VOLUME 1: CHAPTER 10: GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

Figures (Volume 2 of this EIA Report)

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10. GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

10.1 Executive Summary

10.1.1 An assessment has been undertaken of the potential effects on geology (including soils and peat) and the water environment (hydrology and hydrogeology) during the construction and operational phases of the Proposed Development.

10.1.2 Information for the study area was compiled using baseline information from a desk study, which was verified by an extensive programme of field work. The assessment undertaken considered the sensitivity of receptors identified during the baseline study and mitigation measures incorporated in the development design. It has also considered potential future changes to baseline conditions.

10.1.3 The scope of the assessment was informed by pre-application advice, scoping and consultation responses received during the route and alignment stages of the Proposed Development.

10.1.4 The assessment is supported by Appendices that consider potential effects on carbon rich soils and peat (peat management plan), and peat stability (peat landslide hazard risk assessment). A schedule of proposed watercourse crossings associated with the Proposed Development is also provided as an Appendix.

10.1.5 Subject to adoption of best practice construction techniques and a site-specific Construction Environmental Management Plan (CEMP), no significant adverse effects on geology (including soils and peat) and the water environment have been identified. The CEMP includes provision for drainage management plans which will be agreed with statutory consultees, including Scottish Environment Protection Agency (SEPA), and which will be used to safeguard water resources and manage flood risk. A commitment to deploy Sustainable Drainage Systems (SuDS) in these plans has been made. The CEMP also includes provision of a Pollution Prevention Plan which would also be agreed with statutory consultees including SEPA prior to any construction works being undertaken.

10.1.6 The design of the Proposed Development has been informed by a detailed programme of peat depth probing as required by National Planning Framework 4 (NPF4) and it has been shown that wherever possible areas of deep peat have been avoided. The assessment of peat and carbon rich soils has considered all of the proposed infrastructure, including temporary and permanent access tracks. A project specific peat management plan has been prepared which confirms the soils disturbed by the development are limited in volume and that these soils can be readily and beneficially reused in restoration works.

10.1.7 Notwithstanding these safeguards, a programme of baseline and construction phase water quality monitoring is proposed which would be used to confirm that the Proposed Development does not have a significant effect on geology and the water environment. It is proposed that the monitoring programme is agreed with statutory consultees.

10.2 Introduction

10.2.1 This Chapter considers the potential effects of the Proposed Development on geology (including soils and peat) and the water environment (hydrology and hydrogeology) during construction and operation. Where likely significant effects are predicted appropriate mitigation measures are proposed, and the significance of predicted residual effects are assessed.

10.2.2 The assessment should be read in conjunction with **Chapter 8: Ecology**.

10.2.3 This assessment has been carried out by SLR Consulting Ltd (SLR) and overseen and reviewed by Gordon Robb (BSc, MSc, MBA, C.WEM, FCIWEM). Gordon is a Technical Director (Hydrology and Hydrogeology) and

has more than 30 years' experience assessing renewable energy and electrical infrastructure projects and specifically their potential effects on soils, geology and the water environment. He is based in Scotland and has worked throughout Scotland, including on sites in similar environments to the Proposed Development. He has also prepared and given expert witness testimony for renewable and electrical infrastructure projects. A table presenting relevant qualifications and experience of key staff involved in the preparation of this Chapter is included in **Appendix 5.1** of this EIA Report.

10.3 Scope of the Assessment

Study Area

10.3.1 The study area encompasses the area over which all desk-based and field data were gathered to inform the assessment presented in this Chapter and includes a buffer of 500 m to all the proposed works and access tracks that would be constructed during construction and maintenance of the Proposed Development.

10.4 Consultation

10.4.1 To inform the scope of the assessment for the Proposed Development, consultation was undertaken with statutory and non-statutory bodies through a formal EIA scoping process. Full details of the consultation process and responses are included in **Chapter 4 - Scope and Consultation** and associated appendices.

10.4.2 Specific scoping responses relating to geology, hydrology and hydrogeology are included in **Table 10.1**.

Table 10.1: Scoping Responses

Organisation & Date	Summary of Consultation Response	EIA/Design Response to Consultee
NatureScot 21 November 2023	The proposed development is partly within the River Spey Special Area of Conservation (SAC) catchment and crosses a number of watercourses which drain to the Spey. There is potential for a likely significant effect, in particular from the risk of silt, peat and pollution release to watercourses during construction and direct and indirect impacts to habitats. We would expect the EIAR to show that a high standard of pollution prevention and silt control measures would be in place to protect water quality during construction and operation, as well as any other necessary mitigation.	Assessment on potential impacts on the River Spey SAC is included in this Chapter and **Chapter 8: Ecology**, as well as **Appendix 8.1**, the Shadow HRA.
NatureScot 21 November 2023	We advise that NVC surveys cover the whole development site. Target notes should be used to identify the presence of any notable plants including any nationally rare/scarce species. We recommend that survey results are used to inform the design and layout process, so that the development avoids, where possible, sensitive habitats such as blanket bog and montane heath. Where this is not possible, impacts should be minimised and suitable mitigation, restoration and/or compensation measures be proposed. Assessment should consider the extent of habitat loss and damage, both direct and indirect, temporary and permanent, and suitable mitigation and/or restoration measures be presented in an Outline Habitat Management Plan and Peat Management Plan.	Details of the NVC survey are presented in **Chapter 8: Ecology** whilst an assessment on potential GWDTE areas are included in this Chapter. An Outline Habitat Management Plan is presented as XX A Peat Management Plan is presented as **Technical Appendix 10.2: PMP**.

NatureScot 21 November 2023	Recommend that, in addition to NVC data, the EIAR includes an assessment of peatland condition in line with the template provided in Annex 1 of this guidance. Development proposals on peat should be supported by site-specific and detailed peat survey and a Peat Landslide Hazard Risk Assessment (PLHRA). Policy 3 of NPF4 (Biodiversity) also applies to all development proposals, so any proposal affecting carbon-rich soils and peatlands must also take into account the requirements to conserve, restore and enhance biodiversity, including priority peatland habitats. We advise that these site-specific assessments and surveys inform the project design and siting to ensure compliance with the mitigation hierarchy, avoiding impacts to priority peatland habitats as far as possible.	Potential impact on peat and proposed safeguards are summarised in this chapter and presented in full in **Appendix 10.1: PLHRA** and **Technical 10.2: PMP**. The Condition of the peat is discussed in **Chapter 8: Ecology**. Proposals for habitat restoration are presented in **Chapter 8: Ecology.**
Scottish Water 22 November 2023	The towers and tower alignment fall partly within the Loch Ness drinking water catchment which supplies Invermoriston WTW. The Cloiche cable alignment also falls wholly within the Loch Ness catchment. Cloiche and Dell cable alignment falls out of catchment. The Melgarve access tracks fall partly within the Loch Ness drinking water catchment which supplies Invermoriston WTW and also fall within the Laggan Bridge Borehole catchment which supplies Laggan Bridge WTW and this is a small catchment so great care will need to be taken and the appropriate mitigations must be in place to protect water quality and the borehole. In particular attention must be paid to any site run off during wet weather events and the risks of hydrocarbon leaks and spills as if these contaminants were to reach our borehole we would not easily be able to remove them and this would be catastrophic for both parties. The permanent access tracks fall partly within the Loch Ness drinking water catchment which supplies Invermoriston WTW. The temporary access tracks fall partly within the Loch Ness drinking water catchment which supplies Invermoriston WTW. The Cloiche and Dell substations fall within partly within the Loch Ness drinking water catchment which supplies Invermoriston WTW. The Melgarve Substation is not in a drinking water catchment.	Assessments of potential impacts on the water environment, including Scottish Water assets and Drinking Water Protected Areas, is included in this Chapter and includes assessment of water quality and quantity.

SEPA 16 November 2023	Demonstrating that the proposals meet the requirements of Policy 5 of NPF4 will be of most significance. Further peat probing information should be provided so that it is ensured that there is depth information available for all locations where infrastructure – including all temporary construction infrastructure – is proposed. It should be clearly demonstrated that the cable route corridor (which we note will be 30 m wide), location of individual tower hardstandings and supporting infrastructure such as tracks avoids the areas of deepest peat and near natural condition habitat, if there are any on the site.	Potential impacts on peat and proposed mitigation measures are summarised in this Chapter and discussed in full in **Technical Appendix 10.1: PLHRA** and **Technical Appendix 10.2: PMP** and where the results of site-specific peat depth probing are presented.
	Please make sure that drawings are submitted at a scale that allows the relationship between baseline information - such as buffers to watercourses, habitat type and peat depth - and infrastructure to be clearly understood. An overarching plan followed by a series of more detailed drawings such as has been provided for Figure 6 of the scoping report works well, but the final version needs to show the actual location of the poles and all the supporting infrastructure.	See **Figures 10.1** to **10.8** and **Technical Appendix 10.1: PLHRA** and **Technical Appendix 10.2: PMP**.
	The development will have an impact on habitats that are potentially groundwater dependant. The final submission should provide an assessment of whether the habitats are actually considered groundwater dependant and mitigation measures to maintain local hydrology where necessary.	Details of the NVC survey are presented in **Chapter 8: Ecology** whilst an assessment of potential GWDTE areas are included in this Chapter.
SEPA 26 December 2023	Making use of existing infrastructure, or existing disturbed areas is welcomed as a way of reducing impacts on those aspects of the environment in which we have an interest. We would want the layout that comes forward at the application stage to clearly show how impacts on deeper peat (and good quality habitat) have been minimised. As per our earlier scoping advice, please make sure that the final plans show the proposed development corridor.	Noted. Potential impacts on peat and proposed mitigation measures are summarised in this Chapter and discussed in full in **Technical Appendix 10.1: PLHRA** and **Technical Appendix 10.2: PMP** and where the results of site-specific peat depth probing are presented. .

THC 29 February 2024	The EIA should fully describe the likely significant effects of the development on the local geology including aspects such as earthworks, site restoration and the soil generally including direct effects and any indirect. Proposals should demonstrate construction practices that help to minimise the use of raw materials and maximise the use of secondary aggregates and recycled or renewable materials. EIA should include a table detailing the volumes of soil and sand being excavated and where and how this will be reused within the site. The soils balance calculation should demonstrate whether additional material will be required or will be generated.	This Chapter addresses potential likely significant effects on soils, geology and the water environment. A site specific Peat Management Plan (**Technical Appendix 10.2)** has been prepared which shows how soils and peat will be safeguarded.
	It should be demonstrated that any significant effects (on sensitve peatland) can be substantially overcome by siting, design or other mitigation with the routing informed by habitat survey, hydrological assessment and peat probing results, so that it avoids direct and indirect impacts to priority peatland habitats. Where impacts cannot be avoided, they should be minimised. Full details of mapped information on peatland habitats to NVC level together with a detailed description of current condition will be required. Habitat loss and damage, both direct and indirect, should be determined with suitable mitigation and/or restoration measures presented in peat and habitat management plans. Peatland surveys will be required. A Peat Slide Risk Assessment may also be required.	Potential impacts on peat and proposed mitigation measures are summarised in this Chapter and discussed in full in **Technical Appendix 10.1: PLHRA** and **Technical Appendix 10.2: PMP.** Further information on NVC survey and habitat restoration is considered in in **Chapter 8: Ecology**.
	The application should be supported by a detailed peat survey report and calculations showing how much peat will be disturbed by the different elements of the development (broken down into acrotelmic and catotelmic layer) and how and where disturbed peat will be reused on site or elsewhere. The finalised layout plans should be demonstrated to (1) avoid the areas of deepest peat and best quality habitat (2) keep the footprint of each aspect of the development as small as possible and (3) use construction methods, such as floating or piling to reduce impact on peat as much as possible. Specific care will need to be taken to determine the location of construction works which if poorly located and designed could disturb more peat than the final development.	**Technical Appendix 10.2: PMP** presents a detailed plan of peat depths, confirms the peat excavation quantities and characteristics of the peat.

	An NVC survey should be carried out of the sites and within 250m from any proposed infrastructure. The development should avoid direct impacts on any rare groundwater dependant habitats and protect their water supply. If relevant, the mitigation measures required to protect surrounding GWDTE habitats from the impacts of development (such as drying out) should be outlined.	Details of the NVC survey are presented in **Chapter 8: Ecology** whilst an assessment on potential GWDTE areas are included in this Chapter.
	The EIAR needs to address the nature of the hydrology and hydrogeology of the site, and of the potential impacts on water courses, water supplies including private supplies, water quality, water quantity and on aquatic flora and fauna. 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 which will impact on any calculations of run-off, high flow in watercourses and hydrogeological matters.	Potential effects on the water environment are considered in this Chapter.
	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. The EIAR will be expected to identify all water crossings and include a systematic table of watercourse crossings or channelising, 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.	**Figure 10.1** (Local Hydrology) shows water features and the Proposed Development. A schedule of watercourse crossings is included in **Technical Appendix 10.3**.
	The need for, and information on, abstractions of water supplies for concrete works or other operations should also be identified. The EIAR should identify whether a public or private source is to be utilised. If a private source is to be utilised, full details on the source and details of abstraction need to be provided. An investigation will be required 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. An on-site survey will be required.	Potential impacts to private water supplies are considered in this Chapter.

	The Council's Flood Risk Management Team has no comment to make. It is confirmed that 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; and the EIAR should be informed by the Council's Flood Risk and Drainage Impact Assessment SG. Proposals must meet the treatment requirements of the Ciria SuDS Manual C753.	It is confirmed that watercourse crossings would be sized to pass the 0.5% AEP plus an allowance for climate change. Principles, design standards and best practice measures for the management and control of drainage that would be adopted by the Principal Contractor are included within this Chapter.
	A schedule of mitigation should be submitted. It should bring together all the mitigation measures outlined in the EIA report and include reference to best practice pollution prevention and construction techniques and regulatory requirements. Please refer to Guidance for Pollution Prevention (GPPs).	Required mitigation ures and best practice that would be adopted is presented in this Chapter.
Energy Consents Unit 1 March 2024	Scottish Water provided information on drinking water protected areas or Scottish Water assets on which the development could have any significant effect.	Assessments of potential impacts on the water environment, including Scottish Water assets and Drinking Water Protected Areas, is included in this Chapter.
	The presence of any private water supplies which may be impacted by the development should be investigated. The EIA report should include details of any supplies identified by this investigation, and if any supplies are identified, the Company should provide an assessment of the potential impacts, risks, and any mitigation which would be provided.	Assessment of potential impacts to private water supplies is included in this Chapter.
	Where there is a demonstrable requirement for a peat landslide hazard and risk assessment (PLHRA), the assessment should be undertaken and show a clear understanding of whether the risks are acceptable and capable of being controlled by mitigation measures.	A site specific PLHRA is included as **Technical Appendix 10.1**.

Potential Impacts Assessed in Full

10.4.3 The following potential impacts have been assessed in full in relation to the Proposed Development:

- pollution risk, including potential impact on surface water and groundwater quality and public and private water supplies during construction and operation;
- erosion and sedimentation which could give rise to potential impact on surface water and groundwater quality, and public and private water supplies during construction and operation;
- fluvial flood risk resulting from changes to runoff volumes and rates and modifications to natural and man-made drainage patterns during operation;
- potential impact upon the linkage between groundwater and surface water during construction and operation;
- potential impact on areas of peat, included peat stability, during construction and operation;
- potential impact on areas of GWDTE during construction and operation; and

- potential cumulative impacts during construction and operation.

Issues Scoped Out of Assessment

10.4.4 On the basis of the desk based and survey work undertaken, policy, guidance and standards, the professional judgement of the EIA team, feedback from consultees and experience from other relevant projects in similar settings, the following topic areas have been 'scoped out':

- Effects on geology as, with the exception of carbon rich soils and peat, no sensitive geological features have been identified within the proposed study area.
- Detailed Flood Risk and Drainage Impact Assessment (DIA). Published mapping confirms that virtually all of the Proposed Development is not located in an area identified as being at flood risk and where flood risk is recorded it is typically small in extent and bounds watercourse corridors. A simple screening of potential flooding sources (fluvial, coastal, groundwater, infrastructure etc.) is therefore presented and measures that would be used to control the rate and quality of runoff will be specified in the site-specific CEMP and form part of a DIA which will be prepared as part of the detailed design stage of the Proposed Development.
- Baseline water quality monitoring, as water quality data is published by SEPA and can be used to characterise baseline water quality in this assessment.
- Increased flood risk caused by blockages to flow in watercourses during operation and maintenance of the Proposed Development as any required permanent watercourse crossings would be subject to maintenance requirements under the Water Environment (Controlled Activity) (Scotland) Regulations 2011.
- A Geomorphological Assessment as photographs and records of baseline water features are recorded and presented in the EIA and with the safeguards proposed no geomorphological effects are anticipated.

10.5 Legislation, Policy and Guidance

10.5.1 The aquatic environment in Scotland is afforded significant protection through key statutes and the regulatory activity of SEPA and the local authorities. Relevant legislation and guidance documents have been reviewed and considered as part of this assessment.

Legislation

10.5.2 Relevant legislation includes:

- EU Water Framework Directive (2000/60/EC);
- EU Drinking Water Directive (98/83/EC);
- EU The Habitats Directive (92/43/EEC);
- The Conservation of Habitats and Species Regulations 2017;
- The Water Environment (Controlled Activities) (Scotland) Amendment Regulations, 2013 (CAR);
- The Environment Act 1995;
- Environmental Protection Act 1990;
- The Water Supply (Water Quality) (Scotland) Regulations, 2001;
- The Flood Risk Management (Scotland) Act 2009;
- The Water Environment and Water Services (Scotland) Act 2003 (WEWS);
- Private Water Supplies (Scotland) Regulations 2006;
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017;
- European Union Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive);

- The Conservation of Habitats and Species Regulations 2017; and
- The Electricity Act 1989.

Policy

10.5.3 NPF4 adopted by the Scottish Government on 13 February 2023 provides planning guidance and policies regarding sustainable development, tackling climate change and achieving net zero. **Chapter 6: Planning and Energy Policy Context** of this EIAR provides a detailed overview of the relevant planning policy. Policies relevant to this Chapter include:

- Policy 2 (Climate Mitigation and Adaptation);
- Policy 5 (Soils);
- Policy 20 (Blue and Green Infrastructure); and
- Policy 22 (Flood Risk and Water Management).

10.5.4 In addition, THC Highland-wide Development Plan (HwDP) provides planning guidance on the type and location of development that can take place in the region. The HwDP presents policies of which the following are relevant to this assessment:

- Policy 53: Minerals;
- Policy 54: Mineral Wastes;
- Policy 55: Peat and Soils;
- Policy 60: Other Important Habitats and Article 10 Features;
- Policy 62: Geo-diversity;
- Policy 63: Water Environment;
- Policy 64: Flood Risk;
- Policy 66: Surface Water Drainage; and
- Policy 69: Electricity Transmission Infrastructure.

Guidance

10.5.5 The following guidance is also applicable to the assessment.

10.5.6 Planning Advice Notes (PANs) are published by the Scottish Government. Applicable PANs include:

- PAN 61 Planning and Sustainable Urban Drainage Systems (SUDS); and
- Online Planning Advice on Flood Risk (which supersedes PAN 69).

10.5.7 SEPA and NetRegs Pollution Prevention Guidelines (PPG) and replacement Guidance for Pollution Prevention (GPP):

- GPP01 Understanding your environmental responsibilities – good environmental practices;
- GPP02 Above Ground Oil Storage;
- GPP03 Use and Design of Oil Separators in Surface Water Drainage Systems;
- GPP05 Works and Maintenance in or near Water;
- GPP06 Working on Construction and Demolition Sites;
- GPP08 Safe Storage and Disposal of Used Oils;
- GPP13 Vehicle Washing and Cleaning;
- GPP21 Pollution Incident Response Planning; and
- GPP22 Dealing with Spills.

10.5.8 Construction Industry Research and Information Association (CIRIA) publications:

- C532 Control of Water Pollution from Construction Sites (2001);
- C648 Control of Water Pollution from Linear Construction Projects – Technical Guidance (2006);
- C741 Environmental Good Practice on Site (2015);
- C753 The SUDS Manual (2015); and
- R179 Ground Engineering Spoil: Good Management Practice (1997).

10.5.9 SEPA Publications[1]:

- Engineering in the Water Environment: Good Practice Guide – River Crossings (2010);
- Engineering in the Water Environment: Good Practice Guide – Sediment Management (2010);
- Groundwater Protection Policy for Scotland, Version 3 (2009);
- Land Use Planning System SEPA Guidance Note 2a, Version 4 – Flood Risk (2018);
- Land Use Planning System SEPA Guidance Note 31, Version 3 - GWDTE (2017);
- Position Statement – Culverting of Watercourses (2015); and
- Regulatory Position Statement – Developments on Peat (2010).

10.5.10 Other Guidance:

- Scottish Government, Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (2017);
- Forestry Commission Scotland & Scottish National Heritage, Floating Roads on Peat - Report into Good Practice in Design, Construction and Use of Floating Roads (2010);
- Institute of Civil Engineers, Managing Geotechnical Risk: Improving Productivity in UK Building and Construction (2001);
- Scottish Executive, Scottish Roads Network Landslides Study Summary Report (2005);
- Forestry Commission, Guidelines for the Risk Management of Peat Slips on the Construction of Low Volume/Low Cost Roads on Peat (2006);
- Department of Environment, Food and Rural Affairs (DEFRA) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2011); and
- DEFRA Good Practice Guide for Handling Soils (Ministry of Agriculture, Fisheries and Food (MAFF) 2000).

10.6 Methodology

Desk Study

10.6.1 An initial desk study has been undertaken to determine and confirm the baseline characteristics by reviewing available information relating to geology, soils and water. The following sources of information have been consulted to characterise and assess the baseline conditions within the study area:

- Ordnance Survey (OS) 1:50,000 and 1:25,000 scale mapping;
- Natural England MAGIC map[2];
- NatureScot SiteLink[3];
- Scottish Natural Heritage (now NatureScot) Carbon and Peatland 2016 Map[4];

[1] Several SEPA guidance documents are currently in the process of being reviewed following publication of NPF4.
[2] Natural England MAGIC map, available at https://magic.defra.gov.uk/MagicMap.aspx [Accessed January 2024]
[3] NatureScot SiteLink, available at https://sitelink.nature.scot/home [Accessed January 2024]
[4] Scottish Natural Heritage available at https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/ [Accessed January 2024]

- James Hutton Institute, The National Soil Map of Scotland (1:250,000)[5];
- British Geological Survey (BGS) Onshore GeoIndex (1:50,000)[6];
- BGS Hydrogeological maps of Scotland (1,100,000 scale Aquifer Productivity and Groundwater Vulnerability datasets)[7];
- Details of private water supplies provided by THC[8];
- Details of Drinking Water Protected Areas[9];
- SEPA river and loch waterbody nested catchments[10];
- SEPA flood maps[11];
- SEPA reservoir flooding map[12];
- SEPA Water Classification Hub[13];
- SEPA Water Environment Hub[14];
- SEPA Rainfall Data[15];
- National River Flow Archive[16]; and
- SEPA environmental data[17].

Field Survey

10.6.2 The project hydrologists, geologists and ecologists have worked closely on this assessment to ensure that appropriate information is gathered to allow a comprehensive impact assessment to be completed. Detailed site visits and walkover surveys have been undertaken by SLR on the following dates:

- July 2021 – site reconnaissance and walkover survey;
- August 2022 - Phase I peat probing and condition assessment;
- July, August and November 2023 – Phase II peat probing and condition assessment, watercourse crossing survey; and
- February 2024 – Phase II peat probing and condition assessment, watercourse crossing survey.

10.6.3 In addition, site surveys were undertaken by the project ecologists to undertake habitat surveys, NVC surveys and assess the condition of peat at site (see **Chapter 8: Ecology**). With regard to this Chapter the field work has been undertaken in order to:

- verify the information collected during the desk and baseline study;
- assess peat depths and condition, and undertake geomorphological mapping;
- allow appreciation of the study area and undertake visual assessment of the main surface waters;

[5] James Hutton Institute, National soil map of Scotland https://soils.environment.gov.scot/maps/ [Accessed January 2024]
[6] British Geological Survey GeoIndex (onshore), available at https://www.bgs.ac.uk/map-viewers/geoindex-onshore/ [Accessed January 2024]
[7] British Geological Survey Hydrogeological maps of Scotland, available at https://www.bgs.ac.uk/datasets/hydrogeological-maps-of-scotland/ [Accessed January 2024]
[8] THC Private Water Supplies, available at https://map-highland.opendata.arcgis.com/datasets/ded172bbade24650bb2c1baec5e0d318_0/explore [Accessed January 2024]
[9] Drinking Water Protected Areas – Scotland River Basin District Maps, available online at https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/ and https://www.sepa.org.uk/environment/environmental-data/ [Accessed January 2024]
[10] SEPA river and loch waterbody nested catchments, available to download at https://www.sepa.org.uk/environment/environmental-data/ [Accessed January 2024]
[11] SEPA Flood Maps, available at https://www.sepa.org.uk/environment/water/flooding/flood-maps/ [Accessed January 2024]
[12] SEPA Reservoirs Inundation Map, available at https://map.sepa.org.uk/reservoirsfloodmap/Map.htm [Accessed January 2024]
[13] SEPA Water Classification Hub, available at https://www.sepa.org.uk/data-visualisation/water-classification-hub/ [Accessed January 2024]
[14] SEPA Water Environment Hub, available at https://www.sepa.org.uk/data-visualisation/water-environment-hub/ [Accessed January 2024]
[15] SEPA Rainfall Data for Scotland, available at https://www2.sepa.org.uk/rainfall [Accessed January 2024]
[16] UK Centre for Ecology and Hydrology, National River Flow Archive, available at https://nrfa.ceh.ac.uk/ [Accessed January 2024]
[17] SEPA environmental data, available at https://www.sepa.org.uk/environment/environmental-data/ [Accessed January 2024]

- identify drainage patterns, areas vulnerable to erosion or sedimentation deposition and any pollution risks; and
- visit proposed watercourse crossings and prepare a schedule of these.

Assessment of Effects

10.6.4 The significance of effects of the Proposed Development has been assessed by considering two factors: the sensitivity of the receiving environment and the potential magnitude of impact, should that effect occur.

10.6.5 This approach provides a mechanism for identifying the areas where mitigation measures are required and for identifying mitigation measures appropriate to the significance of likely effects presented by the Proposed Development.

10.6.6 Criteria for determining the significance of effect are provided in **Table 10.2**, **Table 10.3**, and **Table 10.4**.

Sensitivity / Importance of Receptors

10.6.7 The sensitivity of the receiving environment (i.e. the baseline quality of the receiving environment) is defined as its ability to absorb an effect without a detectable change and can be considered through a combination of professional judgement and a set of pre-defined criteria which is set out in **Table 10.2**.

10.6.8 Receptors in the receiving environment only need to meet one of the defined criteria to be categorised at the associated level of sensitivity.

Table 10.2: Criteria for Assessing Sensitivity of Receptor

Sensitivity	Definition
High	• soil type and associated land use is highly sensitive (e.g. unmodified blanket bog or peatland); • SEPA Water Framework Directive Water Body Classification: High-Good or is close to the boundary of a classification: Moderate to Good or Good to High; • receptor is of high ecological importance or National or International value (e.g. Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), habitat for protected species) which may be dependent upon the hydrology of the site; • receptor is at high risk from flooding in the future (2080) and/or water body acts as an active floodplain or flood defence; • receptor is used for public and/or private water supply (including Drinking Water Protected Areas); • groundwater vulnerability is classified as High; and • if a Groundwater Dependent Terrestrial Ecosystem or Geological Conservation Review site is present and identified as being of high sensitivity.
Moderate	• soil type and associated land use is moderately sensitive (e.g. arable, commercial forestry); • SEPA Water Framework Directive Water Body Classification: Moderate or is close to the boundary of a classification: Low to Moderate; • moderate classification of groundwater aquifer vulnerability.
Low	• soil type and associated land use not sensitive to change in hydrological regime and associated land use (e.g. intensive grazing of sheep and cattle); • SEPA Water Framework Directive Water Body Classification: Poor or Bad; • receptor is not at risk of flooding in the future (2080); and • receptor not used for water supplies (public or private).
Not Sensitive	• receptor would not be affected by the Proposed Development e.g. lies within a different and unconnected hydrological / hydrogeological catchment.

Magnitude of Effect

10.6.9 The potential magnitude of effect would depend upon whether the potential effect would cause a fundamental, material or detectable change. In addition, the timing, scale, size and duration of the potential effect resulting from the Proposed Development are also determining factors. The criteria that have been used to assess the magnitude of impact are defined in **Table 10.3**.

Table 10.3: Criteria for Assessing Magnitude of Impact

Magnitude of Impact	Criteria	Definition
Major	Results in loss of attribute	Long term or permanent changes to the baseline geology, hydrology, hydrogeology and water quality such as: • permanent degradation and total loss of soils habitat (inc. peat) and geology; • loss of important geological structure/features; • wholesale changes to watercourse channel, route, hydrology or hydrodynamics; • changes to the site resulting in an increase in runoff with flood potential and also significant changes to erosion and sedimentation patterns; • major changes to the water chemistry; and • major changes to groundwater levels, flow regime and risk of groundwater flooding.
Medium	Results in impact on integrity of attribute or loss of part of attribute	Material and short to medium term changes to baseline geology, hydrology, hydrogeology and water quality, such as: • loss of extensive areas of soils and peat habitat, damage to important geological structures/features; • some changes to watercourses, hydrology or hydrodynamics; • changes to site resulting in an increase in runoff within system capacity; • changes to erosion and sedimentation patterns; • changes to the water chemistry of surface runoff and groundwater; and • changes to groundwater levels, flow regime and risk of groundwater flooding.
Low	Results in minor impact on attribute	Detectable but non-material and transitory changes to the baseline geology, hydrology, hydrogeology and water quality, such as: • minor or slight loss of soils and peat or slight damage to geological structures/feature; • minor or slight changes to the watercourse, hydrology or hydrodynamics; • minor or slight changes to Site resulting in slight increase in runoff well within the drainage system capacity; • minor or slight changes to erosion and sedimentation patterns; • minor or slight changes to the water chemistry of surface runoff and groundwater; and • minor or slight changes to groundwater levels, flow regime and risk of groundwater flooding.
Negligible	Results in an impact on attribute but of insufficient magnitude to	No perceptible changes to the baseline geology, hydrology, hydrogeology and water quality such as: • no impact or alteration to existing important soils (inc. peat) geological features;

Magnitude of Impact	Criteria	Definition
	affect the use/integrity	• no alteration or very minor changes with no impact to watercourses, hydrology, hydrodynamics, erosion and sedimentation patterns; • no pollution or change in water chemistry to either groundwater or surface water; and • no alteration to groundwater recharge or flow mechanisms.

Significance of Effect

10.6.10 The sensitivity of the receiving environment together with the magnitude of the impact determines the significance of the effect, which can be categorised into levels of significance as identified in **Table 10.4**.

10.6.11 **Table 10.4** provides a guide to assist in decision making. However, it should not be considered as a substitute for professional judgment and interpretation. In some cases, the potential sensitivity of the receiving environment or the magnitude of potential impact cannot be quantified with certainty and, therefore, professional judgement remains the most robust method for identifying the predicted significance of a potential effect.

Table 10.4: Significance of Effect

Magnitude of Impact	Sensitivity of Receptor			
	High	**Moderate**	**Low**	**Not Sensitive**
Major	Major	Major	Moderate	Negligible
Medium	Moderate	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

10.6.12 Effects of 'Major' and 'Moderate' significance are considered to be 'significant' in terms of the EIA Regulations.

Cumulative Assessment

10.6.13 The assessment considers the potential cumulative effects associated with other material developments within 5km from the nearest element of the Proposed Development infrastructure and within the same surface water catchments as the Proposed Development. A cumulative effect is considered to be the effect on a hydrological, hydrogeological or geological receptor arising from the Proposed Development in combination with other developments.

Limitations to the Assessment

10.6.14 The assessment uses site investigation, survey data and publicly available data sources, including but not limited to SEPA, THC and commercial data supply companies, as well as additional information supplied from stakeholders during the scoping and consultation stages.

10.6.15 It is considered that the data and information used to complete this assessment is robust and that there are no significant data gaps or limitations.

10.7 Baseline Description

10.7.1 This section outlines the baseline soils (including peat), geology and water conditions within the study area. The study area is shown on **Figure 10.1**.

Designations

10.7.2 Review of the NatureScot SiteLink website[3] indicates that one statutory designated site is located within the study area, as shown on **Figure 10.1**.

10.7.3 The River Spey SSSI and SAC are located approximately 350m south of the existing Melgarve substation. The SSSI and SAC have been designated for Atlantic salmon, freshwater pearl mussel, otters, and sea lamprey which are recognised as particularly sensitive to changes in water quality. The SSSI and SAC are considered to be hydraulically connected to the Proposed Development, as they lie downstream of the proposed Overhead Line (OHL) and underground cable (UGC). They have therefore been considered further in this assessment.

10.7.4 No other designated sites are noted within the study area.

Geology and Soils

Soils

10.7.5 An extract of 1:250,000 National Soil Map of Scotland[5] is presented as **Figure 10.2**, which indicates that most of the Proposed Development is underlain by dystrophic blanket peat and subalpine podzols soils. Peaty gleys and peaty podzols are noted within the southern extent of the study area, approximately 300m north of the existing Melgarve substation, with alluvial soils noted near the River Spey.

Peat and Superficial Geology

10.7.6 An extract of BGS superficial deposit mapping is presented as **Figure 10.3**.

10.7.7 Superficial geological mapping[6] shows that the northern extent of the study area is underlain by peat whilst the southern extent is largely underlain by glacial till. Small areas of alluvial, glaciofluvial deposits and hummocky glacial deposits bound the larger watercourses within the southern extent of the study area.

10.7.8 The hilltops locally are shown to be absent of any superficial deposits, particularly within the central and southern extent of the study area.

10.7.9 Priority peatland mapping[4] (see **Figure 10.4**) indicates that there are parts of the Proposed Development, particularly the proposed underground cable (UGC) routes and the northern extent of the proposed overhead line (OHL), are potentially underlain by Class 1 and Class 2 peatland, which are considered nationally important. Approximately 8.8km of the Proposed Development is located within Class 1 and 500m of the Proposed Development is located within Class 2 peatland respectively. **Chapter 8: Ecology** discusses the condition of the peat in these areas and records that much of the peat is eroded and degraded (e.g. it is not priority peatland in good condition).

10.7.10 Small areas of Class 4 and Class 5 peatland (habitats which may contain peaty soils but are not considered to be of high conservation value) are also noted within the southern and northern extents of the study area whilst the remainder of the Proposed Development is shown to be underlain by mineral soils (Class 0) which is not considered to represent any peatland habitats.

10.7.11 As part of this assessment, a comprehensive peat probing exercise has been completed, the results of which are presented in full in **Technical Appendix 10.1: PLHRA** and **Technical Appendix 10.2 PMP**. A review of the peat probing investigation confirms:

- the depth of peat was recorded at more than 6,000 locations;

- 75% of all the peat probe locations recorded a peat depth of <1m; and
- an auger was used to record the condition of the peat and the underlying substrate – the peat was recorded as typically fibrous to pseudo fibrous and with insignificant to moderate decomposition.

Bedrock Geology

10.7.12 An extract of the BGS bedrock and linear features geology mapping[6] is presented as **Figure 10.5**.

10.7.13 Review of **Figure 10.5** shows that:

- parts of the northern and central extent of the Proposed Development is underlain by several bedrock units comprising psammites and semipelites (Loch Laggan Psammite Formation, Coire Nan Laogh Semipelite Formation, Garva Bridge Psammite Formation, Gairbeinn Pebbly Psammite Member and Monadhliath Semipelite Formation).
- the remainder of the northern and central extent of the Proposed Development is underlain by granodiorites with rafts of semipelites and psammites of the Allt Crom Complex, Allt Crom Granodiorite with rafts of the Coire Nan Laogh Semipelite Formation and Allt Crom Granodiorite with rafts of the Garva Bridge Psammite Formation.
- the southern extent is underlain by the Garva Bridge Psammite Formation (comprising psammite and micaceous psammite).

10.7.14 Small igneous intrusions of the North Britain Siluro-Devonian Calc-Alkaline Dyke Suite and Appinite Suite are also noted across the study area.

Hydrogeology

Groundwater Levels and Flow

10.7.15 A review of SEPA's environmental data website[17] indicates that no groundwater level monitoring is undertaken within the study area.

10.7.16 An extract of the BGS 1:625,000 scale Hydrogeological Map of Scotland[6] and 1,100,000 scale Aquifer Productivity and Groundwater Vulnerability datasets[7] and are presented in **Figure 10.6** and **Figure 10.7** respectively.

10.7.17 **Figure 10.6** confirms that the Proposed Development is underlain by rocks classified as a low productivity aquifer whereby small amounts of groundwater are expected in near surface weathered zones and secondary fractures.

10.7.18 The Aquifer Productivity and Groundwater Vulnerability datasets classifies the underlying aquifer (superficial and bedrock) according to the predominant groundwater flow mechanism (fracture or intergranular) and the estimated groundwater productivity. Review of **Figure 10.7** indicates that the bedrock aquifer is considered to be a low and very low productivity aquifer generally without groundwater except at shallow depths and with flow almost entirely through fractures and other discontinuities.

10.7.19 The peat, glacial till and hummocky glacial superficial deposits within the study area are not considered a significant aquifer. The alluvial and glaciofluvial deposits, where present, are considered to be a moderate to high productive aquifer with intergranular flow; groundwater within these deposits are likely to be in hydraulic conductivity with adjacent watercourses.

10.7.20 Groundwater vulnerability is divided into five classes (1 to 5) with 1 being least vulnerable and 5 being most vulnerable. The Proposed Development is shown to be underlain by groundwater vulnerability Classes 4a, 4b and 5. The highest vulnerability is noted within the central and south-western extent of the study area, where

no superficial deposits are recorded, and thus little attenuation of potential pollutants prior to entry to groundwater. Groundwater is less vulnerable where overlain by superficial deposits.

Groundwater Quality

10.7.21 All of Scotland's groundwater bodies have been designated as Drinking Water Protected Areas (DWPA) under the Water Environment (Drinking Water Protected Area) (Scotland) Order 2013 and require protection for their current use or future potential as drinking water resources.

10.7.22 SEPA has identified that the Proposed Development is located within two groundwater bodies which have been classified in 2022 (last reporting cycle)[13] as summarised in **Table 10.5**. The northern extent of the study area is underlain by the Northern Highlands groundwater body whilst the southern extent of the study area is underlain by the Strathnairn, Speyside and Cairngorms groundwater body.

Table 10.5: SEPA Groundwater Classifications (2022)

Groundwater Body (SEPA ID)	Overall Status	Pressures
Northern Highlands (150701)	**Good**	None
Strathnairn, Speyside and Cairngorms (150709)	**Good**	None

Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

10.7.23 A National Vegetation Classification (NVC) habitat mapping exercise was conducted as part of the ecology baseline assessment, and this has been used to identify potential areas of GWDTEs within the study area. The methodology and results of the NVC habitat mapping exercise are discussed in detail within **Chapter 8: Ecology**. With reference to SEPA LUPS-31 guidance[18], areas of potential GWDTE are shown on **Figure 8.4**.

10.7.24 Within **Figure 8.4**, the potential GWDTE sensitivity of each polygon containing a potential GWDTE community was classified using a four-tier approach as follows:

- 'Highly – dominant' where potential high GWDTE(s) dominate the polygon;
- 'Highly – sub-dominant' where potential high GWDTE(s) make up a sub-dominant percentage cover of the polygon;
- 'Moderately – dominant' where potential moderate GWDTE(s) dominate the polygon and no potential high GWDTEs are present; and
- 'Moderately – sub-dominant' where potential moderate GWDTE(s) make up a sub-dominant percentage cover of the polygon and no high GWDTEs are present.

10.7.25 Where a potential high GWDTE exists in a polygon, it outranks any potential moderate GWDTE communities within that same polygon.

10.7.26 The location of potential GWDTE and their likely dependency on groundwater is discussed in **Table 10.6**.

Table 10.6: Groundwater Dependent Terrestrial Ecosystems

NVC Community	GWDTE Potential	Location and Distribution on Site
M10	High	Areas of M10 are typically classified as flush features that tend to be supported by a level of base rich waters. A M10 dominant polygon is located outside of the study area to the south west of Lochan Iain. M10 is also noted

[18] SEPA (2017) Land Use Planning System, SEPA Guidance Note 31, Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, Version 3

NVC Community	GWDTE Potential	Location and Distribution on Site
		as part of several Highly Sub-dominant areas and represent small areas within these larger communities. No development is located within 250m of any polygon that contains M10 and therefore it is not considered further in accordance with SEPA guidance.
M15	Moderate	M15 dominant polygons are located over wide areas across the study area and are typically underlain by low permeability peat and glacial till deposits. The habitat is not rare and is presented across large areas of Scotland. This distribution is typical of that sustained by surface water rather than emergent groundwater. Four M15 target notes are noted within 250m of the Proposed Development, near the consented Cloiche substation and to the south of the proposed Cloiche UGC. These are noted within similar settings to the larger M15 polygons. It is therefore considered M15 communities are predominately sustained by rainfall and surface water runoff and not groundwater.
M25	Moderate	M25 dominant polygons are noted within the southern extent of the site, near the existing Melgarve substation. The polygon is shown to be underlain by low permeability peat and glacial till deposits which will facilitate local water logging of soils in response to rainfall, rather than being sustained by emergent groundwater.
M31	High	Areas of M31 are also generally classified as flush features that tend to be supported by a level of base rich waters. Within 250m of the Proposed Development, one M31 dominant polygons, sub communities which contain M31 and one M31 target note are noted, south of the proposed Cloiche UGC. The polygons and target note are shown to be generally underlain by low permeability glacial till deposits and / or are noted upstream of the Proposed Development. These areas are therefore not considered to be at risk from the Proposed Development.
M32	High	Areas of M32 are generally considered to represent flush habitats and tend to be supported by a contribution of groundwater. The majority of target notes and polygons which contain M32 are noted >250m away from the Proposed Development (and therefore do not need to be considered further in accordance with SEPA guidance). Within 250m of the Proposed Development, M32 areas are noted as part of several Highly Sub-dominant polygons and likely to represent small areas within these larger communities. One target note is also noted approximately 150m north east of the consented Cloiche substation. These areas are generally noted on sloped ground adjacent to watercourses and are therefore likely to be sustained by surface water. Notwithstanding this, works near these communities should be supervised by project ECoW to ensure local water flow paths are maintained.

NVC Community	GWDTE Potential	Location and Distribution on Site
M6	High	M6 dominant polygons largely coincide with watercourse channels or noted immediately adjacent to watercourses. It is therefore considered that these habitats are sustained by surface water, runoff and waterlogging of soils rather than by groundwater.
U6	Moderate	U6 dominant polygons are noted outside of the study area, typically underlain by low permeability peat and glacial till deposits or noted adjacent to watercourses. No development is located within 250m of these areas and therefore it is not considered further.
Je / Jb	Moderate	These communities are not specified in the SEPA guidance but are generally considered to be similar to composition to MG10, a moderate GWDTE community. Areas of Je/Jb within the study area are shown to be underlain by low permeability peat and glacial till deposits which will facilitate local water logging of soils in response to rainfall and not therefore be sustained by groundwater.

10.7.27 Review of **Table 10.6** shows that the potential high and moderate GWDTE are generally located on ground which is underlain by glacial till and peat or on sloped ground upstream or adjacent to watercourses. This distribution is not typical of a habitat sustained by groundwater but rather it is likely to be supported by rainfall, surface water runoff and water logging of soils.

10.7.28 Buffers to areas of potential GWDTE specified in SEPA guidance therefore do not apply, but safeguards to maintain these habitats, and the surface water sources to these habitats will need to be maintained during construction and operation of the Proposed Development, details of which are included in Section 10.8.

Hydrology

10.7.29 The local hydrology is shown on **Figure 10.1**. The Proposed Development is located within three main surface water catchment areas: the River Fechlin to the north and north-east, River Tarff to the north-west and the River Spey to the south.

10.7.30 The north and north-eastern extent of the study area is located within River Fechlin surface water catchment in particular the Allt Breineag, Loch Killin and Allt Odhar sub catchments. These watercourses flow generally to the north and northeast away from the site.

10.7.31 The north-western extent of the study area is located within the surface water catchment of the River Tarff and the Glen Doe Reservoir sub catchment. The River Tarff flows westward and north-westward to the north-west of the study area before discharging into Loch Ness approximately 13km north-west of the Proposed Development. The River Tarff and Glen Doe Reservoir surface water catchment has been designated as a Drinking Water Protected Area (DWPA)[9].

10.7.32 The southern extent of the Proposed Development is located within the River Spey surface water catchment. The River Spey flows eastwards approximately 380m south of the Proposed Development at its closest extent. The southern extent of the Proposed Development is drained by several tributaries of the River Spey including the Allt Coire Iain Oig and Allt Gilbe. These watercourses flow generally south and south-eastwards before discharging into the River Spey approximately 1.9km south-east of the Proposed Development.

10.7.33 The River Spey catchment approximately 7.5km east (downstream) of the Proposed Development has also been designated as a DWPA.

Rainfall and Surface Water Flows

10.7.34 SEPA has provided precipitation data for Spey Dam rainfall gauge (station number 234315)[15] which is located approximately 8km south-east of the Proposed Development. Review of the data record suggests an average annual rainfall in the region of 1,220mm.

10.7.35 The National Flow Archive[16] records stream flow data along the River Spey at Invertruim (located at NGR NN 687 964, >15km east of the Proposed Development) and reports a mean flow of 6.07m^3/s.

Surface Water Quality

10.7.36 The larger watercourses within the study area are monitored by SEPA and were classified in 2022 (the last reporting cycle)[13]. A summary of the SEPA classifications is shown in **Table 10.7**.

Table 10.7: SEPA Surface Waterbody Classifications (2022)

Waterbody ID (SEPA ID)	Overall Status	Overall Ecology	Physico-Chemical	Hydromorphology	Pressures
Allt Odhar (20277)	Good ecological potential	Moderate	High	Moderate	None
River Tarff inflow to Glen Doe Reservoir (23916)	High	High	High	High	None
River Spey – source to Garva (23154)	Poor	Poor	High	Good	Barrier to fish migration due to hydroelectricity generation

Flood Risk

10.7.37 SEPA has developed national flood maps that present modelled flood extents for river, coastal, surface water and groundwater flooding[11]. The river, coastal, surface water and groundwater maps were developed using a consistent methodology to produce outputs for the whole of Scotland, supplemented with more detailed, local assessments where available and suitable for use. Flood extents are presented in three likelihoods: High, Medium and Low.

- High likelihood: a flood event is likely to occur in the defined area on average more than once in every ten years (1:10), or a 10% chance of happening in any one year;
- Medium likelihood: a flood event is likely to occur in the defined area on average more than once in every two hundred years (1:200), or a 0.5% chance of happening in any one year; and
- Low likelihood: a flood event is likely to occur in the defined area on average more than once in every thousand years (1:1000), or a 0.1% chance of happening in any one year.

10.7.38 SEPA has also produced reservoir inundation maps for those sites currently regulated under the Reservoirs Act 1975[12].

10.7.39 A summary of the potential sources of flooding and a review of the potential risks posed by each source is presented in **Table 10.8**.

Table 10.8: Potential Flooding Sources

Potential Source	Potential Flood Risk to Application	Justification
Coastal flooding	No	The Proposed Development is remote from the coast.
River Flooding	Yes (minor)	SEPA river flood mapping highlights that there is a low to high likelihood of flooding along the main river channels near the Proposed Development, including the Allt Creag Chomaich, Allt Coire Iain Oig, Allt Gilbe and the River Spey. The areas denoted to be at risk of flooding are generally confined to the watercourse channels and do not encroach onto the Proposed Development. It is noted that the SEPA flood maps are unlikely to show flooding of the smaller watercourses within the site, however, floodplains associated with the watercourses are likely to be limited and confided to the watercourse corridors. With the exception of watercourse crossings and where technically and practically it is not possible, no development has been proposed within 10m of watercourses. It is therefore considered that the site is not at risk from fluvial flooding.
Surface Water Flooding	Yes (minor)	SEPA records several small, isolated areas at risk of surface water flood risk across the Proposed Development. It is noted that the flood extents are minor and localised, never forming large, linked areas or flow paths. It is likely that these reflect local low points on the ground surface where water can pond / accumulate. Surface water flooding is not considered to present a development constraint and potential effects can be mitigated by good site design.
Groundwater Flooding	No	SEPA groundwater flood mapping confirms the study area is not at risk of groundwater flooding. Additionally, review of the baseline geology and hydrogeology confirms that the geology at and near to the Proposed Development is unlikely to contain significant quantities of groundwater.
Flooding due to dam failure	No	SEPA has produced reservoir inundation maps for those sites currently regulated under the Reservoirs Act 1975. Review of the SEPA Inundation Mapping highlights that the study area is not at risk from any potential breach scenarios.
Flood Defence Breach (Failure)	No	The Proposed Development is remote from any flood defences.
Flooding from artificial drainage systems	No	No drainage systems are present near to the Proposed Development route.

10.7.40 SEPA also publish potential future flood extents (2080) which account for the potential upfit in rainfall depths and intensities as a consequence of climate change. An extract of this mapping is show on **Figure 10.1** and confirms, no element of the Proposed Development is located within the predicted floodplain extents.

Watercourse Crossings

10.7.41 The Proposed Development will cross several watercourses. The length of proposed new permanent access track has been minimised and existing tracks have been utilised where possible. The Proposed Development

will require six new permanent watercourse crossings and nine new temporary watercourse crossings. A schedule of watercourse crossings is included in **Technical Appendix 10.3: Schedule of Watercourse Crossings**.

Private Water Supplies and Licenced Sites (Abstractions / Discharges / Waste)

10.7.42 Consultation with THC and SEPA has been conducted regarding records of registered and licenced water abstractions and discharges. Recorded private water supplies (PWS) and SEPA Controlled Activity Regulations (CAR) authorisations within the study area are shown on **Figure 10.1** and are discussed below.

10.7.43 A review of the THC data[8] indicates that there are no private water supplies within the study area with the exception of the existing Melgarve substation, which is owned and operated by the Applicant. With the exception of the existing Melgarve substation, no properties have been identified within the study area. It is therefore considered there are no private water supplies at risk from the Proposed Development.

10.7.44 Five CAR licences have been identified within the study area, four within the southern extent of the study area associated within engineering works and one to the north associated with Stronelairg Wind Farm. No licenced water abstractions are noted within the study area.

Future Baseline

10.7.45 Due to consent in perpetuity, which is proposed, the temporal scope requires the consideration of the potential for climate change to impact on future baseline conditions. Climate change studies predict a decrease in summer precipitation and an increase in winter precipitation alongside slightly higher average temperatures. This suggests that there is likely to be greater pressures on water supplies and water levels in summer months in the future. In addition, summer storms are predicted to be of greater intensity. Therefore, peak fluvial flows associated with extreme storm events may also increase in volume and velocity.

Summary of Sensitive Receptors

10.7.46 **Table 10.9** outlines the receptors identified as part of the baseline study, and their sensitivity based upon the criteria contained in **Table 10.2**. These receptors form the basis of the assessment, and as per the previously introduced methodology, are used in conjunction with an estimate of the magnitude of an effect to determine significance.

Table 10.9: Sensitivity of Receptors

Receptor	Sensitivity	Reason for Sensitivity
Peat and Carbon Rich Soils	High	Presence of peat and carbon rich soils have been confirmed by site investigation. These are important carbon stores and need to be safeguarded.
Superficial and Bedrock Geology	Not sensitive	Deposits have been shown to be common regionally and have no rarity value. No geological designated sites are recorded with in the study area.
Water Dependent or Geological Statutory Designated Sites	High	River Spey SSSI and SAC is located downstream of the Proposed Development
Groundwater	High	Groundwater has been classified by SEPA as Good and vulnerability is classified as Medium to High.
Groundwater Dependent Terrestrial Ecosystems	High	Areas of potential GWDTE have been identified by NVC mapping. It has been shown that the habitats within 250m of the Proposed Development are not sustained by groundwater but by surface water.

Receptor	Sensitivity	Reason for Sensitivity
		Measures will be required to sustain existing surface water flow paths to these habitats.
Surface Water	High	The majority of surface water watercourses have been classified by SEPA as Good to High and the River Tarff and Glen Doe Reservoir surface water catchment has been designated as a DWPA.
Flooding	Moderate	Minor floodplains have been identified adjacent to the larger watercourses.
Drinking Water Protected Areas	High	It has been confirmed that the Proposed Development crosses and lies within the River Tarff and Glen Doe Reservoir surface water catchment which has been designated as a DWPA.
Private Water Supplies and Licenced Sites	Not sensitive	No third party private water supplies or licenced abstractions have been identified within the study area. Licensed sites are related to engineering activities which are not at risk from the Proposed Development.

10.8 Embedded Mitigation and Mitigation by Design

10.8.1 Mitigation has been developed as the project design has progressed through the route and alignment selection, and EIA stages of the project. The impact assessment and mitigation process has been iterative and therefore mitigation has been developed for the design to be as specific as possible and as an assumed part of the UGC, OHL, and associated infrastructure. This process has included, for example, using existing access tracks where possible, citing infrastructure generally in areas that avoid ecologically and hydrologically sensitive areas where practicable. In addition to the mitigation embodied in the design and routeing of the project, best practice construction measures have also been developed to ensure that disturbance and pollution during construction is avoided.

10.8.2 A description of all elements of the Proposed Development is given in **Chapter 3: Project Description.** Embedded mitigation and mitigation by design relevant to soils, geology and the water environment is presented below.

Good Practice Measures

10.8.3 As a principle, preventing the release of any pollution/sediment is preferable to dealing with the consequences of any release. There are several general measures which cover all effects assessed within this Chapter, details are given below.

10.8.4 The Proposed Development will be constructed in accordance with good practice guidance, including UK and Scottish guidance on good practice for construction projects as detailed in **Section 10.5** of this Chapter.

10.8.5 In addition, the Applicant has established best practice construction techniques and procedures that have been agreed with statutory consultees, including SEPA and NatureScot. These are set out within the Applicant's General Environmental Management Plans (GEMPs), included in **Appendix 3.4**. The Proposed Development would be constructed in accordance with these plans.

Construction and Environmental Management Plan

10.8.6 A contractual management requirement of the successful Principal Contractor would be the development and implementation of a comprehensive and site-specific CEMP. This document would detail how the successful Principal Contractor would manage the works in accordance with all commitments and mitigation detailed in the

EIA Report, Applicant's GEMPs, statutory consents and authorisations, and industry best practise and guidance, including pollution prevention guidance.

10.8.7 The CEMP will also outline measures to ensure that the works minimise the risk to soils (inc. peat), groundwater, surface water, DWPAs and water dependent designated sites.

10.8.8 It is expected that the following will be included within the CEMP and would ensure the works are undertaken in accordance with good practice guidance, which includes, but is not limited to the following:

- measures to protect and safeguard DWPAs and associated distribution pipework;
- any above ground on-site fuel and chemical storage would be bunded;
- emergency spill response kits would be maintained during the construction works;
- a vehicle management system would be put in place wherever possible to reduce the potential conflicts between vehicles and thereby reduce the risk of collision;
- suitable access routes will be chosen which minimise the potential requirement for either new access tracks or for tracking across open land which could contribute to the generation of suspended solids;
- a speed limit would be used to reduce the likelihood and significance of any collisions;
- drip trays will be placed under vehicles which could potentially leak fuel/oils;
- any temporary construction / storage compounds required will be located remote from any sensitive surface water receptors or private water supplies and will be constructed to manage surface water run-off in accordance with best practice;
- any water contaminated with silt or chemicals will not be discharged directly or indirectly to a watercourse without prior treatment; and
- water for temporary site welfare facilities will be brought to site, and foul water will be collected in a tank and collected for offsite disposal at an appropriately licensed facility.

10.8.9 A wet weather protocol would be developed. This would detail the procedures to be adopted by all staff during periods of heavy rainfall. Tool box talks would be given to engineering/construction/supervising personnel. Roles would be assigned and the inspection and maintenance regimes of sediment and runoff control measures would be adopted during these periods.

10.8.10 In extreme cases, the above protocol would dictate that work on-site may have to be temporarily suspended until weather/ground conditions allow.

10.8.11 Further, Scottish Water best practice guidance for construction and land management practices in DWPAs will be adhered to and included in the CEMP[19].

Environmental Clerk of Works

10.8.12 To ensure all reasonable precautions are taken to avoid negative effects on the water environment, a suitably qualified Environmental Clerk of Works (ECoW) will be appointed prior to the commencement of construction to advise the Applicant and the Principal Contractor on all ecological and hydrological matters. The ECoW will be required to be present onsite during the construction phase and will carry out monitoring of works and briefings with regards to any ecological and hydrological sensitivities on the site to the relevant staff of the Principal Contractor and subcontractors.

10.8.13 With respect to the water environment, the ECoW would also have responsibility to ensure water flow paths and quality to water dependant habitat are sustained during all phases of the Proposed Development.

[19] Standard Letter (scottishwater.co.uk)

Safeguarding of Carbon Rich Soils and Peat

10.8.14 As required by NPF4, a detailed review of the distribution, condition and depth of peat at the site is contained in **Chapter 8: Ecology**, **Technical Appendix 10.1: PLHRA** and **Technical Appendix 10.2: PMP**. The Proposed Development design has applied the mitigation hierarchy detailed in Policy 5 of NPF4 and specifically avoided areas of deep peat wherever technically feasible. It is shown (**Technical Appendix 10.2: PMP**) that disturbed soils and peat can be readily managed and accommodated and would not be degraded. No surplus peat would be generated.

10.8.15 A Design and Geotechnical Risk Register would be compiled to include risks relating to peat instability.

10.8.16 Good construction practice and methodologies to prevent peat instability within areas that contain peat deposits are identified in the PLHRA. These include:

- measures to ensure a well-maintained drainage system, to include the identification and demarcation of zones of sensitive drainage or hydrology in areas of construction;
- minimisation of 'undercutting' of peat slopes, but where this is necessary, a more detailed assessment of the area of concern would be required;
- careful micro-siting of access track alignments to minimise effects on the prevailing surface and sub-surface hydrology;
- raising peat stability awareness for construction staff by incorporating the issue into the Site Induction (e.g. peat instability indicators and good practice);
- introducing a 'Peat Hazard Emergency Plan' to provide instructions in the event of a peat slide or discovery of peat instability indicators;
- developing methodologies to ensure that degradation and erosion of exposed peat deposits does not occur as the break-up of the peat top mat has significant implications for the morphology, and thus hydrology, of the peat (e.g. minimisation of off-track plant movements within areas of peat); and
- developing drainage systems that would not create areas of concentrated flow or cause over-, or under-saturation of peat habitats.

10.8.17 Notwithstanding any of the above good construction practices and methodologies, detailed design and construction practices would need to consider the particular ground conditions and the specific works at each location throughout the construction period. An experienced and qualified engineering geologist / geotechnical engineer would be appointed as a supervisor, to provide advice during the setting out, micro-siting and construction phases of the Proposed Development.

Buffer to Water Features

10.8.18 As part of the Proposed Development design, and with the exception of required watercourse crossings, generally a buffer of more than 10 m has been applied to watercourses and water features such as lochs and ponds, where technically and practically possible. A 10m buffer is specified in SSEN-Ts GEMP Working in or Near Water (Revision 1.02, March 2024) and is typical for developments of this nature and provides a standoff to watercourses and water features that, in combination with industry good practice, minimises the risk to water bodies.

Water Quality Monitoring (DWPA and Designated Sites)

10.8.19 It has been confirmed that the Proposed Development lies within River Tarff and Glen Doe Reservoir DWPA. It has also been confirmed that the Proposed Development lies within the River Spey catchment and the River Spey SAC and SSSI.

10.8.20 Water quality monitoring would be used to ensure that the quality and/or quantity of water to these sources is not significantly impacted by the Proposed Development. Monitoring would be undertaken throughout the

construction phase and immediately post construction. Monitoring would be used to allow a rapid response to any pollution incident and also to assess the impact of good practice or remedial measures. Monitoring frequency would increase during the construction phase if remedial measures to improve water quality were implemented. Water quality monitoring plans would be developed during the detailed design stage of the project (Scottish Water, SEPA, THC and local fishery board would be consulted on the plan) and would be contained within the CEMP.

10.8.21 The performance of the good practice measures would be kept under constant review by the water monitoring schedule, based on a comparison of data taken during construction with a baseline data set, sampled prior to the construction period.

Pollution Risk

10.8.22 Good practice measures in relation to pollution prevention would include the following:

- refuelling would take place at least 30 m from watercourses and where possible it would not occur when there is risk that oil from a spill could directly enter the water environment. For example, periods of heavy rainfall or when standing water is present would be avoided;
- foul water generated onsite would be managed in accordance with PPG4;
- areas would be designated for washout of vehicles which are a minimum distance of 30m from a watercourse;
- washout water would also be stored in the washout area before being treated and disposed of;
- a vehicle management plan and speed limit would be strictly enforced onsite to minimise the potential for accidents to occur;
- if any water is contaminated with silt or chemicals, runoff would not enter a watercourse directly or indirectly prior to treatment;
- water would be prevented as far as possible, from entering excavations such as tower foundations;
- procedures would be adhered to for storage of fuels and other potentially contaminative materials in line with the Controlled Activity Regulations, to minimise the potential for accidental spillage; and
- a plan for dealing with spillage incidents would be designed prior to construction, and this would be adhered to should any incident occur, reducing the effect as far as practicable. This would be included in the final CEMP for the Proposed Development.

Erosion and Sedimentation

10.8.23 Good practice measures for the management or erosion and sedimentation would include the following:

- all stockpiled materials would be located out with a minimum 10 m buffer from watercourses;
- water would be prevented as far as possible, from entering excavations such as tower foundations through the use of appropriate cut-off drainage;
- where the above is not possible, water would pass through a number of settlement areas and silt/sediment traps to remove silt prior to discharge into the surrounding drainage system;
- clean and dirty water onsite would be separated and dirty water would be filtered before entering the water environment;
- if the material is stockpiled on a slope, silt fences would be located at the toe of the slope to reduce sediment transport;
- the amount of ground exposed, and time period during which it is exposed, would be kept to a minimum;
- silt/sediment traps, single size aggregate, geotextiles or straw bales would be used to filter any coarse material and prevent increased levels of sediment. Further to this, activities involving the movement or use of fine sediment would avoid periods of heavy rainfall where possible; and

- SSEN construction personnel and the Principal Contractor would carry out regular visual inspections of watercourses to check for suspended solids in watercourses downstream of work areas.

Fluvial Flood Risk

10.8.24 It is proposed to adopt Sustainable Drainage Systems (SuDS) as part of the Proposed Development. SuDS techniques aim to mimic pre-development runoff conditions and balance or throttle flows to the rate of runoff that might have been experienced prior to development. Good practice in relation to the management of surface water runoff rates and volumes where new permanent tracks or temporary compounds and laydown areas are proposed would include the following:

- drainage systems would be designed to ensure that any sediment, pollutants or foreign materials which may cause blockages are removed before water is discharged into a watercourse;
- onsite drainage would be subject to routine checks to ensure that there is no build-up of sediment or foreign materials which may reduce the efficiency of the original drainage design causing localised flooding; and
- appropriate drainage would attenuate runoff rates and reduce runoff volumes to ensure minimal effect upon flood risk.

10.8.25 Further information on ground conditions and drainage designs would be provided in the final CEMP.

Water Abstraction

10.8.26 Abstraction of water for construction activities is not anticipated. If, however, a source of water is required for construction, an application for a CAR Licence would be made to SEPA and managed through the regulation of the CAR Licence(s). Should a suitable source not be identified, a water bowser would be used.

10.8.27 Good practice that would be followed in addition to the CAR Licence regulations includes:

- water use would be planned so as to minimise abstraction volumes;
- water would be re-used where possible;
- abstraction volumes would be recorded; and
- abstraction rates would be controlled to prevent significant water depletion in a source.

Permanent Watercourse Crossings

10.8.28 Good practice in relation to new water crossings involves the following aspects:

- the design of the watercourse crossings would be agreed with SEPA prior to construction and be regulated in accordance with CAR;
- the appropriate crossing type would be identified from SEPA's good practice guidance and would consider geomorphological, ecological and hydrological constraints; and
- the crossing would be sized and designed so as to minimise effect upon flood risk (sized to accommodate at least the 200-year flow plus an allowance for climate change).

Temporary Access Tracks

10.8.29 In general, proposed construction site access would be taken via the existing public road network and would make use of existing wind farm and estate tracks as far as practicable, upgraded as required.

10.8.30 The majority of access will be achieved through upgrade of existing and installation of new tracks. Floating road construction may be installed in sensitive areas such as over deeper areas of peat. All new tracks would be constructed in accordance with best practice construction methods, and with reference to NatureScot's good practice guide on constructing tracks in Scottish uplands[20].

[20] Scottish Natural Heritage (2015) Constructed Tracks in the Scottish Uplands.

10.8.31 Fording will be used where an appropriate crossing point is already in place (on current tracks) with a suitable bed for crossing (where necessary the bed will be protected by the installation of bog mats or similar for running on). Fording will only be used where limited traffic is expected and impacts on the bed and crossing point generally will be monitored with appropriate mitigation being implemented if required.

10.8.32 For watercourses less than 2m wide, General Binding Rules[21] (GBRs) will be adhered to. Bog mats, or similar, will be positioned across the watercourse to enable access, where necessary, side rails will be installed with silt mitigation at either end and across if required to ensure that silt impacts from vehicles crossing are controlled at all times. Crossings will be cleaned at the end of the day if required.

10.8.33 Where possible large water crossings will be avoided by works being accessed and undertaken on either side of the watercourse. Appropriate protection measures (trestles and tables, pilot lines and supports etc.) will be implemented for conductor works to ensure that conductor does not enter the watercourse.

10.8.34 Once access routes have been confirmed, water crossing requirements will be assessed in advance of works with regards to compliance with the CAR and any required authorisations will be gained prior to works progressing – at this time it is expected that all works will be able to be completed under appropriate GBRs.

10.8.35 All proposed crossing locations and methodologies would be reviewed and approved by the ECoW, prior to any works being undertaken.

Permanent Steel Lattice Tower Foundation Construction

10.8.36 The following measures are proposed to mitigate the effects of tower foundation construction on the water environment:

- tower foundations would be located and excavated wherever possible in the driest locations with well consolidated superficial geology, and wetland areas such as deep peat would be avoided. Wherever technically feasible, towers would not be located within 10 m of waterbodies;
- wherever possible, towers would be located outwith floodplains to reduce potential effects on flooding;
- where excavations for tower foundations encounter localised limited quantities of groundwater or become flooded due to surface water runoff or heavy rainfall, appropriate treatment of dewatering would be instigated under direction of the site ECoW;
- no dewatering discharge would be permitted directly adjacent to watercourses;
- unless directed otherwise by the site ECoW, dewatering discharge would drain across buffer areas of vegetation (e.g. grassland, heather) of at least 10m width, which would provide for natural attenuation and dispersal of the flow and removal of silt;
- where no suitable vegetation is available for natural treatment of dewatering, the discharge would be passed through on-site settling tanks/lagoons prior to discharge by soakaway or to watercourse;
- the requirement for dewatering would be minimised in all locations by timely and efficient excavation of the foundation void and subsequent concrete pouring and backfilling;
- excavated soils would be used to restore foundations and be placed in the order they were removed from the foundation;
- turves would be used to dress the restored foundations;
- all procedures for dewatering would be agreed by the Principal Contractor with SEPA, THC and NatureScot and detailed within the CEMP; and
- the Principal Contractor would develop a method statement to address the transport, transfer, handling and pouring of liquid concrete at tower foundation sites.

[21] car-a-practical-guide.pdf (sepa.org.uk)

Concrete Works, Transport and Pouring

10.8.37 Concrete is likely to be brought to site ready-mixed with no requirement for concrete batching at individual tower locations. In relation to works involving concrete, transport and pouring, the following mitigation would be adopted:

- where concrete transfers are required, measures would be adopted at the point of concrete transfer to prevent accidental spillage of liquid concrete and no transfers would be undertaken in proximity to watercourses or areas of standing water;
- there would be no wash-out of concrete carrying vehicles at tower foundation sites (except the concrete chute) with wash-out undertaken at the nearest compounds where suitably bunded/protected facilities would be provided. Chutes would be washed out to a suitable container, allowed to settle and disposed at suitably licensed facilities;
- excess concrete or wash-out liquid would not be discharged to drains or watercourses. Drainage from washout facilities would be collected and treated or removed to an appropriate treatment point/licensed disposal site; and
- vehicles and plant working at tower foundations would be confined to the area required for safe working only to prevent compaction, rutting and habitat damage to adjacent areas of land. Working areas would be clearly marked out and temporary fencing used where risk assessments indicate a requirement. Similar procedures would be adopted to demarcate areas where plant access is required for conductor stringing and tensioning works.

Installation of Underground Cables and Joint Bays

10.8.38 Underground cable ducts would be installed progressively. The length of time the cable trench would remain open would be minimised. The cable trench would be opened using a tracked excavator. Arisings from the trench would be temporarily stored adjacent to the trench ready for use to restore the trench.

10.8.39 Arisings would be stored so that the potential for erosion and sedimentation is minimised (see above). Silt fences, cut-off drains and temporary cover of the stockpiles will be deployed as directed by the ECoW.

10.8.40 Vegetation turves would be stored separately to the spoil arisings. Once the cable has been installed in the cable trench arisings would be used to restore the trench and backfilled in the same order that the material was excavated from the trench. Turves would then be replaced on the backfilled trench.

10.8.41 If directed by the ECoW, low permeability barriers would be installed in the trench to prevent the trench forming a preferential water flow path. Where ground conditions are saturated a geotextile wrap would be used within the trench to ensure there is no loss of the sand or stone cable surround to adjacent ground.

10.8.42 Where required localised temporary pumping of water from the cable trench would be undertaken to maintain safe working conditions and to facilitate cable duct installation. Pumping arrangements would be agreed and supervised by the site ECoW. Pumping would cease once the cable duct has been installed.

10.8.43 Following completion of installation of a cable duct a cable team will install (pull) the cables through the ducts. Safeguards used to control pollution, runoff, erosion and sedimentation presented above would be deployed as required.

10.9 Potential Effects

10.9.1 The assessment of effects is based on the Proposed Development description outlined in **Chapter 3: Project Description** and is structured as follows:

- construction effects of the Proposed Development; and
- operational effects of the Proposed Development.

Construction Effects

10.9.2 Potential construction impacts on soils, geology and the water environment have been considered for the different phases of the proposed project (construction and operation). The impacts have been identified with reference to relevant guidance, through consultation and project team discussions, through targeted research on hydrological and water quality effects and by considering the information provided by the project engineers on infrastructure and construction methods.

10.9.3 During the construction phase the Proposed Development has the potential to result in the following effects without appropriate controls or mitigation:

- adverse effects on carbon rich soils and peat through inappropriate handling and safeguarding;
- an adverse effect on surface water or groundwater quality from pollution, fuel, oil, concrete or other hazardous substances;
- potential adverse change of surface and groundwater flow paths and contribution to areas of peat and GWDTEs, water dependent habitat and water supplies;
- increased flood risk to areas downstream of the site through increased surface water runoff; and
- potential pollution impacts and adverse effect to private water supplies and DWPAs.

Peat and Carbon Rich Soils

10.9.4 The peat management plan (**Technical Appendix 10.2**) and peat landslide hazard risk assessment (**Technical Appendix 10.1)** presents the result of a detailed programme of site investigation and show that areas of deeper peat and organic soils have generally been avoided by the design of the Proposed Development. This 'embedded mitigation' greatly reduces the potential adverse effect on peat and carbon rich soils.

10.9.5 Best practice measures to maintain the integrity and structure of peat and organic soils are given in the sections above. Peat and organic soils are considered highly sensitive receptors. The Proposed Development and proposed safeguards embedded in the development design reduce the magnitude of potential effect to low, during the construction phase. The significance of effect is therefore assessed as negligible. No additional mitigation, over and above that detailed in the peat management plan (**Technical Appendix 10.2**) and peat landslide hazard risk assessment (**Technical Appendix 10.1**) is required.

Surface Water and Groundwater Quality

10.9.6 As stated above the works would be undertaken in accordance with the Applicant's GEMPs and relevant technical guidance, PPG/GPPs and other codes of best practice, to limit the potential for contamination of both ground and surface waters. In addition, a site-specific CEMP would be prepared by the Principal Contractor and include a surface and groundwater quality management plan.

10.9.7 The above measures would significantly reduce the likelihood of pollutants, including suspended solids, being discharged to nearby watercourses or groundwater.

10.9.8 The safeguards included in the Proposed Development design and the committed best practice construction techniques would also safeguard the quality of water which sustains water dependant designated sites, including the River Spey SAC and SSSI and River Tarff and Glen Doe Reservoir DWPA.

10.9.9 Surface water and groundwater are considered highly sensitive receptors. The Proposed Development and proposed safeguards embedded in the development design reduce the magnitude of potential effect to low, during the construction phase. The significance of effect is therefore assessed as negligible. No additional mitigation, over and above confirmatory monitoring, is therefore required.

Surface and Groundwater Flow

10.9.10 No significant deep or expansive earthworks are proposed when compared to surface and groundwater catchments at any location of the Proposed Development and therefore there will be no significant impact on catchment scale surface water or groundwater flows. Notwithstanding this, the best practice measures listed above would be included in the CEMP and would be used to control and manage surface and groundwater flows and maintain existing water flow paths at a local scale and be used to ensure water flow paths to water dependent habitat would be maintained.

10.9.11 Surface and groundwater are highly sensitive receptors. With these safeguards, the potential effect on ground and surface water flows is assessed as negligible and thus the resultant significance of effect is negligible. No additional mitigation, over and above confirmatory monitoring, is required.

Flood Risk

10.9.12 Areas of flood risk are considered to have a moderate sensitivity. As part of the detailed site design the Principal Contractor will prepare a detailed construction method statement which will have regard to areas of known and potential flood risk. This will ensure no new permanent features which are sensitive to flooding is located within the floodplain.

10.9.13 It is proposed that access to the Proposed Development will use existing tracks and watercourse crossings wherever possible. Where permanent new access tracks or watercourse crossings cannot be avoided, the following measures will be implemented to protect surface water and groundwater quality as well as to mitigate a potential increase in flood risk:

- silt traps / check dams will be used to capture suspended solids generated during construction; and
- construction will be carried out in accordance with appropriate SEPA and CIRIA guidance.

10.9.14 The design and capacity of the watercourse crossings would be agreed by the Principal Contractor in consultation with SEPA as part of the detailed design.

10.9.15 With these safeguards the magnitude of potential effect is assessed as negligible and the resultant significance of effect is assessed as negligible. No additional mitigation is required.

Designated Sites within Hydraulic Connection to the Proposed Development (inc. DWPA)

10.9.16 The baseline assessment has confirmed that the River Spey SSSI and SAC is hydraulically connected to the Proposed Development and that the Proposed Development crosses and lies within the River Tarff and Glen Doe Reservoir DWPA catchment.

10.9.17 The controls which would be adopted at site in accordance with best practice and discussed above would be used to ensure water resources are not impaired and significant erosion and sedimentation does not occur. This will ensure that the potential effect on the designated sites and DWPAs is negligible and thus the significance of effect is negligible. No additional mitigation, over and above confirmatory monitoring, is required.

Operation Effects

10.9.18 During the operational phase of the Proposed Development, it is anticipated that routine maintenance of infrastructure and tracks would be occasionally required.

10.9.19 During the operational phase the Proposed Development has the potential to result in the following effects without appropriate controls or mitigation:

- adverse changes to surface water flow paths, watercourse discharge rates and volumes, and alteration of watercourse geomorphology;

- as a result of an alteration of groundwater and surface water flow paths, an adverse effect on water abstractions and water dependent habitat;
- an adverse effect on surface water or groundwater quality from pollution, fuel, oil, concrete or other hazardous substances from site traffic associated with maintenance activities; and
- increased flood risk through increased surface water runoff from new impermeable areas.

10.9.20 Should any maintenance be required onsite which would involve construction activities method statements would be developed and used which will adopt the best practices agreed with regulators as part of the construction phase CEMP.

Peat and Carbon Rich Soils

10.9.21 During the operational phase there will be no requirement to undertake earthworks which could impair peat or carbon rich soils. In unlikely event earthworks are required these would be undertaken using the same controls and safeguards which would be used during the construction phase.

10.9.22 The likelihood, magnitude of impact and duration of works which have the potential to impair peat or carbon rich soils would be negligible following adherence to good practice measures. Therefore, the potential significance of effect on peat and carbon rich soils is negligible. No mitigation is therefore required.

Surface Water and Groundwater Quality

10.9.23 The possibility of a pollution event, resulting in impairment of surface water or groundwater impairment, occurring during operation is very unlikely as there would be a limited number of vehicles required onsite for routine maintenance.

10.9.24 Any maintenance activities would be undertaken using the same controls agreed with statutory consultees and deployed during the construction phase, including adherence to a CEMP, and supervision of all works. Further the scope of works which might be undertaken are no different to the work which would be undertaken during the construction phase.

10.9.25 Immediately post-construction, newly excavated drains and track dressings may be prone to erosion as any vegetation would not have matured. Appropriate design of the drainage system, incorporating sediment traps, would reduce the potential for the increased delivery of sediment to natural watercourses. Potential effects from sedimentation or erosion during the operational phase are considered to come from linear features on steeper slopes, where velocities in drainage channels are higher. Immediately post-construction, flow attenuation measures would remain and be maintained to slow runoff velocities and prevent erosion until vegetation becomes established.

10.9.26 An outline site restoration plan is presented as **Appendix 3.3**. Restoration works would be undertaken in accordance with the best practice and safeguards detailed in this Chapter.

10.9.27 Based upon this, the potential risk associated with frequency, duration and likelihood of a pollution event is low. It is, therefore, anticipated that the magnitude of a potential effect on surface water or groundwater during the operational phase of the Proposed Development would be negligible, as no detectable change would likely occur. Therefore, the significance of effect during the operational phase of the Proposed Development is predicted to be negligible on surface water and groundwater. No further or additional mitigation, therefore, is required.

Surface and Groundwater Flow

10.9.28 During the operation of the Proposed Development, it is not anticipated that there would be any excavation or need to stockpile large volumes of soils, reducing the potential for effects on surface and groundwater flows. Should any excavation be required, this is likely to be limited and required for maintenance of tracks etc. Any

excavation, handling and placement of material would be subject to the same safeguards that would be used during the construction phase of the project.

10.9.29 Should any non-routine maintenance be required at the sections of track crossing wet areas (defined visually onsite by a contractor or operational personnel) then the good practice measures as detailed for the construction phase would be required on a case-by-case basis. Extensive work at watercourse crossings/adjacent to the water environment may require approval from SEPA under the CAR (depending upon the nature of the activity).

10.9.30 The likelihood, magnitude and duration of works which have the potential to alter surface and groundwater flow paths would be negligible following adherence to good practice measures. Therefore, the potential significance of effect on surface and groundwater is negligible. No mitigation is, therefore, required.

Flood Risk

10.9.31 Culverts beneath permanent access tracks could become blocked without routine inspection or maintenance. Any reduction in conveyance could locally increase flood risk.

10.9.32 In accordance with the Applicants GEMPs proposed infrastructure would be subject to routine inspection, and if required maintenance. Where identified, any remedial works would be undertaken using the same controls and authorisations detailed above and would be deployed during the construction phase of the project.

10.9.33 The likelihood, magnitude of impact and duration of works which have the potential to alter surface and groundwater flow paths would be negligible following adherence to good practice measures. Therefore, the potential significance of effect on surface and groundwater is negligible. No mitigation is therefore required.

Designated Sites within Hydraulic Connection to the Proposed Development (inc. DWPAs)

10.9.34 The controls which would be adopted at site during the operational phase, and which are in accordance with best practice, will safeguard surface water and groundwater quality, surface water and groundwater flows, and mitigate flood risk. They would ensure that the potential effect of the River Spey SSSI and SAC and River Tarff and Glen Doe Reservoir DWPA is negligible and thus the significance of effect is negligible. No additional mitigation is required.

10.10 Cumulative Effects

10.10.1 The following developments that are within 5km and in the same water catchments as the Proposed Development include:

- Cloiche Wind Farm (consented) in the River Tarff and River Fechlin surface water catchments; and
- Dell 2 Wind Farm (proposed) in the River Fechlin surface water catchment.

10.10.2 These developments will be constructed shortly and therefore have/will adopt current industry standard guidelines and be managed in accordance with best practice, industry standards and relevant legalisation, planning policy and guidance regulated by statutory consultees. These standards ensure, with respect to the soils, geology and water environment, potential impacts are mitigated and controlled at source.

10.10.3 The magnitude of cumulative impact is therefore considered negligible and the potential effect on identified receptors is negligible and not significant.

10.11 Mitigation

10.11.1 As there are no predicted likely significant effects under the terms of the EIA regulations, other than the good practice measures that SSEN Transmission implement as standard, no specific mitigation is required.

10.12 Residual Effects

10.12.1 No significant residual effects on soils (inc. peat), geology, surface water or groundwater receptors including designated water dependent sites and DWPAs are predicted during the construction and operation of the Proposed Development.

10.13 Summary and Conclusions

10.13.1 Existing soils, geological, hydrogeological and hydrological conditions have been identified and used to assess the potential effects the Proposed Development may have on geology, soils and the water environment.

10.13.2 Best practice construction techniques that would safeguard soils, geology and the water environment and would be incorporated in the detailed design of the works have been identified. Subject to the adoption of the best practice, peat resources, soils, geology, or the water environment can be safeguarded during and following development.

10.13.3 A summary of assessed effects and identified mitigation measures required to reduce the potential effects to acceptable levels are identified in **Table 10.10**.

Table 10.10: Summary of Effects and Proposed Mitigation Measures

Potential Effect	Proposed Mitigation/Enhancements	Resultant Significance of Effect
Construction Phase		
• Alteration of surface water or groundwater flow • Impairment of surface water or groundwater quality • Increase in flood risk • Adverse effect on water dependent designated sites and DWPAs	• Mitigation by design • Good practice construction techniques • Confirmatory water quality monitoring	Negligible
Operational Phase		
No additional effects or mitigation / enhancements identified		
Cumulative Effects		
No additional effects or mitigation / enhancements identified		