9 Hydrology and Hydrogeology

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9 Hydrology & Hydrogeology

9.1 Executive Summary

9.1.1 This chapter considers the effects of the Proposed Development on hydrology and hydrogeology. It details the relevant legislation, policy and guidelines and the consultation carried out to inform the assessment. Site survey work has been undertaken in two phases to inform this assessment and the design layout.

9.1.2 The baseline hydrology and hydrogeology has been established through a desk study and survey work. The majority of the site drainage is anticipated to flow to Allt Saigh, either directly or via the Allt Carn Choire Rainich or smaller unnamed watercourses. The west of the Site is included within the Allt Bhlaraidh catchment. The Site extends into the River Moriston catchment in the south however the large majority of the Site area is assessed as not being in hydraulic connectivity to the River Moriston. The River Moriston is also a Special Area of Conservation (SAC). The potential flood risk to the Site is considered to be low.

9.1.3 The hydrogeology at the Site comprises low productivity bedrock aquifers. It is anticipated that there is an absence of substantial groundwater within the superficial deposits in the Turbine Development Area (defined below in Section 9.2.2). There may be potentially localised groundwater within areas of glacial and glaciofluvial deposits with higher proportions of sand and gravel content in the south which are located along the existing access track and at the proposed construction compound location.

9.1.4 It is considered that potential Ground Water Dependent Terrestrial Ecosystems (GWDTEs) at the Proposed Development are not dependent on groundwater and instead are fed by surface water run-off and incident rainfall.

9.1.5 Private Water Supplies (PWS) within the study area have been considered in this assessment. The study area has incorporated the area within the Site and also considers any potential hydrological and hydrogeological effects up to 1km from the Site. Consideration has also been given to PWS which are out with the study area but may be in hydraulic continuity with the Site. All groundwater sources are sufficiently distanced from the Proposed Development and given the geological site setting there is no risk to these supplies. All surface water sources are located at least 1000m from any proposed infrastructure, however, they are in continuity with the Proposed Development with respect to hydraulic continuity and / or locality to the existing access track.

9.1.6 Mitigation has been detailed and includes embedded mitigation e.g. existing tracks have been incorporated into the site design as far as possible, the number of watercourse crossings has been minimised as far as reasonably possible and a 50m buffer has been maintained around all surface watercourses shown on Ordnance Survey (OS) 1:50,000 scale mapping, with some exceptions. During the construction phase good practice measures will be in place to avoid or minimise the pollution impact from silt-laden run-off and chemical contaminated run-off and a water quality monitoring programme will be implemented to record the existing water condition and ensure no deterioration to water quality during construction. Mitigation will also be in place to reduce the impact of the construction phase on the integrity of watercourse banks. During the operational phase, water quality mitigation measures will be included as part of the permanent drainage design and run-off from the Site will be managed and monitored as part of an Operational Environmental Management Plan (OEMP).

9.1.7 Potential effects on hydrological and hydrogeological receptors, taking account of the above-noted embedded mitigation, have been assessed as negligible to minor adverse and not significant and thus no further additional mitigation has been required. The significance of residual effects on hydrological and hydrogeological receptors is considered to be negligible to minor adverse and not significant.

9.2 Introduction

9.2.1 This chapter considers the effects of the Proposed Development on hydrology and hydrogeology. It assesses the current baseline conditions and identifies potential alteration of run-off rates and volumes of surface water, sediment regime and water quality of the surface water environment. It will also assess the current baseline conditions of the hydrogeology and identifies the aspects of the Proposed Development which may affect the hydrogeology. This includes the effects on groundwater levels, groundwater flows, groundwater quality and GWDTE. The effect on PWS, both surface water and groundwater sourced, will also be assessed.

9.2.2 The Proposed Development will extend the Operational Development onto the adjoining land to the east (referred to as the Turbine Development Area).

9.2.3 A Watercourse Crossing Schedule has been prepared detailing proposed crossings types for identified watercourse crossings within the Proposed Development design and is included as Appendix 9.1.

9.2.4 A Flood Risk Assessment (FRA) has been undertaken and supports this chapter (refer to Appendix 9.2). This provides a detailed overview of the existing hydrological and hydrogeological regime of the local area and site setting and a comprehensive assessment of all potential sources of flooding.

9.3 Legislation, Policy and Guidelines

Legislation

9.3.1 Regulation of activities relating to the water environment in Scotland is the responsibility of the Scottish Environment Protection Agency (SEPA) and the relevant local authorities.

9.3.2 Relevant legislation and guidance documents at local, national and international scale have been reviewed and taken into account as part of this hydrological and hydrogeological assessment. Of particular relevance are:

- The European Union (EU) Water Framework Directive (WFD), which has been implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003 (WEWSA). This Act introduced a regulatory system for the water environment with SEPA as the lead authority working alongside the public, private and voluntary sectors. The Act ensures that all human activities with the potential to cause a harmful effect on the water environment can be controlled by establishing a framework for co-ordinated controls on water abstraction and impoundment, engineering works affecting watercourses, and discharges to the water environment.
- The European Commission (EC)'s Groundwater Directive provides specific measures to protect groundwater against pollution and deterioration. This Directive is implemented through the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) (as amended), introduced under WEWSA to provide the main regulatory controls for protecting the water environment from harm. CAR introduced specific controls for activities affecting watercourses and waterbodies (both surface water and groundwater).
- SEPA maintains water monitoring and classification systems that provide the data to support the aim of the WFD, namely that all waterbodies would have good ecological status, or similar objective, by 2015. The River Basin Management Plan for the Scotland River Basin District: 2015-2027 (Scottish Government, 2015) provides an assessment of the condition of the water environment, building on the first river basin plans and sets new objectives for improving the water environment over 12 years. The classification system covers all rivers, lochs, transitional, coastal and groundwater bodies.
- The Water Resources (Scotland) Act 2013 makes provision for the development of Scotland's water resources.

- The Flood Risk Management (Scotland) Act 2009 provides a coordinated approach to manage flood risk at a national and local level.
- The Private Water Supplies (Scotland) Regulations 2006 helps ensure the provision of clean drinking water from private sources.

Planning Policy

9.3.3 The policies set out below include those from The Highland Wide Local Development Plan (HwLDP) which is a plan for the Highland Council Area as a whole and addresses the wider needs of the Highland Council (THC). The relevant policies are:

- Policy 63 Water Environment. This policy relates to the water environment and states that the council will support proposals for development that do not compromise the objectives of the Water Framework Directive. The council will consider the River Basin Management Plan for the Scotland River Basin District and the associated area management plans. The water environment includes rivers and burns, lochs, canals, coastal and transitional waters (e.g. estuaries) wetlands and groundwater.
- Policy 64 Flood Risk. This policy sates that development proposal should avoid areas susceptible to flooding and promote sustainable flood management. A Flood Risk Assessment or submission of other suitable information demonstrating compliance with Scottish Planning Policy (SPP) may be required for development proposals at risk of flooding.
- Policy 66 Surface Water Drainage: This policy states that Sustainable Drainage Systems (SuDS) should be designed in accordance with The SuDS Manual (CIRIA C697) and, where appropriate, the Sewers for Scotland Manual 4th Edition must be used to drain all proposed development. Submission of planning applications should be informed by PAN 69: Planning and Building Standards Advice on Flooding paragraphs 23 and 24.
- Policy 67 Renewable Energy Developments. This policy is relevant to the hydrology and hydrogeology of the Site. It lists multiple aspects that the council will consider for the support of Renewable Energy Developments, including any significant effects on ground and surface water.

9.3.4 Greater detail on how the outcomes set out in the HwLDP can be delivered at a more local level are provided in three additional Area Local Development Plans. These address local policy and spatial issues. The Proposed Development is located within the Inner Moray Firth LDP area. There are not any specific policies or proposals within the Inner Moray Firth LDP that are relevant to the Site.

9.3.5 Relevant aspects of the Scottish Planning Policy (SPP), Planning Advice Notes (PAN) and other relevant guidance has also been considered. Of relevance to the hydrological and hydrogeological assessment presented within this chapter are the following polices:

- PAN 51: Planning, Environmental Protection and Regulation (Scottish Executive, 2006);
- Scottish Government Online Planning Advice on Flood Risk (2015);
- PAN 79: Water and Drainage (Scottish Executive, 2006) and
- Scottish Planning Policy (Scottish Government, 2020).

Guidance

9.3.6 The following relevant guidance / best practice guidance has been considered as part of the assessment of hydrology and hydrogeology and provision of appropriate mitigation measures:

- THC Supplementary Guidance: Flood Risk and Drainage Impact Assessment (The Highland Council, 2013);

- Scottish Natural Heritage (SNH), SEPA and Forestry Commission Scotland (2019): Good Practice During Wind Farm Construction;
- SEPA Pollution Prevention Guidance (PPGs) and the emerging replacement series of Guidance for Pollution Prevention (GPPs). The following PPGs and GPPs have been considered to be of particular relevance as part of this assessment:
  - PPG 1: Understanding your environmental responsibilities – good environmental practices (2013); and
  - GPP 5: Works and maintenance in or near water (2017).
- SEPA Guidance Note 2a: Development Management Guidance on Flood Risk (2018);
- SEPA Guidance Note 4: Planning advice on wind farm developments, LUPS-GU4 (SEPA, 2017);
- SEPA Guidance Note 31: Guidance on assessing the impacts of development proposals on groundwater abstractions and groundwater dependent terrestrial ecosystems (SEPA, 2014);
- SEPA Policy 19: Groundwater Protection Policy for Scotland (Version 3, 2009);
- SEPA Policy 41: Planning Authority Protocol - Development at Risk of Flooding: Advice and Consultation (2016);
- SEPA (2010) Good Practice Guide, River crossings, 2nd edition;
- SEPA (2011) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) A Practical Guide, Version 8.4;
- Technical Flood Risk Guidance for Stakeholders - SEPA Requirements for Undertaking a Flood Risk Assessment (Version 12, 2019);
- Construction Industry Research and Information Association (CIRIA) C532: 'Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors' (CIRIA, 2001);
- CIRIA C648: 'Control of Water Pollution from Linear Construction Projects – Technical Guidance' (CIRIA, 2006);
- CIRIA C741: 'Environmental good practice on site guide' 4th edition (CIRIA, 2015);
- CIRIA C786: 'Culvert, screen and outfall manual' (CIRIA, 2019);
- CIRIA C698: 'Site handbook for the construction of SUDS' (CIRIA, 2007); and
- CIRIA C753: 'The SuDS Manual' (CIRIA, 2015).
- Scottish Government (2012) River Crossing and Migratory Fish: Design Guidance Consultation

9.3.7 Consultations of particular relevance to this assessment were undertaken with regulatory bodies and key stakeholders including SEPA. The parties consulted and a summary of the key information received is presented in Table 9.1.

Table 9.1 – Summary of Consultation Responses

Consultee	Summary Response	Comment/ Action Taken
Scottish Water	Note the following: - The proposal is within a drinking water catchment where a Scottish Water abstraction is located. Loch Ness supplies Invermoriston Water	No action required.

Consultee	Summary Response	Comment/ Action Taken
	Treatment Works and it is essential that water quality and water quantity in the area are protected. It is a relatively large catchment and the activity is sufficient distanced from the intake that it is likely to be low risk. - Will not accept any surface water connections into combined sewer system. - The Applicant should identify any potential conflicts with Scottish Water assets and contact Asset Impact team directly.	Given the remote setting of the Site, no sewer connections will be made and no conflicts with Scottish Water assets are anticipated.
SEPA	Requested a copy of NVC results to provide detailed advice. Where impacts on the water environment cannot be avoided then justification must be provided. Requested plan(s) showing the following: - All proposed temporary or permanent infrastructure overlain with all watercourses and lochs. - 50m buffer around all water features - Detailed layout of proposed mitigation including cut off drains and settlement ponds. - GWDTE locations and distance from excavations. - Location of existing and/or any proposed water abstractions. Provided reference to relevant regulatory requirements and good practice guidance. GWDTEs are protected under the Water Framework Directive and therefore the layout and design of the Proposed Development must avoid impact on such areas. The following information must be included in the submission: - A map demonstrating that all GWDTEs are outwith a 100m radius	SEPA have been consulted (Refer to Appendix 3.5) and the NVC data has been shared (email sent 11th December 2020). A full assessment of all identified hydrological and hydrogeological receptors is included in this chapter and impacts on these are minimised where possible. The assessment follows all relevant SEPA guidance. Outline drainage arrangements are discussed in 9.7.24 and detailed drainage design will be considered at post-consent stage during detailed design of all infrastructure. Plans and data with the requested detail relating to watercourses, water features, and potential GWDTE are included within the EIA Report where relevant.

Consultee	Summary Response	Comment/ Action Taken
	of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions. If micrositing is to be considered as a mitigation measure, the distance of survey needs to be extended by the proposed maximum extent of micrositing. The survey needs to extend beyond the Site boundary where the distances require it. - If the minimum buffers above cannot be achieved, a detailed site-specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all GWDTEs affected. Confirmed that potential GWDTE at the Site are either very unlikely to be groundwater dependent or are a significant distance from infrastructure. Accepts that small areas of saxifrage (M11) identified during site survey work are also not likely to be groundwater dependent in this setting but requests that they are shown on mapping as they are a locally unusual wetland (SEPA email response PCS/174301).	
THC	Impacts on watercourses, lochs, groundwater, other water features and sensitive receptors, such as water supplies, need to be assessed. Advised to consult with SEPA. EIA Report should identify all water crossings and include a table of watercourse crossings. The table should include details and photography of each watercourse impacted. EIA should identify and assess any private water supplies with the potential to be impacted.	Consultation has been undertaken with SEPA as part of the Scoping process. This chapter includes a detailed assessment of hydrology and hydrogeology impacts. A water crossing schedule is included as Appendix 9.1. A PWS risk assessment from surface water sources has been included within EIA Report.

9.4 Assessment Methodology and Significance Criteria

9.4.1 The criteria for defining the study area have been established based on the professional judgement and experience of the technical authors with regard to likely access and working areas, and with due consideration to the relevant guidance on hydrological and hydrogeological assessment.

Consultation

9.4.2 Consultation was undertaken with Scottish Water, SEPA and THC at the Scoping stage following initial consultation with THC during the Pre-Application process. Further consultation was undertaken with SEPA in December 2020 regarding watercourses and potential GWDTE. A summary of the consultation responses is provided is Table 9.1.

Study Area

9.4.3 The study area has incorporated the area within the Site and this assessment also considers any potential hydrological and hydrogeological effects up to 1km from the Site (refer to Figure 9.1).

9.4.4 PWS within the study area have been considered in this assessment. Consideration has also been given to PWS which are out with the study area but may be in hydraulic continuity with the Site.

9.4.5 The hydrology within the study area relevant to the Proposed Development has been reviewed, as shown on Figure 9.2 (Hydrological Overview). Associated environmental designations are shown on Figure 9.3 (Chapter Relevant Environmental Designations). The Livishie Hydro Scheme infrastructure locations are shown on Figure 1.2 (Wider Layout Plan).

Desk Study

9.4.6 Data was collected from the following sources in order to establish the catchment characteristics and baseline hydrogeological conditions beneath the Site:

- Current Ordnance Survey 1:50,000 scale mapping;
- Available aerial and topographical mapping;
- British Geological Survey (BGS). (2020). *Online Geology of Britain Viewer.* Available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html. Accessed on 14th January 2021.
- BGS. (2020). *Online GeoIndex Onshore*. Available at https://www.bgs.ac.uk/map-viewers/geoindex-onshore/. Accessed on 14th January 2021.
- Environmental Statement (ES) chapters and appendices relating to the Bhlaraidh Wind Farm (the Operational Development);
- Ecology survey findings and mapping, in particular National Vegetation Classification (NVC) survey to identify potential GWDTE;
- THC/SEPA data on locations of PWSs;
- SEPA. Scotland's Environment Web Map. Available at https://map.environment.gov.scot/sewebmap/. Accessed on 14th January 2021, for information on aquifer status and water quality (groundwater and surface water);
- SEPA listings of current and deregulated abstraction licences and discharge consents. Abstraction licence and discharge consent details will be obtained for an area covering the zones within which any PWSs could be affected by the wind farm;
- SEPA. (2021). Online Flood Map. Available at https://map.sepa.org.uk/floodmap/map.htm. Accessed on 14th January 2021

- SEPA (2015). River Basin Management Plan (RBMP) Interactive Map. Available at https://www.sepa.org.uk/data-visualisation/water-environment-hub/. Accessed on 14th January 2021
- Water quality and gauging station flow data obtained from SEPA; and
- UK Centre for Ecology and Hydrology. (2021). *Flood Estimation Handbook (FEH) Web Service*. Available at https://fehweb.ceh.ac.uk/GB/map. Accessed on 14th January 2021.

Site Visit

9.4.7 Site survey work has been undertaken in two phases. A first phase reconnaissance survey was carried out in 2019 to broadly understand the hydrological and hydrogeological baseline. This survey included a visual survey of watercourses and water bodies, site topography and observations on existing drainage.

9.4.8 A second stage survey was undertaken in July 2020 following further design development. This survey involved recording of key features and characteristics of watercourses and waterbodies which may be impacted by the development.

9.4.9 During this second stage survey several locations were identified for potential track realignment to avoid potentially significant crossings where possible and reduce design risk. Existing crossings beneath the hydro track were also identified and assessed and crossings which need replaced/upgraded as part of the track upgrade works were identified.

9.4.10 A PWS assessment was undertaken during the second stage survey. Based on the information form THC's PWS register, those properties within locality to the Site which were on private supplies were visited and assessed.

Assessment of Likely Effect Significance

9.4.11 The sensitivity of hydrological and hydrogeological receptors has been guided by the matrix presented in Table 9.2, which provides indicative criteria.

Table 9.2 – Sensitivity Criteria (Hydrology and Hydrogeology)

Sensitivity	Description
High	Areas containing hydrological features considered to be of national / international interest, for example, Aquatic Natura 2000 Sites, SACs, SSSIs. Highly permeable superficial deposits allowing free transport of contaminants to groundwater and surrounding surface waters. Wetland/watercourse of High or Good Ecological Status. High risk of flooding. Remote PWS source within 250m of any development.
Medium	Areas containing features of designated regional importance considered worthy of protection for their educational, research, historic or aesthetic importance. Moderately permeable superficial deposits allowing some limited transport of contaminants to groundwater and surrounding surface waters. Wetland/watercourse of Moderate Ecological Status. Moderate risk of flooding. Remote PWS source within 500m of any development.
Low	Features not currently protected and not considered worthy of protection.

Sensitivity	Description
	Low permeability superficial deposits likely to inhibit the transport of contaminants. Wetland/watercourse of Poor or Bad Ecological Status or no WFD classification. Low risk of flooding. Remote PWS source within 1000m of any development or further but in hydraulic continuity with development.

9.4.12 The criteria for sensitivity have been developed based on a hierarchy of factors relating to quality of the aquatic and geological environment including international and national designations, water and soil quality information, waterbody status from the WFD review work undertaken to date by SEPA, consultations, site visits, and the professional judgement of the assessment team.

9.4.13 The prediction and assessment of effects on hydrology and hydrogeology has been undertaken using a series of tables to document the various potential impacts from aspects of the construction and operational phases of the Proposed Development. Impacts have been predicted based on the guidance criteria for the magnitude of change set out in Table 9.3.

Table 9.3 – Magnitude of Change Criteria (Hydrology and Hydrogeology)

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 e.g. development resulting in increased flood risk, PWS source pollution (during and post construction), groundwater or surface water quality or permanent changes to local surface and groundwater flow regimes, permanent change to the water quality / quantity in designated sites containing hydrological features
Medium	Loss of, or alteration to, key features of the baseline resource such that post development characteristics or quality would be partially changed e.g. instream permanent bridge supports, temporary or non-material changes to local surface / groundwater flow regime, increased pollution potential / alteration of source volumes to remote PWS during construction only, localised change in groundwater or surface water quality and partial change to the water quality / quantity in designated sites containing hydrological features
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 (unmapped) watercourses / drains, temporary and / or very localised change in local surface / groundwater flow regime, very localised and temporary change in groundwater and surface water quality and. Possible although very low potential for change in PWS source quality / quantity. Possible although very low potential for change to the water quality / quantity in designated sites containing hydrological features
Negligible	A very slight change from baseline conditions, which is barely distinguishable, and approximates to the 'no-change' situation e.g. new site drainage discharge from developed SuDS scheme to receiving watercourse, new land drainage measures to maintain hydraulic continuity between upgradient and downgradient of development site and no / negligible development in PWS source catchment.

9.4.14 Using these criteria, potential effects resulting from the Proposed Development have been assessed. These effects are presented in Section 9.8. Details of generic and embedded (design-related) mitigation measures are given in Section 9.7 and any additional, site-specific mitigation measures, if required are given in Section 9.9. The remaining residual effects are detailed in Section 9.10.

9.4.15 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 receptor, was developed to provide a consistent framework for evaluation. This is shown in Table 9.4 below.

Table 9.4 – Significance of Effect Matrix

	Magnitude of Change			
Sensitivity of Receptor	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

9.4.16 The guideline criteria for the various categories of effect are provided in Table 9.5.

Table 9.5 – Significance (Hydrology and 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	Very slight or no detectable change to the environment.	A very slight change from baseline conditions, which is barely distinguishable, and approximates to the 'no-change' situation. No effects on geological resources, drainage patterns, surface and groundwater quality or aquatic habitats.

9.4.17 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.

9.4.18 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 taken into account. For this reason, the evaluation of the significance of effects in particular 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.

9.4.19 Cumulative effects have been accounted for through the prediction and evaluation of effects within the hydrological study area.

Requirements for Mitigation

9.4.20 Committed mitigation measures are presented within this chapter where the potential to affect sensitive hydrological or hydrogeological receptors has been predicted. These may include temporary effects from construction or permanent/longer term effects associated with the operational phase of the Proposed Development and its associated infrastructure. To a large extent, mitigation has been embedded or incorporated into the design process through appropriate siting of infrastructure, buffering of sensitive receptors, and stipulating good construction practice (refer to Section 9.7)

Assessment of Residual Effect Significance

9.4.21 An assessment of predicted residual effects on sensitive hydrological or hydrogeological receptors is presented within this chapter.

Limitations to Assessment

9.4.22 No water quality monitoring or intrusive investigation, other than peat depth survey work as described in Chapter 10 (Geology and Soils) has been undertaken to date.

9.5 Baseline Conditions

Environmental Designations

9.5.1 A review of environmental constraints relevant to this chapter highlighted that the River Moriston is a Special Area of Conservation (SAC), which is immediately out with the site boundary in the south and within the study area. The River Moriston is a designated SAC primarily as it as it supports a functional freshwater pearl mussel *Margaritifera margaritifera* population. The sensitivity of this receptor is considered to be high as per Table 9.2 (areas containing hydrological features considered to be of national / international interest are considered to have a high sensitivity). There are no other environmental designations within or immediately out with the Site that require assessment in this chapter.

9.5.2 Levishie Wood is a Site of Special Scientific Interest (SSSI) located approximately 60m from the Site where the access track is located. Levishie Wood SSSI has been designated as a SSSI for its upland birch woodland. This site is assessed in Chapter 5 (Ecology and Nature Conservation) and is not directly relevant to this chapter.

Hydrology

9.5.3 The Site features numerous watercourses and water bodies (refer to Figure 9.2). The largest water body is Loch a' Chrathaich adjacent to the western edge of the Site, into which the far western and south-western Site area extents drain. A series of smaller lochs and lochans are present across the rest of the Site, within complex topography meaning drainage will flow from various high points into these water bodies. The majority of the Site is anticipated to drain to the Allt Saigh, either directly or for the most part via the numerous smaller tributaries / sub-catchments to the Allt Saigh. The main watercourses within the study area are classed by SEPA as heavily modified water bodies (HMWB) and are discussed below.

9.5.4 Infrastructure of the Livishie hydro-electric scheme is located within the study area, including a dam at Loch a' Chráthaich and multiple intake locations. A dam is also located within the Allt Bhlaraidh but is located outwith the study area. A dam is located on the Allt Saigh, approximately 200m downstream of the Turbine Development area and within the study area. A dam and water outfall are also located at the Dundreggan Reservoir, upstream along the River Moriston outwith the study area (refer to Figure 1.2).

Catchment Overview

9.5.5 All turbines and associated infrastructure (hardstandings and turning heads), new track, existing Livishie Hydro track (required to be upgraded), hydro borrow pit search areas, borrow pit search

areas, the batching plant search area and the substation are located within the Allt Saigh catchment (refer to Figure 9.2).

9.5.6 The construction compound at the site entrance, although not new, will require construction activities and the reinstatement of the western half of it (refer to Figure 1.3). This construction compound was utilised during construction of the Operational Development and is located within the catchment of the River Moriston.

9.5.7 The Satellite temporary construction compound is located within the Allt Bhlaraidh catchment. This compound is located on the site of the former batching plant for the Operational Development, allowing the platform that remains beneath the reinstated layer to be utilised (refer to Chapter 2 (Design Iterations and Proposed Development)). Further construction activities will be required to form the compound for use during the construction of the Proposed Development.

9.5.8 The access tracks via the existing wind farm track are located within each of the above discussed catchments (Allt Saigh catchment, River Moriston catchment and the Allt Bhlaraidh catchment). However no major works are required on these tracks. As discussed above, the existing Livishie hydro track will be upgraded as part of the Proposed Development and is located within the Allt Saigh catchment.

Allt Saigh Catchment

9.5.9 The most substantial surface watercourse within the Study Area is the Allt Saigh, which flows roughly parallel to the existing hydro track within the Site. The majority of the construction activities are located on land which, as discussed in Section 9.5.5) eventually drains to Allt Saigh and its tributaries.

9.5.10 The Allt Saigh originates from an area to the east of Loch a'Chrathaich that includes Loch Carn Tarsuinn and a smaller unnamed lochan. It flows through multiple lochs in the upper areas of the catchment, within the Site. A dam within the Allt Saigh is located immediately upstream of Loch a' Mheig just outside the south-east of the Site. Beyond the dam, Allt Saigh continues to flow east, into Loch Ness approximately 4km east of the Site. Numerous smaller watercourses and drains flow from local high points and link the water bodies across the Site, ultimately draining to Allt Saigh. All these tributaries are unnamed with the exception of Allt Carn Choire Rainich which flows north to south in the east of the Site.

9.5.11 The named lochs and lochans included in the Allt Saigh Catchment and located within the Site are as follows;

- Loch Carn Tarsuinn;
- Loch nam Brathain;
- Lochan an Ruighe Dhuibh;
- Loch Liath;
- Loch an Dubhair;
- Loch Righ Guidh;
- Loch Carn Tarsuinn Beag;
- Loch na Feannaig; and
- Loch Coire na Rainich.

9.5.12 None of the above water bodies are classified by SEPA. In classifying lochs, SEPA include lochs with surface areas equal or larger than 0.5km^2.

9.5.13 Review of SEPA's River Basin Management Plan (RBMP) Interactive Map indicates that the Allt Saigh is designated as a heavily modified water body (HWMB) due to the hydroelectric dam situated on the watercourse. SEPA assess HWMB's on their ecological potential and whether the water bodies are managed (as far as reasonably possible) to support wildlife. The overall ecological potential of the Allt Saigh is classed as Good. Allt Saigh's access for fish migration, freedom from invasive species

and water quality are all classed as High for a HMWB. Water flows and levels and physical condition are both classed as Good for a HMWB.

Allt Bhlaraidh Catchment

9.5.14 The west of the Site is included within the Allt Bhlaraidh catchment, although no new infrastructure is proposed in these areas, existing infrastructure of the Operational Development is present that will facilitate access routes and the main construction compound. The satellite construction compound, located at the site of the previous batching plant for the Operational Development, is also located within this catchment (as discussed in Section 9.5.6 and Section 9.5.7). Allt Bhlaraidh originates approximately 5.4km west of the Site and flows predominantly south-east. Allt Bhlaraidh eventually flows into the River Moriston at a confluence approximately 560m south of the Operational Development access track and the Site. The River Moriston discharges into Loch Ness approximately 3.5km south-east of the Site.

9.5.15 With the exception of the lower stretches of the Site access track, the western extents of the Site will drain to the Allt Loch a' Chrathaich which discharges into Allt Bhlaraidh at a location adjacent to the existing access track. The headwaters of the Allt Loch a' Chrathaich catchment originate from Loch a' Chrathaich itself, located within the Operational Development and forms part of the Proposed Development Site, although no infrastructure is proposed within the catchment.

9.5.16 Review of SEPA environmental data indicates that the Allt Bhlaraidh is designated as a HWMB and its overall ecological potential is classed as Bad. Allt Bhlaraidh's access for fish migration, physical condition, freedom from invasive species and water quality are all classed as High for a HWMB. Water flows and levels are classed as Bad for a HMWB, due to water abstraction pressures associated with hydroelectricity generation, however this classification is expected to be Good by 2027.

9.5.17 Review of SEPA environmental data indicates that Loch a' Chrathaich is designated as a HWMB and its overall ecological potential is classed as Good. The access for fish migration, freedom from invasive species and water quality are all classed as High for a HMWB. Water flows and levels and physical condition are both classed as Good for a HMWB.

River Moriston Catchment

9.5.18 A roughly east-west trending ridge to the south of the Turbine Development Area separates the majority of the Site from the River Moriston and its tributaries. Based on this and the above observations regarding the contributing Allt Bhlaraidh catchment, the large majority of the Site is assessed as not being in hydraulic connectivity to the River Moriston to the south with the exception of the lower part of the existing access track and construction compound.

9.5.19 Review of SEPA's River Basin Management Plan (RBMP) Interactive Map indicates that the River Moriston component relevant to this assessment (ID:23381 River Moriston – Loch Ness to Dundreggan Dam) is designated as a HMWB with an overall condition of Good. The access for fish migration, freedom from invasive species and water quality are all classed as High. Water flows and levels and physical condition are both classed as Good. SEPA's environmental mapping classifies this component of the River Moriston as having moderate ecological potential.

Watercourse Crossings

9.5.20 A watercourse crossing survey was carried out in July 2020 to identify existing and new crossings. The locations of these proposed water crossings are shown on Figure 9.4. Indicative watercourse crossing details and recommendations are included in Appendix 9.1: Watercourse Crossing Schedule.

9.5.21 Watercourse crossings identified on OS 1:50,000 mapping were assessed during the Site walkover. A total of eight crossings were identified from the mapping and assessed. All crossings are required and unavoidable given the site setting and other site constraints.

9.5.22 The majority of the existing crossings beneath the hydro track are required for drainage continuity, allowing the upgradient areas south of the track to continue draining north to the Allt Saigh. This

track will need to be upgraded to wind farm specification and given the expectant increased loading from construction traffic, the majority of these culverts will also need to be upgraded.

9.5.23 A total of 28no. additional crossings have been identified along the proposed track routes originating from minor watercourses (not shown on OS 1:50,000 mapping) and discrete watershed pathways which are common in upland areas. For discrete drainage pathways such as these, providing drainage continuity within the track drainage design will suffice in most instances, this is likely to be in the form of closed culverts. For more defined minor watercourses, a specific crossing would be required, and these are outlined in the Watercourse Crossing Schedule (Appendix 9.1).

Overall Hydrological Sensitivity

9.5.24 For the purposes of this assessment the overall sensitivity of baseline hydrological resources at this Site is considered to be high, reflecting the Good classification of the Allt Saigh, Loch a'Chrathaich and the River Moriston and considering the River Moriston is a SAC. It is noted that the Allt Bhlaraidh is recorded as having a Bad classification (because of water levels and flows) and having a low ecology potential though this is anticipated to increase to a Good classification in 2027 and long term. The majority of the Turbine Development Area, with the exception of 3no. turbines and associated 3.5km access track (which includes approximately 2.4km of upgraded hydro track and approximately 1.1km of new track), will drain to upgradient components of the Allt Saigh, i.e. minor tributaries and sub-catchments.

Hydrogeology

9.5.25 The 1:50,000 BGS Superficial Geology Map from the BGS Onshore GeoIndex Viewer indicates that superficial cover is absent across the majority of the Site, suggesting that bedrock is at or close to the surface. This is supported by Site reconnaissance survey work, during which bedrock outcrops were observed frequently across the Site. Stage 1 and Stage 2 peat probing surveys have been undertaken by others to inform the iterative design process (refer to Chapter 10 (Geology and Soils)). These surveys found that peat depth varied across the Site, but most of the peat was found to be less than 1.0m (92% of probe locations). Further details can be found in Chapter 10 (Geology and Soils). Peat would be expected to have low permeability and inhibit groundwater flow.

9.5.26 The areas in the south of the Site where the existing access track is located are covered in parts with Devensian Till, Devensian Hummocky Glacial Deposits consisting of diamicton sand and gravel and Devensian Glaciofluvial Sheet Deposits consisting of sand, gravel and boulders.

9.5.27 The 1:50,000 BGS Bedrock Geology Map from the BGS Onshore GeoIndex Viewer indicates that the solid geology underlying the Site comprises Psammite and interbedded Psammite and Semipelite, all recorded as low productivity aquifer with small amounts of groundwater in near surface weathered zones and secondary fractures. Given the nature of the bedrock geology, any groundwater within peat or other localised superficial deposits is unlikely to be in hydrological connectivity with deeper groundwater.

9.5.28 The BGS Onshore GeoIndex Hydrogeology Viewer indicates that the Site is underlain by rocks of the following aquifer groups:

- Loch Eil Group – recorded as a low productivity aquifer with small amounts of groundwater in near surface weathered zones and secondary fractures.
- Glenfinnan Group – recorded as a low productivity aquifer with small amounts of groundwater in near surface weathered zones and secondary fractures.

9.5.29 A review of the SEPA RBMP Interactive Map indicates that the Site is within a groundwater 'drinking water protection zone', as is the whole of the Scotland River Basin District but is not within a surface water 'drinking water protection zone'. The Site is underlain by the Northern Highlands water body which is classified as 'good' in terms of groundwater quality.

9.5.30 The overall sensitivity of groundwater resources at the Site is considered to be low, reflecting the limited superficial cover which is unlikely to be in hydrological continuity with the deeper

groundwater and the low productivity bedrock aquifer. It is noted that this groundwater is within a groundwater drinking water protection zone.

GWDTE

9.5.31 NVC and Phase 1 habitat surveys were completed in June 2019. This initial NVC survey data has now been refined considering Stage 2 peat probing completed in September 2020 and further field data collated during a peatland condition assessment survey undertaken in October 2020. Further details can be found in Chapter 5 (Ecology and Nature Conservation).

9.5.32 Potential GWDTE areas have been refined and is based on the refined NVC map (Figure 9.5). A 100m and 250m buffer around proposed infrastructure are included within Figure 9.5 as requested by SEPA (Table 9.1). Six potential GWDTEs were recorded:

- M15 *Scirpus cespitosus-Erica tetralix* wet heath;
- M15a *Scirpus cespitosus-Erica tetralix* wet heath, *Carex panicea* sub-community;
- M15b *Scirpus cespitosus-Erica tetralix* wet heath, typical sub-community;
- M15c *Scirpus cespitosus-Erica tetralix* wet heath, *Cladonia* sub-community;
- M15d *Scirpus cespitosus-Erica tetralix* wet heath, *Vaccinium myrtillus* sub-community; and
- M25a *Molinia caerulea-Potentilla erecta* mire, *Erica tetralix* sub-community.

9.5.33 The majority of infrastructure is situated on M15c, further details can be found in Chapter 5 (Ecology and Nature Conservation).

9.5.34 It is considered very unlikely that any potential GWDTEs are in fact groundwater dependent given its dry nature and the hydrogeological Site setting (underlying impermeable rocks generally without groundwater). Consultation with SEPA (SEPA email response PCS/174301, refer to Appendix 3.5) has confirmed that M15c is very unlikely to be groundwater dependent in this setting and does not need to be considered as a constraint to development. It is considered that the Proposed Development would not need to avoid impacts on these areas provided suitable drainage is installed for habitat continuity purposes. Therefore, the potential GWDTE taken forward for assessment are all potential GWDTEs listed above, minus the areas of M15c as in agreement with SEPA.

9.5.35 Two areas of M15b occur within 250m of the Proposed Development, one of which being approximately 175m north-east of the proposed turbine hardstanding for T09. Approximately half of this area of M15b is found along a minor tributary on the opposite side of the Allt Saigh and therefore is not in hydraulic continuity with the proposed infrastructure. The other half of the area is found down gradient from the proposed infrastructure along the Allt Saigh itself. Therefore, indirect impacts on this M15b area may be possible. However, it is also noted that the association with the Allt Saigh indicates that this area is surface water fed from flows associated with the Allt Saigh and not dependent on upgradient runoff. The second area of M15b is located in the west and occurs 48m at its closest point from the proposed access track at the junction between the Operational Windfarm track and the existing Livishie Hydro track. This area of M15b has been identified over several pockets of ground, all of which are located on the opposite side of the Operational Windfarm track to the hydro track which requires upgrading. These pockets of M15b are located at a higher elevation to the proposed track upgrades with the exception of the closest area located next to the track junction (on the opposite side) which is at approximately the same elevation to the hydro track. Therefore, direct and indirect impacts on this area are unlikely.

9.5.36 Taking into account the above and given the hydrogeological site setting, is it therefore considered that the areas of M15b are not likely to be groundwater fed and mitigation instead will only be required to ensure surface water drainage/hydraulic continuity to the M15b areas identified as being down gradient of proposed infrastructure.

9.5.37 A single area of M15d occurs within 250m of the proposed hydro track upgrading and two hydro borrow pit search areas in the south of the Site. The area is located 53m uphill from the Proposed Development at its closest point, therefore direct and indirect impacts are not considered to be

possible. A single area of M15a occurs within the 250m GWDTE buffer around the proposed hydro track upgrading and borrow pit search area in the south of the Site. The area is located 64m uphill from the Proposed Development at its closest point, therefore direct and indirect impacts are not considered to be possible. The other M17, M15 and M25a habitat locations are shown in Figure 9.6 and demonstrate that these potential GWDTE are suitably distanced from new infrastructure. SEPA have also noted that areas of other M15 habitat are a significant distance from infrastructure. Further details are provided in Chapter 5 (Ecology and Nature Conservation). Notwithstanding, all additional areas of potential GWDTE's are considered not likely to be groundwater fed given the reasons previously stated and are instead fed by surface water run-off and incident rainfall.

9.5.38 The updated NVC mapping has identified two small areas of M11 (*Carex demissa-Saxifraga aizoides* mire) – classed as potentially highly groundwater dependent (refer to Figure 9.5 and Figure 9.6). Given the hydrogeological site setting as discussed and the very limited extent of the habitat, it is unlikely that these small pockets of M11 are dependent on groundwater. Consultation with SEPA (email response PCS/174301, refer to Appendix 3.5) confirmed that M11 is not likely to be groundwater dependent in this location. However, they note that it is an unusual wetland habitat and therefore warrants some protection.

9.5.39 The track will be microsited, ideally down gradient where possible, to avoid these small patches of M11, and track drainage design will ensure hydraulic continuity is maintained. Micrositing will also seek to maximise the distance of infrastructure and associated construction working areas from these habitats.

9.5.40 Taking into account the above, it is therefore considered that all potential GWDTEs at the Proposed Development are not dependent on groundwater and instead are fed by surface water run-off and incident rainfall. As GWDTE are not present at the Proposed Development, impacts on GWDTE are not considered further.

Public and Private Water Supplies (PWS)

9.5.41 PWS were identified from the ES for the Operational Development and a review of THC's Private Water Supply Register. A summary of the PWS findings is presented in Table 9.6 and are shown in Figure 9.7. Following an initial desk study of the PWS locations, certain locations were visited to further understand the supplies and a summary of each location is detailed below.

Table 9.6 – Summary of PWS Survey Findings

PWS Identifier	Source NGR	Source Type	Notes
PWS01	240277 817896	Groundwater	Groundwater Borehole serving multiple properties at Levishie
PWS02	237419 817911	Surface Water	Sourced from Allt Loch a' Chrathaich
PWS03	237795 816887	Surface Water	Sourced from Allt Bhlaraidh
PWS04	238298 816844	Surface Water	Sourced from Caochan na Muic
PWS05	241640 817981	Groundwater / Spring	Groundwater spring serving properties at Achnaconeran
PWS06	245528 819187	Surface Water	Sourced from Allt Saigh
PWS07	245717 818999	Groundwater	Groundwater Borehole serving youth hostel

PWS01

9.5.42 PWS01 is located approximately 2km south of the Turbine Development Area and approximately 1km east of the Site access point. The source at this location is a groundwater borehole that serves multiple properties in the Levishie area. The location of the borehole is within the catchment of the Levishie Burn, a tributary to the River Moriston. The Levishie Burn is not in hydraulic continuity with any part of the Site and given that the source is groundwater fed, there is no risk to the source in terms of quality or quantity with respect to the Proposed Development.

PWS02

9.5.43 PWS02 is located approximately 100m west of the Site where the access track is located. The PWS source is taken from the Allt Loch a' Chrathaich immediately upstream of its confluence to the Allt Bhlaraidh. The contributing catchment to the source location is approximately 7km^2, with no proposed infrastructure within the catchment extents. Existing tracks to be used for the Proposed Development are located within the catchment extents and thus there is a low to negligible risk to the source in terms of water quality.

PWS03

9.5.44 PWS03 is located approximately 170m south-west of the Site where the access track is located and is taken from the Allt Bhlaraidh. The contributing catchment to the source location is approximately 26km^2, with no proposed infrastructure within the catchment extents. Existing tracks to be used for the Proposed Development are located within the catchment extents in the tributary of Allt Loch a' Chrathaich and thus there is a low to negligible risk to the source in terms of water quality.

PWS04

9.5.45 PWS04 is located approximately 260m south of the Site where the access track is located. The PWS source is from the Caochan na Muic minor tributary of the River Moriston. The contributing catchment to the source location is approximately 1.5km^2, with no proposed infrastructure within the catchment extents. Upstream of the source location, the watercourse passes beneath the existing tracks to be used for the Proposed Development and thus there is a low to negligible risk to the source in terms of water quality.

PWS05

9.5.46 PWS05 is located 1.8km south of the Turbine Development Area and 2.0km east of the Site access point. The source at this location is a groundwater spring that serves the properties in the Achnaconeran area known as Mountview. The spring is located adjacent to several minor tributaries to the River Moriston. These tributaries are not in hydraulic continuity with any part of the Site and given that the source is groundwater fed, there is no risk to the source in terms of quality or quantity with respect to the Proposed Development.

PWS06

9.5.47 PWS06 is located 4.4km east of the Site in an area known as Altsigh, located at the downstream discharge location of the Allt Saigh to Loch Ness. The source is taken from the Allt Saigh and THC's Private Water Supply Register indicated that this supply served three properties in the area. However, upon speaking with the residents it was advised that 2 of the properties had now switched to independent groundwater boreholes (similar to PWS07). The contributing catchment to the source location is approximately 27km^2 with the Proposed Development extents confined to the upper catchment, where the site boundary accounts for approximately 8km^2 of the Allt Saigh catchment and is located upstream of the dam located at Loch a' Mheig. The source is located at least 5km from any Proposed Development thus there is a low to negligible risk to the source in terms of water quality.

PWS07

9.5.48 PWS07 is located 4.6km east of the Site in an area known as Altsigh, located at the downstream discharge location of the Allt Saigh to Loch Ness. The source at this location is a groundwater

borehole and given the distance from the Proposed Development and geological site setting in terms of groundwater movement, there is no risk to the source in terms of quality or quantity with respect to the Proposed Development. The assessment of PWS07 is also applicable to the aforementioned groundwater boreholes supplies of the properties previously sourced from the Allt Saigh (PWS06), i.e., there is no risk to the source in terms of quality or quantity with respect to the Proposed Development.

Overall PWS Sensitivity

9.5.49 The overall sensitivity of PWS at and around the Site is considered to be low / negligible. All groundwater sources are sufficient distance from the Proposed Development and given the geological site setting there is no risk to these supplies. All surface water sources are located at least 1000m from any proposed infrastructure, however, are in continuity with the Proposed Development with respect to hydraulic continuity and / or locality to the existing access track. As such the risk to surface water source quality is deemed to be low / negligible.

Flooding

9.5.50 A Flood Risk Assessment (FRA) has been undertaken and is included in Appendix 9.2.

9.5.51 Flood Hazards affecting the Site are summarised in Table 9.7 and explained in more detail in Appendix 9.2. Based on this detailed assessment the pre-development potential flood risk to the Site is considered to be low and would not be a significant risk to the operation of the Proposed Development provided suitable / standard measures were in place.

Table 9.7 – Pre-Development potential flood risk from all sources of flooding

Flood Source	Potential risk	Description
Fluvial	Low Risk	Review of SEPAs Fluvial Flood Map for the Site indicates high risk fluvial flooding of the banks of Allt Saigh in the south of the Turbine Development Area. However, this flooding is localised to the river and connected lochs and lochans. All turbines have been located at least 50m from all watercourses. The minimum distance from the flooding extent to any turbines is over 100m and downgradient. The majority of the Site is suitably distanced from this flooding extent with the exception of the track to Turbine 9 and Turbine 16 which lies approximately 30m from the flooding extent and the watercourse crossing location on the approach to Turbine 14.
Tidal/Coastal	No Risk	Review of SEPA's Flood Map confirms that the Site is not at risk of coastal / tidal flooding as it is located over 30km inland from any coastal flood risk areas and therefore, is designated as 'No Risk' to the Site.
Surface water	No Risk	Review of SEPAs Surface Water Flood Map shows highly localised areas of surface water flooding within the Site, however this flooding is generally located within lochans and watercourses. The turbine infrastructure is all located on areas of ground which are raised above or are suitably distanced from these areas.

Flood Source	Potential risk	Description
		Given the upland nature of the Site, overland flow routes from higher to lower ground will be common. However, given the extent of watercourses in the area, overland routes will for the most part, have relatively short drainage paths. Track extents, turbine platforms and other infrastructure will be designed with appropriately sized cut-off drains on their upgradient extents and route these collected flows downstream at regular intervals. This approach will mimic the existing drainage conditions of the area and minimise any risk of overland flows impacting built infrastructure.
Groundwater	No Risk	Review of SEPA's Groundwater Flood Map shows that the Site is not located in an area potentially at risk of groundwater flooding. Groundwater flooding areas are shown to be associated with Loch Ness however these are located over 2.5km from the Site.
Sewers/ Drainage Systems	No Risk	The Site is not at material risk from any off-site drainage systems / sewers owing to its rural setting and site context.
Infrastructure	Low risk	Review of SEPA Reservoir inundation map indicates that there is a risk of flooding from Loch A' Chrathaich Reservoir. The area of flood risk is a suitable distance from the turbine locations and associated infrastructure however the existing access track located near Allt Loch a' Chrathaich lies within the flood risk area.

9.5.52 The sensitivity of the Site with respect to flooding is considered to be low / negligible.

9.6 Receptors Brought Forward for Assessment

9.6.1 The following receptors are being brought forward for assessment:

- River Moriston SAC considered to have a high sensitivity, reflecting the designation.
- Local Surface Water Environment including all watercourses considered to have a high sensitivity, reflecting the Good classification of the Allt Saigh, Loch a'Chrathaich and the River Moriston and considering the River Moriston is a SAC.
- Groundwater with respect to superficial deposits and bedrock geology considered to have a low sensitivity, reflecting the low productivity aquifers in both the bedrock and localised superficial deposits.
- Private Water Supplies with respect to locations sourced from surface waters (PWS02, PWS03, PWS04 and PWS06).

9.6.2 As discussed within Section 9.5, the following receptors have been scoped out for further assessment

- Private Water Supplies with respect to locations sourced from groundwater due to their distance from the Turbine Development Area and the elevational difference between the

developed areas of the Site and the source locations. Furthermore, the hydrogeological setting of the Site inhibits groundwater flows into the deeper bedrock aquifer.

- The Site's risk to flooding has been designated to be low to negligible risk. There is a low risk associated with several sources of flooding however these risks are attributed to the development itself and would not alter flood risk to any downstream receptors. The Proposed Development drainage strategy will manage the low risk of flooding to the development.
- Potential GWDTEs at the Proposed Development are not dependent on groundwater and instead are fed by surface water run-off and incident rainfall. As true GWDTE are not present at the Proposed Development, impacts on GWDTE are not considered further.

9.7 Standard Mitigation

Project Design

9.7.1 The following considerations have been taken into account in the iterative design of the Proposed Development, considered as embedded mitigation (mitigation by design):

- Existing tracks have been incorporated into the Site design as far as possible, minimising the requirement for new road construction.
- The number of watercourse crossings has been minimised as far as reasonably possible given the extent of watercourses within the Turbine Development Area.
- The design seeks to avoid deep areas of peat where possible (identified from peat surveys, refer to Chapter 10 (Geology and Soils)) which will reduce the risk of dewatering peat.
- A 50m buffer has been maintained around all surface watercourses shown on OS 1:50,000 scale mapping (refer to Figure 9.2), except where watercourse crossings are required, and a small number of other exceptions described below. In all of the cases noted below, good construction practices would be implemented, to ensure suitable protection of the relevant watercourses.
    - A short section of proposed track north of proposed Turbine 12 encroaches into the 50m buffer around a small lochan. The track layout has been designed to provide a route and turbine location that works with the topography of the hillside. During construction, micrositing and detailed drainage design will prevent risk to the lochan and robust pollution prevention measures will be in place.
    - A short section of proposed new track north between Turbine 4 and Turbine 5 encroaches into the 50m buffer around Loch nam Brathain. The track layout has been designed to provide a route between the turbine locations that works with the topography of the hillside. This section of track is short and during construction, micrositing and detailed drainage design will prevent risk to the lochan and robust pollution prevention measures will be in place.
    - A short section of proposed new track north of Turbine 7 encroaches into the 50m buffer around an unnamed watercourse. The initial track layout avoided this buffer. However, during the watercourse crossing survey it was identified that the initially proposed track crossed this watercourse upstream at a wide steep valley section with a boggy valley bed. Re-alignment of the track into the 50m buffer area largely avoids this valley feature. Additionally, the initial track proposed to cross an unmapped watercourse identified during the survey at a heavily boggy section with numerous braided channels in a slight valley. Realignment of the track into the 50m buffer area allows a crossing at more defined section of the watercourse. It is considered that the realignment of the track is an overall

environmental improvement to the design and reduces the complexity and extent of the crossing design in this location.

- The south-eastern extent of the primary construction compound, making use of the existing permanent hardstanding (to be retained) and the temporary hardstanding (to be reinstated), encroaches into the 50m buffer of the River Moriston. The A887 is located between the compound and the watercourse and it is considered that a 50m buffer between the two is unnecessary.

Pre- Construction

9.7.2 In undertaking this assessment of effects, standard good practice measures are assumed to be incorporated as embedded mitigation. This includes pre-construction baseline water quality sampling and analysis which will be undertaken to develop a database and understanding of the existing water quality within the Site and local area. The scope, location and frequency of monitoring to be undertaken will be agreed with SEPA prior to commencement.

Construction

Water Quality Monitoring Programme

9.7.3 In line with the pre-construction baseline monitoring proposed above, a Water Quality Monitoring Programme will be implemented during construction to record the existing water condition and ensure no deterioration to water quality during construction. As above, the scope, location and frequency of monitoring to be undertaken will be agreed with SEPA prior to commencement.

Pollution Impact from Silt-laden Run-off

9.7.4 With specific reference to the SEPA guidance 'Prevention of Pollution from Civil Engineering Contracts: Special Requirements' (SEPA, 2006), and following detailed design and any updated environmental surveys, the Applicant will further develop the Outline Construction Environmental Management Plan (CEMP) (Appendix 2.1), in consultation with SEPA, NatureScot and THC prior to the commencement of construction activities. The CEMP will also be included within the main civil works contract and the Principal Contractor will be required to prepare a site-specific construction method statement that includes:

- a detailed breakdown of the phasing of construction activities;
- a pollution risk assessment of the Site and the proposed activities;
- identification of all Controlled Waters that may be affected by the works and temporary discharge points to these watercourses;
- planning and design of appropriate pollution control measures during earthworks and construction;
- storage of all fuel and other chemicals in accordance with best practice procedures;
- borrow pit management measures;
- ensuring that concrete batching is undertaken only at the designated concrete batching plant area;
- management of the pollution control system, including dewatering of excavations (if required) away from watercourses;
- contingency planning and emergency procedures; and
- on-going monitoring of construction procedures to ensure management of risk is maintained.

9.7.5 All earthmoving works or similar operations will be carried out in accordance with BSI Code of Practice for Earth Works BS6031:1981.

9.7.6 The use of stockpiles will be minimised and/or stockpiles will be covered and contained. Sediment interception measures at their bases will be provided.

9.7.7 Temporary drainage measures will be installed providing filtration and settlement to collect sediments prior to off-site discharge. Temporary drainage measures and silt fencing will also be installed around large areas of exposed soils.

9.7.8 Drainage ditches and watercourses will be inspected on a regular basis (e.g. weekly) and after storm events, to check for blockages during construction.

9.7.9 Mass overburden stripping will be avoided on the Site, exposing parts of the Site only when essential for construction activity. If topsoil is to be stored, constructing stockpiles more than 2m high will be avoided. This will ensure anaerobic conditions do not occur and that the soil will remain fertile and capable of being re-seeded. It will also be less susceptible to erosion.

9.7.10 A robust site traffic management plan will be in place to reduce sediment run-off risks. This will include good practise measures such as minimising turning of tracked vehicles where possible and managing dedicated turning areas appropriately (hard surfacing, silt fencing etc.), avoiding unnecessary turning of large site plant and minimising overall routes on-site to better manage sediment run-off.

9.7.11 Measures will be in place to prevent/ reduce sediment impacts to public roads. This includes good practise measures such as wheel wash facilities where required and vehicles only permitted on-site not to use public roads, unless required at the beginning and end of construction period.

9.7.12 All watercourse crossings, site discharges, and any temporary water abstraction will be regulated under the CAR licensing regime and all necessary licences will be sought from SEPA prior to the commencement of any operations on-site.

9.7.13 Site management will check the local weather forecast daily and prime all site staff to ensure that everyone is aware of their responsibilities to maintain the pollution control system during wet weather or suspend sensitive operations during adverse weather conditions if required.

Pollution Impact from Chemical Contaminated Run-off

9.7.14 All fuel and other chemicals will be stored in accordance with best practice procedures, including in a designated fuelling site located at a safe distance from existing watercourses and in appropriate impermeable bunded containers/areas which will be defined within the CEMP. These will be designed to capture any leakage, whether from a tank or from associated equipment such as filling and off-take points, sighting gauges etc., all of which will be located within the bund.

9.7.15 Spill kits will be maintained in all work areas and kept in all vehicles to enable a rapid and effective response to any accidental spillage or discharge. All construction staff will be trained in the effective use of this equipment.

9.7.16 Construction vehicles and plant will be regularly maintained and all maintenance, fuelling and vehicle washing will be undertaken on appropriate impermeable surfaces away from watercourses in order to minimise risks of leaks to soil and surface waters.

9.7.17 A concrete batching plant will be present on-site. The contractor will develop a method statement to address the transport, transfer, handling and pouring of liquid concrete at foundations.

9.7.18 Cement, grout and unset concrete will not be allowed to enter the water environment. No operations involving concrete transfer between vehicles or into vehicles will take place within 30m of watercourses and waterbodies.

9.7.19 All vehicles used for delivery of concrete will only be washed out at locations as detailed within the CEMP. Excess concrete or wash-out liquid will not be discharged to drains or watercourses on-site or at compounds. Drainage from washout facilities will be collected and treated or removed to an appropriate treatment point / licensed disposal site.

9.7.20 The requirement for dewatering will be minimised in all locations by timely and efficient excavation of the foundation void and subsequent concrete pouring and backfilling.

Impact on Integrity of Watercourse Banks

9.7.21 Field drains and fencing will be constructed and maintained where necessary during construction to uphold the integrity of watercourse banks. Detailed intrusive site investigation work will be undertaken prior to construction to ensure design and installation of new watercourse crossings would be suitable to local ground conditions. When constructing watercourse crossings, good construction practice measures as set out in the CEMP will be fully implemented.

Direct Discharge of Untreated Foul Drainage

9.7.22 Welfare facilities will either connect directly to the foul sewer, self-contained storage tanks or to a septic tank, subject to approval from Scottish Water and SEPA.

9.7.23 If self-contained or septic tanks are to be used, these will be maintained and emptied on a regular basis by a suitably licensed contractor.

Operation

9.7.24 Prior to commissioning, an OEMP will be developed and agreed with THC and SEPA, where required. The OEMP would detail the site drainage design, including the type of surface to be used for the access track, the soft engineering and habitat enhancement measures proposed to slow surface water flows and any necessary ponds, swales, cross drains and bunds, to ensure that run off from hard surfaces and borrow pit excavations would be controlled. The OEMP will also detail the dimensions and final design of the proposed watercourse crossings, which will be designed to maintain continuous flows.

9.7.25 The potential for chemical and silt water pollution incidents to occur during operation is lower than during construction. The OEMP will detail the location of any storage and use of any potential pollutants such fuels and oils and the location of emergency response stations containing spill kits. The storage of fuels and oils will follow SEPA best practise guidance. The detailed design for the watercourse crossings, and the requirements for CAR authorisations or licences, will be agreed with SEPA prior to construction in order to ensure that impacts on fluvial geomorphology are minimised and acceptable to SEPA.

Decommissioning

9.7.26 At the end of the Proposed Development's operational lifespan of 50 years, it will be decommissioned, unless subject to a successful new planning application for repowering. It is expected that decommissioning will take approximately 12 months. The environmental effects of decommissioning are considered to be the same or less than those during construction, and over a shorter time period.

9.7.27 Prior to decommissioning, a Decommissioning Environmental Management Plan (DEMP) will be produced to reflect then current legislation and policy and will be agreed with the relevant statutory authorities.

9.8 Likely Effects

Construction

Changes to Groundwater Flow

9.8.1 As discussed in Section 9.5, there is anticipated to be little groundwater at shallow depth beneath the Site, limited to perched groundwater within peat deposits, and localised groundwater in areas of glacial and glaciofluvial deposits with higher proportions of sand and gravel content in the south which are located along the existing access track and at the proposed construction compound location. Groundwater within the bedrock is anticipated to be minimal, with flow restricted to fractures and other discontinuities.

9.8.2 Excavations will be required to form turbine foundations, cable routes and borrow pit workings, and shallower excavations will be required to form platforms for the substation, the temporary construction compounds, temporary laydown areas and access tracks. These excavations would result in changes to groundwater conditions, including potential requirement for dewatering of excavations. However, given the anticipated absence of substantial groundwater within the superficial deposits in the Turbine Development Area, any changes to groundwater flow would be highly localised, recovering following completion of construction. The magnitude of impact is therefore assessed as low.

9.8.3 There is therefore a potential low magnitude impact on a low sensitivity receptor (groundwater), resulting in a direct, temporary, short-term effect of **negligible** adverse significance.

Pollution Impact from Sediment Run-off/Transport or Chemical Contaminated Run-off

9.8.4 Surface run-off containing silt and other sediments, particularly during and after rainfall events, has the potential to enter the watercourses on and adjacent to the Site. Silt and sediment laden surface water run-off 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 into watercourses.

9.8.5 A minimum buffer of 50m around all watercourses has been maintained in siting all infrastructure except where watercourses need to be crossed and a small number of exceptions where proposed tracks, the construction compound are slightly less than 50m from watercourses / waterbodies for reasons outlined in paragraph 9.7.1. Furthermore, as noted in paragraph 9.7.4, good construction practice measures would be set out in a CEMP and fully implemented to minimise the risk of pollution to surface watercourses and waterbodies.

9.8.6 With respect to the high sensitivity elements of the surface water environment (Allt Saigh and River Moriston), the Proposed Development for the most part is more than 50m from the respective watercourses with the exception of the existing construction compound proposed for re-use (River Moriston) and the proposed crossing over the Allt Saigh. All other development areas are not in hydraulic continuity with the River Moriston and situated within the upper areas of the Allt Saigh, directly draining to its sub-catchments and tributaries.

9.8.7 The magnitude of change is therefore considered to be negligible, on high sensitivity receptors of the Allt Saigh and the River Moriston SAC. Therefore, there is potential for a direct, temporary, short-term effect of **minor** adverse significance prior to the implementation of any additional mitigation measures.

PWS

9.8.8 As detailed above, sediments and pollutants from the Proposed Development have the potential to enter watercourses on and adjacent to the Site. This has the potential to temporarily impact on the water quality of receiving watercourse at and downstream of the works in absence of any mitigation. Whilst all surface water PWS sources are located at least 1000m from any proposed infrastructure they are however in continuity with the Proposed Development with respect to hydraulic continuity and / or locality to the existing access track. As a result, there is the potential for construction works to impact these surface water PWS sources in absence of any mitigation. As outlined in Section 9.7, embedded mitigation and construction measures will be in place to minimise the risk of pollution to surface watercourses and waterbodies from chemical contaminated run-off and sediment laden run-off.

9.8.9 The magnitude of change is therefore considered to be negligible on a low sensitivity receptor of surface water sourced private water supplies, resulting in a direct, temporary, short-term effect of **negligible** adverse significance.

Impact on the Integrity of Banking

9.8.10 Permanent new watercourse crossings would be required at eight significant watercourses and 29 minor/discrete watercourses as well as 30 existing crossings to be replaced or upgraded. Construction activities on or close to the sides of watercourses can detrimentally affect the structural integrity of watercourse banks, either through direct damage to bankside material or indirect loosening of soil structure thus impacting on the localised morphology and water quality of the watercourse through erosion or even collapse of the banking.

9.8.11 As noted in paragraph 9.7.21, detailed intrusive site investigation work will be undertaken prior to construction to ensure design and installation of new water crossings suitable to the local ground conditions, and good construction practice measures will be set out in a CEMP and fully implemented.

9.8.12 The potential magnitude of impact is therefore negligible, on high sensitivity receptors within the local surface water environment, resulting in potential for a direct, permanent effect of **minor** adverse significance.

Direct Discharge of Untreated Foul Drainage

9.8.13 Unless appropriately sited and managed, there is potential for direct discharge of untreated foul sewage from welfare facilities from site compounds during construction. This has the potential to pollute the local water environment, the River Moriston SAC downstream and surface water PWS sources if not appropriately managed.

9.8.14 As outlined in Section 9.7, suitable foul drainage management will be agreed with SEPA to ensure no adverse impacts on hydrological receptors.

9.8.15 Therefore, the magnitude of impact is assessed as negligible on high sensitivity receptors within the local surface water environment and the River Moriston SAC, resulting in potential for a direct, temporary, short term effect of **minor** adverse significance.

9.8.16 The magnitude of change is considered to be negligible on a low sensitivity receptor of surface water sourced PWS, resulting in a direct, temporary, short-term effect of **negligible** adverse significance.

Operation

Long-term Changes to Groundwater Flow Regime and Dewatering of Peat

9.8.17 The presence of turbine foundations, access tracks and other infrastructure has the potential to interrupt groundwater flow; for example, impermeable concrete foundations can act as barriers to flow. This could result in drying of peat deposits. However, given the nature of the superficial geology at the Site, groundwater is anticipated to be restricted to perched water in limited near-surface peat and glacial deposits, with flow likely to be limited and slow. Though sand and gravel superficial deposits are found within the Site these are at the existing access track and therefore will not be affected by this change.

9.8.18 Taking account of embedded mitigation measures set out in Section 9.7 and the Outline CEMP (Appendix 2.1), including the avoidance of deep areas of peat where possible, reducing the risk of dewatering, the magnitude of impact is assessed as low, on a low sensitivity receptor (groundwater). There is therefore potential for an indirect, long-term effect of **negligible** adverse significance in the absence of any additional, specific mitigation.

Surface Water Drainage (Increased Rate of Surface Water Run-off)

9.8.19 The access tracks and crane hardstanding for the wind turbines could result in an increased rate of surface water run-off from the Site, increasing downstream flood risk and potentially resulting in soil erosion and silt-laden run-off, which could pollute watercourses and waterbodies including impacts on downstream PWS sources. However, as set out in Section 9.7, the CEMP will be further developed at detailed design stage and will include site-specific requirements for silt and run off management and agreed with SEPA and THC.

9.8.20 The magnitude of change, prior to any additional mitigation, is therefore negligible, on a high sensitivity receptor (local surface water environment and downstream PWS sources). Therefore, there is potential for an indirect, long-term effect of **minor** adverse significance.

Impacts on Fluvial Geomorphology

9.8.21 If new watercourse crossings are not designed properly to ensure continuous flows, this could potentially adversely affect the geomorphology of watercourses by reducing heterogeneity. However, as noted in Section 9.7, detailed designs of crossings will be developed as part of the CAR application process, including detail of the dimensions and final design of the new and replaced/upgraded water crossings. All watercourse crossings will be regulated under the CAR licensing regime and all necessary licences will be sought from SEPA prior to the commencement of any operations on-site.

9.8.22 The magnitude of change, prior to any additional mitigation, is negligible, on a high sensitivity receptor. Therefore, there is potential for a direct, permanent effect of **minor** adverse significance.

Decommissioning

9.8.23 This assessment assumes that the operational lifespan of the Proposed Development would be 50 years, after which it would be appropriately decommissioned. The potential effects of the decommissioning stage on hydrology and hydrogeology are considered to be fewer than those at construction and typically of a lesser magnitude in terms of scale and effect.

9.9 Additional Mitigation and Enhancement

9.9.1 No significant environmental effects have been identified following the implementation of the standard mitigation outlined in Section 9.7 and therefore no further mitigation is considered to be required.

9.10 Residual Effects

Construction

9.10.1 No significant effects on the local surface water environment, River Moriston SAC, hydrogeology and surface water PWS have been predicted during construction when taking account of mitigation by design and embedded mitigation set out in Section 9.7. All residual effects on hydrological and hydrogeological receptors are assessed as being **negligible or minor**, and not significant.

Operation

9.10.2 No significant effects on the local surface water environment, River Moriston SAC, hydrogeology and surface water PWS have been predicted during operation when taking account of mitigation by design and embedded mitigation set out in Section 9.7. All residual effects on hydrological and hydrogeological receptors are assessed as being **negligible or minor**, and not significant.

Decommissioning

9.10.3 No significant potential effects on hydrological and hydrogeological receptors have been predicted as described in paragraph 9.8.23.

9.10.4 The CEMP will be updated prior to decommissioning by the Principal Contractor to reflect current legislation and policy and will be agreed with THC, NatureScot and SEPA. Prior to decommissioning, a Decommissioning Environmental Management Plan (DEMP) will be produced to reflect then current legislation and policy and will be agreed with the relevant statutory authorities.

9.10.5 Taking account of the above, all residual effects on hydrological and hydrogeological receptors are assessed as being **negligible or minor**, and not significant.

9.11 Cumulative Assessment

9.11.1 The only wind farm within the study area is the Operational Development to the west. Although the majority of this wind farm is within the Allt Bhlaraidh catchment, with the exception of the east of this wind farm within the catchment of the Allt Saigh, and therefore could in theory give rise to cumulative effects together with the Proposed Development, there is little potential for this to be realised in practice given that no construction works are planned on the Operational Development and no significant effects are likely during operation.

9.11.2 Loch Liath wind farm to the north of the Proposed Development is not yet developed but is currently in the scoping stage of the development process, with a Scoping Report submitted to THC in January 2021. The majority of this wind farm is within the Allt Seanabhaille and the River Coilti catchments and not in hydraulic continuity with the Proposed Development, with the exception of the south-east of this wind farm (including two proposed turbines) within the catchment of the Allt Saigh, and therefore could in theory give rise to cumulative effects together with the Proposed Development. However, there is little potential for this to be realised in practice given that construction phases are unlikely to overlap with the Proposed Development, and no significant effects are likely during operation.

9.11.3 No significant residual effects are predicted resulting from the construction or operation of the Proposed Development in isolation, and there is considered to be negligible potential for significant cumulative effects to arise when the operation of above-noted developments is taken into account.

9.12 Summary

9.12.1 The Site features numerous watercourses and water bodies. The largest water body is Loch a' Chrathaich adjacent to the western site boundary, into which the far western and south-western site area drains. A series of smaller lochs and lochans are present across the rest of the Site, within complex topography meaning drainage will flow from various high points into these water bodies. The majority of the Site drainage is anticipated to flow to Allt Saigh, either directly or via the Allt Carn Choire Rainich or smaller unnamed watercourses. The west of the Site is included within the Allt Bhlaraidh catchment. The Site extends into the River Morriston catchment in the south however the large majority of the Site is assessed as not being in hydraulic connectivity to the River Moriston. The Allt Saigh, Loch a'Chrathaich and the River Moriston are classified as Good and the River Moriston is a SAC. Watercourse crossings have been identified and crossing types proposed in order to maintain drainage continuity.

9.12.2 The hydrogeology at the Site comprises low productivity bedrock aquifers. It is anticipated that there is an absence of substantial groundwater within the superficial deposits in the Turbine Development Area. There may be potentially localised groundwater within areas of glacial and glaciofluvial deposits with higher proportions of sand and gravel content in the south which are located along the existing access track and at the proposed construction compound location.

9.12.3 It is considered that potential GWDTEs at the Proposed Development are not dependent on groundwater and instead are fed by surface water run-off and incident rainfall.

9.12.4 PWS were identified from the ES for the Operational Development and a review of THC's Private Water Supply Register. Of the identified PWS four are identified as being sourced from surface water (PWS02, PWS03, PWS04 and PWS06) and three are identified as being sourced from groundwater / springs (PWS01, PWS05 and PWS07). All groundwater sources are sufficiently distance from the Proposed Development and given the geological site setting there is no risk to these supplies. All surface water sources are located at least 1000m from any proposed infrastructure, however, are in continuity with the Proposed Development with respect to hydraulic continuity and / or locality to the existing access track.

9.12.5 An FRA has been undertaken and is summarised in this chapter. The Site is at low fluvial flood risk from any nearby watercourse and low risk of flooding due to infrastructure failure and overland flows. All other potential sources of flood risk have been evaluated (i.e. groundwater, sewer flooding etc) which confirms the Site is not at material flood risk from any other source. The pre-development

potential flood risk to the Site is considered to be low and would not be a significant risk to the operation of the Proposed Development provided suitable / standard measures were in place.

9.12.6 Potential construction and operational effects include changes to the groundwater flow regime, the risk of siltation and pollution of watercourses resulting in adverse effects on water quality, effects on the integrity of watercourse banks, long-term effects on fluvial geomorphology, and effect on on-site and downstream flood risk.

9.12.7 The iterative design process for the Proposed Development has ensured embedded mitigation, including appropriate buffering of sensitive watercourses, and avoidance of very boggy ground with networks of braided peat channels. Standard good construction and design practice has also been considered as embedded mitigation, including mitigation by design, detailed pre-construction site investigations, agreement and implementation of a CEMP and pollution control, and appropriate design of watercourse crossings, regulated under the CAR licensing regime.

9.12.8 Potential effects on hydrological and hydrogeological receptors, taking account of the above-noted embedded mitigation, have been assessed as **negligible to minor adverse** and not significant and thus no further additional mitigation has been required. The significance of residual effects on hydrological and hydrogeological receptors is considered to be **negligible to minor adverse** and not significant. A summary of the residual effects on hydrology and hydrogeology resources at the Site are included in Table 9.8.

Table 9.8 – Summary of Effects

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Changes to Groundwater Flow	Negligible and not significant	Adverse	No specific measures beyond embedded mitigation.	Negligible and not significant	Adverse
Pollution Impact from Sediment Run-off/Transport or Chemical Contaminated Run-off	Negligible or Minor and not significant	Adverse	No specific measures beyond embedded mitigation.	Negligible or Minor and not significant	Adverse
Impact on the Integrity of Banking	Minor and not significant	Adverse	No specific measures beyond embedded mitigation.	Minor and not significant	Adverse
Direct Discharge of Untreated Foul Drainage	Minor and not significant	Adverse	No specific measures beyond embedded mitigation.	Minor and not significant	Adverse
Operation					
Long-term Changes to Groundwater Flow Regime and Dewatering of Peat	Negligible and not significant	Adverse	No specific measures beyond embedded mitigation.	Negligible and not significant	Adverse
Surface Water Drainage (Increased Rate of Surface Water Run-off)	Minor and not significant	Adverse	No specific measures beyond embedded mitigation.	Minor and not significant	Adverse

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Impacts on fluvial geomorphology	Minor and not significant	Adverse	No specific measures beyond embedded mitigation.	Minor and not significant	Adverse

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