed development was increased to up to 14 turbines alongside a battery energy storage system (BESS).

8.3.2 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken as detailed in Table 8.1.

Table 8.1: Summary of consultation responses relevant to this chapter

Consultee	Issued Raised	Response/Action Taken
Scottish Environment Protection Agency (SEPA) 29/05/24	**Site Layout and Infrastructure Design** • SEPA requires detailed scale drawings showing all temporary and permanent infrastructure (e.g., tracks, excavations, borrow pits, cabling, storage areas) overlaid with environmental sensitivities such as peat depth, peat condition, GWDTEs, and proximity to watercourses. • The layout must prioritise minimising disturbance to undisturbed ground and demonstrate how impacts on local hydrology have been reduced. • Specific concern was raised regarding T02 being too close to a watercourse.	The infrastructure layout has been designed to minimise disturbance to undisturbed ground and sensitive hydrological features. Appropriate buffers have been maintained from watercourses, and sustainable drainage measures have been incorporated to preserve natural flow paths. The design avoids areas of deep or highly saturated peat where possible, reducing impacts on peat hydrology and groundwater-dependent habitats. Erosion and sediment control measures will be implemented to protect water quality and comply with SEPA requirements. During design consultation, T02 was relocated to ensure an appropriate setback from the watercourse.
	Water Environment and Flood Risk • Watercourse crossings must be designed to accommodate the 1:200-year flow event plus climate change. • A 50m buffer around watercourses is required; any breaches must be justified with site-specific details, including photographs and dimensions. • Borrow pits within 250m of watercourses must have site-specific buffers proportional to excavation depth. • SEPA does not foresee the need for detailed flood risk information if these conditions are met.	All watercourse crossings will be designed to allow the 1 in 200 year flow plus climate change allowance and freeboard and will be licenced where required under CAR. These are presented in **Appendix 8.5 Watercourse Crossing Inventory** A 50m buffer has been applied to all 1:50k, 1:25k and 1:10k Ordnance Survey watercourses. There are no breaches of the buffer zone associated with the development. No borrow pits are located within 250m of a watercourse, so site-specific buffers are not required.

<table>
<tr><th>Consultee</th><th>Issued Raised</th><th>Response/Action Taken</th></tr>
<tr><td></td><td>Peat and Carbon-Rich Soils (CRS)
SEPA emphasises adherence to the mitigation hierarchy in NPF4, with clear demonstration that adverse impacts on peat are first avoided, then minimised.
An Outline Peat Management Plan (PMP) must provide detailed peat volumes (acrotelmic, catotelmic, and amorphous) and outline their intended use, storage, and handling.
Excavated peat used for restoration must be supported by evidence that the quantity used is genuine and does not exceed what is required.
SEPA no longer provides planning advice on peat use in areas undisturbed by development.</td><td>Peat has been extensively mapped across the Site as presented in Appendix 8.2.
An Outline Peat Management Plan (PMP) has been provided in Appendix 8.3 with excavation volumes based on the full infrastructure and earthworks footprint.
Opportunities for the reuse of excavated peat in temporary infrastructure areas are also presented in Appendix 8.3. Further reuse for peat in the undisturbed environment are presented in Appendix 6.5: Outline Habitat Enhancement and Management Plan (OHEMP).</td></tr>
<tr><td></td><td>Groundwater Dependent Terrestrial Ecosystems (GWDTE) and Groundwater Abstractions
A National Vegetation Classification (NVC) survey must map all GWDTEs and groundwater abstractions.
A 100m buffer from excavations <1m deep and 250m from excavations >1m deep is required. Any encroachments must be supported by a qualitative or quantitative risk assessment.
SEPA does not accept the UK Habitat Classification System (UKHab) as a substitute for NVC.</td><td>GWDTE’s on site have been classified and assessed within Appendix 8.7 based on NVC mapping across the Site.</td></tr>
<tr><td>The Highland Council (THC)
Robin Fraser – Environmental Health Officer (EHO)
16/05/24</td><td>Private Water Supplies:
Private Water Supply Survey: An investigation to identify any private water supplies potentially affected by the development is required. A report detailing measures to prevent contamination or disruption must be submitted, along with a monitoring plan during and post-construction.</td><td>Information on private water supplies based on council provided information and further data search along with source inspections is provided in Appendix 8.6 – Private Water Supply Assessment.</td></tr>
</table>

Consultee	Issued Raised	Response/Action Taken
Findhorn, Nairn and Lossie Rivers Trust R. Laughton 03/06/24	**Fisheries:** • **Fish Habitat Survey**: The survey, conducted in September 2023 by Avian Ecology, focused on the fish habitat in the upper and middle sections of the burns. While the survey provided useful insights, the lower sections of the burns, which are often better for fish habitat, were not included. Notably, the Moy and Funtach Burns and Loch Moy were excluded from the survey, which is concerning. • **Additional Data**: The Findhorn Nairn and Lossie Trust holds data on nearby burns such as the Allt Craig Beithin and Allt a'Chuil, which support juvenile trout and salmon. These burns are similar in structure to those affected by the wind farm. The Moy and Funtach Burns are important for salmonid spawning and juvenile rearing. • **Concerns on Survey Scope**: The survey should have been expanded to cover potential effects on fish habitats downstream of the development. Greater collaboration with the Findhorn, Nairn, and Lossie Rivers Trust (FNLRT) would have been beneficial. • **Water Quality and Fish Monitoring Plan**: The Trust supports the proposed water quality and fish monitoring plan but is concerned that fisheries have not been included in the future Environmental Impact Assessment (EIA). Further discussions on this matter are encouraged.	Discussion on these aspects can be found in **Chapter 6: Ecology and Biodiversity.**

The Highland Council (THC) 05/08/24	The EIAR needs to address the nature of the hydrology and hydrogeology of the site, and of the potential impacts on watercourses, water supplies including private supplies, water quality, water quantity and on aquatic flora and fauna. Impacts on watercourses, lochs, groundwater, other water features including bog pools surrounding the proposed infrastructure, and sensitive receptors such as water supplies, need to be assessed and demonstrated that they will not be degraded by site drainage and excavations. Measures to prevent erosion, sedimentation or discolouration will be required, along with monitoring proposals and contingency plans. Assessment will need to recognise periods of high rainfall that will impact on any calculations of run-off, high flow in watercourses and hydrogeological matters. The applicant is strongly advised at an early stage to consult Scottish Environment Protection Agency (SEPA) as the regulatory body responsible for the implementation of the Controlled Activities (Scotland) Regulations 2005 (CAR), however it is likely that a map and assessment of all engineering activities in or impacting on the water environment including proposed buffers, details of any flood risk assessment, and details of any related CAR applications will be required to be included with the EIAR. SEPA will identify whether a CAR license is necessary and the extent of information required to assess any license application. If culverting should be proposed, either in relation to new or upgraded tracks, then it should be noted that SEPA has a general presumption against modification, diversion or culverting of watercourses. Schemes should be designed to avoid crossing watercourses, and to bridge watercourses where this cannot be avoided. The EIAR will be expected to identify all water crossings and include a systematic table of watercourse crossings or channelling, with detailed justification for any such elements and design to minimise impact. The table should be accompanied by photography of each watercourse affected and include dimensions of the watercourse. It may be useful for the applicant to demonstrate choice of watercourse crossing by means of a decision tree, taking into account factors including catchment size	The EIAR includes an assessment of the site's hydrology and hydrogeology, considering potential impacts on watercourses, private water supplies, water quality, and quantity, as well as aquatic flora and fauna. Impacts on sensitive receptors, including lochs, bog pools, and groundwater, have been evaluated, with embedded mitigation ensuring no significant effects. The assessment accounts for high rainfall periods and runoff variability. The EIAR includes an assessment of all proposed watercourse crossings, in line with SEPA guidance, with a systematic table detailing each crossing, justification, and design to minimise impact. Where crossings are unavoidable, appropriate design measures, including consideration of bridging options, have been incorporated. Photography, dimensions, and relevant environmental factors have been included, and the approach aligns with best practice as outlined in SEPA's Construction of River Crossings Good Practice Guide

	(resultant flows), natural habitat and environmental concerns. Further guidance on the design and implementation of crossings can be found on SEPA's Construction of River Crossings Good Practice Guide.	
	There are a number of watercourses on the site therefore the following applies: • A minimum of a 50m buffer of all watercourses/bodies and turbines/crane hard standings, which should be shown on a suitably scaled drawing; • All tracks should be kept a minimum 10m away from any waterbody except water crossings; • Access tracks not acting as preferential pathways for runoff and efforts being made to retain existing natural drainage wherever possible; • Natural flood management techniques should be applied to reduce the rate of runoff where possible; use of SuDS to achieve pre-development runoff rates and to minimise erosion on existing watercourses; • Water crossings in the form of culverts or bridges, or upgrades to existing crossings must be designed to accommodate to 1 in 200 year flood event, plus climate change; • Land rising within any floodplain to be avoided; if ultimately required, compensatory storage must be provided; and, • The EIAR should be informed by the Council's Flood Risk and Drainage Impact Assessment Supplementary Guidance.	The EIAR considers the presence of watercourses on-site and incorporates appropriate buffers, track setbacks, and drainage design to minimise hydrological impacts. The assessment ensures that access tracks do not act as preferential pathways for runoff and that natural drainage patterns are retained where possible. SuDS and natural flood management techniques have been incorporated to control runoff and minimise erosion. Water crossings have been designed to accommodate the 1 in 200-year flood event, including climate change allowances. Flood risk considerations align with the Council's Flood Risk and Drainage Impact Assessment Supplementary Guidance.
	The applicant will be required to carry out an investigation to identify any private water supplies, including pipework, which may be adversely affected by the development and to submit details of the measures proposed to prevent contamination or physical disruption. This information should be in the form of a map and assessment of impacts upon groundwater abstractions and buffers. Highland Council has some information on known supplies, but it is not definitive. An on-site survey will be required.	Information is noted in **Appendix 8.6 –** Private Water Supply Assessment.
	Highland Council's Flood Risk Management Team consider the associated BESS should be scoped in to a flood risk appraisal. It should be	There is no flood risk at the Battery Energy Storage System (BESS) location, as it is situated within the substation area, which is not within any identified flood risk zones.

Consultee	Issued Raised	Response/Action Taken
	assessed on its own merits and not those of the scheme as a whole.	
Scottish Water 11 December 2024	An FOI request was submitted to Scottish Water to gather information on any public water supply abstractions or other infrastructure within a 5km radius of the site boundary. The request included hydrological mapping and shapefiles for the site boundary to assist Scottish Water in identifying relevant infrastructure. The requested data aimed to clarify potential interactions between the proposed development and public water supply systems, supporting the environmental impact assessment process. Scottish Water responded on the 11th of December 2024 via email and stated: *"A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity."*	Information is noted in **Appendix 8.6 –** Private Water Supply Assessment.

SEPA 19 February 2024	A Freedom of Information (FOI) request was submitted to the Scottish Environmental Protection Agency (SEPA) to obtain details of any registered water abstractions within the Lynemore Wind Farm site boundary and a 5km radius of the boundary. The request specifically sought: • **Location of the source** (surface water, groundwater, borehole, spring, etc.). • **Type of source**. • **Abstraction volumes**. • **Intended use**. • **Properties or businesses utilising the abstraction**. SEPA provided a detailed response regarding water abstractions within an 8km radius of the Lynemore Wind Farm site boundary, focusing on both licensed and registered abstractions. Among the licensed abstractions, the following key activities were highlighted: • **CAR-L-1010493** authorises surface water abstraction from the Allt Coash Burn, with a licensed volume of 6480m³/day at a location approximately NH 8070 2760. • **CAR-L-1011810** permits abstraction from two sources, the Allt Na Frithe Burn and the River Findhorn, with volumes of 6144m³/day and 6000m³/day respectively, located at NH 7873 2916 and NH 7972 3031. • **CAR-L-1106477** allows for the abstraction of a significantly higher volume of water—47,865m³/day—from Uisge Dubh, situated at NH 7155 3091. In addition to the licensed abstractions, SEPA also shared information about registered abstractions under the Controlled Activities Regulations (CAR). These include the abstraction of less than 50m³/day from the Allt na Fuar-ghlaic, at NH 7110 3720; groundwater abstraction at Daviot Quarry, spread across two points (NH 7185 3907 and NH 7210 3916); and surface water abstraction from Moy Burn for Moy Wind Farm at NH 7694 3686. SEPA clarified that private drinking water abstractions of 10m³/day or less are not formally recorded by SEPA, as they are regulated under General Binding Rules (GBRs). This limitation	Information is noted in **Appendix 8.6 –** Private Water Supply Assessment.

Consultee	Issued Raised	Response/Action Taken
	suggests that such abstractions would require verification through local authority records, specifically those held by the Highland Council. SEPA also noted that, for public safety reasons, they do not disclose the locations of public drinking water supply abstractions. The data provided by SEPA reflects their best available information, but they cautioned that some records may be incomplete due to the impact of the 2020 cyber-attack on their systems. As such, the response highlights the importance of cross-referencing SEPA's data with other sources, such as local authority records, to ensure a comprehensive understanding of water abstractions in the area. SEPA's data review confirms that none of these abstractions will be impacted by the proposed Lynemore Wind Farm scheme. The licensed and registered abstractions are located at sufficient distances from the site boundary to be unaffected by construction or operational activities. Furthermore, the diffuse and localised nature of hydrological changes anticipated from the development, coupled with the abstraction points' upstream or distant positions relative to the site, ensures no measurable impact on theses identified abstractions.	
Highland Council 01 February 2024	A request was made for Private Water Supply (PWS) data within a 5km radius from the site centre. The PWS database for the Highlands was provided; however, it was noted that the database may not be entirely complete or fully accurate.	Information is noted in **Appendix 8.6 –** Private Water Supply Assessment.

8.4 Approach to the Assessment

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 groundwater dependent terrestrial ecosystems (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 as a result 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 On the basis of 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 the construction period on any GWDTEs that are not hydrogeologically connected to the development, as discussed in Appendix 8.7;
- Effects during the construction period on any PWSs that are not hydrologically connected to the development, as discussed in Appendix 8.6;

8.4.3 Pollution of surface water during construction, on the basis that best practice measures will be followed and all infrastructure is located at least 50 m from 1:25,000 OS mapped water features. The main surface water receptors include the Allt na Fuar-ghlaic and River Findhorn (classified as Good Overall Condition) and the Moy Burn, Funtack Burn, and Loch Moy (classified as Moderate Overall Status);

8.4.4 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. With the exception of watercourse crossings, infrastructure, including the BESS will be located outside of flood zones. Correct application of SuDS measures will prevent any increase in flood risk, and all watercourse crossings will 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 will occur, these will be substantially less than during the construction period which represents a worst case; and
- Effects during the decommissioning phase as these will be similar, but of lower magnitude, to that of construction phase, and detailed plans and requirements will be agreed when required.

Baseline Methodology

Study Area

8.4.5 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 from the Site infrastructure in excess of 2 km, although if a direct pathway exists, e.g. a watercourse, these are also considered.

Desk Study

8.4.6 The 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.

- Centre for Ecology and Hydrology (CEH): National River Flow Archive (NRFA)[1];
- Meteorological Office website for rainfall data[2] (accessed February 2025, http://www.metoffice.gov.uk/climate/uk/averages/);
- Ordinance Survey (OS) Mapping[3] [4] [5]
- British Geological Society (BGS) GeoIndex Boreholes database6, 1:50,000 scale;
- BGS Geology Viewer[7;]
- National soil map of Scotland[8];
- SNH Carbon and Peatland Map[9] (2016);

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[1] Centre for Ecology and Hydrology (CEH): Natiuonal River Flow Archive. Available at: http://www.ceh.ac.uk/data/nrfa/data/search.html [Accessed January 2025]

[2] Available at: http://www.metoffice.gov.uk/climate/uk/averages/ [Accessed January 2025]

[3] OS 1:10,000 Opendata

[4] OS 1:25,000 map 416

[5] OS 1:50,000 maps 26

[6] Available at https://mapapps2.bgs.ac.uk/geoindex/home.html?layer=BGSBoreholes&_ga=2.15034101.2146370583.1664807670-870855505.1664807670 [Accessed January 2025]

[7] Available at https://geologyviewer.bgs.ac.uk/?_ga=2.75028626.1831206251.1664806301-2113370483.1664806301 [Accessed January 2025]

[8] Available at https://map.environment.gov.scot/Soil_maps/?layer=1 [Accessed January 2025]

[9] Available at https://map.environment.gov.scot/Soil_maps/?layer=10 [Accessed January 2025]

- SEPA Rive Basin Interactive Map for Water Framework Directive Classifications via the SEPA Water Environment Hub[10];
- Hydrogeological Map of Scotland[11] (Scale 1:625,000, Institute of Geological Sciences, 1988);
- Scottish Aquifer Properties Interim Report12 (BGS, NERC and Sniffer, June 2006);
- A GIS of aquifer productivity in Scotland explanatory notes[13] (BGS, 2004);
- Groundwater Vulnerability Map of Scotland[14];
- SEPA Indicative River and Coastal Flood Map[15];
- Scottish Drinking Water Protected Area for surface water16, Scottish Government Website Maps;
- Joint Nature Conservation Committee (JNCC) National Archives for Designated site and Geological Conservation Review (GCR) Site[17] ;
- JNCC C.H. Emeleus and M.C. Gyopari: British Tertiary Volcanic Province[18];
- National Biodiversity Network (NBN) Gateway[19] website; and
- Multi-Agency Geographic Information for the Countryside (MAGIC)[20] website.

Field Surveys

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

- Peat Surveys (multiple phases with results presented in **Appendix 8.2**) including peat probing, coring and verification of peat geomorphology features:
- Phase 1 100m grid November 2023;
- Phase 2 detailed probing of layout July 2024;

[10] Available at https://www.sepa.org.uk/data-visualisation/water-environment-hub/ [Accessed January 2025]

[11] Available at https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=1003988 [Accessed January 2025]

[12] BGS, NERC and Sniffer (June 2006), Scottish Aquifer Properties Interim Report. Available at https://nora.nerc.ac.uk/id/eprint/7448/ [Accessed January 2025]

[13] BGS (2004), A GIS of aquifer productivity in Scotland explanatory notes. Available at https://nora.nerc.ac.uk/id/eprint/504764/#:~:text=GIS-based%20maps%20of%20aquifer%20productivity%20have%20been%20produced,describe%20the%20potential%20of%20an%20aquifer%20%28bedrock%20or [Accessed January 2025]

[14] Available at https://www.researchgate.net/figure/The-groundwater-vulnerability-Scotland-map-Version-2_fig1_277773418 [Accessed January 2025]

[15]Available at https://scottishepa.maps.arcgis.com/apps/webappviewer/index.html?id=b3cfd390efa44e3b8a72a07cf5767663&showLayers=FloodMapsBasic_2743;FloodMapsBasic_2743_0;FloodMapsBasic_2743_1;FloodMapsBasic_2743_2;FloodMapsBasic_2743_3;FloodMapsBasic_2743_4;FloodMapsBasic_2743_5;FloodMapsBasic_2743_6;FloodMapsBasic_2743_7;FloodMapsBasic_2743_8;FloodMapsBasic_2743_9;FloodMapsBasic_2743_10;FloodMapsBasic_2743_11 [Accessed January 2025]

[16] https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/ [Accessed January 2025]

[17] https://webarchive.nationalarchives.gov.uk/ukgwa/20190301143239/http://jncc.defra.gov.uk/page-2947 [Accessed January 2025]

[18] JNCC. C.H. Emeleus and M.C. Gyopari: British Tertiary Volcanic Province Chapter 2 Skye, Page 30-32

[19] Available at https://data.nbn.org.uk/ [Accessed January 2025]

[20] Available at http://magic.defra.gov.uk/ [Accessed January 2025].

- Phase 3 further detailed probing as well as 100m grid following layout changes in August 2024;
- Phase 4 further detailed probing following layout changes November 2024
- Phase 5 further detailed probing following layout changes December 2024; and
- Phase 6 detailed survey of final layout January 2025.
- Private water supplies – site visit in January 2025 confirmed which properties were on PWS, inspected the overall water supply source locations (prioritising on those likely to be connected to the Site where access was permitted) and establish the PWS systems to determine construction constraints to the Site (see **Appendix 8.6**);
- Hydrology Walkover – visits for baseline and proposed development design inspection on 15th and 16th January 2025; and

Assessment Methodology

1.1..1 There is a wide body of legislation, guidance and policy that has been used in relation to the assessment with key documents listed below.

Legislation

8.4.8 Water Environment (Controlled Activities) (Scotland) Regulations (CAR) 2011[21];

- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017[22];
- The Public Water Supplies (Scotland) Regulations 2014[23];
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[24]; and
- The Water Framework Directive (WFD). The WFD is no longer law post-Brexit but has been implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003 (WEWs Act)25 and the Water Environment (Controlled Activities) (Scotland) Regulations (CAR) 201121. The primary objective of the WEWs Act 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)[26] which detail the current and target status of water bodies, and the means of achieving these targets (as last assessed in 2008 and 2014).

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[21] Available online: https://www.legislation.gov.uk/ssi/2011/209/contents/made [Accessed December 2024]

[22] Available online: https://www.legislation.gov.uk/ssi/2017/282/contents/made [Accessed December 2024]

[23] Available online: https://www.legislation.gov.uk/sdsi/2014/9780111024782/contents [Accessed December 2024]

[24] Available online: https://www.legislation.gov.uk/ssi/2017/101/contents/made [Accessed December 2024]

[25] Available online: https://www.legislation.gov.uk/asp/2003/3/contents [Accessed December 2024]

[26] SEPA, River Basin Management Planning, Available at: https://www.sepa.org.uk/environment/water/river-basin-management-planning/ [Accessed December 2024]

Guidance

8.4.9 The Pollution Prevention Guidelines (PPGs) are being replaced by the Guidance for Pollution Prevention (GPP) and include the documents referred to below. These are the principal documents providing guidance on preventing contamination of surface water from construction activities. Those relevant to the Proposed Development include:

- GPP1: Understanding your Environmental Responsibilities – Good Environmental Practices (SEPA, DAERA, NRW & NIEA, June 2021)[27];
- GPP2: Above ground oil storage tanks (SEPA, NIEA & NRW, January 2018)[28];
- GPP4: Treatment and disposal of sewage where no foul sewer is available (SEPA, DAERA, NRW & NIEA, 2021)[29];
- GPP5: Works and maintenance in or near water (SEPA, DAERA, NRW & NIEA, January 2017)[30];
- PPG6: Working at construction and demolition sites (EA, SEPA & NIEA, 2012)31;
- GPP8: Safe storage and disposal of used oils (SEPA, DAERA, NRW & NIEA, July 2017)[32];
- GPP21: Pollution incidence response planning (SEPA, DAERA, NRW & NIEAEA, June 2021)[33]; and
- GPP26: Storage and handling of drums and intermediate bulk containers (SEPA, DAERA, NRW & NIEA, 2017, June 2021)[34].

8.4.10 Other SEPA guidance includes:

- SEPA Flood maps / Indicative River & Coastal Flood Map (Scotland) (SEPA January 2014, updated April 2018 and 2022)[35];

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[27] NetRegs (2021), Guidance for Pollution Prevention, *Understanding your environmental responsibilities – good environmental practices: GPP 1*. Version 1.2, June 2021. Available at: https://www.netregs.org.uk/media/1898/guidance-for-pollution-prevention-1-2022-update.pdf [Accessed December 2024]

[28] NetRegs (2021), Guidance for Pollution Prevention, *Above ground oil storage tanks: GPP 2*. Version 1.2, June 2021. Available at: https://www.netregs.org.uk/media/1890/guidance-for-pollution-prevention-2-2022-update.pdf [Accessed December 2024]

[29] NetRegs (2021), Guidance for Pollution Prevention, *Treatment and disposal of wastewater where there I no connection to the public foul sewer: GPP 4*. Version 1.2, June 2021. Available at: https://www.netregs.org.uk/media/1887/guidance-for-pollution-prevention-4-2022-update.pdf [Accessed December 2024]

[30] NetRegs (2018), Guidance for Pollution Prevention, *Works and maintenance in or near water: GPP 5*. Version 1.2, February 2018. Available at: https://www.netregs.org.uk/media/1418/gpp-5-works-and-maintenance-in-or-near-water.pdf [Accessed December 2024]

[31] NetRegs (2012), Pollution Prevention Guidelines, *Working at construction and demolition sites: PPG 6.* Version 2. Available at: https://www.netregs.org.uk/media/1672/ppg-6.pdf [Accessed December 2024]

[32] NetRegs (2021), Guidance for Pollution Prevention, *Safe storage and disposal of used oils: GPP 8.* Version 1.2, June 2021. Available at: https://www.netregs.org.uk/media/1900/guidance-for-pollution-prevention-8-2022-update.pdf [Accessed December 2024]

[33] NetRegs (2021), Guidance for Pollution Prevention, *Pollution incident response planning: GPP 21*. Version 1.1, June 2021. Available at: https://www.netregs.org.uk/media/1436/gpp-21-final.pdf [Accessed December 2024]

[34] NetRegs (2021), Guidance for Pollution Prevention, *safe Storage of Drums and Intermediate Bulk Containers (IBCs): GPP 261*. Version 1.2, June 2021. Available at: https://www.netregs.org.uk/media/1885/guidance-for-pollution-prevention-26-2022-updated.pdf [Accessed December 2024]

[35] SEPA Flood maps. Available online: https://www.sepa.org.uk/environment/water/flooding/flood-maps/ [Accessed December 2024]

- Temporary Construction Methods, Engineering in the Water Environment Good Practice Guide, WAT-SG-29 (SEPA; 2009)[36];
- River Crossings, Engineering in the water environment, WAT-SG-25 (SEPA, 2010)[37];
- Water Run-Off from Construction Sites, Sector Guidance, Sector Specific Guidance WAT-SG-75 (SEPA, 2021)[38];
- SEPA Regulatory Position Statement – Developments on peat (SEPA, 2010)[39];
- Land Use Planning System Guidance Note 4 (LUPS GU4) (SEPA, 2017)[40];
- Land Use Planning System Guidance Note 2 (LUPS GU2) (SEPA, 2010)[41]; and
- Land Use Planning System Guidance Note 31 (LUPS 31) (SEPA, 2017)[42].

Policy and Other Relevant Guidance

- National Planning Framework 4: National Spatial Strategy for Scotland, approved by Scottish Parliament on 11 January 2023[43].
- Control of water pollution from constructions sites. Guidance for consultants and contractors C532 (CIRIA, 2001)[44];
- Environmental good practice on site C650 2nd Edition (CIRIA, 2005)[45];
- Control of water pollution from linear construction projects: technical guidance C648 (CIRIA, 2006)[46];

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[36] SEPA (2009), *Engineering in the Water Environment: Good Practice Guide, Temporary Construction Methods*. Available online: https://www.sepa.org.uk/media/150997/wat_sg_29.pdf [Accessed December 2024]

[37] SEPA (2010), *Engineering in the Water Environment: Good Practice Guide, Temporary Construction Methods.* Available online: https://www.sepa.org.uk/media/151036/wat-sg-25.pdf [Accessed December 2024]

[38] SEPA (2021), Supporting Guidance (WAT-SG-75). Sector Specific Guidance: Water Run-Off from Construction Sites. Available online: https://www.sepa.org.uk/media/340359/wat-sg-75.pdf [Accessed December 2024]

[39] SEPA (2010), *SEPA Regulatory Position Statement – Developments on Peat.* Available online: https://www.sepa.org.uk/media/143822/peat_position_statement.pdf

[40] SEPA (2017), Land Use Planning System SEPA Guidance Note 4: *Planning guidance on on-shore wind farm developments.* Available online: https://www.sepa.org.uk/media/136117/planning-guidance-on-on-shore-windfarms-developments.pdf [Accessed December 2024]

[41] SEPA (2010), Land Use Planning System SEPA Guidance Note 2: *Planning advice on Sustainable Drainage Systems (SUDS).* Available online: https://www.sepa.org.uk/media/143195/lups-gu2-planning-guidance-on-sustainable-drainage-systems-suds.pdf [Accessed December 2024]

[42] SEPA (2017), Land Use Planning System: SEPA Guidance Note 31: *Guidance on Assessing the Impacts of Developments Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems*. Available online: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf [Accessed December 2024]

[43] Scottish Government (2023), *National Planning Framework 4*. Available at: https://www.gov.scot/publications/national-planning-framework-4/documents/ [Accessed December 2024]

[44] CIRIA (2001), C532 Control of water pollution from construction sites: Guidance for consultants and contractors. Available at https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C532&Category=BOOK [Accessed December 2024]

[45] CIRIA (2005), Environmental good practice on site C650 2nd Edition. Available at https://www.thenbs.com/PublicationIndex/Documents/Details?DocId=277130

[46] CIRIA (2005), Control of water pollution from linear construction projects: technical guidance C648. Available at https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C648D [Accessed December 2024]

- Good practice during windfarm construction (Scottish Renewables, SNH, SEPA & Forestry Commission Scotland, 4th Edition 2019)[47];
- Managing Forest Operations to Protect the Water Environment Practice Guide (Forestry Commission Scotland, 2019)[48];
- 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)[49];
- Planning Advice Note 50 Controlling the Environmental Effects of Surface Mineral Workings (1996)[50];
- Planning Advice Note 79: Water and Drainage (2006)[51];
- Guidance on Road Construction and Maintenance (Forests and Water Guidelines Fifth Edition 2011, Forestry Commission)[52];
- A Handbook of Environmental Impact Assessment, 5th Edition (SNH, 2018)[53];
- Peatland Survey. Guidance on Developments on Peatland. Scottish Government, Scottish Natural Heritage (SEPA, 2017)[54];
- Peat Landslide Hazard and Risk Assessments: Best practice Guide for Proposed Electricity Generation Developments (Scottish Government, Second Edition, 2017)[55];

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[47] Scottish Renewables, SNH, SEPA & Forestry Commission Scotland (2019), Good practice during windfarm construction, 4th Edition. Available at https://www.scottishrenewables.com/assets/000/000/453/guidance_-_good_practice_during_wind_farm_construction_original.pdf?1579640559 [Accessed December 2024]

[48] Forestry Commission Scotland (2019), Managing Forest Operations to Protect the Water Environment Practice Guide. Available at https://www.forestresearch.gov.uk/publications/managing-forest-operations-to-protect-the-water-environment/ [Accessed December 2024]

[49] Forestry and Water Scotland Initiative (January 2018), Practice guide for forest managers to assess and protect Groundwater Dependent Terrestrial Ecosystems when preparing woodland creation proposals. Available at https://www.confor.org.uk/media/246950/practice-guide-on-ground-water-dependent-terrestrial-ecosystems.pdf [Accessed December 2024]

[50] Available at: https://www.gov.scot/publications/planning-advice-note-pan-50-controlling-environmental-effects-surface-mineral/ [Accessed December 2024]

[51] Available at: https://www.gov.scot/publications/planning-advice-note-pan-79-water-drainage/ [Accessed December 2024]

[52] Forestry Commission (2011), Guidance on Road Construction and Maintenance (Forests and Water Guidelines Fifth Edition). Available at UK forestry standard guidelines - forests and water, Forestry Commission - Publication Index | NBS (thenbs.com) [Accessed December 2024]

[53] SNH (2018), A Handbook of Environmental Impact Assessment, 5th Edition. Available at: https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf [Accessed December 2024]

[54] Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. *Guidance on Developments on Peatland,* on-line version only. Available at https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2018/12/peatland-survey-guidance/documents/peatland-survey-guidance-2017/peatland-survey-guidance-2017/govscot%3Adocument/Guidance%2Bon%2Bdevelopments%2Bon%2Bpeatland%2B-%2Bpeatland%2Bsurvey%2B-%2B2017.pdf [Accessed December 2024]

[55] Scottish Government (2017), Peat Landslide Hazard and Risk Assessments: Best practice Guide for Proposed Electricity Generation Developments. Available at https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2017/04/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/documents/00517176-pdf/00517176-pdf/govscot%3Adocument/00517176.pdf [Accessed December 2024]

- NatureScot. (2023). Advising on peatland, carbon-rich soils, and priority peatland habitats in development management. National Planning Framework 4 (NPF4)[56].

Assessment of Effect Significance

8.4.11 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.

8.4.12 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 effect.

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

Criteria for Assessing Sensitivity of Receptors

8.4.14 Sensitivity criteria is based on both the ability of a receptor to accommodate the anticipated effect 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.

8.4.15 The sensitivity criteria used in this assessment is presented in Table 8.2

[56] NatureScot. (2023). Advising on peatland, carbon-rich soils, and priority peatland habitats in development management. National Planning Framework 4 (NPF4). Available at https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management (accessed February 2025)

Table 8.2: Receptor value and sensitivity

Sensitivity	Description
Very High	• Environment is very sensitive and would respond in a major way to effects. • 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, Special Area of Conservation (SAC), Site of Special Scientific Interest (SSSI), National Nature Reserves, Marine Nature Reserves, GCR sites). • Habitats listed in Regional Biodiversity Action Plans or Annex I habitats. • Internationally important species. • >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	• Environment is sensitive and would respond in a moderate way to effects. • 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. • Other water dependent habitats. • >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.
Medium	• Environment is not very sensitive and responds in a minimum way to effects. • Surface water classified under the WFD as ‘moderate’ (or equivalent older chemical or biological monitoring designation). • Sites designated at a local level. • Groundwater vulnerability to pollution Class 3 or 2.

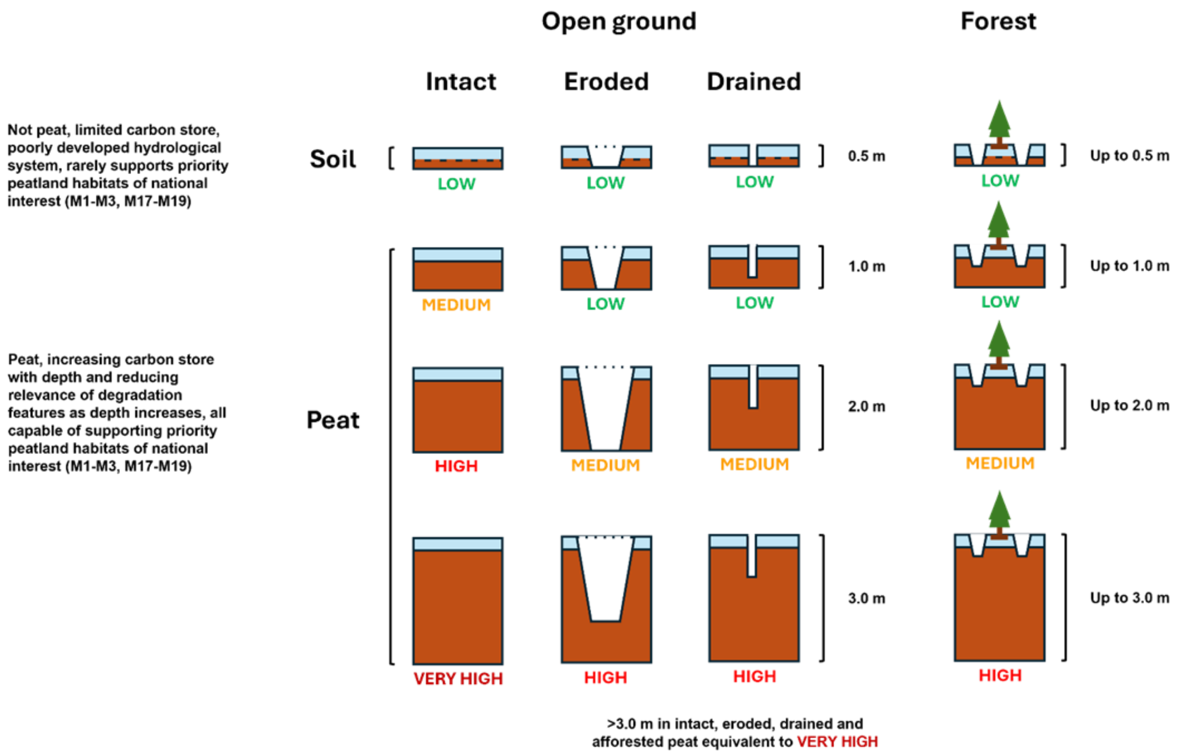
Sensitivity	Description
	• >25% of infrastructure located on peat with depth between 0.5 m – 1 m in open and undegraded terrain or with depth between 1 m – 2 m in forestry, densely drained, eroded or gullied open terrain.
Low	• Environment is not sensitive and responds in a negligible way to effects. • Surface water classified under the WFD as ‘poor or bad’ (or equivalent older chemical or biological monitoring designation). • Groundwater classified under the WFD as ‘poor’. • Groundwater vulnerability to pollution Class 1. • No private or public supply abstractions (surface water or groundwater). • No designated fisheries. • >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.

8.4.16 Any assessment regarding peat resource considers the peat as a carbon store and therefore the following forms the basis for the assessment of sensitivity:

Assessment of Sensitivity of Peat

8.4.17 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. 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. **Plate 8.1** illustrates this approach with the sensitivity for each degradation and depth combination provided below the associated image, coloured using RAG (Red-Amber-Green) styling. The assessment of sensitivity does not take into account vegetation, which is considered within the ecological impact assessment in **Chapter 6: Ecology and Biodiversity**.

Plate 8.1 Peat Sensitivity



Source: Fluid 2025

Criteria for Assessing Magnitude of Change

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

8.4.19 The magnitude of the potential effect criteria is presented in Table 8.3.

Table 8.3: Definition of magnitude of effect

Magnitude	Summary
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 >10% of total peat volume within the peat survey area/site.
High	• Impact resulting in integrity of feature or use being impacted, or loss of part 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 between 5% and 10% of total peat volume within the peat survey area/site.
Medium	• Impact on feature or use.

Magnitude	Summary
	• Detectable but non-substantial and temporary changes to the surface water, groundwater and geology (in terms of quantity, quality and morphology). • Excavated peat volume between 2% and 5% of total peat volume within the peat survey area/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 <2% of total peat volume within the peat survey area/site.

8.4.20 The magnitude of the potential effects has been assessed based on the location of the receptor and the proximity of operational infrastructure, or construction activity taking place. The magnitude of potential effect takes into account the good practice and standard embedded mitigation methods described in this chapter and **Technical Appendix 8.1.**

Assessment of Magnitude of Effect on Peat

8.4.21 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 effect. Importantly, for the assessment to be upheld, the assumption is that any excavated peat has an appropriate reuse specified within the PMP, HMP, or these documents in combination.

Criteria for Assessing Significance

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

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

8.4.24 **Major** and **Moderate** effects are considered to be **significant** in the context of the EIA Regulations. Where the significance of effect is assessed as being moderate or above, the scope for additional site-specific mitigation is considered.

Table 8.4: Significance of effect matrix

	Magnitude			
Sensitivity	**Very High**	**High**	**Medium**	**Low**
Very High	Major	Major	Moderate	Minor
High	Major	Moderate	Moderate	Minor
Medium	Moderate	Moderate	Minor	Minor

Sensitivity	Magnitude			
	Very High	High	Medium	Low
Low	Moderate	Minor	Minor	Minor

Nature of Effect

8.4.25 In addition to determining the significance of the effect, the assessment process also includes a qualitative description regarding the nature of the effect. These terms add additional information about how the effect would affect receptors.

Table 8.5: Assessment descriptors

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 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 effect may occur with sufficient frequency to reduce the ability of a receptor to recover effectively.

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

Limitations

8.4.27 The fieldwork was undertaken in a range of weather conditions. However, the nature of some hydrological features may not manifest themselves at all times and may be a result of extreme weather conditions. Whilst the best care has been undertaken to visit the Site in different weather conditions, there is a potential that some small, minor features may be missed as a result of their ephemeral or temporary nature.

8.4.28 Not all properties responded to the PWS survey/questionnaires. Site visits were undertaken that filled in gaps on the basis of starting with the nearest properties to the Proposed Development. It was not possible to interview all properties where questionnaires were issued and not all residents wished to respond.

8.4.29 It is considered that all potential PWSs within the catchment of the Proposed Development have been adequately identified and assessed and that there are no impacted private water supplies within 2km of the Proposed Development. The assessment presented in **Technical Appendix 8.6** is based on the information known at the time of submission of the EIA Report.

8.4.30 Whilst some information gaps have been identified, it is considered that there is sufficient information to enable a reasoned conclusion to be taken in relation to the identification and assessment of likely significant environmental effects on the geology, hydrology, hydrogeology and peat. This chapter does not include the potential geological, hydrogeological and hydrological effects of the transport access route or any grid connection.

Assumptions

8.4.31 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 will, 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 **Technical 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.

8.4.32 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.

8.5 Existing Environment

8.5.1 The following section outlines the baseline hydrological, hydrogeological, and geological conditions within the Study Area. It encompasses an overview of the physical characteristics, designated water bodies, water-dependent habitats, their quality, and their current use. This information provides the foundation for assessing potential effects and informing mitigation strategies related to the Proposed Development.

Topography and Land Use

8.5.2 A review of Ordnance Survey mapping and aerial imagery (Google, 2024) indicates that the site is situated primarily on the northeastern slopes of Beinn nan Cailleach, Carn na h-Easgainn, and Carn na Loinne. The landscape consists of a mix of stepped hillsides and consistently steeper slopes, with elevations ranging from 616m AOD at Carn na h-Easgainn in the south to 290m AOD near the northeastern site boundary along the A9 public road. The site generally slopes moderately from south to north, featuring a series of plateaus on the stepped hillsides in the west, transitioning to steeper gradients in the central and eastern areas before levelling out near the A9, which serves as the main access point. There is one existing track on site which is in poor condition and steep therefore it is unable to be upgraded for use for the Proposed Development.

8.5.3 The topography and main surface water catchments are shown in **Figure 8.1**.

Meteorological Summary

8.5.4 The National River Flow Archive indicates that the Findhorn at Shenachie (Station 7001, NGR NH825335), which drains the majority of the site, experiences an average annual rainfall of 1,217mm (1961–1990). Based on the rainfall legend for the catchment, the site itself is estimated to receive between 1,000mm and 1,400mm of annual rainfall. In comparison, the average annual rainfall across Scotland is 1,570.9mm, suggesting that the site experiences slightly lower-than-average rainfall relative to the national average.

8.5.5 Data from the Inverness climate station (Met Office), located approximately 14km northwest of the site, records an average annual rainfall of 755mm (1991–2020), with January being the wettest month (76.22mm) and April the driest (40.55mm). The average annual maximum temperature at Inverness is 12.68°C, with monthly averages ranging from 7.11°C in January to 18.95°C in July. Given the higher elevation of the site (predominantly 290–616m AOD) compared to Inverness (13m AOD), the site is expected to experience lower average temperatures.

8.5.6 Sunshine hours at Inverness average 1,249.67 annually, with a peak of 183.63 hours in May and a low of 27.66 hours in December. This is comparable to the national average annual sunshine of 1,200.04 hours.

Soils

8.5.7 The distribution of soils across the site is influenced by the underlying geology, topography, and drainage conditions. According to the National Soil Map of Scotland (accessed November 2024), the site is predominantly underlain by peaty podzols along the summits near the southwestern site boundary, peaty gleys on the shallower slopes in the northeastern area, and extensive peat across the remainder of the site.

Peat

8.5.8 The SNH Carbon and Peatlands 2016 map indicates that most of the site is classified as Class 1 peat, which represents nationally important carbon-rich soils, deep peat, and priority peatland habitats. In contrast, the summit of Carn na h-Easgainn and areas of forestry in the northeast are classified as Class 5 peat, characterised by peat soils without peatland vegetation. The mapping is a broad approach to peat across Scotland and is superseded by the site-specific habitat mapping and detailed peat probing surveys.

8.5.9 The spatial occurrence and depth distribution of peat across the Site has been examined extensively based on guidance Developments on Peatland: Site Surveys SNH, SEPA, Scottish Government and The James Hutton Institute (2017), and high-density probing has taken place at all infrastructure locations to determine peat depth and permit appropriate and accurate avoidance where possible. Full results of the peat surveys are described within **Technical Appendix 8.2. Figures 8.8 and 8.9** show the peat depth distribution across the Site.

8.5.10 The following tasks have been completed to obtain this detailed understanding of the spatial and depth distribution of peat and its properties, a series of tasks have been completed:

- Phase I Habitat Survey and National Vegetation Classification (NVC) ecological habitat mapping (see Chapter 6).

- Peat probing surveys (Appendix 8.2):
- Six phases of surveys were carried out between November 2023 and January 2025, totalling 8,598 depth probes and 41 cores. A GPS linked photographic record of photos of peatland and core have also been obtained.
- Development of a maximum depth of peat contour map (Figure 8.9) to indicate the peat variation across the Site. The peat depth model presents an accurate peat depth surface with peat depths verified by coring.
- Examination of the variability of the depth of the acrotelm, the thickness of the catotelm and the thickness of amorphous peat.
- Further mapping of areas where peat is eroded or modified by forestry activity, historical cutting or muir burning using aerial imagery, lidar data and Site inspection as these will be restored using excavated peat.
- Peatland Condition Assessment **(Annex I, Technical Appendix 6.5: OHEMP).**

8.5.11 The following summarises the results of the various phases of the peat survey campaign and subsequent interpreted peat depth contouring across the Site:

8.5.12 Peat is recorded across much of the Site with almost continuous peat in the southern half of the site. However, there are areas, some fairly large, where no peat is present. The largest areas free of peat are in the north-east of the site adjacent to the A9 public road.

8.5.13 Peat is generally deepest in the southeastern part of the site, where it occupies a hilltop area with a slope extending to the south. While there isn't a strict pattern to its distribution, the deeper deposits tend to occur in pockets rather than forming a continuous expanse. Peat up to 1.5m in depth is relatively widespread across the area. Overall, peat is extensive across the layout but varies in depth and distribution.

- The maximum peat depth recorded was c. 6.5m close to the northern boundary of the site at the base of the slopes to the south.
- Rate of refusal / the 'feel' method indicated the majority (61.7%) of probes to be located over bedrock, and a large proportion (18.2%) over silt.
- The coring results have generally verified the depth of penetration probing to be representative of peat depth with some areas of over estimation of peat depth related to encountering soft silty clay.
- There is no peat (0 – 0.5m depth) at 23% of the surveyed area, peat is present across 77% of the survey area: peat (0.5m – 1.0m depth) at 27.4% of the surveyed area and deep peat (>1.0m) 49.6% of the surveyed area (the total area where probing has been conducted – see Appendix 8.3 and Figure 8.8).

8.5.14 As a result of modification and degradation of the peat habitats, the depth of the peat does not always relate to the quality of the overlying habitat.

8.5.15 The Scottish Soil mapping relatively accurately represents the distribution of peat across the site. While it aligns with the peat survey results in general, it lacks the resolution to capture localised pockets of peat.

8.5.16 The SNH Carbon and Peatland (2016) Map classifies the peat deposits across the north of the Site as Class 1, or of National Importance, whereas the peatland in the south is

Class 5. Based on the resolution, the SNH Carbon and Peatland (2016) Map overestimates the peat coverage of the site compared to the quantitative peat survey. The peat survey data shows a more localised coverage with pockets of peat, on plateaus, saddles and basins.

8.5.17 The Peatland Condition Assessment (see **Annex I, Technical Appendix 6.5: Peatland Condition Assessment**) shows the Site to be characterised by extensive erosional gullies and various modifying influences. The majority of the peatland (71.6%) was classified as either Modified or Modified and Drained, with only a small fraction (1.4%) retaining Near-Natural features. Actively-Eroding areas accounted for 16.9% of the Study Area.

8.5.18 Near-Natural features within the Site are a result of favourable topography on summits and saddles of ridges and were found largely to be at risk from ongoing peat erosion.

8.5.19 There were no areas of Near-Natural peatland observed within the Study Area.

Peat Geomorphology

8.5.20 Peat geomorphology is discussed in **Technical Appendix 8.4** and the key features on site are presented in **Figure 8.4.5** of **Technical Appendix 8.4**. Summit areas show signs of moderate to severe erosion centred on the existing track network that has been cut to the underlying geology in these areas. Bare peat occurs in pockets along these tracks, grading into deeper peat areas via haggs. On the lower benched areas to the north of Beinn nan Cailleach and Carn na h-Easgainn, where there is likely to be more shelter from prevailing winds, there is evidence of micro-erosion in the form of numerous small bare areas in complex patterns.

8.5.21 Radiating from these areas are numerous linear gullies (on the slightly steeper slopes) and dendritic gullies, the latter merging into large gully alignments which are often the headwaters of the main watercourses draining the site. While the main gullies are shown on Figure 8.4.5, there are numerous narrow gullies in the intervening areas, a large proportion of which will be responsible for carbon and peat particulate losses as the gully sidewalls dry and the gully floors erode. In the published literature, peat landslides are very rarely observed in gullied areas, with planar areas relatively more likely to experience failures (since subsurface pipe networks are more likely to form where natural drainage is not expressed at the ground surface).

8.5.22 Farther downslope, gullies tend to pinch out, and wider areas of planar peat dominate, large areas of which have been subject to burning at some point in the past.

8.5.23 There is no evidence of peat instability on satellite imagery, and extensive walkover surveys showed no signs of incipient instability in the surveyed areas.

Peat Slide

8.5.24 A PLHRA was undertaken incorporating a qualitative likelihood assessment and factor of safety analysis, including consideration of undrained loading along floating tracks. Site walkover showed no indications of past landslides nor indicators of incipient instability. This is consistent with the widespread gullying and erosion across the site, these conditions tending not to be associated with hillsides experiencing peat landslides.

8.5.25 The likelihood assessment showed the majority of the Site to have a Low baseline likelihood of failure, as did the baseline factor of safety assessment. One potential source zone was identified within a hardstanding footprint. A crane loaded factor of safety assessment for floating road alignments identified 13 further potential source zones for instability in non-gullied sections of floating road. Areas dissected by gullies were excluded as the gullies and their neighbouring peat are relatively free draining, as well as forming discontinuities in the peat mass which would prevent large-scale failure occurring.

Geology

8.5.26 Digital solid and drift geological maps were sourced from the British Geological Survey Digimap (1:250,000 scale) website and reviewed to provide geological information on the Site.

Drift Geology

8.5.27 As illustrated on **Figure 8.4**, which shows BGS superficial geology data, peat has a similar distribution as the peat survey undertaken, albeit with lower resolution in that localised pockets are not shown. The drift geology mapping slightly overestimates the peat distribution in places, such as the steeper slopes of the River Ose valley and along the north-eastern boundary, and underestimates the peat distribution in the western section and a small area in the centre of the compared to the peat survey distribution.

8.5.28 The superficial deposits on the site vary, reflecting influences from glacial, fluvial, and organic processes:

8.5.29 Peat: Most of the site is covered by organic peat deposits, which are rich in plant remains. These lacustrine and palustrine deposits have accumulated in wetlands and lagoons, forming extensive organic material beds.

8.5.30 Till: Found in the northern area of the site and along some watercourses, the till is a diamicton composed of unsorted gravel in a fine mud matrix. These glacially derived deposits were laid down during the Devensian period under ice age conditions.

8.5.31 Alluvium: Alluvial deposits are present along certain watercourses and consist of clay, silt, sand, and gravel, with occasional peat. These fluvial sediments represent modern floodplain environments shaped by river activity.

8.5.32 Glaciofluvial Deposits: Scattered in the northern part of the site, these deposits include gravel, sand, and silt, formed by meltwater interacting with glacial ice. They are typically coarse-grained and associated with hummocky terrain.

8.5.33 Exposed Bedrock: On the summits of hills within the site, there are no superficial deposits, and the bedrock is exposed at the surface.

Solid Geology

8.5.34 The bedrock (or solid) geology BGS mapping is presented on **Figure 8.5**. The site is predominantly underlain by metamorphic bedrock from the Dava Subgroup, which originated as sedimentary rocks and was later altered through regional metamorphism. The majority of the site consists of psammite and gneissose rocks, which were subjected to high-grade metamorphic processes.

8.5.35 In the western area of the site, the bedrock includes psammite and quartzite from the same subgroup, altered by lower-grade metamorphism. These rocks are visually distinct and form a small portion of the geology. In the northwest corner of the site, there is a very small area of igneous bedrock, specifically quartz-feldspar porphyry. This rock type originated from the intrusion of silica-rich magma during the Silurian to Devonian periods, forming batholiths, plutons, and other intrusive features.

8.5.36 No main geological faults are shown on the 1:50,000 geological mapping.

Quarries and Mining

8.5.37 No significant quarries or areas of mining are found within the Site.

Hydrogeology

8.5.38 The BGS Hydrogeology (1:625,000 scale) map shows the Site to be underlain by the Moine Supergroup, which is classified as a low-productivity aquifer. Groundwater flow within this aquifer is predominantly restricted to fractures, faults, and other discontinuities. While the aquifer is not highly productive, small amounts of groundwater may be present within the near-surface weathered zone and secondary fractures. These characteristics suggest limited groundwater availability, primarily for local-scale use.

Classification

8.5.39 A search of the SEPA Water Environmental Hub (https://www.sepa.org.uk/data-visualisation/water-classification-hub/ accessed November 2024) and the River Basin Management Plan (RBMP) GIS Database provides additional context for the site's groundwater characteristics. According to the database, the entire Site is underlain by the Strathnairn, Speyside, and Cairngorms groundwater body (ID 150709), which spans an area of 3,726.0 km². This groundwater body is classified as “Good” quality by SEPA, indicating that the groundwater resource in the region meets the necessary standards for both environmental protection and sustainable use. Given this classification, the groundwater in the area is not only suitable for most water uses but also remains in a healthy state with respect to ecological standards, which could be relevant for future groundwater management or extraction considerations.

Vulnerability to Pollution

8.5.40 The BGS Hydrogeological Map of Scotland shows that the majority of the Site and the surrounding area are underlain by the Moine Supergroup, which is classified as a low productivity aquifer Class 2c. Flow is virtually all through fractures and other discontinuities an there are only small amounts of groundwater in near surface weathered zone and secondary fractures. Groundwater vulnerability at the site is influenced by the permeability of the bedrock and the overlying superficial deposits. According to SEPA, the site is expected to have low to moderate vulnerability, depending on local drift cover. Areas with thick glacial till or clay-rich deposits provide protection from surface contamination, resulting in low vulnerability. However, locations where bedrock is exposed or covered by permeable deposits (such as sands, gravels, or thin peat) may exhibit moderate vulnerability, allowing for some infiltration of contaminants.

8.5.41 The Strathnairn, Speyside, and Cairngorms groundwater body (ID 150709) which underlies the Site is classified as a drinking water protection Areas (DWPA) as are all groundwater bodies within Scotland. It is classified by SEPA as having good water flows and levels and good water quality.

Groundwater Dependent Terrestrial Ecosystems

8.5.42 The Site has been mapped based on the National Vegetation Classification Survey (**Chapter 6: Ecology and Biodiversity**). A total of 198 polygons and 13 target notes were identified across the Site. These categories allow those habitats that are assessed as GWDTE onsite to be identified and their actual dependency of groundwater to be subsequently determined. The ecological NVC survey identified habitats that are potentially groundwater dependent in accordance with SEPA LUPs Guidance GU3122. This resulted in a total of 30 polygons with a High potential for groundwater dependency (GWD), 30 polygons that are mosaics containing a habitat with High potential for GWD, 2 polygons with a Moderate potential for GWD and 3 polygons that are mosaics containing a habitat with a Moderate potential for GWD.

8.5.43 Buffer zones were then created around the Proposed Development infrastructure at a distance of 250 m from turbines and crane hardstandings and other infrastructure where excavation would exceed 1 m depth, and at 100 m around tracks where excavation would be less than 1m depth. A total of 42 polygons with potential groundwater influence according to the LUPS guidance fell within these buffers. These are presented on **Figure 8.7.1** in **Technical Appendix 8.7.**

8.5.44 Habitats that were not hydrologically connected to the Proposed Development due to being either upgradient or separated by a watercourse were then ruled out. A further 13 polygons were ruled out at this stage.

8.5.45 Habitats were then grouped by hydrogeological setting – habitats underlain by aquitard superficial geology layers with no distinguishable mechanism of groundwater discharge were ruled out from further assessment. This ruled out four polygons as being not GWD.

8.5.46 Finally, polygons that were in clear association with surface water features within topographical basins were ruled out on the basis of being surface water or rainfall fed. This ruled out an additional 10 polygons as being not GWD.

8.5.47 After applying these criteria, a total of 15 polygons were identified as having potential groundwater dependence and were taken forward for further assessment.

8.5.48 A site walkover was then undertaken by Fluid Environmental Consulting Ltd in January 2025 to identify any potential features that could imply groundwater dependency in any of the remaining polygons and aid in the desk-based assessment and identify any potential mechanisms of groundwater discharge. A further 11 polygons were ruled out at this stage leaving four for final assessment: 7, 8, 26, 156.

8.5.49 The four polygons were assessed to not have a substantial groundwater component and therefore no actual GWDTEs are within the area of potential effect from the Proposed Development and GWDTEs have been ruled out of further assessment.

Hydrology

8.5.50 The majority of the Site drains to the north-east through four main watercourses and their tributaries, which ultimately discharge to Loch Moy either directly or via its tributary, Allt Creag Bheithin. From Loch Moy, water flows into Funtack Burn, which then joins the River Findhorn approximately 3.7 km to the east of the Site near Milton of Moy. A small area in the western part of the Site drains north-west via Allt na Ranain to Allt na Fuar-ghlaic, which eventually flows into the River Nairn, located around 4.7 km to the north-west of the Site.

8.5.51 The 1:50,000 scale Ordnance Survey mapping indicates the presence of 16 watercourses on the Site, with all but three flowing approximately north-east. The three exceptions flow north-west. Additionally, the mapping shows a single surface waterbody, Loch Moy, located 0.7 km outside the north-eastern Site boundary. A review of the 1:25,000 scale OS mapping reveals five additional un-named tributaries within the Site boundary, which are tributaries of some of the larger watercourses identified at the 1:50,000 scale.

8.5.52 The majority of the Proposed Development is within the wider River Findhorn catchment and its sub-catchments (Funtack Burn and Allt na Fuar-ghlaic).

8.5.53 The review of the hydrology of the Site was undertaken reviewing OS 1:50,000 scale, 1:25,000 scale and 1:10,000 scale mapping together with aerial imagery. Hydrological site visits for baseline and design inspection were undertaken in January 2025. The site visits inspected the overall water features and determined construction constraints through the identification of major hydrological and hydrogeological receptors. The site visit included an assessment of site drainage patterns, springs, sensitive features, watercourse crossings assessments and identification of potential source to receptor pathways. A GPS linked photographic record of photos of hydrological, hydrogeological, geological, topographical and ecological features have been obtained.

8.5.54 Several wetlands and waterbodies were identified from aerial imagery and confirmed during the site walkovers. Some springs, some minor drains and some man-made drains were identified on the Site.

8.5.55 The water features, including watercourses, waterbodies, wetlands, springs, drains, and artificial drainage are shown on **Figure 8.1** and **Figure 8.6**.

Table 8.6: Hydrological Catchments

Discharges to coastal waters	Main Catchment	Sub-catchment within the Site	Smaller sub-catchment within the Site
1:50,000 OS Map			
Loch Moy	River Findhorn	Funtack Burn	Allt na Loinne Moire
			Allt na Slanaich
			Un-named Tributary
Allt na Fuar-ghlaic	River Nairn	Allt na Ranain	Un-named Tributary

Water Quality

8.5.56 SEPA has introduced water monitoring and classification systems that will provide the data to support the aim of the 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’.

8.5.57 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 water bodies (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 Water Classification Hub was consulted to identify the status of the waters within the Site and the catchments connected to the Site, where data was available.

8.5.58 Loch Moy, located downstream of the Site, is a lake within the River Findhorn catchment in the Scotland River Basin District. Covering an area of 0.8 square kilometres, Loch Moy is classified with a high overall status, indicating excellent water quality. The watercourses on-site flow directly into Loch Moy, making it an important receptor for water quality.

8.5.59 Given its high status and the direct connection to the Site's watercourses, Loch Moy is considered a sensitive receptor. Any potential impacts on water quality, such as contamination, sedimentation, or changes in flow from site activities, could affect the lake's status and its ecological health. It is crucial to implement effective mitigation measures to protect the water quality of Loch Moy and maintain its high status.

8.5.60 Moy Burn, located downstream of the Site, is part of the River Findhorn catchment within the Scotland River Basin District. The burn, which is approximately 12.2 km in length, receives water from Loch Moy, into which the on-site watercourses flow. Currently, the Moy Burn is classified with a moderate overall status, indicating that while it is not in poor condition, it remains susceptible to impacts on water quality.

8.5.61 Given its position as a receiving body for site runoff, Loch Moy will act as a natural buffer before water continues downstream into the Moy Burn. As such, our assessment will focus on Loch Moy as the primary receptor for any potential water quality impacts from the Proposed Development. Any changes in flow, sedimentation, or contamination would likely be observed within the loch before reaching the burn, allowing for natural attenuation. Mitigation measures will be implemented to protect water quality within Loch Moy and ensure no significant effects on the wider River Findhorn catchment.

River Flows

8.5.62 There are no flow records for the watercourses on the Site, or downstream of the Site, as all the catchments are less than 10 km^2 in area. The nearest flow monitoring station is on the River Findhorn at Sheachie (Station ID: 7001) approximately 6 km east of the Site boundary.

8.5.63 The size, topography, land use and geology of the area suggest that the catchments onsite will be flashy. This means that flow in them will respond rapidly to rainfall and flood conditions could potentially occur with very little, or no, warning. Flashy flow conditions will also affect the water quality. Peatlands have the potential to sustain some base flows from steady seepage from the low permeability deposits, however, during prolonged dry periods headwaters may become dry or experience low flows.

Flood Risk

8.5.64 A review of the SEPA Flood Risk Management Mapping indicates that the majority of the Site is not located within or near any identified flood risk areas. SEPA mapping does not cover catchments smaller than 3 km^2, meaning there could be potential for minor localised flooding around the smaller watercourses, especially in areas where these watercourses converge with other drainage features.

8.5.65 Any upgrades to existing crossings will adhere to SEPA guidelines, ensuring that they can accommodate the conveyance of a 0.5% annual probability (200-year) flow event. Localised areas of high and medium likelihood river flooding are noted downstream of the Site, particularly where Allt Creag Bheithin and Allt na Slanaich converge. More extensive flood risk areas are identified further downstream at the large flat area upstream of Loch Moy, where Moy Burn meets Allt na Slanaich, as well as along Funtack Burn, downstream of Loch Moy.

8.5.66 The Proposed Development is unlikely to significantly increase the probability of flooding elsewhere or raise surface runoff rates in a substantial way. The sub-catchment area that the Site covers represents less than 1.0% of the total River Findhorn catchment, which is approximately 1,300 km^2. Given that the Proposed Development footprint is a fraction of this area, the impact on the catchment's overall runoff is minimal. Furthermore, a portion of the land take is already used for an access track, much of the new land take will be semi-permeable, such as for crane pads and laydown areas, and all temporary infrastructure areas will be restored.

8.5.67 Flood risk sensitivity for the Proposed Development is considered low, as no infrastructure will be placed within or near a SEPA floodplain. The design has also been optimised to minimise land take and hard surfacing. Watercourse crossings will be engineered to accommodate a 0.5% annual probability (200-year) flow event, and runoff during all stages of development will be controlled and attenuated with appropriate mitigation measures.

Public and Private Water Supplies and Abstractions

8.5.68 There are no known water supply boreholes or Surface Water Drinking Water Protected Areas (DWPA) within the Site boundary. However, there is a Surface Water DWPA located approximately 4.4km south-east of the Site, extending from the area north-east of Dalmigavie Lodge to Tomatin along the River Findhorn and its tributaries.

8.5.69 A review of SEPA abstraction licenses within an 8km radius of NH 74957 32964 identified three licensed surface water abstractions in the vicinity of the Site:

CAR-L-1010493:

- Source: Allt Coash Burn.
- Location: NH 8070 2760 (approx. 6.3km from centre of Site).
- Licensed Volume: 6,480 m^3/day.

CAR-L-1011810

- Sources: Allt Na Frithe Burn: 6,144 m³/day at NH 7873 2916 (approx. 5.8km from centre of site). River Findhorn: 6,000 m³/day at NH 7972 3031 (approx. 5km from centre of site).

CAR-L-1106477

- Source: Uisge Dubh.
- Location: NH 7155 3091 (approx. 3.8km from centre of site).
- Licensed Volume: 47,865 m³/day.

8.5.70 The following registered water abstractions, each with a maximum abstraction limit of 50 m³/day, are identified within the vicinity of the Site:

Registration CAR-R-1011935:

- Abstraction from Allt na Fuar-ghlaic at grid reference NH 7110 3720 (approx. 5.5km from centre of site).

Registration CAR-R-1028392:

- Groundwater abstraction at Daviot Quarry from two locations, grid references NH 7185 3907 (approx. 6.8km from centre of site) and NH 7210 3916 (approx. 6.5km from centre of site).

Registration CAR-R-1107953:

- Surface water abstraction from Moy Burn at grid reference NH 7694 3686 (approx. 4.3km from centre of site), associated with Moy Wind Farm.

8.5.71 These registrations cover smaller-scale water use activities that fall under the Controlled Activities Regulations (CAR). They are categorised separately from larger licensed abstractions due to their limited daily volume.

8.5.72 The Site is classified as a groundwater DWPA, however it should be noted that the whole of Scotland is classified as a groundwater protection zone.

Private Water Supplies (PWSs)

8.5.73 Private water supply records were requested from THC which was reviewed together with OS mapping and aerial imagery to identify properties potentially reliant on PWS that could be hydrologically connected to the Site.

8.5.74 A site visit was carried out on 15 January 2025 to confirm the status of each property, supplemented by follow-up correspondence where necessary. Questionnaires were conducted with property occupants where possible. A total of two PWS sources were identified within the Site and assessed for connectivity to the Proposed Development.

8.5.75 There are no known PWS sources connected to the Proposed Development.

8.5.76 All PWS sources and their system infrastructure are more than 100m from proposed access tracks requiring excavations of less than 1m and more than 250m from proposed infrastructure requiring excavations deeper than 1m depth. The two identified PWS (Lynemore Cottage and Foresters House) are not hydrologically connected to the Proposed Development footprint and therefore can be scoped out of further assessment as part of this EIA Report. A full assessment of the PWSs, including a figure showing their locations and indicative catchment, is provided in **Technical Appendix 8.6.**

Designated Sites

8.5.77 There are two designated areas within 5km of the Site boundary:

- The Littlemill Fluvioglacial Landforms, located 1.8km to the north-west of the Site, is designated as both a Site of Special Scientific Interest (SSSI) for earth sciences and a Geological Conservation Review (GCR) site.
- Carn nan Tri-tighearnan, located further north, is designated as both an SSSI and a Special Area of Conservation (SAC). This area is recognised for its blanket bog and, in the case of the SSSI, also for subalpine dry heath.

Fish and Other Water Dependent Species

8.5.78 SEPA RBMP information indicates that Loch Moy is classified as being of High status for fish. However, site visits suggest that the shallow watercourses within the upland areas of the Site have limited potential to support fish due to their low flow conditions and lack of suitable habitat.

8.5.79 The larger watercourses in the surrounding catchment, such as those draining into Loch Moy, may provide habitat for migratory fish species. However, based on site observations, some of the smaller streams within the site contain natural barriers such as steep gradients and seasonal flow variability, which likely limit fish movement and presence.

No specific fishery records were identified for the smaller watercourses within the Site, and no direct evidence of fish presence was noted during site walkovers.

Future Baseline

8.5.80 The predicted environmental conditions and potential changes which may occur in the absence of the Proposed Development are outlined below:

- In the absence of the Proposed Development, site conditions are expected to continue deteriorating due to ongoing erosion. As shown in **Figures 8.10** and **8.11**, extensive erosion is already present across the site, and without intervention, this process will likely accelerate, leading to further degradation of the peat and loss of carbon stock.
- Continuation of rough grazing in open moorland areas increasing erosion, drying and ground poaching is also expected.

8.5.81 The Proposed Development presents an opportunity to address these issues by incorporating measures that could enhance peat condition and stabilise affected areas. Given the highly degraded state of the site, significant investment would be required to restore the peatland independently.

General Site Conceptualisation

8.5.82 The Site is characterised by low permeability superficial deposits (extensive peat and limited areas of glacial till) over low permeability bedrock which is occasionally exposed on ridges or in areas where water has eroded the overlying superficial deposits. The low permeability of both the superficial deposits and the low permeability of the bedrock will allow limited infiltration of rainfall and relatively high runoff rates. Groundwater movement within the superficial deposits is therefore also low.

8.5.83 Based on the assessment criteria defined in Table 8.2, a summary of the Site sensitivities is presented in Table 8.7.

Table 8.7: Sensitive Receptors

Sensitive Receptors		Sensitivity	Rationale/Designations
Terrestrial	Non peaty or peaty / organic rich soils <0.5 m in depth Peat <1 m in depth in forestry or in densely drained, eroded or gullied open terrain	Low	Guidance on Developments on Peatland - Site Surveys
	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
	GWDTE	High	SEPA guidance LUPS-GU31
Groundwater	Shallow Groundwater	Medium	Maintains water dependent habitats and peat saturation
	Deep Groundwater	Low	Limited resource and no users
Surface Watercourses and Waterbodies downstream of Site	Loch Moy	Very High	Loch Moy is classified as having a high status by SEPA, which indicates that the water quality in the lake is currently excellent. This high status reflects a pristine or near-pristine ecological condition, with minimal anthropogenic impact. Given its classification and the associated ecological value, Loch Moy should be regarded as a very high sensitivity receptor.
Surface Watercourses and	Minor watercourses (Allt Creag Bheithin, Allt na Loinne Moire, Allt na Slanaich, Allt na Ranain and	Medium	The watercourses on-site discharge into Loch Moy (with the exception of Allt na Ranain), a very high sensitivity waterbody. While

Sensitive Receptors		Sensitivity	Rationale/Designations
Waterbodies on Site	un-named tributaries) and drains within the Site		this connection elevates their importance, the potential for significant impact is mitigated by the distance from Loch Moy and other factors. Although any degradation in water quality could impact Loch Moy, 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 to Loch Moy, which lowers their overall sensitivity despite their hydrological link. Although Allt na Ranain is not connected to Loch Moy, any changes in water quality, flow, or sediment transport could still have localised ecological impacts. Its relatively small size and low-flow nature suggest a limited capacity for significant downstream transport of pollutants or sediment, further supporting a medium sensitivity classification. Additionally, like the other on-site watercourses, its potential to support fish migration is constrained by its flow regime and physical characteristics, reducing its sensitivity in comparison to larger, migratory watercourses.

8.5.84 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:

- Surface watercourses and lochs; and
- Peat deposits and peatland habitats.

8.6 Embedded Mitigation

8.6.1 A number of embedded mitigation measures have already been applied as part of the iterative design process (see below and **Chapter 14: Schedule of Environmental Commitments**), to avoid the higher value areas of blanket bog, waterbodies and watercourses.

Design Considerations

8.6.2 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 to maintain at least a 50m ‘buffer zone’ from natural watercourses and water bodies (including bog pools) shown on 1:50,000 scale and 1:25,000 scale Ordnance Survey mapping. 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 existing access tracks have been utilised where possible. A total of 7 watercourse crossings will be constructed on Site for the Proposed Development. Of these, all 7 are watercourse crossings shown on the 1:50,000 scale OS Mapping. Potential further crossings of minor, man-made or ephemeral drain crossings will also be required.

8.6.3 Watercourse crossings will be subject to appropriate SEPA CAR licencing and will be designed to allow the conveyance of a 0.5% AP (Annual Probability 200 year) flow event plus an allowance for climate change and freeboard. Additionally, mitigation will be put in place to control and attenuate runoff during all phases of the development and crossings will be regularly checked and maintained during operation. Where required, designs appropriate for fish migration and otter passage will used.

- 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 (**Chapter 2: Proposed Development**) to optimise the layout and reduce environmental impact.

8.6.4 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. If planning approval is obtained, there will be further investigation of the ground conditions to inform micro-siting of the tracks and turbines to ensure the minimal amount of peat is disturbed and to identify detailed peat slide mitigation.

- Floating track is proposed to be used where track is located on peat >0.5m depth for greater than 50m in length to reduce peat excavation, where feasible considering other constraints.
- Where possible, extracted peat will be appropriately reused and restored concurrently without storage, however where this is not feasible it will be stored appropriately in proximity to its reuse location.
- During the detailed design and construction phase, sections of track will be surveyed and micro-sited to optimise the distance from water bodies, check for otter evidence, minimise peat disturbance and peat slide hazard.
- Concrete batching will be undertaken on Site which will require a water supply either from a water body 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 will be obtained from SEPA.
- Concrete batching and washdown areas will be in a controlled areas of the BESS so that any leakage or spills can be captured and managed appropriately.

Micrositing

8.6.5 Micrositing of infrastructure may be required to take account of local conditions. It is proposed that micrositing of infrastructure within 100m may be considered by the Ecological Clerk of Works (ECoW), appointed for the Site. A variation in indicated positions over 50m, would also require approval in writing by the ECoW, following consultation with THC as the planning authority.

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

8.6.7 A suitably qualified ECoW and Geotechnical Engineer will be present on site during the construction period to provide initial onsite advice for micrositing.

Good Practice Measures

8.6.8 **Technical Appendix 8.1** details the good practice techniques that will 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 **Technical Appendix 8.1** is not exhaustive and the latest guidance and good practice literature will be used when construction commences. Where required, additional mitigation measures will be identified which are specific to the source-pathway-receptor at risk to address likely significant effects.

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

8.6.10 The risk of peat slide can be mitigated through good engineering practice prior to construction, during construction and post construction as set out in **Technical Appendix**

8.4. All construction activities and operational decisions that involve disturbance to peat deposits should be overseen by an appropriately qualified geotechnical engineer with experience of construction on peat sites.

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

8.7 Overview of Typical Wind Farm Effects

8.7.1 Possible hydrological, hydrogeological and geological effects resulting from the construction of wind farms are related to common main factors as detailed below:

Erosion and Sediment Transport

8.7.2 Unmanaged erosion/sediment deposition and suspended solids generated from ground disturbance and new infrastructure could travel directly by surface run-off or cause modification to stream channel morphology, with resulting smothering of habitats/effect on both terrestrial and aquatic flora and fauna, especially fish. Unacceptable levels of sediment could also affect water abstracted for drinking supply. This could result from:

- Slides or movement of incorrectly stored excavated or stockpiled materials;
- Direct disturbance of the banks and bed of watercourses during watercourse crossing construction, repair and/or upgrade works or during cable installation within the watercourse bed;
- Pumping of standing water required for dewatering of excavations such as turbine bases, borrow pits or as required for drainage management purposes;
- Runoff from exposed ground, excavations and material stockpiles (aggregate and excavated/overburden peat and soil), cable trenches and tracks;
- Runoff from tracks, bridges and culverts crossings at watercourse and drain crossings;
- Runoff from forestry felling;
- Runoff from recently reinstated areas (road verges, borrow pits, etc); and
- Peat slide.

Flow Alteration

8.7.3 Any alteration of natural drainage could disturb natural surface and subsurface water flows and water dependent habitats including peat, unless properly managed. Tracks and other hardstand areas could provide new preferential pathways and interfere with the retention of flows within catchments. Inappropriate water crossings could result in blockages and flooding, with the potential to exacerbate erosion. Storage of peat or other excavated material in inappropriate locations could result in an alteration to water flows and in an increase in peat slide risk in hazard prone areas.

Potential Polluting events affecting Groundwater and Surface Water Quality

8.7.4 Oil/Fuel/Chemical pollution from for instance, accidental spillage or incorrect transport or storage during concrete preparation and refuelling procedures, or from leaching of concrete from turbine bases and installations) could affect both terrestrial and aquatic flora and fauna and also on human activities such as water abstracted for drinking supply. These could include:

- Concrete batching area;
- Cement wash-out areas, storage areas and other areas where cement grout or concrete is being applied;
- Plant washing and vehicle wheel wash areas;
- Fuel and chemical storage/refuelling areas;
- Leaking/vandalised plant and equipment;
- Sewage and waste water from the construction compounds; and
- Acidification of watercourses from forestry activities.

Increase in the Magnitude or Frequency of Flood Events

8.7.5 The alteration of areas on floodplains and increase in impermeable areas may result in flood waters extending further or deeper elsewhere and/or increase the frequency of such events. This could result in risk to human life/health, damage to infrastructure, devaluing of land and change to ecological systems.

Alteration of the Geological Environment

8.7.6 The excavation of the subsoil required to build the Site infrastructure such as turbine bases and access tracks will result in an alteration of the geological environment; in particular any underlying peat may be removed and will need to be managed appropriately. Potential effects on the peat resource, and on peat slide risk, are considered.

8.8 Assessment of Potential Effects

8.8.1 The assessment of effects is based on the project description as outlined in **Chapter 2: Proposed Development.** Unless otherwise stated, potential effects identified are considered to be negative.

8.8.2 This section describes the potential effects of the Proposed Development during the construction phase in relation to the sensitive receptors of the Site highlighted above in **Table 8.8**, prior to mitigation and management, and assuming that good practice methods are employed. 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 effects. The assessment of effect significance has been undertaken based on the assessment of baseline conditions across the Site.

8.8.3 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 **Technical Appendix 8.1.**

8.8.4 Where the significance of effect is assessed as being moderate or above with good practice and standard mitigation applied, further site-specific mitigation is required. The site-specific mitigation and the residual significance of effects are summarised and discussed below.

Construction Effects

Erosion and Sedimentation Effects

8.8.5 Construction may result in increased sediment loads observed in watercourses and water bodies. Potential effects may occur from the following:

- Construction of access tracks. Construction of the excavated tracks will involve stripping and stockpiling of material to expose underlying soils or bedrock, potentially increasing runoff and the potential for transportation of sediment. Floating tracks will involve building the track on the existing surface vegetation mat with geotextile layers, minimising excavation of peat, however side slopes will be required.
- Construction of seven new watercourse crossings 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.
- Excavation of the 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 and resulting 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.

8.8.6 Infrastructure within the Site has been located in so far as possible over 50m from main watercourses or waterbodies (shown on 1:50,000 scale, 1:25,000 scale and 1:10,000 scale OS mapping), with the exception of where tracks approach watercourse crossings.

8.8.7 The sensitivities of the minor drains and watercourses (Allt Creag Bheithin, Allt na Loinne Moire, Allt na Slanaich, Allt na Ranain and un-named tributaries) within the catchments connected to the Proposed Development are medium. The sensitivity of the main waterbody (Loch Moy) downstream from Site is very high.

8.8.8 The magnitude of effect is assessed as low for the majority of infrastructure locations due to the implementation of careful design and good practice methodologies. Where infrastructure is in close proximity to a watercourse or steep ground requiring careful water management and monitoring, the magnitude of effect is considered to be medium. However, Loch Moy is not within these areas and remains in the low magnitude category.

8.8.9 The likelihood of significant sedimentation and erosion effects occurring is considered to be low (unlikely) due to the careful design of the Proposed Development and the implementation of robust good practice measures. Drainage design will incorporate appropriate sediment control features to manage runoff and prevent excessive sediment transport.

8.8.10 The sensitivity, magnitude and likelihood combination equates to a **Minor** (not significant) effect in respect of sedimentation and erosion for the Proposed Development.

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

8.8.11 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.

8.8.12 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.

8.8.13 Infrastructure has avoided all water features shown on 1:50,000 scale, 1:25,000 scale, and 1:10,000 scale, with the exception of watercourse crossings. There may be additional minor ephemeral drains that require diversion or culverting for the Proposed Development, however these drains would be of low sensitivity and therefore any alteration would have at most a **Minor** (not significant) effect on the larger receiving watercourse.

8.8.14 Groundwater levels in peat could potentially be reduced in the immediate vicinity of Site infrastructure. For turbine bases and cable trenches this water level reduction will be temporary during excavation and concrete pouring/cable installation. For excavated tracks the effects will be permanent as a seepage face will develop at the peat – track interface although this is unlikely to extend much further than the 2 in 1 gradient side slopes.

8.8.15 The likely effect from alteration of natural drainage patterns, runoff volumes and rates, prior to mitigation and management, is assessed as **Minor** and not significant, therefore no site-specific mitigation is required other than good practice outlined in **Technical Appendix 8.1.**

Potential Pollution Events Affecting Groundwater and Surface Water Quality

8.8.16 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; and/or
    - 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).

8.8.17 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. The sensitivity of onsite receptors is mostly assessed as being medium to very high; where this is not the case, sensitivity is considered low. Therefore, the likely effect on surface water from pollution is mostly assessed as **Minor**, with no additional mitigation beyond good practice methods (as presented in **Technical Appendix 8.1**) likely to be required.

Increase in the Magnitude and Frequency of Flood Events

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

8.8.19 The flood hazard has been assessed as low for the Site. It is noted that there are some crossings of watercourses and the design of the layout has taken this into account to use natural topographical formations, such as narrow valleys with abutted with rock on either side to allow the option for low impact single span crossing where possible.

8.8.20 The amount of proposed infrastructure present in each catchment is no greater than 1.5% of the area of each catchment 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 flooding is assessed as low and therefore the significance of effect will be **Minor** (not significant).

Effects on Peat

Peat Landslide Hazard Risk Assessment

8.8.21 Runout assessment was undertaken for the 14 source zones, and risk calculated based on the sensitivity of watercourse receptors draining from the site and habitat receptors. Pre-mitigation risks were identified as Low or Negligible for all source zones except Source Zones 5, 11, 13 and 14. Risks relate to impacts on open priority peatland habitats in the upper slopes rather than to potential impacts on watercourses (where risks were calculated to be Low). Site specific mitigation at these locations will comprise detailed pre-construction site investigation to verify strength parameters of peat in these locations and detailed design to ensure stability of floated track. If stability is not sufficiently ensured, then a change in track construction methodology will be considered (e.g. rock displacement, or reversion to cut & fill methods). If floating track is carried forward, a remediation plan will be put in place to identify any unanticipated track displacement of localised instability that might result.

Peat Resource

8.8.22 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**. Infrastructure is located in areas of degraded and drained open peatland with depths between <1 m (Low sensitivity) and >2 m (High sensitivity). The best quality unmodified peatland has been avoided by design and all excavated peat is therefore considered to be modified. No unmodified peat will be excavated.

8.8.23 Although the main area of the Site suitable for development is almost entirely on peat with depths encountered up to 6m, no individual infrastructure elements are on peat with average depth of >2m. Less than 25% of the total proposed infrastructure (including earthworks) footprint is located on modified peat with depth of >2 m and therefore, the proposed infrastructure footprint is classified as Medium sensitivity overall in accordance with Table 8.2.

8.8.24 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 will be undertaken. Micrositing will have cognisance of other sensitive hydrological, hydrogeological, geological and peat features identified.

8.8.25 The total volume of peat that is present across the survey area within the Site boundary has been calculated as 8,625,500 m^3. The total volume of peat that will be excavated for the construction of the infrastructure including associated earthworks is 269,830 m^3, as detailed below, which represents 3.1% of the peat volume within the peat survey area on Site. This is considered to be a Medium magnitude of effect according to Table 8.3

8.8.26 Over the whole of the Site, conservative estimates for the volume of peat that will be excavated (including footprints, a wider distance for slope batters and earthwork footprints), as detailed in **Technical Appendix 8.3** are:

- Total volume of peat excavated = 269,830 m3;
- Total volume of acrotelm excavated = 24,543 m3; and
- Total volume of catotelm excavated = 245,287 m3.

8.8.27 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 restoration, so no disposal of excess peat offsite is expected (see **Technical Appendix 8.3**).

8.8.28 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) will be floating track, where possible, requiring no excavation of peat and therefore reducing the magnitude of effect.

8.8.29 The overall **Medium** sensitivity of peat resource across the Site combined with the **Medium** magnitude of effect results in a **Minor (not significant)** effect in relation to peat disturbance. It should be noted that all peat disturbed is considered to be heavily modified and no unmodified peat will be disturbed for the Proposed Development.

8.8.30 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 **Technical Appendix 6.5: OHEMP**. The translocated peat aims to recover the currently compromised, and essentially devoid of carbon, upper layer of peat and aims to restore and enhance peatland habitat.

Summary of Significance of Effects during Construction Phase

8.8.31 The infrastructure, and associated construction activities, will result in a significance of effect that in each case is no greater than **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. As such, no further specific mitigation is required beyond the implementation of standard good practice measures.

8.9 Potential Operational Effects

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

8.9.2 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.

8.9.3 Erosion and sedimentation effects, as well as potential pollution events affecting groundwater and surface water quality, are considered to be **Minor** (not significant) due to careful design and construction. Any potential effects will be temporary and limited to the construction period.

8.10 Additional Mitigation and Enhancement

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 **Technical Appendix 8.1**. These measures are sufficient to manage potential effects, ensuring all effects remain **Minor**. However, the following further good practice and enhancement measures will be employed to reduce effects where possible.

Peat Resource

8.10.2 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 will be undertaken. This is to be a particular focus on the infrastructure with peat depths approaching and exceeding 2 m. Micrositing will have cognisance of other sensitive hydrological, hydrogeological, geological and peat features identified.

8.10.3 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 of excess peat offsite is expected.

8.10.4 On site, there is an opportunity for the following volumes of peat to be re-used within temporary infrastructure areas and translocated to support peatland restoration which will be implemented through the PMP:

- Total volume of peat that can potentially be reused on site reinstating infrastructure = ~ 139,620 m3; and
- Total volume of peat that can potentially be reused on peatland restoration = ~ 132,687 m3.

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

8.10.6 The peat mass balance is c. 2,477m^3 in deficit, which means that slightly more peat (272,307 m^3) 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 micro-siting may lead to adjustments in infrastructure positions, and the earthworks footprints included in the calculations are worst-case values to support EIA.

8.10.7 All excavated peat volumes have been demonstrated to be able to 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.

8.10.8 The restoration of the peatland and the reinstatement around the infrastructure would be a positive enhancement to the current peatland conditions on Site, would reduce the effect on peat resource, and would complement the additional peatland restoration measures proposed across the site as a means of biodiversity enhancement (see **Technical Appendix 6.5: OHEMP.**

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 will remain **Minor**. No significant residual effects are anticipated.

8.12 Cumulative Effects

8.12.1 No significant cumulative effects are anticipated. Given that all assessed effects are **Minor**, and mitigation measures are embedded within the project design, the potential for significant cumulative effects in combination with other developments is considered negligible.

8.13 Further Survey Requirements and Monitoring

8.13.1 The following monitoring will be undertaken post consent:

- A geotechnical risk register and further peat landslide hazard risk assessment (PLHRA) will be undertaken following the review of further ground investigation information. Geotechnical monitoring will be undertaken in accordance with further detailed assessments as discussed in **Technical Appendix 8.4**.
- Watercourse crossing and drainage system conditions will be regularly monitored for blockages or signs of erosion - see **Technical Appendix 8.1.**
- Peat excavation volumes for the PMP will be revised using the data collected during the construction period. The ECoW and / or Geotechnical engineer will be responsible for monitoring and ensuring peat excavations, peat storage and peat reuse is in accordance with best practice and **Technical Appendix 8.3.**
- A Water Quality Monitoring Plan (WQMP) will be produced and implemented as part of the CEMP and approved by THC as part of the planning conditions post consent. Water Quality Monitoring will be undertaken before, during and after construction.
- During the construction phase, an Environmental Clerk of Works (ECoW) (or Hydrological Clerk of Works (HCoW)) will undertake observations and monitoring regarding drainage management during construction workings.
- Further ecological surveys will be undertaken by an ECoW prior to earthworks in each area to check for protected species etc. Peat reinstatement, restoration and enhancements will 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 and Biodiversity**.
- Peat restoration monitoring will be carried out for a minimum of five years after construction and reinstatement works have concluded and if required, further mitigation will be undertaken.
- Key to the success of the strategy for peat management will be careful monitoring of the post-construction works and any restoration activities. A monitoring programme will be initiated once restoration and peat reinstatement works have been completed, and will 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 should be subject to a detailed monitoring programme until they are well established on a trajectory of recovery.

8.14 Summary of Significant Effects

8.14.1 The assessment concludes that all identified effects, including those on peat resources, peat landslide hazard risk, flood magnitude and frequency, pollution risk, alterations to flow and drainage patterns, and erosion/sedimentation, will be **Minor**. Embedded mitigation and good practice measures outlined in **Technical Appendix 8.1** are sufficient to manage these effects, and no additional mitigation is required. No significant residual or cumulative effects are anticipated.