# 10. Hydrology, Hydrogeology & Geology

## 10.1. Introduction

10.1.1 This chapter assesses the potential impacts of the proposed development on hydrological, hydrogeological, and geological resources, including peat. This includes potential impacts on surface watercourses, groundwater, water abstractions, designated receptors and flood risk within the local area.

10.1.2 The specific objectives of the chapter are to:

- describe the current baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address the likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation measures.

10.1.3 The chapter assessment and technical appendices have been jointly undertaken by Alex Dickson (BSc (Hons), MSc, GradCIWEM) and Joanna Cassidy (BSc (Hons), MCIWEM). Alex holds a BSc in Geography and an MSc in Environmental Engineering and has undertaken and supported on geological, hydrological and hydrogeological assessments as part of EIAs. Joanna holds a BSc in Geology and has undertaken and supported multiple geological, hydrogeological and hydrological assessments as part of EIAs, including delivery of relevant technical appendices, on a large variety of renewable energy developments.

10.1.4 A technical review has been undertaken by David Nisbet (BSc (Hons)). David is Head of Geology, Peat and Hydrology at ITPEnergised, with 11 years of experience in environmental consultancy. David has led geology and peat assessments on many renewable energy and electrical transmission projects across the United Kingdom and Ireland, including PLHRA, peat management, engineering geological assessment and carbon balance calculations.

10.1.5 A full review of all hydrology, hydrogeology, and geology deliverables has been undertaken by Jenny Hazzard (MSc Engineering Geology, BSc, MIEMA). Jenny is Head of Environmental Planning at ITPEnergised with 21 years of experience in environmental consultancy.

10.1.6 The chapter is supported by:

- Technical Appendix 10.1: Private Water Supply Risk Assessment;
- Technical Appendix 10.2: Peat Landslide Hazard and Risk Assessment; and
- Technical Appendix 10.3: Water Crossing Schedule.

10.1.7 Figures 10.1 – 10.9 are referenced in the text where relevant.

## 10.2. Legislation, Policy and Guidance

10.2.1 Relevant legislation and guidance documents have been reviewed and taken into account as part of this assessment.

### Legislation

10.2.2 The European Union (EU) Water Framework Directive (WFD) has been implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003. The act introduced a regulatory system with the Scottish Environmental Protection Agency (SEPA) as the lead authority, to establish a framework for co-ordinated controls on activities with the potential to negatively impact the water environment. Water monitoring and classification systems are maintained by SEPA to provide the data to support the aim of the WFD.

10.2.3 The European Parliament and of the Council (EC) Groundwater Directive (GWD) is implemented in Scotland through the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) (as amended).

10.2.4 Other relevant legislation includes:

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended);
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- The Water Resources (Scotland) Act 2013;
- The Private Water Supplies (Scotland) Regulations 2006;
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017;
- Flood Risk Management (Scotland) Act 2009;
- The Conservation (Natural Habitats, & c.) Regulations (1994, as amended in Scotland);
- Environmental Protection Act 1990;
- Environment Act 1995;
- The Contaminated Land (Scotland) Regulations 2000 (as amended); and

- The Conservation (Natural Habitats, & c.) Regulations (1994, as amended in Scotland).

### Planning Policy

10.2.5 Local strategies are considered within The Scottish Borders Local Development Plan (SBLDP), which sets out policies on development and land use within the Scottish Borders.

10.2.6 This section also considered the relevant aspects of the National Planning Framework 4 (NPF4), SBLDP, Planning Advice Notes (PAN) and other relevant guidance. Of relevance to the hydrological, hydrogeological, geological and soils assessment presented within this chapter are the following policies and advice notes:

- NPF4 Policy 5 Soils;
- NPF4 Policy 22 Flood Risk;
- SBLDP Policy ED9 Renewable energy Development;
- SBLDP Policy ED10 Protection of Prime Quality Agricultural Land and Carbon Rich Soils;
- SBLDP Policy ED11 Safeguarding of Mineral Deposits;
- SBLDP Policy EP2 National Nature Conservation Sites and Protected Species;
- SBLDP Policy EP15 Development Affecting the Water Environment;
- SBLDP Policy IS8 Flooding;
- PAN 51: Planning, Environmental Protection and Regulation (Scottish Executive, 2006);
- PAN 79: Water and Drainage (Scottish Executive, 2006);
- Flood Risk: planning advice (Scottish Government, 2015); and
- Scottish Planning Policy (Scottish Government, 2014).

### Guidance

10.2.7 Pollution Prevention Guidelines (PPGs) provide guidance on responsibilities and good practice to prevent pollution from a range of development activities. These are currently in the process of being replaced by the Guidance for Pollution Prevention (GPPs) series. SEPA's environmental regulatory guidance applies to Scotland.

- GPP1: Understanding your environmental responsibilities – good environmental practices (2021);
- GPP2: Above ground oil storage tanks (2018);
- GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer (2017);
- GPP5: Works and maintenance in or near water (2018);
- PPG6: Working at construction and demolition sites (2012);
- GPP8: Safe storage and disposal of used oils (2017);
- GPP13: Vehicle washing and cleaning (2017);
- GPP21: Pollution incident response planning (2021); and
- GPP22: Dealing with spills (2018).

10.2.8 The following relevant guidance from SEPA has been considered as part of the assessment of geology, peat, hydrology and hydrogeology:

- Land Use Planning System Guidance Note 4 (LUPS GU4) Planning guidance on onshore windfarm developments (SEPA, 2017);
- Land Use Planning System Guidance Note 31 (LUPS-GU31) Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2017);
- Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Water Run-Off from Construction Sites (SEPA, 2021);
- Technical Flood Risk Guidance for Stakeholders, Version 12 (SEPA, 2019);
- Developments on Peat and Off-Site Uses of Waste Peat (SEPA, 2017);
- Guidance on Developments on Peatland (Scottish Government, SNH and SEPA, 2017);
- Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables and SEPA, 2012); and
- Groundwater Protection Policy for Scotland, Version 3 (SEPA, 2009).

10.2.9 The following relevant guidance has also been considered:

- CIRIA C532: 'Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors' (CIRIA, 2001);
- CIRIA C741: 'Environmental Good Practice on Site' (CIRIA, 2015);
- Good practice during wind farm construction, 4th edition (NatureScot, 2019);
- Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (ECU Scottish Government, 2017);
- The Scottish Soil Framework (Scottish Government, 2009);
- Advising on Peatland, Carbon-Rich Soils and Priority Peatland Habitats in Development Management (NatureScot, 2023); and
- BS5930:2015 - Code of Practice for Site Investigation (British Standards Institute, 2015).

## 10.3. Consultation

10.3.1 **Table 10.1** provides details of consultations undertaken with regulatory bodies, together with action undertaken by the applicant in response to consultation feedback.

**Table 10.1 - Scoping Responses**

| Consultee | Consultation Response | Applicant Action |
|---|---|---|
| SEPA<br>Response received 02/05/2023 | The applicant has suggested that further peat surveys could be scoped out and that due to the limited amount of peat on-site, a detailed Peat Management Plan (PMP) is not necessary. However, for SEPA to agree to this, we would need to see a site layout map with all proposed infrastructure (including tracks, borrow pits, crane pads, laydown areas, substation) overlaid on a peat depth map. If this information is provided and the likely impact on peat appears to be minor, we may agree to the scoping out as suggested. | As part of the EIA, targeted Phase II peat probing was completed to define the extent and depth of peat on the site in relation to the proposed development. The peat depths collected are outlined in Section 10.5 and is discussed in detail in relation to specific infrastructure within **Technical Appendix 10.2 Peat Landslide Hazard Risk Assessment (PLHRA).** |
| | We will assess the proposals in accordance with National Planning Framework 4 (NPF4) and information should be provided to demonstrate compliance with Policy 5 of NPF4 including confirmation of how the development is considered to meet the requirements of policy 5c and the provision of the information outlined in 5d. It should be demonstrated how impacts on peat have been minimised via location, layout and design of all proposed infrastructure in line with the mitigation hierarchy. We are likely to object to proposals where infrastructure is located on peat with a depth of >1m. | Noted, an outline of the peat depth surveys undertaken and the results are outlined in Section 10.5 and shown in **Figure 10.5**. |
| | Provided watercourse crossings are designed to accommodate the 1 in 200-year event (plus climate change) and other infrastructure is located well away from watercourses, we do not foresee from current information a need for detailed information on flood risk. | Noted, an outline of flood risk is included within Section 10.5, before being scoped out of further assessment. Embedded mitigation included keeping the proposed development outwith 50m, excepting watercourse crossings, as shown in **Figure 10.8**. |
| | Existing built infrastructure must be re-used or upgraded wherever possible. The layout should be designed to minimise the extent of new works on previously undisturbed ground. | Existing tracks have been used as far as practicable for the proposed development. The infrastructure and layout are shown in **Figure 1.3**. |
| | The site layout must be designed to avoid impacts upon the water environment. Where activities such as watercourse crossings, watercourse diversions or other engineering activities in or impacting on the water environment cannot be avoided then the submission must include justification of this including a map. This must show all proposed temporary or permanent infrastructure overlain with all lochs and watercourses, a minimum buffer of 50 m around each loch or watercourse, a detailed layout of all proposed mitigation including all cut off drains, location, number and size of settlement ponds.<br>If water abstractions or dewatering are proposed, a table of volumes and timings of groundwater abstractions and related mitigation measures must be provided. | A description of baseline surface water features on and surrounding the site is included in Section 10.5.<br>A minimum buffer of 50m from surface water features has been embedded into the design, as outlined in Section 10.7 and shown in **Figure 10.8**. Where this buffer cannot be avoided due to watercourse crossings, this is outlined in **Technical Appendix 10.3 Watercourse Crossing Schedule** (WCS). The WCS outlines proposed water crossing types which would be designed to maintain hydrological connectivity following relevant guidance.<br>Measures to mitigate for any dewatering at borrow pits or wind turbines are included within the outline Construction Environmental Management Plan (CEMP) (see **Technical Appendix 2.1**).<br>Any water abstraction would only be made with authorisation from SEPA and in accordance with the CAR. |
| | Where peat and other carbon rich soils are present, applicants must assess the likely effects of development on carbon dioxide ($CO_2$) emissions. Where peatland is drained or otherwise disturbed, there is liable to be a release of $CO_2$ to the atmosphere. Developments must aim to minimise the release.<br>The submission must include: a detailed map of peat depths; a table which details the quantities of acrotelmic, catotelmic and amorphous peat which will be excavated for each element and where it will be re-used during reinstatement; proposal must be in accordance with guidance; applicants must consider whether a full Peat Management Plan is required. | Noted, a carbon balance assessment is included in **Technical Appendix 10.5**.<br>A detailed map of peat depths is shown in **Figure 10.5.** An outline of data collected is included in **Technical Appendix 10.2 PLHRA**. |
| | GWDTE are protected under the Water Framework Directive and therefore the layout and design of the development must avoid impact on such areas. The submission should include a map demonstrating that all GWDTE are outwith a 100 m radius of all excavations shallower than 1 m and outwith 250 m of all excavations deeper than 1 m and proposed groundwater | The methodology for assessing GWDTEs on site for actual groundwater dependency is included within Section 10.3. The assessment of GWDTEs across the site is included within Section 10.5 and shown in **Figure 10.9**. |

| Consultee | Consultation Response | Applicant Action |
|---|---|---|
| | abstractions. If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. | |
| | Excavations and other construction works can disrupt groundwater flow and impact on existing groundwater abstractions. The submission must include a map showing that all existing groundwater abstractions are outwith 100 m radius of all excavations shallower than 1 m and outwith 250 m of all excavations deeper than 1 m and proposed groundwater abstractions. If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. | The methodology for assessing private water supplies (PWS) is included in Section 10.3, with baseline summary of abstractions included in Section 10.5 and **Technical Appendix 10.3**. A summary of PWS sources with infrastructure buffers is shown in **Figure 10.10**. |
| | The following information should also be submitted for each borrow pit: a map showing the location, size, depths and dimensions; map showing any stocks of rock, overburden, soils and temporary and permanent infrastructure, overlain with all lochs and watercourses to a distance of 250 metres; provide justification for the proposed location of borrow pits and evidence of the suitability of the material to be excavated; ground investigation report giving existing seasonally highest water table; site map showing cut-off drains, silt management devices and settlement lagoons to manage surface water and dewatering discharge; a site map showing proposed water abstractions; a site map showing the location of pollution prevention measures; a site map showing where soils and overburden will be stored; sections and plans detailing how restoration will be progressed; and details of how the rock will be processed. | The location of borrow pits on-site are shown in **Figure 10.3** and **Figure 10.4**. As included within the outline CEMP, a detailed drainage design will be implemented, including silt management measures such as settlement ponds and cut-off swales, during construction.<br>No water abstractions are planned as part of the proposed development. |
| SEPA<br>Response received 27/10/2023 | The applicant has asked if a detailed Peat Management Plan and Peat Slide Risk Assessment may be scoped out of this application. We accept this, given the limited extend of peat deposits on this site. However, we recommend that the applicant investigates the possibility of floating the sections of new track which cross areas of peat deeper than 0.5 m (as shown in the Gatecheck Report, Fig.4 Peat Depth). This could eliminate the need for peat excavation. If this is not possible, any peat reuse arising from cut and fill tracks should be discussed and agreed with SEPA.<br><br>Please also note that the peat survey findings should be included in the EIA report. | Noted, the applicant welcomes SEPA's confirmation that a PMP can be scoped out of the assessment, due to the limited extent of peat deposits identified on the site. |
| NatureScot<br>Response received 07/04/2023 | The wind farm development will have connectivity with the River Tweed SAC. The Soonhope Burn and Whalplaw Burn located within the development boundary are part of this designated site, and so drainage and water flow from the wind farm will enter the SAC directly.<br>We advise consideration is given to the potential effects of construction, operation and decommissioning of the proposed development in relation to the qualifying features of the River Tweed SAC. | Section 10.5 outlines designated sites within the study area (10km radius) from the proposed development. This study area includes the River Tweed SAC, which is scoped into further assessment. Section 10.6 outlines the potential effects of the proposed development on the River Tweed with mitigation outlined in Section 10.7. |
| Scottish Borders Council (SBC)<br>Response received 29/05/2023 | We don't have any observations in response to this chapter. | Noted. |
| East Lothian Council (ELC)<br>Response received 07/04/2023 | This area does not drain into East Lothian so we do not anticipate any impact on water in our area. We also do not anticipate any significant impacts on air, land or soil in our area. | Noted, with surface water catchments outlined within Section 10.5. |
| Scottish Water<br>Response received 28/03/2023 | A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity. | Noted, this is included within Section 10.5 which outlines details the baseline of public water supplies, including Drinking Water Protected Areas. |

10.3.2 Following scoping responses further consultation was undertaken with the Scottish Borders Council (SBC) and East Lothian Council (ELC) to identify potential PWS within a 2km radius of the site.

10.3.3 SBC responded to the Freedom of Information (FOI) request on 4th April 2023, confirming there were 19 PWS located within a 2km radius of the site.

10.3.4 ELC responded to the FOI request on 14th April 2023, confirming there were no PWS located within a 2km radius of the site.

10.3.5 Access track iterations and changes to the extent of the site resulted in further consultation with SBC to identify any additional PWS within the revised, larger study area. The second FOI request on 3rd August 2023 confirmed a further two PWS sources within 2km of the site.

10.3.6 An FOI request was issued to SEPA 27th March 2023, to request information regarding groundwater and surface water monitoring data, in addition to water abstraction CAR licences within 2km of the site. A response was received 26th April 2023, which included five discharge authorisations (sewage (private)) within 2km; no water abstractions were recorded.

## 10.4. Methodology

### Scope of Assessment

10.4.1 The scope of the assessment is to assess the potential impacts to geological, hydrological and hydrogeological receptors within the study area from the proposed development.

10.4.2 As outlined in **Table 10.1**, issues raised during consultation included peat depth surveys and the requirement for PMP and PLHRA, protection of GWDTE and groundwater abstractions, consideration of construction effects to River Tweed SAC, and suitable layout design to prevent impacts to receptors. The baseline of these receptors are outlined in Section 10.5 and the potential sensitivity is summarised in **Table 10.9**. The embedded mitigation followed and considered during design iterations is included in Section 10.7.

### Baseline Characterisation

#### Study Area

10.4.3 The study area for assessment of hydrological and hydrogeological receptors, including designated sites, incorporates the site and up to 10km from the site. Potential effects to PWS are considered within 2km from the site. The study area for assessment of geological receptors is considered to be within the site.

10.4.4 These study areas are based upon professional judgement and experience assessing similar developments, with due consideration of relevant guidance on hydrological and geological assessment. It is considered that in excess of these distances, due to attenuation and dilution, the proposed development is unlikely to have an effect.

#### Desk Study

10.4.5 Baseline conditions have been established primarily through desk-based assessment which has included:

- consultation with relevant bodies and collation of data;
- review of previous reporting;
- identification of surface watercourses and waterbodies, including WFD classifications;
- identification of hydrogeological receptors, including aquifers;
- identification of underlying bedrock and superficial geology, including assessment of peat depth contours;
- assessment of topography, land use and climate conditions to inform drainage patterns;
- assessment of any identified PWS;
- assessment of potential GWDTEs; and
- assessment of flood risk.

10.4.6 The following information sources have been reviewed to inform the desk study:

- The Ordnance Survey (OS) Mapping (1:50,000 and 1:25,000);
- British Geological Survey (BGS) GeoIndex Online Mapper;
- National Soils Map of Scotland;
- Scottish Natural Heritage (SNH) (now NatureScot) Carbon and Peatland 2016 Map;
- SEPA Flood Map;
- Scotland's Environment Map;
- NatureScot SiteLink
- National River Flow Archive (NRFA); and
- Meteorological Office Rainfall Data.

#### Field Survey

10.4.7 Phase I peat depth probing was undertaken by a team of suitably qualified and experienced surveyors, following relevant guidance, in February 2023. Peat depths were measured on a 100m grid across the site. In addition to the 100m grid supplementary peat depth measurements were taken in locations that were being considered in early design iterations for wind turbine placement.

10.4.8 Data obtained from the peat depth surveys was used to plot the presence and distribution of peat across the site and feed into the detailed design process. Following the design process, a 'design chill layout' was agreed, considered by the project team to represent the optimal wind turbine and infrastructure layout to maximise electricity yield whilst minimising environmental effects, including effects on geology, peat, hydrology, and hydrogeology.

10.4.9 A phase II peat depth survey was undertaken in July to August 2023, to target areas of proposed infrastructure which were on or adjacent to areas identified as having peat soils (>0.5m) during phase I or where ecology data indicated potential peatland habitat. The phase II survey probed nine of the nineteen proposed wind turbines locations, and the proposed access track that was not probed during phase I (having not been within the extent of the site). The phase II peat survey was carried out using the following pattern:

- Probe wind turbine centre and every 10m to the north, east, south, and west, out to 50m from the centre;
- Probe points every 50m along the proposed access tracks, with staggered, offset probes 25m either side of the access track centre line, and at turning heads; and
- Other infrastructure locations were probed to an approximate 25m grid.

10.4.10 The information collected during phase I and phase II peat survey informs **Technical Appendix 10.2: PLHRA**.

10.4.11 A hydrological walkover was undertaken in August 2023, which included a water crossing survey of the site. Site observations included topography, habitats, ground conditions and features of watercourses and waterbodies in related to the proposed infrastructure.

10.4.12 A site visit to local residents as part of the PWS assessment was undertaken concurrently with the hydrological assessment in August 2023.

10.4.13 A National Vegetation Classification (NVC) Survey was undertaken by the project Ecology consultants and included the identification of habitats which have the potential to be GWDTE. Further details of this are provided in **Chapter 8: Terrestrial Ecology**.

## Sensitivity Criteria

10.4.14 The sensitivity characteristics of geological, peat, hydrological and hydrogeological resources have been guided by the matrix presented in **Table 10.2**.

**Table 10.2 - Sensitivity Criteria for Receptors**

| Sensitivity | Description |
|---|---|
| High | Highly sensitive land use including raised or blanket bog, carbon-rich or peat soils (Class 1 or 2 priority peatland).<br>Highly permeable superficial deposits, allowing storage and transport of contaminants.<br>Designated receptor present protected under national or international legislation, including SSSIs, SACs and SPA.<br>A waterbody with a SEPA WFD Overall or Ecological classification of 'High' or 'Good'.<br>An aquifer, classified by BGS as a 'highly productive aquifer' or 'moderately productive aquifer', or that is of regional importance.<br>Extensive areas of 'High Likelihood' or 'Moderate Likelihood' of river, surface water or coastal flooding which acts as an active floodplain.<br>Public Water Supplies or Private Water Supplies that abstract from a hydrological receptor underlying or connected to the site.<br>Potential GWDTE identified through NVC survey classified by SEPA to be 'highly groundwater dependent' with minimal degradation, that are found to have site-specific groundwater dependency and are not ombrotrophic. |
| Medium | Moderately sensitive land use including carbon-rich or peat soils (Class 3 or 4 priority peatland).<br>Moderately permeable superficial deposits, allowing limited storage and transport of contaminants.<br>Designated Receptors of regional importance, including Regionally Important Geological and Geomorphological Sites (RIGS), or receptors of local importance<br>A waterbody with a SEPA WFD Overall or Ecological classification of 'Moderate'.<br>An aquifer, classified by BGS as a 'low productivity aquifer' that does not support abstractions.<br>Isolated areas of 'High Likelihood' or 'Moderate Likelihood' of surface water flooding or river or coastal flooding that is confined to waterbody extents and is not an active floodplain.<br>Potential GWDTE identified through NVC survey classified by SEPA to be 'moderately groundwater dependent', that are found to have site specific groundwater dependency and are not ombrotrophic. |
| Low | Low sensitive land use that do not include carbon-rich or peat soils (Class 5 or 0).<br>Geological or hydrological features not currently protected and not considered worthy of protection.<br>Low permeability superficial deposits likely to inhibit the transport of contaminants.<br>A waterbody with a SEPA WFD Overall or Ecological classification of 'Poor' or 'Bad', or no classification.<br>A non-aquifer, classified by BGS as a 'Rocks with essentially no groundwater'.<br>Areas of 'Low Likelihood' of surface water, river or coastal flooding.<br>Public Water Supplies or Private Water Supplies are not supported by hydrological receptor underlying or connected to the site.<br>Potential GWDTE identified through NVC survey classified by SEPA to be 'highly groundwater dependent' or 'moderately groundwater dependent', that are not found to be groundwater dependent and are instead ombrotrophic. |

10.4.15 The criteria for sensitivity have been developed based on a hierarchy of factors which has been assessed following experience and professional judgement through extensive assessment and work undertaken to date, in line with appropriate guidance, legislation and best practice.

## Magnitude of Effect

10.4.16 The magnitude of change criteria that will apply to the baseline sensitivities of the identified receptors are set out in **Table 10.3.** Like the criteria for sensitivity, these have been developed based on professional judgement in line with appropriate guidance, legislation and best practice.

10.4.17 Using these criteria, potential effects resulting from the proposed development have been assessed. Details of embedded mitigation measures and additional mitigation measures are outlined in Section 10.7.

**Table 10.3 - Magnitude of Change Criteria**

| Magnitude of Change | Guidance Criteria |
|---|---|
| High | Total loss of, or alteration to key features of the baseline resource such that post development characteristics or quality would be fundamentally and irreversibly changed, for example, extensive excavation of peatland or watercourse realignment. |
| Medium | Loss of, or alteration to key features of the baseline resource such that post development characteristics or quality would be partially changed, for example, in-stream permanent bridge supports or partial excavation of peatland. |
| Low | Small changes to the baseline resource, which are detectable, but the underlying characteristics or quality of the baseline situation would be similar to pre-development conditions e.g., culverting of very small watercourses/drains. |
| Negligible | A very slight change from baseline conditions, which is barely distinguishable, and approximates to the 'no change' situation, for example short term compaction from machinery movements. |

## Significance Criteria

10.4.18 The significance of the predicted effects has been assessed in relation to the sensitivities of the baseline resource. A matrix of significance, based on the combination of magnitude of change and sensitivity of the receptor, was developed to provide a consistent framework for evaluation, shown in **Table 10.4** below.

**Table 10.4 – Significance of Effect Matrix**

| | | Magnitude of Impact | | | |
|---|---|---|---|---|---|
| | | High | Medium | Low | Negligible |
| Sensitivity of Receptor | High | Major | Major | Moderate | Minor |
| | Medium | Major | Moderate | Minor | Negligible |
| | Low | Moderate | Minor | Negligible | Negligible |
| | Negligible | Minor | Negligible | Negligible | Negligible |

10.4.19 The guideline criteria for the various categories of effect are provided in **Table 10.5** below.

**Table 10.5 – Significance Criteria (Geology, Peat, Hydrology, Hydrogeology)**

| Significance | Definition | Guidance Criteria |
|---|---|---|
| Major | A fundamental change to the environment | Changes in water quality or quantity affecting widespread catchments or groundwater reserves of strategic significance, or changes resulting in substantial loss of conservation value to geological or aquatic habitats and designations. |
| Moderate | A large, but non-fundamental change to the environment | Changes in water quality or quantity affecting part of a catchment or groundwaters of moderate vulnerability, or changes resulting in loss of conservation values to geological or aquatic habitats or designated areas. |
| Minor | A small but detectable change to the environment | Localised changes resulting in minor and/or reversible effects on soils, surface and groundwater quality or habitats. |
| Negligible | No detectable change to the environment | Essentially no effects on geological resources, drainage patterns, surface and groundwater quality or aquatic habitats. |

10.4.20 In the above classification, fundamental changes are those which are permanent, either adverse or beneficial, and would result in widespread change to the baseline environment. For the purposes of this assessment, those effects identified as being major or moderate have been evaluated as significant environmental effects.

10.4.21 These matrices have been used to guide the assessment, though they have been applied with a degree of flexibility, since the evaluation of effects will always be subject to location-specific characteristics which must be considered. For this reason, the evaluation of the significance of effects will not always correlate exactly with the cells in the relevant matrix, especially where professional judgement and knowledge of local conditions may result in a slightly different interpretation of the impact concerned.

### Requirements for Mitigation

10.4.22 Depending on the potential impact predicted to sensitive receptors, committed embedded and additional mitigation measure are presented within this chapter. Wherever possible, mitigation has been embedded and incorporated into the design of the proposed development. Additional mitigation has been outlined in this chapter and those to be implemented during the construction phase will be included within a CEMP.

### Assessment of Residual Effect Significance

10.4.23 An assessment of any predicted significant residual effects on sensitive geological, hydrological or hydrogeological receptors is presented within this chapter (Section 10.8). This includes effects from other developments or proposed developments in the surrounding area, with potential cumulative effects identified, as shown in Section 10.9.

### Limitations to Assessment

10.4.24 Other than peat depth survey work, no water quality monitoring or intrusive investigations have been undertaken. This is not considered to represent a significant limitation to the assessment of effects, as detailed intrusive site investigation works and water quality monitoring would be undertaken prior to and during construction to inform detailed engineering design, micro-siting and environmental protection and control measures to be implemented.

## 10.5. Baseline

### Current Baseline

#### Topography and Land Cover

10.5.1 The site is located in the south-west of the Lammermuir Hills, approximately 8.5km north-east of Lauder in the Scottish Borders.

10.5.2 The site is characterised by a prominent valley that runs centrally through a series of hills, which include Longcroft Hill 381m Above Ordnance Datum (AOD), Cadam Law 360m AOD, Broomy Law 382m AOD, Riddel Law 392m AOD, South Hart Law 460m AOD, and North Hart Law 480m AOD.

10.5.3 The site primarily comprises heather moorland or rough grassland. On Longcroft Hill there are areas of coniferous plantation, as well as rectilinear fields boundaries. An existing track network runs through the centre of the site, and links to tracks to the west and east, of the site. Access to the site is currently along the D124 to Longcroft, off the A697 at Cleekhimin.

#### Climate

10.5.4 The nearest National River Flow Archive (NRFA) monitoring station to the site is the Leader Water at Earlston. It records an average annual rainfall in the standard period (1961 – 1990) of 853mm.

10.5.5 The closest Meteorological Office climate station is Galashiels. It records an annual average rainfall in the climate period (1991 – 2020) of 832.58mm.

#### Surface Water

10.5.6 The site lies within several sub-catchments including Soonhope Burn, Whalplaw Burn, Earnscleugh Water, Cleekhimin Burn, Kelphope Burn and Dye Water, as shown in **Figure 10.2**. While the other sub-catchments drain to the Leader Water, the Dye Water drains to the Whiteadder Water. All the sub-catchments are within the surface water catchment of the River Tweed within the Solway Tweed River Basin District.

10.5.7 The Whalplaw Burn (ID 5277) and the Soonhope Burn (ID 5276) transverse the site flowing from north to south, confluencing at grid reference E350790, N654361 to become Cleekhimin Burn, north of the proposed site entrance.

10.5.8 The Cleekhimin Burn confluences with Leader Water at grid reference E351567, N651795 south of the site. The Leader Water confluences with the River Tweed approx. 20km south of the site. The surface waterbodies are classified by SEPA as having an overall status of 'Good' under the Water Framework Directive (WFD), with the exception of the Leader Water which is classified as 'Moderate'.

10.5.9 There are several unnamed tributaries of Soonhope Burn and Whalplaw Burn on-site. A watercourse crossing survey was carried out in July to August 2023, with the watercourse observations detailed in **Technical Appendix 10.3**.

10.5.10 Following consultation with SEPA, it was confirmed that there are no surface water or groundwater monitoring stations within 2km of the site.

**Superficial Geology**

10.5.11 British Geological Survey (BGS) online mapping indicate that superficial deposits are absent across much of the site. Alluvial deposits flank the numerous watercourses with concentrated areas of glacial till mapped upslope of the watercourses but absent on hill tops. There are some localised areas of peat mapped in the north and east of the site, as shown in **Figure 10.2**.

10.5.12 The National Soil Map of Scotland indicates that the soils at the site comprise brown soils to the south of the site, alluvial soils across central areas of the site and peat in the north of the site. BGS GeoIndex Onshore data and mapping indicate that no artificial ground is present within the site.

**Bedrock Geology**

10.5.13 The site is shown by BGS online mapping to be mostly underlain by Silurian age sedimentary bedrock of the Gala Group (wacke sandstone, with siltstone and mudstone in variable proportions), as shown in **Figure 10.4.**

10.5.14 There are numerous intrusive igneous rocks present across the site, ranging in age from Siluro-Devonian (predominately comprising felsic and granitic rocks) to Carboniferous (mafic rocks).

10.5.15 The start of the proposed access track is underlain by the Silurian-Devonian aged Great Conglomerate Formation. This consists of fine-to coarse-grained conglomerates composed of greywacke pebbles, sandstones, siltstones, and mudstones.

10.5.16 There are no Geological Conservation Review (GCR) or Regionally Important Geological Sites (RIGS) present within the site.

**Peat**

10.5.17 A phase I peat depth survey was carried out in February 2023. This showed some areas of localised peat located across the site. To address the scoping response from SEPA, a phase II peat depth survey was completed in July-August 2023. This undertook targeted probing at proposed infrastructure locations which were in, or adjacent to areas which had been identified as having peat soils (>0.5m) or where ecology data indicated potential peatland habitat, to delineate the extent of identified peat deposits across the site.

10.5.18 **Figure 10.5** shows an interpolation of soil depths recorded during phase I and phase II peat depth surveys. **Figure 10.5** shows that much of the site is absent from peat with localised deposit found in the north and east of the site. The design of the proposed development has ensured that areas of peat greater than 1m have been avoided.

10.5.19 **Technical Appendix 10.2** details the PLHRA for the site, the likelihood of a peat landslide occurring is deemed to be negligible to low across the site.

10.5.20 There is no requirement to excavate peat on the site, with peat deposits avoided through design.

10.5.21 Published priority peatland mapping by NatureScot indicates that majority the site is not located within an area designated as priority peatland, peatland classifications are shown in **Figure 10.6.** To the north of the site there is a large area of Class 5 peatland. Class 5 peatland may contain peat or carbon-rich soils. The ecology surveys recorded areas of blanket bog and degraded blanket bog to be present, however much of the typical vegetation associated with this habitat type has been heavily managed as a result of the ongoing land management practices onsite, including muirburn.

**Hydrogeology**

10.5.22 The groundwater unit underlying most of the site is the Gala Group which is a low productivity Class 2C aquifer. The unit is described as *"highly indurated greywackes with limited groundwater in near surface weathered zone and secondary fractures"*. Its primary source of flow is through these secondary fractures and other discontinuities.

10.5.23 A small area in the south of site is underlain by the Crawford Group and Moffat Shale Group. This is an undifferentiated, low productivity Class 2C aquifer with very limited groundwater available from fractures.

10.5.24 The south of the site at the proposed access track is underlain by the Reston Group, which is a moderately productive Class 2B aquifer. This aquifer comprises *"sandstones, in places flaggy, with siltstones, mudstones and conglomerates and interbedded lavas locally yield up to 1 L/s"*.

10.5.25 The underlying groundwater bodies of Lauder (ID 150539) and Peebles, Galashiels and Hawick (ID 150697) have an overall status of 'Good'.

### Flooding

10.5.26 A review of SEPA Flood Maps confirms that while there is a high likelihood of fluvial flooding along watercourses (10% annual probability of flooding), including the Soonhope Burn and Whalplaw Burn. The extent of flooding is confined to within the watercourse channel.

10.5.27 There is a high to medium likelihood of pluvial flooding on the site, it is confined to the watercourses and not widespread throughout the site.

10.5.28 There is no risk of coastal flooding at the site.

### Public Water Supplies

10.5.29 The north of the site is marginally located within the Dye Water Drinking Water Protected Area (DWPA). All of the proposed development is located outwith and downslope of the DWPA catchment. Scottish Water in their scoping response advised there to be no drinking water catchments or abstractions that may be affected by the proposed development.

### Private Water Supplies

10.5.30 Consultation with SEPA found there to be no CAR authorisations for abstractions identified within 2km of the site.

10.5.31 Consultation with SBC identified a total of 25 PWS sources present within an approximate 2km radius of the site (04/04/2023 and 03/08/2023). ELC responded to the FOI request (14/04/2023) confirming there were no PWS located within a 2km radius of the site. The remaining PWS sources were identified using habitations data and OS mapping.

10.5.32 From these PWS sources identified, desk study assessment was undertaken to scope out those which were either outwith the study area, or likely to be hydrologically or hydrogeologically disconnected. Following this, 12 PWS sources were identified for further consultation with residents.

10.5.33 Consultation with residents was undertaken in July 2023 by issuing letters with an assessment form and a map, to be self-completed with information regarding the type, location and use of PWS. Following responses from residents a PWS site visit was undertaken in August 2023 to confirm and add to the information that had been supplied.

10.5.34 Following the consultation and assessment a total of 8PWS have been included into this assessment. The private water supply risk assessment (PWSRA), **Technical Appendix 10.1**, details each source, why is has been scoped into the assessment and mitigation employed to limit and potential effects that might impact the supply.

### Designated Sites

10.5.35 Within the wider study area of 10km from the site, the following designated sites have been identified, distances not including the turbine laydown area, these are listed in **Table 10.6**.

**Table 10.6 – Designated Sites within 10km of the proposed development**

| Designation | Distance from site (approx.) | Designated features | Hydrologically connected to site? |
|---|---|---|---|
| River Tweed SSSI, SAC | Located on-site | Atlantic salmon, brook lamprey, river lamprey, otter, fly assemblage (favourable maintained).beetle assemblage, vascular plant assemblage (unfavourable recovering) trophic range river/stream, rivers with floating vegetation often dominated water-crowfoot (unfavourable no change) sea lamprey (unfavourable declining) | Yes – located on-site |
| Lammar Law SSSI | 1.3km | Upland assemblage (favourable maintained), blanket bog (unfavourable no change) juniper scrub, subalpine dry heath (unfavourable declining). | No - located upslope, disconnected by topography. |
| Airhouse Wood SSSI | 4.4km | Upland oak woodland (unfavourable no change) | No – located upstream within catchment. |
| Fala Flow SSSI | 7.9km | Pink footed goose, non-breeding (favourable maintained). | No – located upstream of catchment, disconnected by topography. |
| Danskine Loch SSSI | 8.4km | Fen woodland (unfavourable declining) | No – located in separate catchment, disconnected by topography |
| Papana Water SSSI | 9.0km | Upland mixed ash woodland (favourable maintained) | No – located in separate catchment, disconnected by topography |
| Threepwood Moss SSSI, SAC | 9.2km | Active raised bog and degraded raised bog, raised bog (unfavourable no change) | No – disconnected by Leader Water and River Tweed catchment. |

### Groundwater Dependent Terrestrial Ecosystems (GWDTE)

10.5.36 A detailed National Vegetation Classification (NVC) survey was completed, as outlined in **Chapter 8: Terrestrial Ecology** and reported in **Technical Appendix 8.2: Vegetation Survey and Habitat Mapping Report**. From the NVC survey data, communities have been identified that have the potential to be groundwater dependent in accordance with Scottish Environment Protection Agency Land Use Planning System Guidance Note 31 (SEPA-LUPS-GU31). The survey methodology for this is outlined in **Chapter 8: Terrestrial Ecology**.

10.5.37 The following potential GWDTE communities were identified, with potential groundwater dependency, based on SEPA-LUPS-GU31, shown in brackets.

10.5.38 A review of the baseline features including topography, underlying geology, surface water features, was undertaken to determine the groundwater dependency. This is shown in **Table 10.7**.

**Table 10.7 – Revised Groundwater Dependency**

| Potential Groundwater Dependency | NVC Communities | Description of Baseline Features | Revised Groundwater Dependency |
|---|---|---|---|
| High | M6, M6c, M6d, M23, M23a, M23b | Located by:<br>• Surface watercourses or waterbodies, which it will be primarily fed by.<br>• Downslope of areas of ombrotrophic peatland with flushing surface water.<br>• Underlain by largely impermeable deposits of till or ombrotrophic peatland. | Low:<br>• Groundwater is unlikely to be dominant water source as located and fed by surface water.<br>• Fed by surface water runoff to watercourses.<br>• Fed by surface water runoff from flushes from upslope ombrotrophic peatland.<br>• Disconnected from groundwater by impermeable glacial till and peat. |
| High Subdominant | M6c, M23, M23a, M23b, | | |
| Moderate Subdominant | MG10a, U6 | | |

10.5.39 As outlined within SEPA-LUPS-GU31, the following infrastructure buffers are employed to determine potential GWDTE which may be impacted and require further assessment are:

- within 100m radius of all excavations less than 1m in depth; and
- within 250 m of all excavations deeper than 1m.

10.5.40 There are areas of potential GWDTE that are located within 100m and 250m infrastructure buffers which require further detailed assessment, as summarised in **Table 10.8**.

**Table 10.8 – Mosaic Specific Revised Groundwater Dependency**

| Mosaic Polygon Ref | Potential Groundwater Dependency | GWDTE NVC Communities | Description of Baseline Features | Revised Groundwater Dependency |
|---|---|---|---|---|
| 0 | High Subdominant | M23b | Underlain by low productivity bedrock of Gala Group Wacke. Located beside watercourse and in headwaters of Jock's Burn, underlain by alluvium with peat deposits upslope. Located downslope of degraded blanket bog. | Low - Located along surface waterbody and downslope within flushes from degraded ombrotrophic habitat. Limited groundwater present from low productivity aquifer. |
| 1 | High | M23b | Underlain by low productivity bedrock and alluvium deposits. Located in area of degraded blanket bog along a surface watercourse. | Low – Fed by surface water from runoff to watercourse and flushes from degraded bog. Dry habitat with absence of springs with low productivity aquifer showing limited groundwater influence. |
| 8 | High | M23b | Underlain by low productivity aquifer, no superficial deposits noted. Located in steep gully along small watercourse, downslope of acid grassland and degraded blanket bog. | Low – influence from surface water runoff from flushes from degraded ombrotrophic habitat upslope. No point source emergence with low productivity bedrock. |
| 9 | High | M23b | Underlain by low productivity aquifer, no superficial deposits noted. Located in flat lying area within steep sided gully beside watercourse. Located downslope of bracken and degraded blanket bog. | Low – supplied by overland surface water flow from dry habitats upslope to watercourses. Limited groundwater influence from low productivity bedrock. |
| 12 | High | M23a | Low productivity bedrock with alluvium. Located in flat lying area at confluence of two tributaries. Located downslope of bracken and degraded blanket bog. | Low – likely fed by fast surface water flow from surrounding dry bracken habitats, flushes from degraded bog, into flat lying area with flow to watercourses. |
| 17 | High Subdominant | M23a | Underlain by low productivity bedrock and alluvium and till deposits. Located along | Low – fed by surface water overland flow from dry habitats, with flushes from |

| Mosaic Polygon Ref | Potential Groundwater Dependency | GWDTE NVC Communities | Description of Baseline Features | Revised Groundwater Dependency |
|---|---|---|---|---|
| | | | watercourse in flat lying valley, where several tributaries confluence. Located downslope of bracken, degraded blanket bog and acid grassland. | degraded ombrotrophic bog to several watercourses. Vertical hydrological connectivity limited by lower permeability peat. |
| 24 | High | M23 | Underlain by low productivity bedrock, with no superficial deposits noted. Located in moderately sloping gully along Foxes Cleugh watercourse. Located in area of grassland downslope of dry heaths. | Low – supplied by fast overland surface water flow from topographic high into gully. |
| 25 | High Subdominant | M23 | Underlain by low productivity bedrock, with no superficial noted. Located in moderately sloping gully along Thorney Cleugh watercourse. Located in area of grassland downslope of degraded blanket bog. | Low – Supplied by flushes from degraded bog and overland surface flow. This will flow quickly into gully and watercourse. |
| 26, 27, 28 | High, High Subdominant | M6, M6c, M6d | Underlain by low productivity bedrock, with no superficial deposits noted. Located in gently sloping area along Hogs Burn. In open area, dry heaths and degraded blanket bog upslope. | Low – likely fed by surface overland flow from slopes and flushes from blanket bog into burn. |
| 29 | High | M6, M23 | No superficial deposits noted and underlain by low productivity bedrock. Located in moderate slopes along Trow Burn, in area of grass and rush pastures with access track present upslope. | Low – no obvious groundwater emergence, likely fed by surface water runoff from dry habitats into watercourse. |
| 30 | High Subdominant | M23b | Underlain by low productivity bedrock and partly underlain by alluvium downslope. It is located along moderate slope, bound by Whalplaw Burn downslope and watercourse within mosaic. Habitat noted to be bracken with modified grassland upslope. On map it is noted to be a spring. The location was visited on-site, it was noted to start upslope of this location and noted to be an ephemeral watercourse. No point source emergence was observed. | Low – while a spring is noted on the OS map, there is no point source emergence observed on-site. There is no change in bedrock, superficial soils or faults present, with the underlying geology noted to be low productivity. The dry bracken habitat suggests groundwater level is low with fast overland surface flow on steep slopes. Considered to be fed by surface water from overland flow and watercourse. |
| 31 | High | M23a, M23b | No superficial deposits noted and underlain by low productivity bedrock. Located in moderate slopes along Gladesclaugh Burn. Downslope of grassland and dry heaths. | Low – no obvious groundwater emergence, likely fed by surface water runoff from dry habitats into watercourse. |

## Future Baseline

10.5.41 The future baseline characterisation of the site under a 'do nothing' scenario would be impacted by different current activities occurring across the site, including pastoral farming, heather burning, and grouse rearing and shooting.

### Surface Water

10.5.42 There is a current potential impact to surface water quality from chemical pollution from grouse feed, livestock faeces and off-road vehicles used to navigate the site. Additionally, there is risk of erosion and sedimentation from use of existing tracks and grazing livestock. Additionally burning heather may increase soil erosion and runoff of dissolved organic carbon to watercourses.

### Peat

10.5.43 If poorly controlled, the burning of heather on the site could ignite the underlying peat soils, which would release carbon which could result in loss of carbon storage.

10.5.44 Peat deposits would also be disrupted from grazing of livestock, off-road vehicles on-site, activity associated with grouse shooting.

### Designated Sites

10.5.45 The Whalplaw Burn and the Soonhope Burn, present on the site, are tributaries of the River Tweed (SAC, SSSI), with contaminated surface run-off from grazing and vehicles on-site, there is potential to transfer contaminants to the River Tweed.

## Receptors Brought Forward for Assessment

10.5.46 A summary of potential receptor sensitivity is outlined in Table 10.9. Those with a High or Medium sensitivity have been brought forward for assessment. Those with a Low sensitivity will not require further assessment following the application of the standard mitigation in Section 10.7.

**Table 10.9 – Receptor Sensitivity**

| Receptor | Description | Sensitivity |
|---|---|---|
| Surface Water | Waterbodies on-site are noted to have a WFD Overall classification of 'Good'. | High |
| Groundwater | Site underlain by bedrock units classified by BGS as 'low productivity aquifer' and a 'moderate productivity aquifer'. | High |
| Flooding | Isolated areas of 'High Likelihood' or 'Moderate Likelihood' of surface water flooding or river or coastal flooding that is confined to waterbody extents and is not an active floodplain. | Medium |
| Superficial Geology | Moderately permeable superficial and bedrock deposits, allowing limited storage and transport of contaminants. | Medium |
| Bedrock Geology | No RIGS or GCRs present on-site. Low permeability and productivity bedrock underlies the majority of the site. | Low |
| Peat | Low sensitive land use that do not include carbon-rich or peat soils (Class 5 or 0). Peat is mostly absent from site and highly localised. | Low |
| PWS | PWS that abstract from a hydrological receptor underlying or connected to the site. | High |
| Public Water Supplies | Public Water Supplies are not supported by hydrological receptor underlying or connected to the site. | Low |
| Designated Sites | Designated receptor River Tweed SSSI SAC is located on-site. | High |
| Groundwater Dependent Terrestrial Ecosystems | Potential GWDTE identified through NVC survey classified by SEPA to be 'highly groundwater dependent' or 'moderately groundwater dependent', that are not found to be groundwater dependent and are instead ombrotrophic. | Low |

10.5.47 With regards to peatlands on the site, a PLHRA (Technical Appendix 10.2) has been undertaken which confirmed a negligible to low likelihood of a peat landslide occurring. As there are limited peat deposits on site, which have been avoided by design, the requirement for a PMP was scoped out, in consultation with SEPA..

10.5.48 The following receptors have been scoped out of further assessment:

- RIGS or GCRs are not present on-site, therefore there will be no direct or indirect impacts to protected geological receptors.
- Due to areas of high or medium risk of flooding not being present on-site, apart from where highly constrained to watercourse channels, the risk of significant impacts from flooding is considered very unlikely. It is therefore considered that a separate Flood Risk Assessment is not required, and flood risk is scoped out of further assessment. Best practice measures to prevent increase of flood risk are included within Section 10.7.
- GWDTEs identified during the NVC surveys through further assessment were found to not be groundwater dependent and are instead ombrotrophic. This was assessed by identifying surface water sources or characteristics that disconnected the habitats from groundwater.

## 10.6. Assessment of Potential Effects

### Construction Effects

#### Impacts on Surface Water Flow

10.6.1 The construction of the proposed development civil infrastructure could result in an increased rate of surface water run-off from the site. This could potentially increase sedimentation and erosion in watercourses and risk of flooding downstream. It can also result in the diversion of surface water flows.

10.6.2 Runoff from proposed development civil infrastructure will be controlled through suitable construction drainage provision, the outline principles of which are noted in Section 10.7 and in the outline CEMP, the detail of which shall be prepared and agreed with SBC, in consultation with SEPA. Hydrological connectivity and maintenance of existing drainage pathways will be undertaken through installation of appropriate drainage.

10.6.3 As outlined in **Technical Appendix 10.3 WCS**, there are several watercourse crossings required across the site, the outline solutions which include pipe culverts and bottomless arch culverts. Measures outlined within the WCS, will prevent constricting and increase in flow. Prior to construction there will be further detailed design of the watercourse crossings.

10.6.4 The magnitude of impact prior to any additional mitigation, is considered to be negligible, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of minor significance, this is considered to be not significant.

#### Impacts on Surface Water Quality

10.6.5 Surface water runoff containing silt and other sediments, particularly during and after rainfall events, has the potential to enter the watercourses and field drains on and adjacent to the site. Silt and sediment laden surface water runoff is predicted to arise from excavations, exposed ground, and any temporary stockpiles. This has the potential to temporarily impact on the water quality and hydrological and ecological function of the receiving watercourse at and downstream of the works in the absence of any mitigation. Additionally, pollutants such as oils, fuel and cement may be mobilised through mechanical leaks or spillage and carried in surface drainage.

10.6.6 As noted previously, a minimum buffer of 50m around all watercourses will be maintained in siting all of the proposed development civil infrastructure except where watercourses crossings are required. Furthermore, good construction practice measures would be set out in a CEMP and fully implemented to minimise the risk of pollution to surface watercourses.

10.6.7 The magnitude of impact prior to any additional mitigation, is considered to be negligible, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of minor significance, this is considered to be not significant.

**Impacts on Groundwater Flow**

10.6.8 Construction of the proposed development civil infrastructure can result in the diversion of groundwater flows within underlying geology by creating a barrier. If dewatering occurs during construction, this could locally reduce groundwater quantity.

10.6.9 As outlined in Section 10.5 superficial deposits are absent across much of the site, with alluvium located along waterbodies. Alluvium is typically permeable with good transmission of groundwater. The underlying bedrock is described as having low productivity with limited near surface groundwater, therefore there is likely to be limited groundwater flow. The south of the site overlies a moderately productive aquifer, however, proposed development civil infrastructure within this area consists of the public road widening and a temporary construction compound.

10.6.10 The spatial impacts of drawdown from dewatering will be a localised area at each excavation. It is also considered to be a short-term impact with localised groundwater levels anticipated to restore when completed. Embedded measures will be implemented to prevent impacts to groundwater, which will include completing excavation and dewatering as quickly as practicable.

10.6.11 Diversion of groundwater flows by proposed development civil infrastructure is a potential impact. Drainage will be utilised to maintain hydrological connectivity upslope and downslope of the proposed development civil infrastructure.

10.6.12 The magnitude of impact prior to any additional mitigation, is considered to be negligible, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of minor significance, this is considered to be not significant.

**Impacts on Groundwater Quality**

10.6.13 As outlined above, the geology underlying the site is characterised by typically low permeability, sedimentary bedrock of the Gala Group consisting of wacke, siltstones and mudstones. The Gala Group is a low productivity bedrock aquifer.

10.6.14 The installation of the concrete foundations has the potential to impact groundwater quality because of alkaline leachate from concrete. Due to the characteristics of the underlying geology, the spatial impact of any alkaline leachate is therefore likely to be limited to the localised area at the wind turbine foundations and foundations in the substation and BESS compounds. Other forms of chemical pollution that may occur include spills of fuels and chemicals stored on-site or from vehicle and plant spills.

10.6.15 Embedded mitigation measures include sufficient and continued dewatering at the foundation excavations until the concrete is cured, to prevent leaching. To prevent pollution to groundwater, other standard mitigation includes appropriate management measures for transfer of concrete and minimising the duration of concrete pouring. Other measures will include appropriate storage of fuels and chemicals, refuelling of plant and vehicles at designated locations and distributing spill kits throughout the site and within all plant and vehicles.

10.6.16 The magnitude of impact prior to any additional mitigation, is considered to be negligible, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of minor significance, this is considered to be not significant.

**Removal of and Impact on Peat**

10.6.17 As discussed, there are limited isolated deposits of peat present on-site. As outlined in embedded mitigation measures, the proposed development civil infrastructure has been sited to minimise the excavation of peat as far as practicable, taking account of other constraints.

10.6.18 Given limited peat deposits are present across the site, and have been avoided by design, a PMP has been scoped out of the assessment, in consultation with SEPA. Should unexpected peat deposits be identified during ground investigation, post-consent; a detailed peat management plan should be prepared. Embedded mitigation measures outlined will then be implemented by the Principal Contractor, to reduce the potential effects on peat during construction. This includes measures to prevent drying out of peat in stockpiles, to enable the peat to be successfully restored, where practicable.

10.6.19 Following implementation of embedded and good practice mitigation, the removal of and impact on peat is assessed to be a negligible magnitude on a low sensitivity receptor. This will result in a direct, temporary, long-term effect of negligible significance and is considered to be not significant.

**Peat Landslide Impact on Watercourses**

10.6.20 Construction on peat soils can result in destabilisation of peat deposits on slopes and lead to slope failure. This can result in peat and debris reaching watercourses, potentially resulting in sedimentation and changes to flow and fluvial geomorphology.

10.6.21 A detailed assessment of peat landslide risk has been undertaken as presented in **Technical Appendix 10.2**. This has identified the risk of peat landslides for the proposed development civil infrastructure, to downslope receptors.

10.6.22 Based on the findings of **Technical Appendix 10.2**, the potential magnitude of impact from peat landslides is assessed to be negligible on a high sensitivity receptor, resulting in a minor effect that is indirect, temporary and short-term. This is considered to be not significant.

**Compaction of Soils**

10.6.23 As part of the proposed development there will be a requirement for construction of civil infrastructure. During construction there will also be movement of vehicles and plant. There is therefore potential for this to result in soil compaction, leading to reduced permeability, increasing the potential for surface water runoff. Reduced permeability could also reduce the flood storage capacity within the site and could potentially lead to localised flooding incidents.

10.6.24 As discussed previously, marked superficial deposits are largely absent from site. There is therefore unlikely to be a significant reduction in flood storage capacity between limited superficial deposits to low permeability civil infrastructure. In addition, the area of civil infrastructure of the proposed development has been minimised and the existing tracks will be utilised as far as practicable, as part of the embedded design measures.

10.6.25 The magnitude of impact prior to any additional mitigation, is considered to be negligible, on a medium sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of negligible significance, this is considered to be not significant.

**Impact on Private Water Supplies**

10.6.26 Construction of the proposed development has the potential to affect the quality and quantity of the PWS identified by SBC within the surrounding area. Best Practise and guidance will be followed with a CEMP to avoid any effects on the PWS.

10.6.27 As outlined within **Technical Appendix: 10.1: PWSRA**, with the exception of PWS Longcroft, no PWS are considered to be at risk of residual effects. PWS Longcroft is assessed as being at risk due to the unknown location of the pipework connecting the source to the properties supplied, which may be impacted by upgrades to the current access track or by the new proposed track. During intrusive works, care will be taken to prevent damage to the pipe by slow excavation works to be monitored by the onsite ECoW. If identified, it will be marked and through detailed design redirected under the access tracks.

10.6.28 The magnitude of impact prior to any additional mitigation, is considered to be negligible, on a high sensitivity receptor (PWS excepting PWS Longcroft). Therefore, there is potential for a direct, temporary, short-term effect of minor significance, this is considered to be not significant.

10.6.29 The magnitude of impact prior to any additional mitigation, is considered to be low, on a high sensitivity receptor (PWS Longcroft). Therefore, there is potential for a direct, temporary, short-term effect of moderate significance, this is considered to be significant.

**Impacts to Designated Sites**

10.6.30 Following a review of the proposed development, it is found that the River Tweed (SAC) is located on-site, located downslope of proposed development. This designated site therefore has the potential to be affected by changes in quality or quantity of surface water or near surface groundwater. While River Tweed (SSSI) is located 6km downstream of the site, it is hydrologically connected to the proposed development.

10.6.31 The River Tweed (SAC) is protected based on its river vegetation, fish species, and otters. These designations may be affected by changes to water quality from polluted surface water run-off. The habitats are located on-site on upstream tributaries of the River Tweed, including on-site on the Soonhope Burn and Whalplaw Burn (as shown in **Figure 10.2**).

10.6.32 The River Tweed (SSSI) is protected based on its vascular plant, fly and beetle assemblage, fish populations, otters and being a trophic range river/stream. These designations may also be affected by changes to water quality, with the designation located 6km downstream along the River Tweed.

10.6.33 All of the proposed development civil infrastructure sits within the River Tweed catchment. During construction, silt management measures will be included within the CEMP to follow best practice to minimise risk of pollution to surface watercourses and downstream designated sites. Additional measures would include surface water monitoring during construction, regular visual checks by the Environmental Clerk of Works (ECoW) and an emergency procedure plan in the event of a chemical spill within these catchments.

10.6.34 Furthermore, all of the proposed development civil infrastructure, except watercourse crossings where required, has been sited 50m from surface watercourses, and good construction practice measures will be set out in a CEMP and fully implemented to minimise the risk of pollution to surface watercourses.

10.6.35 The magnitude of impact prior to any additional mitigation, is considered to be negligible, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of minor significance, this is considered to be not significant.

## Operational Effects

### Impacts on Surface Water Flow

10.6.36 The proposed development civil infrastructure could result in an increased rate of surface water runoff from the site. This could potentially increase sedimentation and erosion in watercourses and risk of flooding downstream. Permanent civil infrastructure can also alter natural drainage pathways.

10.6.37 There will be a reduction in exposed ground and hardstand areas during the operational phase as compared to the construction phase. Any changes to drainage of surface water will be altered from the construction phase and continue during the operational phase.

10.6.38 The magnitude of impact prior to any additional mitigation, is considered to be negligible, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of minor significance, this is considered to be not significant.

### Impacts on Fluvial Geomorphology

10.6.39 If new watercourse crossings are not designed properly to ensure continuous flows, this could potentially adversely affect the geomorphology of watercourses by reducing heterogeneity. While the proposed development does cross watercourses, several of these are existing crossings, some of which are to be upgraded or replaced.

10.6.40 The WCS (**Technical Appendix 10.3**) details the new watercourse crossings required and suggested crossing types to ensure maintenance of suitable flow and therefore heterogeneity. Following detailed design of these watercourse crossings, any necessary CAR authorisations would be sought prior to construction on-site, if required.

10.6.41 The magnitude of impact on a high sensitivity receptor is assessed to be negligible. This is considered to be an indirect, long-term effect of minor significance and is considered to be not significant.

### Impacts on Groundwater Flow and Drying Out of Peat

10.6.42 The presence of the proposed development civil infrastructure has the potential to interrupt groundwater flow by acting as barriers to flow. This could result in drying out of surrounding peat deposits. As outlined previously, there is considered to be limited groundwater in the low productivity bedrock and limited, highly localised peat deposits present on-site.

10.6.43 There may be impacts to peat immediately surrounding areas excavated during the construction of the proposed development civil infrastructure, however, as it is considered that these are likely to be localised to the immediate areas around excavations, they are unlikely to produce long term effects and water levels are likely to rebound during the operational phase.

10.6.44 Taking account of embedded mitigation measures, the magnitude of impact is assessed as negligible, on high sensitivity receptors. There is therefore potential for an indirect, temporary, short-term effect of minor significance, which is considered to be not significant.

**Impacts on Surface Water and Groundwater Quality from Chemical Pollution and Sedimentation**

10.6.45 As outlined during the construction phase, surface water and groundwater quality can be impacted by polluted run-off from the site. Following the construction phase, there will also be less disturbance to sediments during the operational phase. Many of the activities that may have resulted in chemical pollution including refuelling and concrete pouring, will not occur during the operational phase. Embedded measures to mitigate potential chemical pollution including spill kits to be present within each vehicle will continue within the operational phase.

10.6.46 A battery energy storage system (BESS) is planned as part of the proposed development. In the event of a battery fire at the site, polluted waters can be produced where water is introduced to the system to cool the batteries. This will therefore only become a risk during the operational phase when the BESS is connected. Mitigation measures to prevent the release of polluted waters to the hydrological receptors will be included within an Operational Environmental Management Plan (OEMP). These will include an emergency plan in the event of a fire, consultation with local fire services and appropriate treatment and disposal of the polluted waters.

10.6.47 Impact on surface water quality is assessed to be of negligible magnitude of impact on a high sensitivity receptor. This is assessed to be a direct, temporary, short-term effect of minor significance and considered to be not significant.

10.6.48 Impact on groundwater quality is assessed to be of negligible magnitude on high sensitivity receptors. This is assessed to be a direct, temporary, short-term effect of minor significance and considered to be not significant.

### Decommissioning Effects

10.6.49 The potential effects of the decommissioning phase will be similar to during construction. Due to reduced site activity, impacts are predicted to be of the same or lesser magnitude, with resultant effects being the same or lesser significance to construction phase effects.

## 10.7. Mitigation

### Embedded Mitigation

10.7.1 The following considerations have been taken into account in the iterative design of the proposed development, considered as embedded mitigation.

- A 50m buffer has been maintained around all surface watercourses identified in OS 1:50k mapping, except where access tracks need to cross watercourses. The need for watercourse crossings has been minimised as far as practicable while taking account of other technical and environmental constraints.
- As a result of limited peat on-site and several design iterations, the proposed development is largely outwith areas of peat soils and deep peat.
- No areas on-site were identified as high risk within the PLHRA, therefore the proposed development has been sited outwith high risk areas.
- As there are no GWDTEs assessed to be present on-site, the proposed development is not located within areas of GWDTEs.
- The proposed blade transfer station located south-east of the site has not been accounted for within this assessment. This is an arable field, the risk to any potential receptors is considered to be low. Any relevant mitigation measure will be outlined in the CEMP.

### Good Practice Measures

10.7.2 In undertaking the assessment of potential effects from the proposed development, good practice measures are assumed to be embedded mitigation. As appropriate, these mitigation measures would be outlined within the CEMP.

**Pre-Construction**

10.7.3 Prior to construction being undertaken, relevant detailed site investigations would be conducted. This could include investigations of underlying deposits, in particular where the proposed development is sited, to inform detailed design and suitable micro-siting of the proposed development civil infrastructure.

10.7.4 If there are assessed to be potential effects to surface watercourses or groundwater, baseline water quality monitoring will be undertaken as required. A Water Quality Monitoring Plan (WQMP) will be prepared and agreed with SBC, in consultation with SEPA, prior to commencement of construction. It is anticipated that this will include a programme of pre-construction monitoring, over a period to be set out in the plan.

**Construction**

10.7.5 Following review of best practice outlined in relevant guidance and legislation a detailed CEMP will be compiled. The Principal Contractor will implement measures outlined within the CEMP, as agreed with relevant consultees. An Environmental Clerk of Works (ECoW) would be based onsite to verify measures undertaken. This would also include a construction method statement, which would account for:

- Pollution Risk Assessment;
- Identification of Controlled Waters and temporary discharge points to these watercourses;
- Planning and design of dewatering activities to minimise the local drawdown;
- Planning and design of pollution control measures, such as drip trays, bunds and spill kits, in particular during earthworks;
- Storage of fuel and chemicals in a designated area in accordance with best practice procedures, outwith 50m watercourse buffers;
- Designated area for concrete batching, 100m from watercourses;
- Pollution control system management, including dewatering of excavations;
- Contingency planning and emergency procedures; and
- Ongoing monitoring of construction procedures.

10.7.6 Embedded measures within the CEMP to prevent sedimentation pollution and erosion will include:

- All earthworks would be carried out in accordance with BSI Code of Practice for Earth Works BS6031:2009;
- Stockpiles will be placed at least 50m from watercourses. The height and maximum slope angle will be in accordance with BSI guidance. Where there are stockpiles of peat, re-wetting will occur to prevent peat drying out. Sediment pollution mitigation measures, including swales will be implemented at the base of stockpiles.
- Sediment pollution mitigation measures will be emplaced across the proposed development, this may include: drainage; silt fencing; settlement ponds; and check dams.
- Plant movements will be minimised through management measures. Measures to prevent sediment on public roads may include wheel washing or road sweeping at the site entrance.
- Any CAR licences required for site discharges or watercourse crossings will be applied to from SEPA prior to construction.
- A ‘wet weather policy’ will be in place, given that there are likely to be periods of significant rainfall at the site. The policy will include that site management checks local weather forecast daily, regularly checks and maintains pollution control system and suspends work during adverse conditions.
- Where topography dictates that working platforms are needed, these would be formed to ensure that surface water drains away from watercourses.
- To avoid unnecessary compaction and disturbance to site soils, working areas and corridors would be established and demarcated, with construction operatives appropriately inducted and trained to avoid work outside the designated work areas.

10.7.7 Embedded measures within the CEMP to prevent chemical pollution include:

- Dewatering at the wind turbine will be minimised through careful management and reducing the time the excavation is open, including concrete pouring.
- A method statement to address the transport, transfer, handling and pouring of concrete at foundations will be undertaken by the Principal Contractor.
- Cement, grout and unset concrete will not be allowed to enter the water environment. No operations involving concrete transfer will take place within 50m of watercourses.
- There will be no washing out of vehicles used for concrete delivery or washing of vehicles within 50m of watercourses.
- Fuel and chemicals will be stored in impermeable bunded containers at least 110% of the volume stored. All fuelling on-site will occur in a designated location, at least 50m from watercourses.
- Spill kits will be stored across the site and within all vehicles and plant. On-site toolbox talks with construction staff will include to report all on-site spills and the correct implementation of spill kits.
- All vehicles and plant will be checked regularly with regular maintenance undertaken as required.

10.7.8 Embedded measures within the CEMP to enable surface water drainage management include:

- A suitable surface water drainage strategy with detailed drainage design will be prepared and agreed prior to construction, but the following outline measures will be included.
- Identified watercourse crossings in **Technical Appendix 10.3** will be designed to convey flows of 0.5%AEP (1:200yr) plus climate change, to prevent exacerbating downstream flood risk.
- Track-side swales will be designed to ensure separation of clean water from potentially contaminated water.
- Check dams will be employed to slow down the flow of water and decrease erosion within drainage swales.

- Sumps and settlement ponds will be used to treat and slow down the flow of water during periods of high rainfall. This will be employed at drainage outlets prior to reaching watercourses.
- Areas of excavation and earthworks will have drainage designed to drain to a sump to prevent pollution and increase surface water run-off.
- Hydrological connectivity between upslope and downslope will be maintained through cross-drainage and culverts.

## 10.8. Assessment of Residual Effects

### Construction

10.8.1 As noted above, no significant potential construction-phase environmental effects were identified, taking account of embedded and good practice mitigation. The level of potential effect assessed for all impacts are minor to negligible, excepting effects to PWS Longcroft which are considered to be moderate and are significant.

10.8.2 Additional mitigation required to ensure the continued water quantity at the supply, would include for a watching brief to be employed, with excavation to be closely monitored by onsite ECoW. If pipework associated with the PWS is identified this will be marked and a detailed design strategy to either lay the pipework under the track or redirect it, to maintain supply.

10.8.3 Following the implementation of additional mitigation measures at PWS Longcroft, the residual effects are considered to be minor and not significant.

### Operation

10.8.4 As noted above, no significant potential operational-phase environmental effects were identified, taking account of embedded and good practice mitigation. The level of potential effect assessed for all operational phase impacts is minor. No additional mitigation measures are considered to be necessary, therefore the residual effect significance for most impacts is unchanged, remaining as minor, and not significant.

### Decommissioning

10.8.5 The residual effects of the decommissioning phase will be similar to construction, however, due to reduced site activity, these will be of lesser magnitude.

## 10.9. Assessment of Cumulative Effects

10.9.1 Cumulative developments have been considered where they are located within the study area of 10km from the site. These developments are listed below in **Table 10.10.**

10.9.2 Operational developments are scoped out of consideration from cumulative effects. This is due to impacts to receptors being of greatest magnitude during the construction phase. There is little potential for substantial construction works to be planned on operational developments, and therefore no significant cumulative effects are likely to arise.

**Table 10.10 – Cumulative Developments Considered in the Assessment**

| Development | Phase | Distance to Development wind turbine (approx. km) | Surface Water Catchment |
|---|---|---|---|
| Ditcher Law Wind Farm | Application | 1km | River Tweed |
| Dunside Wind Farm | Application | 3km | Whiteadder Water – located upslope of proposed development. |
| Newlands Hill Wind Farm | Scoping | 6km | Whiteadder Water - located upslope of proposed development. |

10.9.3 As identified in **Table 10.10**, Ditcher Law Wind Farm is the only cumulative development within 10km that is also within the same hydrological catchment as the proposed development, the River Tweed.

10.9.4 Within the Ditcher Law Wind Farm submitted EIA Report, the hydrology and hydrogeology chapter considered impacts to receptors to be not significant following implementation of mitigation measures. The application documents for Ditcher Law Wind Farm has included a CEMP and a schedule of mitigation which details the implementation of the following measures:

- Implementation of a 50m watercourse buffer
- Methods for water control and drainage from areas of hardstand, with drainage to remain in place during the operational phase.
- Good practice construction techniques to include Sustainable Drainage Systems (SuDS) where applicable, to help attenuate and treat runoff.
- Implementation of silt traps and settlement ponds, and a maintenance schedule for all SuDS and drainage assets installed.

- Implementation of a Pollution Prevention Plan.
- Implementation of Water Quality Monitoring Plan (WQMP) at watercourses downstream of the proposed development.

10.9.5 It is considered that the cumulative effects on identified receptors will be no greater than minor (not significant) and no additional mitigation measures are therefore required.

## 10.10. Summary

10.10.1 The site is located within the catchments of the River Tweed within the Solway Tweed River Basin District. The tributaries of the River Tweed, the Whalplaw Burn and Soonhope Burn are located on-site and have a SEPA WFD overall status of 'Good'.

10.10.2 The bedrock beneath the site consists of sedimentary rocks of the Gala Group with igneous intrusions present. Superficial deposits where present comprise alluvium located along watercourses and till located upslope. The peatland is identified as Class 5 peatland according to the Carbon and Peatlands Map 2016.

10.10.3 Extensive peat probing surveys found highly localised peat deposits in the north and east of the site, which have been largely avoided through layout design iterations of the proposed development.

10.10.4 A PLHRA has identified that there are no areas within influencing distance of proposed development exceeding a likelihood score of 'low'. With the much of the site classified as having negligible likelihood of a peat landslide occurring.

10.10.5 While 8 PWS were scoped into further assessment, following implementation of guidance and best practice measures, only 1 PWS is considered to require additional mitigation. As pipework associated with PWS Longcroft may underlie the proposed track, a watching brief including slow excavation monitored by the onsite ECoW has been included.

10.10.6 Potential construction and operational effects include changes to surface water and groundwater flow and quality, compaction of soils, and impacts to designated sites.

10.10.7 The mitigation measures set out in this chapter will be included within a CEMP prior to commencement of construction activities. These mitigation measures are considered to be robust and implementable and will reduce the potential impacts on watercourses and groundwater. A programme of water quality monitoring would also be implemented.

10.10.8 The significance of residual effects on geology, peat, hydrology and hydrogeology receptors following the implementation of these mitigation measures are considered to be Minor to Negligible and therefore not significant. Potential effects, mitigation measures and residual effects are summarised in **Table 10.11**.

**Table 10.11 – Summary of Residual Effects**

| Likely Significant Effect | Mitigation | Means of Implementation | Residual Effect |
|---|---|---|---|
| **Construction** | | | |
| Impacts on Surface Water Quality | • Minimum 50m buffer from watercourses.<br>• Use of existing infrastructure as far as practicable.<br>• Implementation of mitigation measures in CEMP.<br>• PPP to be agreed and implemented.<br>• Final design of watercourse crossings to be implemented.<br>• Any PWS pipework will be marked and avoided with a detailed design strategy to ensure continuation of supply.<br>• Dewatering undertaken for as short a time as practicable.<br>• Pre-construction ground investigation works.<br>• Water Quality Monitoring Plan (WQMP) to be agreed and implemented.<br>• Siting civil infrastructure to minimise peat excavation requirements.<br>• Management, storage and restoration in line with best practice guidance, detailed in CEMP. | • Embedded design.<br>• Good practice mitigation measures.<br>• Implementation by Principal Contractor.<br>• Verification by ECoW. | Minor |
| Impacts to Groundwater Flow | | | Minor |
| Impacts to Groundwater Quality | | | Minor |
| Compaction of Soils | | | Negligible |
| Private Water Supplies | | | Minor |
| Impacts to Designated Sites (River Tweed SAC, SSSI) | | | Minor |
| Removal and Impact on Peat | | | Negligible |
| Peat Landslide Impact on Watercourses | | | Negligible |
| **Operational** | | | |
| Impacts on Surface Water Flow | | • Embedded design. | Minor |

| Likely Significant Effect | Mitigation | Means of Implementation | Residual Effect |
|---|---|---|---|
| Impacts on Fluvial Geomorphology | • Embedded design and good practice mitigation.<br>• PPP, to include track-side and cross drainage.<br>• Regulation of watercourse crossings by CAR, to include maintenance and removing any blockages<br>• Implement best practice and correct storage of fuels and management plans in the event of spills.<br>• Embedded design and good practice mitigation. | • Good practice mitigation measures | Minor |
| Impacts on Groundwater Flow and Drying out of Peat | | | Minor |
| Impacts on Surface Water Quality | | | Minor |
| Decommissioning | | | |
| All decommissioning effects are assessed as being the same as, or lesser than, construction phase effects | | | |

## 10.11. References


- BGS (2020) Online GeoIndex Map Viewer. Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html Accessed on: 11 October 2023.
- British Standards Institute (2015). BS5930:2015 Code of Practice for Site Investigation.
- CIRIA. (2001). C532 Control of water pollution from construction sites: guidance for consultants and contractors. CIRIA, London.
- CIRIA. (2015). C741 Environmental Good Practise on site guide. 4th Edition. CIRIA, London.
- NatureScot. (2019). Good practice during wind farm construction, 4th edition. Available at: https://www.nature.scot/guidance-good-practice-during-wind-farm-construction Accessed on: 11 October 2023.
- NatureScot (2022) SiteLink Map Search. Available at: https://sitelink.nature.scot/map Accessed on: 11 October 2023.
- Scottish Environment Protection Agency (2022) Scotland's Environment Map. Available at: https://www.environment.gov.scot/maps/scotlands-environment-map/ Accessed on: 11 October 2023.
- Scotland's Soils (2022) Carbon and Peatland Map 2016. Available at: https://map.environment.gov.scot/Soil_maps/?layer=1# Accessed on: 11 October 2023.
- Scotland's Soils (2022) National Soil Map of Scotland. Available at: https://map.environment.gov.scot/Soil_maps/?layer=1# Accessed on: 11 October 2023.
- Scottish Government (2006). The Private Water Supplies (Scotland) Regulations 2006. Available at: https://www.legislation.gov.uk/ssi/2006/209/contents/made Accessed on: 11 October 2023.
- Scottish Government (2009). Flood Risk Management (Scotland) Act 2009. Available at: https://www.legislation.gov.uk/asp/2009/6/contents Accessed on: 11 October 2023.
- Scottish Government (2009). The Contaminated Land (Scotland) Regulations 2000 (as amended). Available at: https://www.legislation.gov.uk/ssi/2000/178/contents/made Accessed on: 11 October 2023.
- Scottish Government (2009). The Scottish Soil Framework. Available at: https://www.gov.scot/publications/scottish-soil-framework/ Accessed on: 11 October 2023.
- Scottish Government (2011). The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available at: https://www.legislation.gov.uk/ssi/2011/209/contents/made Accessed on: 11 October 2023.
- Scottish Government (2011). Water Environment and Water Services (Scotland) Act 2003. Available at: https://www.legislation.gov.uk/asp/2003/3/contents Accessed on: 11 October 2023.
- Scottish Government (2013). The Water Resources (Scotland) Act 2013. Available at: https://www.legislation.gov.uk/asp/2013/5/enacted Accessed on: 11 October 2023.
- Scottish Government (2017). The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made Accessed on: 11 October 2023.

- Scottish Government, SNH, SEPA (2017). Guidance on Developments on Peatland. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2018/12/peatland-survey-guidance/documents/peatland-survey-guidance-2017/peatland-survey-guidance-2017/govscot%3Adocument/Guidance%2Bon%2Bdevelopments%2Bon%2Bpeatland%2B-%2Bpeatland%2Bsurvey%2B-%2B2017.pdf Accessed on: 11 October 2023.
- Scottish Government (2017). Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments. Available at: https://www.gov.scot/publications/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/documents/ Accessed on: 11 October 2023.
- Scottish Government (2017). The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/282/contents/made Accessed on: 11 October 2023.
- Scottish Government (2020). Scottish Planning Policy. 2020. Available at: https://www.gov.scot/publications/scottish-planning-policy/ Accessed on: 11 October 2023.
- Scottish Government. (2022). Planning Advice Notes. Available at: https://www.gov.scot/collections/planning-advice-notes-pans/ Accessed on: 11 October 2023.
- Scottish Government (2022) National Planning Framework 4: revised draft. Available at: https://www.gov.scot/publications/national-planning-framework-4-revised-draft/pages/3/Scottish Renewables, SEPA (2012). Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste. Available at: https://www.gov.scot/publications/assessment-of-peat-volumes-reuse-of-excavated-peat-and-minimisation-of-waste-guidance/ Accessed on: 11 October 2023.
- SEPA. (2009). Groundwater Protection Policy for Scotland, Version 3 Environmental Policy Number 19. Available at: https://www.sepa.org.uk/media/34371/groundwater-protection-policy-for-scotland-v3-november-2009.pdf Accessed on: 11 October 2023.
- SEPA (2017) Developments on Peat and Off-Site Uses of Waste Peat. Available at: https://www.sepa.org.uk/media/287064/wst-g-052-developments-on-peat-and-off-site-uses-of-waste-peat.pdf Accessed on: 11 October 2023.
- SEPA. (2017). Land Use Planning System SEPA Guidance Note 31 Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf Accessed on: Accessed on: 11 October 2023.
- SEPA. (2017). Land Use Planning System SEPA Guidance Note 4. Available at: https://www.sepa.org.uk/media/136117/planning-guidance-on-on-shore-windfarms-developments.pdf Accessed on: 11 October 2023.
- SEPA (2019) Technical Flood Risk Guidance for Stakeholders. Available at: https://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf Accessed on: 14 August 2023.
- SEPA. (2020). Online Water Environment Hub and Classification Hub. Available at: https://www.sepa.org.uk/data-visualisation/water-environment-hub/ Accessed on: 11 October 2023.
- SEPA. (2021). Supporting Guidance (WAT-SG-75) – Sector Specific Guidance: Construction Sites. Available at: https://www.sepa.org.uk/media/340359/wat-sg-75.pdf Accessed on: 11 October 2023.
- SEPA (2022) Flood Maps. Available at: https://map.sepa.org.uk/floodmaps Accessed on: 11 October 2023.
- SEPA (2022). Guidance for Pollution Prevention. Available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/guidance-for-pollution-prevention-gpps-full-list/ Accessed on: 11 October 2023.
- SEPA. (2022). The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) A Practical Guide, Version 9.1. Available at https://www.sepa.org.uk/regulations/water/ Accessed on: 11 October 2023.
- The Scottish Borders (2018) The Scottish Borders Local Development Plan (SBLDP Available at: https://www.scotborders.gov.uk/info/20051/plans_and_guidance/121/local_development_plan Accessed on: 11 October 2023.
- UK Government (1990). Environmental Protection Act 1990. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents Accessed on: 11 October 2023.
- UK Government (1994). The Conservation (Natural Habitats, & c.) Regulations (1994, as amended Scotland). Available at: https://www.legislation.gov.uk/uksi/1994/2716/contents/made Accessed on: 11 October 2023.
- UK Government (1995). Environment Act 1995. Available at: https://www.legislation.gov.uk/ukpga/1995/25/contents Accessed on: 11 October 2023.