Chapter 7
Hydrology, Geology, Hydrogeology, Water Resources and Peat

Introduction

7.1 This chapter presents the findings of the assessment of likely significant effects of the proposed EDM Project (both the construction and operation of the New 132kV OHL and the decommissioning of the Existing 132kV OHL) on hydrology, geology, hydrogeology, water resources and peat. It details the baseline environment, based on desk-based studies supplemented by site surveys of the Study Area, identifies likely effects and their significance, together with mitigation measures where required, including an assessment of cumulative effects.

7.2 This chapter should be read alongside **Chapter 8: Ecology and Ornithology** due to interactions between both chapters in terms of the potential effects of water quality on fish and other species/habitats and water supply on potential Ground Water Dependant Terrestrial Ecosystems (GWDTEs).

7.3 This chapter is supported by **Figures 7.1-7.5** and the following appendix:

- **Appendix 7.1 Watercourse Crossing Inventory**.

7.4 Planning policies of relevance to this assessment are provided in **Chapter 5: Planning Policy Context**.

7.5 The assessment was undertaken by Fluid Environmental Consulting Ltd (Fluid).

Scope of the Assessment

Effects Assessed in Full

7.6 The following effects have been considered in the assessment:

- pollution of surface water, including private drinking water supplies through operation of machinery (e.g. spillage of fuels, oils etc.) and /or caused by releases of sediment to watercourses from felling activities, excavated/stockpiled material during construction of the New 132kV OHL, or as a result of stream crossings or works near streams;
- damage to river banks or changes in channel form due to the operation of machinery during construction of the New 132kV OHL;
- localised flooding and watercourse bank erosion caused by temporary impediments to flow for watercourse crossings, particularly in conditions of high discharge during construction of the New 132kV OHL;
- direct and indirect disturbance of peat by land take, removal, excavations, relocation, storage, vehicle loading, vegetation disturbance, drainage changes, oxidation, erosion and loss of carbon storage during site preparation and construction of the New 132kV OHL;
- direct and indirect effects to designated sites, such as Sites of Special Scientific Interest (SSSIs); and,
- effects of decommissioning the Existing 132kV OHL including access tracks, foundation excavation works and risks posed to sensitive features, such as wetlands, designated sites and private water supply infrastructure from operation of vehicles and sediment-laden runoff.

Effects Scoped Out

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

- Effects on bedrock geology during both construction of the New 132kV OHL and decommissioning of the Existing 132kV OHL.
- Pollution and alteration of public water supply sources as none have been identified within the Study Area based on consultation and the baseline assessment.
- The requirement for an outline peat management plan or peat slide risk assessment for the New 132kV OHL and decommissioning of the Existing 132kV OHL as the majority of the site is peat free with the exception of two very small localised areas which are discussed further in this chapter.
- Modifications to natural drainage patterns, changes to runoff rates and volumes and a consequent increase in flood risk during construction of the New 132kV OHL and the decommissioning of the Existing 132kV OHL.
- Increased flood risk caused by impediments to flow in watercourses or volume up taken within the flood plain during construction of the New 132kV OHL and the decommissioning of the Existing 132kV OHL as there will be no permanent hardstanding within flood plains and permanent structures are minor and comprise wooden poles in the ground.
- All operational effects of the New 132kV OHL as there will be no permanent land take for the OHL other than for the wooden poles, and no groundworks will be undertaken during its operation; and
- Cumulative effects with other development proposals and installations on the basis that there will be no permanent hardstanding for the New 132kV OHL, there will be no permanent watercourse crossings or hydrological activities and good practice and regulatory requirements will be met. No other developments are known within the sub-catchments of the New 132kV OHL which are likely to interact cumulatively during the construction and decommissioning phases.

Assessment Methodology

Legislation and Guidance

Legislation

7.8 This assessment has been carried out in accordance with the principles contained within the following legislation:

- The Flood Risk Management (Scotland) Act 2009[i].
- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended 2013 and 2017) (CAR)[ii].
- Water Framework Directive (2000/60/EC) (WFD), and Water Environment and Water (Scotland) Act (WEWS Act) 2003[iii].
- Pollution Prevention and Control (Scotland) Regulations 2012[iv].
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the 2017 EIA Regulations')[v].
- Control of Pollution Act 1974 (as amended) Part II: Pollution of Water[vi].
- Surface Waters (Fish Life) (Classification) (Scotland) Directions 2007[vii].
- The Water Supply (Water Quality) (Scotland) Regulations 2001[viii].
- European Drinking Water Directive (Council Directive 98/83/EC)[ix].
- Private Water Supplies (Scotland) Regulations 2017[x].
- Water Environment (Drinking Water Protected Areas) (Scotland) Order 2007[xi].
- Groundwater Daughter Directive (2006/118/EC) (GWDD)[xii].
- The Scotland River Basin District (Classification of Water Bodies) Directions 2009[xiii].
- The Scotland River Basin District (Surface Water Typology, Environmental Standards, Condition Limits and Groundwater Threshold Values) Directions 2009[xiv].
- The Scotland River Basin District (Standards) Directions 2014[xv].
- The Waste Management Licensing (Scotland) Regulations 2011[xvi].

Guidance

7.9 This assessment is carried out in accordance with the principles contained within the following documents:

- The Scottish Environment Protection Agency (SEPA)'s Guidance for Pollution Prevention (e.g. PPG1, GPP2, GPP4, GPP5, PPG6, GPP8, GPP21, GPP22 and GPP26)[xvii].
- Scottish Government Planning Advice Notes (PANs) and Guidance (including PAN 51 Planning, Environmental Protection and Regulation; PAN 1/2013 Environmental Impact Assessment; PAN 69 Planning and Buildings Standards Advice on Flooding; and PAN 79 Water and Drainage)[xviii].
- Scottish Executive: River crossings & migratory fish: Design guidance, 2012[xix].
- SEPA: Technical Flood Risk Guidance for Stakeholders, version 10 (SEPA, July 2018)[xx].
- SEPA: Water Environment (Controlled Activities) (Scotland) Regulations 2011 - A Practical Guide, Version 8.2 February 2018[xxi].
- SEPA: Position Statement to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2005, WAT-PS-06-02: Culverting of Watercourses - Position Statement and Supporting Guidance, Version 2, June 2015[xxii].
- SEPA: Engineering in the Water Environment Good Practice Guide – River Crossings, WAT-SG-25, 2010[xxiii].
- SEPA: Engineering in the Water Environment Good Practice Guide – Temporary Construction Methods, WAT-SG-29, 2009[xxiv].
- SEPA: Sector Specific Guidance: Construction Sites, WAT-SG-75, 2018[xxv].
- SEPA: Policy No. 19, Groundwater protection policy for Scotland, 2009[xxvi].
- SEPA: Special requirements for civil engineering contracts for the prevention of pollution, WAT-SG-31, 2006[xxvii].
- SEPA: Land Use Planning System, SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, 2017[xxviii].
- SEPA (2018) Flood Risk and Land Use Vulnerability Guidance, version 3, February 2018[xxix].
- SEPA (2010) Regulatory Position Statement – Developments on Peat (SEPA, 2010[xxx]).
- Forestry Commission (2017) The UK Forestry Standard[xxxi].
- Scottish Water standards and policies, including Sewers for Scotland 3rd edition, 2015 and Water for Scotland 3rd edition, 2015[xxxii].
- CIRIA: The SUDS Manual (C753) 2015[xxxiii].
- CIRIA: Control of water pollution from linear construction projects. Technical guidance (C648) 2006[xxxiv].
- CIRIA: Control of water pollution from linear construction projects. Site guide (C649) 2006[xxxv].
- CIRIA: Control of water pollution from construction sites: Guidance for consultants and contractors (C532) 2001[xxxvi].
- CIRIA: Groundwater Control – design and practice (C515) 2016[xxxvii].
- Peatland Survey. Guidance on Developments on Peatland. Scottish Government, Scottish Natural Heritage (SEPA 2017[xxxviii]).
- Good Practice during Windfarm Construction[1] (Scottish Renewables, SNH, SEPA & Forestry Commission Scotland, 4th Edition 2019[xxxix]).
- A Handbook of Environmental Impact Assessment, 5th Edition (SNH, 2018)[xl].
- Code of Practice for the sustainable use of soils on construction sites (DEFRA, 2009)[xli].
- Marine Scotland: Scoping advice on information required in environmental impact assessment reports in relation to assessing risk to freshwater and diadromous fish and associated fisheries (Scottish Government, April 2018)[xlii].

Consultation

7.10 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken as detailed in **Table 7.1**.

Table 7.1: Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
Energy Consents Unit (ECU) 28/02/2019	Formal scoping consultation	The Applicant should investigate the presence of any private water supplies (PWSs) which may be affected by the development.	This was completed as part of the baseline studies, and is reported on within this chapter.
		ECU advised that The Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition) should be followed in the preparation of the EIA report, which should contain such an assessment of peat stability and details of mitigation measures.	No peat slide hazard risk assessment was conducted as only two localised pockets of peat were encountered on the route and these are not considered of sufficient depth or slope to pose a landslide hazard. The effect on these two pockets is discussed in this chapter.
Scottish Natural Heritage (SNH) 30/01/2019	Formal scoping consultation	SNH advise that the retention of existing in situ concrete bases associated with the Existing 132kV OHL would be the least damaging option for surface vegetation and underlying hydrology associated with Dargavel Burn SSSI.	The existing concrete bases will be kept in situ. It is proposed to excavate the existing bases to only one metre in depth to facilitate restoration of the surface vegetation. The design advice relating specifically to the SSSI will be included in the Construction and Decommissioning Environmental Management Plan (an example of a CDEMP is provided in **Appendix 4.1**) and it is outlined in the mitigation section of this chapter.
		Concerning the decommissioning of the existing pylons at the eastern and western end of the Dargavel Burn SSSI, the decommissioning method statement should include: - Information on the stability of the surface in this area. - Detailed information on the proposed methods for the removal of the old infrastructure including what kind of machinery would be needed for their dismantling and removal from the site. - Information detailing the access route including measures to minimise damage such as: minimising the number of times the vehicles track over the agreed route; no deviation from the agreed route; and no storage of materials on the wetland vegetation.	This chapter assesses the effects of the decommissioning of the Existing 132kV OHL at the western end of the Dargavel Burn SSSI. It includes discussion of the underlying soils and geology, providing information on the stability of the surface. Further information on the specific machinery and number of vehicles movements is included in **Chapter 4: Project Description**. The only deviation from the agreed route will be within the Infrastructure Location Allowance discussed within this chapter, which will be used to move further away from sensitive areas such as the Dargavel Burn SSSI. There will be no storage of materials within the Dargavel Burn SSSI.
		SNH advise that the siting of new wood poles on the slopes to the north of the Dargavel Burn SSSI should avoid springs and flushes which may supply water to it. Additionally, consultation with SEPA may be required if access tracks cross any GWDTE in the area. The construction method statement should include: - Detailed information on the proposed methods for the siting and installation of new infrastructure. Recommended avoiding placing new poles in any	The design has been informed by advice from SNH, LUC ecologists and Fluidec and avoids watercourses, springs and flushes feeding the Dargavel Burn SSSI. This included advice that infrastructure should avoid being located within Dargavel Burn SSSI wetland area and type of foundations minimised. This resulted in the realignment of the project to create a further buffer from the Dargavel Burn SSSI. Embedded mitigation and additional mitigation has been included within this chapter, including

[1] Whilst this document focuses primarily on wind farm developments, as this document provides good, recent and relevant guidance of the requirements and considerations for constructing infrastructure in rural locations with a variety of land uses including forestry and peatland, it is also considered applicable to the EDM Project.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
		springs or flushes that may be supplying water to the SSSI. - Information detailing the access route including measures to minimise damage such as: avoiding tracking across spring and flushes; taping off springs and flushes to exclude them from the working corridor and minimize risk of damage; if planning an access track that crosses watercourses or GWTEs you may need to consult SEPA; if installing a track refer to best practice guidelines to avoid any interruption of the hydrology of any springs and flushes supplying water to the SSSI. - Details regarding storage of materials i.e. do not store any materials on springs and flushes. - Details of measures to avoid an increase in the sediment load reaching the SSSI, either through the burns which enter the SSSI from the north or via seepages.	measures to avoid any increase in sediment load or pollution. SEPA has been consulted in relation to the EDM Project (see below).
Scottish Environmental Protection Agency (SEPA) 29/01/2019	Formal scoping consultation	It is advised that adequately scaled maps and an assessment of all engineering activities in or impacting on the water environment including proposed buffers, details of any flood risk assessment and details of any related Controlled Activities Regulation (CAR) applications are included in the EIA Report. The EIA Report should be accompanied by a Schedule of Mitigation (including pollution prevention measures).	This chapter includes appropriate maps and figures linking the project with the water environment. It also includes mitigation measures to address potential effects. A schedule of mitigation is included at **Appendix 2.1.**
		Advised that the proposed route should be designed to avoid effects on the water environment. Where effects are unavoidable, justification for this should be provided. Where watercourse crossings are unavoidable, these should be numbered on a map and accompanied by a photograph.	A general water features watercourse survey was undertaken as part of this assessment, including a site visit to all accessible main watercourse crossings. Crossings were avoided as part of the detailed alignment process where possible.
		It is requested that the planning submission includes information on how the layout of the site has been designed to minimise peat disturbance as well as providing an outline of the preventative/mitigation measures which will be put in place to avoid significant drying or oxidation of peat.	There is minimal peat across the site and only three poles are located within peatland (165 to 167), and one section of access track to decommission a tower on Devol Moor (Between G073 and G074). This chapter includes mitigation measures to prevent peat disturbance in those areas. This will be further detailed as part of the CDEMP, an example is provided in **Appendix 4.1**.
		A full Peat Management Plan (PMP) should be considered by the applicant dependent on the scale of the development and volume of peat likely to be encountered. The PMP should include a detailed map of peat depths and information regarding the quantities of acrotelmic, catotelmic and amorphous peat which will be excavated and where it will be re-used should also be included. It is advised that the proposal should follow Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste as well as Developments on Peat and Off-Site uses of Waste Peat.	This was not considered to be required given the very small volume of peat encountered. The temporary access tracks will be floating in areas of peat and no peat will be removed for temporary tracks or pole foundations.
		An assessment of GWTEs should be carried out and a map provided showing that all potential GWDTEs are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of excavations deeper than 1m. As assessment should be undertaken if these buffers cannot be accommodated.	Potential GWDTE are shown on **Figures 7.6a-7.6c**. The design alignment was altered to further avoid these areas. An NVC survey was undertaken by LUC for habitats considered to be potential GWDTEs (see **Chapter 8: Ecology and Ornithology and Appendix 8.1**).
		SEPA note that the proposed development is situated within the medium likelihood flood extent of the SEPA Flood Map. As such, SEPA advise that, if possible, floodplains should be avoided and appropriate buffer distances should be applied to watercourses located in close proximity to the proposed development.	The SEPA Flood Risk Maps have been consulted as part of this chapter and design advice has informed the siting of wood poles. Buffers from all watercourses have been applied, where possible and therefore the effects on flooding have been scoped out for the construction, operation and decommissioning stages.
		The EIA Report should assess the potential effects of forestry felling on water quality.	The effects of felling on watercourses are assessed in this chapter in relation to sedimentation and Private Water Supply (PWS) quality.
Scottish Water 10/01/2019	Formal scoping consultation	There are no Scottish Water drinking water catchments or water abstraction sources with the area affected by the proposed development. Where surface water discharge to the combined sewer system is anticipated, it is advised that contact is established as early as possible with Scottish Water in order to present strong evidence to support the intended drainage plan prior to making a connection request.	Noted. There is no intention to discharge surface water to the combined sewer system as part of the project.
Marine Scotland 22/01/2019	Formal scoping consultation	Marine Scotland has advised that effects associated with the proposed development upon watercourses which support salmon and trout populations should be taken into consideration.	This chapter assesses the effect of the EDM Project upon watercourses and no effects on watercourses with associated effects on fish are anticipated.
		Marine Scotland advises that appropriate site-specific mitigation measures are undertaken and presented within the EIA as a means of avoiding and/or minimising any effects on important fish stocks.	This chapter summarises mitigation measures to minimise disturbance, erosion and sedimentation of watercourses during construction, to minimise the effect on fish stocks.
		The impacts associated with the susceptibility to flooding in the area and felling on the water quality and fish populations should also be addressed. Felled material should be removed from within and adjacent to watercourses as set out in The Forests and Water UK Forestry Standard Guidelines.	The effects of felling on water quality are assessed in this chapter and all felling will be in accordance with UK Forestry Guidelines.
Renfrewshire Council Environment and Communities 05/07/2018	Email response to request for information on private water supplies	List provided of ten registered private water supplies within 250m of the likely extent of search area for the route.	Data used in the assessment of private water supplies in this chapter.
Inverclyde Council,	Email response to request for information on	Map provided of private water supplies with an overlay of the Study Area.	Data used in the assessment of private water supplies in this chapter.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
Environmental & Public Protection 03/07/2018	private water supplies		

Study Area

7.11 The study area for the purposes of this assessment is the New 132kV OHL route and the Existing 132kV OHL with an up to 250m buffer. It extends from the existing Devol Moor substation, to the south of Harelaw Reservoir, to the existing Erskine substation, to the south-east of Kingston.

7.12 Where sensitive receptors, such as private water supplies, watercourses, GWDTEs or designated sites, have catchments within the buffer area that extend beyond the buffer area, these have also been included and assessed. These are discussed in more detail in the sections below.

Desk Based Research and Data Sources

7.13 The assessment was predominantly based on a desk study with site visits for verification and additional information. The desk study involved collating and assessing the relevant information from the following sources summarised in **Table 7.2**.

Table 7.2: Hydrology, Hydrogeology, Geology, Water Resources and Peat Data Sources

Data Type	Source
Climate Rainfall, Climate change	Meteorological Office website (accessed September, 2019): https://www.metoffice.gov.uk/services/data SEPA climate change guidance (April 2014) https://www.sepa.org.uk/media/426913/lups_cc1.pdf
Topography Elevation, Relief	1:50,000 and 1:25,000 scale Ordnance Survey Mapping Google Maps aerial images
Geology Solid and Drift	British Geological Survey Geology mapping Lochgoilhead Sheet S037E Bedrock Deposits 1:50,000scale (1990). British Geological Society Geological Mapping and Interactive Map and Boreholes database http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html (accessed September, 2019) SNH website www.snh.org.uk (accessed September, 2019)
Soil	Scotland's soils website http://www.soils-scotland.gov.uk/ (accessed September, 2019) SNH Carbon and Peatland Map 2016 The James Hutton Institute Soil Information for Scottish Soils http://sifss.hutton.ac.uk/SSKIB_Stats.php
Groundwater Hydrogeology, Aquifer Properties, Source Protection Zones and Groundwater Levels	SEPA - published sources on their website (www.sepa.org.uk) SEPA Water Environment Hub Interactive Map for Water Framework Directive classifications (accessed October, 2018): https://www.sepa.org.uk/data-visualisation/water-environment-hub/ Baseline Scotland Groundwater Chemistry Data http://www.bgs.ac.uk/research/groundwater/quality/baselineScotland/southernScotlandData.html SEPA groundwater monitoring sites Hydrogeological Map of Scotland (Scale 1:625,000) (Institute of Geological Sciences, 1988) Scottish Aquifer and Groundwater Properties (BGS, 2008) A GIS of aquifer productivity in Scotland explanatory notes (BGS, 2004). Groundwater Vulnerability Map of Scotland (http://data.gov.uk/dataset/groundwater-vulnerability-map-of-scotland)
Surface Water River Flow, Surface Water Features, Flood Risk, Water Quality, Recreational Waters and Fisheries	Centre for Ecology and Hydrology (CEH): National River Flow Archive (NRFA) website for river flow data (accessed September, 2019 http://www.ceh.ac.uk/data/nrfa/data/search.html); SEPA - Consultation and published sources on their website (www.sepa.org.uk) SEPA Indicative River and Coastal Flood Map http://map.sepa.org.uk/floodmap/map.htm (accessed September, 2019) Scotland Drinking Water Protected Area for surface water, Scottish Government Website Maps
Private Water Supplies	Renfrewshire Council consultation Inverclyde Council consultation Issue of Private Water Supply Questionnaires to properties identified as being potentially reliant on a PWS up to 250m of the New 132kV OHL and Existing 132kV OHL to be decommissioned.
Designated Areas	Multi-Agency Geographic Information for the Countryside (MAGIC) website http://magic.defra.gov.uk/ (accessed September, 2019)

Field Survey

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

- Site walkover on the 4th and 5th January 2019 of the New 132kV OHL route and private water supplies. Conditions were clear and mild.
- Site walkover of the west end of the site and the decommissioning route for the Existing 132kV OHL on 17th and 18th September 2019 in clear weather following a lengthy period of wet weather. The conditions were therefore good for observing water presence and flow.

7.15 These surveys were undertaken by two hydrologists to obtain baseline information and inform constraints mapping for the location of infrastructure. The main aims of the field survey were to:

- identify, photograph and measure main watercourse crossings, proposed and existing;
- identify and map other water features such as marshy areas, wetlands and springs;
- ground truth identified water supplies to identify the nature of supply (e.g. open or protected);
- assess the distance from and potential connectivity with sensitive areas such as designated sites and potential identified GWDTEs;
- provide a general overview of landscape, topography, potential peatland and land cover of importance to hydrology.

Assessing Significance

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

7.17 There are no published guidelines or criteria for assessing and evaluating effects on hydrology, geology, hydrogeology, water resources or peat within the context of an EIA. The assessment is therefore based on a methodology derived from relevant EIA regulation guidance, IEMA guidance and SNH publication Environmental Impact Assessment Handbook Version 5 April 2018. The methodology is also based upon relevant SEPA guidance including Assigning Groundwater Assessment Criteria for Pollutant Inputs (SEPA 2010). The methodology sets a list of criteria for evaluating the environmental effects, as follows:

- Sensitivity criteria based on both the likely effect on a receptor due to a particular activity, as well as the importance of the resource under consideration or designated value of the receptor (e.g. an area of international/European significance has a higher value and therefore higher sensitivity than other areas of lower status). The sensitivity of a receptor is its ability to absorb the anticipated effect without perceptible change resulting.
- The type of effect (i.e. whether it is positive, negative, neutral or uncertain).
- The magnitude of the potential effect in relation to the resource that has been evaluated and quantified using the scale major, moderate, minor and negligible and included the consideration of probability of the effect occurring (based on the scale of certain, likely, or unlikely), timing, scale, size and duration of a potential effect.

Sensitivity

7.18 Sensitivity for the EDM Project has been determined using the definitions in **Table 7.3**.

Table 7.3: Sensitivity Criteria

Sensitivity of Environment	Definition
High	Receptor is of National or International value i.e. Special Area of Conservation (SAC), Special Protection Area (SPA), RAMSAR and SSSI. Overall water quality classified by SEPA as high and salmonid spawning grounds present. Abstractions for public water supply. Groundwater classified under the WFD as 'good' or groundwater resource with numerous sensitive users/receptors The flooding of property (or land use of great value) that has been susceptible to flooding in the past. Watercourse floodplain/hydrological feature that provides critical flood alleviation benefits.
Medium	Receptor is of Regional or Local value. Overall water quality classified by SEPA as good or moderate, salmonid species may be present, and may be locally important for fisheries. Smaller watercourse lying upstream of larger river which is a SSSI or SAC. May be subject to improvement plans by SEPA. Abstractions for PWSs. Groundwater resource with sensitive users/receptors. Environmental equilibrium copes well with natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. The flooding of property (or land use of great value) that may be susceptible to flooding. Watercourse/floodplain/hydrological feature that provide some flood alleviation benefits. Habitats listed in Regional Biodiversity Action Plans or Annex I habitats. Unmodified active peatland Deep (>1.0m depth) unless minor area (Very Deep peat is >2.0m depth)
Low	Receptor is of low environmental importance (e.g. water quality classified by SEPA as bad or poor, fish sporadically present or restricted). Not subject to water quality improvement plans by SEPA. Heavily engineered or artificially modified and may dry up during summer months. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or PWSs. No significant groundwater resource and no identified sensitive users/receptors. No flooding of property or land use of great value. Watercourse/floodplain/hydrological feature that provides minimal flood alleviation benefits. Shallow (0.5m to <1.0m depth) and/or modified peat.

Magnitude

7.19 The magnitude of change has been assessed using the definitions in **Table 7.4**.

Table 7.4: Magnitude of Potential Effect Criteria

Magnitude of Potential Effects	Definition
Major	■ Fundamental (long-term or permanent) to substantial changes to hydrology, water quality, geology or hydrogeology (in terms of quantity, quality and morphology). ■ A >10% change in average or >5% change in flood flows.
Moderate	■ Material, but non-fundamental or temporary changes to hydrology, water quality, geology or hydrogeology (in terms of quantity, quality and morphology). ■ A >5% change in average and minimal change in flood flows. ■ Extent of 'high risk' areas (1 in 200-year - SPP) will be moderately increased/or decreased. ■ Change that would render water supply unusable for days or weeks with no alternative.
Minor	■ Detectable but non-material changes to hydrology, water quality, hydrogeology or geology. ■ A >1% change in average flows and no increase in flood flows. ■ Change that would render water supply unusable for short period (days) or for longer period if alternative supply put in place.
Negligible	■ No perceptible changes to hydrology, water quality, geology or hydrogeology (in terms of quantity, quality and morphology). ■ A <1% change in average and no change in flood flows. ■ No change in water supply or minor change (days) where alternative is put in place.

Significance

7.20 The combination of the sensitivity and magnitude of potential effect combine to provide a matrix categorisation of significance (major, moderate, minor and none). These are presented in **Table 7.5**. **Major** and **moderate** effects are considered significant in the context of the EIA Regulations.

Table 7.5: Significance Matrix

Magnitude of Potential Effects	Sensitivity		
	High	Medium	Low
Major	Major	Major - Moderate	Moderate
Moderate	Moderate	Moderate	Minor
Minor	Minor	Minor	Minor - None
Negligible	None	None	None

Assessment Limitations

7.21 Although the majority of the Study Area for both the New 132kV OHL and Existing 132kV OHL and all major features were visited, not all areas were fully accessible during the site visits due to landowner requests. Therefore, some smaller water features have been derived from desk-based sources and their assessment interpolated from general site conditions.

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

7.23 Whilst some information gaps have been identified, it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental effects on hydrology, geology, hydrogeology, water resources and peat for the EDM Project.

Existing Conditions

New 132kV OHL

Topography

7.24 The topography of the New 132kV OHL is shown in **Figures 7.1a-1f** in five metre contours. It spans from sea level in its eastern end to the heights of Devol Moor in the west at 205mAOD.

7.25 Described from east to west, the eastern end of the corridor crosses the relatively gentle plains to the north of Bishopton at a height of approximately 40mAOD. Further west it descends to sea level alongside the River Clyde, before turning sharply south and steeply uphill. It ascends through rolling countryside to enter a saddle between a series of small hills at a height of 70mAOD. To the south-east is Barbeg Hill (86mAOD) and Burmore Hill (109mAOD).

7.26 From here it drops into the Barochan / Dargavel Burn valley, traversing the northern side of the valley through agricultural fields. After crossing Gallahill Road it gradually rises up the flanks of Gled Craig to a height of 165mAOD.

7.27 From Gled Craig it again drops into the river valley at the head of the Barochan / Dargavel Burn at approximately 145mAOD. It rises with the valley contour to a saddle and across Finlaystone Road before descending sharply to cross Leperstone Reservoir at 95mAOD. Rising again across the A761 Port Glasgow Road it passes to the north of the hills in Craigmarloch Wood, with a high point at Pole 144 and 145 at between 140mAOD and 145mAOD and Pole 149 by the Auchenbothie Road at 137mAOD.

7.28 Crossing Auchenbothie Road it begins to climb up to Devol Moor. A high point is again reached at Pole 170 at 192mAOD and 172 of 188mAOD, just before the route crosses Devol Road. Across Devol Road the route descends into an unnamed river valley, sidling along the north-east flank before climbing more steeply up to the highest pole 185 at 195mAOD and onto Harelaw Substation, located on Auchenfoil Road at 205mAOD.

Watercourses and Surface Water

7.29 New 132kV OHL is located primarily within the larger River Clyde catchment area and Clyde Outer Coastal waters (**Figures 7.1a-1c**). Within the Study Area the large watercourses are the River Gryffe, Barochan Burn and Dargavel Burn which are all tributaries of the River Clyde. There are two main reservoirs within the Study Area: Achendones Reservoir and Leperstone Reservoir (shown on **Figure 7.5b**) in the central section, both of which are used for recreational fishing. There are a number of smaller features, as described below from east to west.

7.30 The Erskine Substation at the very start of the New 132kV OHL is drained via the Craigton Burn. This flows south and confluences with the Dargavel Burn, and eventually the River Gryfe.

7.31 Poles 1 to 62 drain north to the Clyde outer coastal waters. There are no substantial watercourses in this section; the New 132kV OHL crosses five small drains or streams, and there are two small farm ponds at a distance from the EDM Project but within the Study Area. After wet weather it was noted that there is some additional ponding in low topographical features in this part of the site.

7.32 Rising up to Barbeg Hill the Study Area enters the Dargavel Burn catchment. In the Study Area this comprises three small tributaries. The second of these is directly adjacent to the access track through Barbeg Cottage. These were flowing at the time of the site visits, and had associated marshy surrounds.

7.33 Crossing the saddle, the Study Area enters the main Barochan / Dargavel Burn catchment. All poles from 63 to 122 fall within this catchment boundary. Poles 82, 83, 94, 95 and 100 are located next to five small tributaries of the burn. There is a small pond to the east of Barscube property which the access track to Pole 89 circumnavigates.

7.34 The Dargavel Burn SSSI lies at the head of the valley, online with the burn. This includes 10.82hectares (ha) of wetland and forms the most noteworthy water feature of the Study Area. The site includes a wetland at the base of valley and several ponds on the northern valley side, which may be man-made as it was observed during the site visit they appear to be retained with artificial bunds. The burn has several channels, which meander through the main wetland area.

7.35 At the head of the valley, leading up to the saddle, there are no further water features apart from a pond up-gradient and to the north of the EDM Project alignment. Across the saddle a small drain leading to Auchendores Reservoir crosses the steep slope down the other side from Findlaystone Road. Poles 126 to 131, and the associated access track, are within the catchment of this drain. The reservoir is drained to the north via Findlaystone Burn and into the River Clyde.

7.36 The Leperstone Reservoir is adjacent to the south of the Auchendores Reservoir, but its outlet leads away to the south into the Auchenbothie Burn, which is a tributary of the River Gryfe. The catchment for poles 132 to 133 is directly to this reservoir, and poles 134 to 143 are also in its catchment via a small drain to the north-west of the reservoir. This is also the location of PWS 3, discussed further below.

7.37 Poles 143 to 166 drain into the Auchenbothie Burn catchment. This area is wet and comprises boggy streams and marshland. The access track for the installation of these crosses five small tributaries and has two existing crossings of small tributaries.

7.38 In the very west of the New 132kV OHL route Poles 167 to 182 are within an unnamed stream catchment that flows south into the Gryfe Water, which is a tributary of the River Gryfe. There are a series of small streams and marshy areas in this section. Where crossed by the New 132kV OHL they are small, and of the four crossings required, one already has an existing crossing point. Near the Devol Moor substation itself is a small pond, artificially dammed by the existing access track. This issues on the far side of the track, so no new crossing will be required.

Flood Risk

7.39 Flood extents have been reviewed from SEPA flood mapping and observations made during the site walkover.

7.40 The section of the New 132kV OHL adjacent to the River Clyde is susceptible to a flood event between Poles 38 to 55. In particular, the area between Poles 42 to 55 are shown on SEPA's Flood Risk Map as having a high likelihood of being affected by flooding. This flooding could be greater than a metre in depth.

7.41 The Dargavel Burn is shown on SEPA's Flood Risk mapping to have areas of localised out of bank flow, becoming more extensive as the burn grows in size to the south-east. It is generally retained within close proximity to the watercourse, apart from one area of localised backwater around the intersection of Netherton and Gallahill Roads. If timed especially poorly, Poles 92 and 93.

7.42 It can be assumed that the smaller watercourses across the Study Area will cause some localised shallow flooding during particular periods of wet weather, and may become hazardous to cross. It is likely given the small size of these catchments and the underlying geology that the time to concentration will be short and any high flows and flooding equally short in duration.

Water Quality

7.43 Under the terms of the Water Framework Directive (WFD), all river basin districts are required to be characterised. The characterisation process requires SEPA to produce an initial assessment of the impact of all significant pressures acting on the water environment.

7.44 Surface water bodies are defined as being whole or parts of rivers, canals, lochs, estuaries or coastal waters. The main purpose of identifying water bodies is so that their status can be described accurately and compared with environmental objectives.

7.45 The WFD applies to all surface waters, but for practical purposes SEPA has defined a size threshold above which a river or loch qualifies automatically for characterisation. Rivers must have a catchment area of 10 km^2 or more. In addition to these larger water bodies, smaller waters have been characterised where there is justification by environmental concerns and to meet the requirements of regulatory legislation such as for drinking water supplies.

7.46 Classification of status by SEPA considers water quality, hydromorphology, biological elements including fish, plant life and invertebrates, and specific pollutants known to be problematic. The classification grades through High, Good, Moderate, Poor and Bad status. This provides a holistic assessment of ecological health. Heavily modified waterbodies, which can no longer be considered to be natural, are classified on the basis of 'ecological potential'.

7.47 The Barochan / Dargavel Burn is classified by SEPA as having a 'good' overall water quality status. It is projected to remain this way by SEPA. It has a 'high' status for fish access and freedom from invasive species, and generally has good water quality indicators including appropriate temperatures, pHs, dissolved oxygen (DO) levels, and acidity. The exception is a section draining the Barbeg and Burnmore Hill area. This is classified by SEPA as having a 'good' water quality status, but has a 'bad' overall rating. This is due to its physical condition; specifically, barriers to fish migration and modification to banks, beds and shores. This situation is predicted by SEPA to persist for several years, but with mitigation is expected to improve within the decade.

7.48 In terms of the New 132kV OHL's end receiving waters, the River Gryfe and the River Clyde estuary have both been assigned a 'moderate' classification by SEPA. The River Gryfe is heavily modified and has moderate access issues for fish migration; however,

its water quality is considered to be 'good'. The fish passage issues are currently being addressed by SEPA. The River Clyde equally is considered to have 'good' water quality but its physical condition is heavily modified.

Soils, Peat and Geology

7.49 The superficial geology within the New 132kV OHL Study Area is illustrated in **Figures 7.3a-f**, with bedrock geology in **Figures 7.4a-f**.

7.50 The Scottish Soils Mapping shows the Study Area predominately has brown soils of the Darleith type, resulting from the underlying basaltic rocks.

7.51 The SNH Carbon and Peatlands Map (2016) assigns mineral soils to the majority of the Study Area. (**Figures 7.2a-f**). There are two areas of predominately peaty soil, located in the west between Poles 146 and 149, and Poles 161 to 169. There is an additional minor area at the intersection of Netherton and Gallahill Road in the centre of the Study Area, close to Pole 92. All three areas of peat are Class 3, which means they are classified as having a dominant vegetation cover that is not priority peatland habitat but is associated with wet and acidic type.

7.52 British Geological Society (BGS) superficial geology maps show peat is only noted in three discrete areas, which are slightly different to those on the Carbon and Peatlands Map. These include between Poles 24 and 40 (**Figure 7.4e-f**), Poles 160-168 and to the north of Poles 174 and 175 (**Figure 7.4a**). There are five poles and associated access track sections located within this peat area.

7.53 Geology mapping also shows that across the majority of the Study Area there are no other superficial deposits, and bedrock is at or close to the surface. However, in places glacial till and alluvium deposits are shown. The alluvial deposits are mainly along the Barochan / Dargavel Burn valley. In the far east of the Study Area there are some raised marine deposits.

7.54 In terms of bedrock, the vast majority of the New 132kV OHL route is located on macroporphyritic basaltic and Markle lavas of the Clyde Volcanic Plateau Formation (Strathclyde Group), which are extrusive igneous rocks from the Carboniferous Period. There are numerous geological faults along the route. There is also a Dinantian dyke of basalt from the Carboniferous located beneath Barscube Hill in the centre of the Study Area, which trends south-west to north-east.

7.55 At the very eastern end of the Study Area, underlying the location of Poles 1-13, there is Lawmuir Formation of the Strathclyde Group Type, which comprises sedimentary bedrock from the Carboniferous Period and indicates the local environment was previously dominated by swamps, estuaries and deltas. Crossing the eastern tip of the study area is Central Scotland Late Carboniferous Tholeiitic dyke of igneous quartz-microgabbro bedrock.

Water Supplies

7.56 As noted by Scottish Water during the formal scoping consultation (**Table 7.1**) there are no known public drinking water supply catchments within the Study Area and therefore this was scoped out of the assessment.

7.57 There are several wells and springs shown on OS mapping. Consultation with Inverclyde Council, Renfrewshire Council and public consultation has indicated that there are several properties which have PWSs along the route. These have been investigated through desk and field survey and the PWSs within the Study Area, or with catchments in the Study Area, are listed in **Table 7.6**, and shown on **Figures 7.5a-f** These are all Type 'B' supplies[2] for smaller, domestic use of less than 50 persons.

7.58 Based on SEPA Guidance[xliii] for assessing effects of development proposals on groundwater abstractions and PWSs a 100m buffer and 250m buffer zone has been applied for all New 132kV OHL infrastructure, including temporary access tracks. The 250m buffer is a conservative approach that considers all ground excavations are deeper than 1m, which may not be the case for the wood pole installations (see **Chapter 4**). However, the temporary access tracks are likely to require minimal, if any excavations, and therefore will be less than 1m. Hence, using a 250m buffer across all project infrastructure is a conservative approach.

Table 7.6: Private Water Supplies (PWS) within the Study Area

PWS No.	Grid Reference	Supply Name	Description
PWS 1	233050 672339	Cunston and West Kilbride	Spring underground to north-west of properties. Occasionally runs dry, but is the primary source for household use, with PWS 2 as a secondary source.
PWS 2	232930 672230	Cunston and West Kilbride	Surface water abstraction from small watercourse. Noted by the owners to be of poorer quality than PWS 1. Joins with the pipeline from PWS 1.
PWS 3	235155 671785	Cloak Road Caravan	Collects from watercourse and drains with a bucket. No treatment.
PWS 4	238248 671446	North Glen Farm	Located to the west of and at the base of Barscube Hill, and is outwith the Study Area.
PWS 5	238465 670600	Mid Glen Farm	Borehole in horse field to north-west of properties. Supplies four dwellings and provides for farm needs, excluding irrigation. Located on the opposing bank of the Dargavel Burn to the EDM Project, and is a 9 inch bore at a depth of 100 feet, installed in 1970. Analysis of the geology shows there are no superficial deposits here so it is within the relatively impermeable bedrock, and is likely on a fault or other discontinuity. The residents noted it does not dry up so is a reliable source. Once extracted it is treated with a filter and UV.
PWS 6	239150 671525	Barscube	Spring to north of property, northeast of Barscube Hill outwith the Study Area.
PWS 7	239104 670264	Yetson Farm	Spring and receiving tank to the south of the property across West Glen Road. This gravity feeds to the house, where it is pumped. It is on the opposing side of Dargavel Burn to the EDM Project, and outwith the Study Area.
PWS 8	240398 671204	Barbeg Cottage	Shallow groundwater collection chamber. Potential catchment from Barbeg Hill to the south.
PWS 9	231095 672177	Auchentiber Farm	Borehole to the north-east of the property, pumped to holding tank to the north-west and uphill of the property.
PWS 10	235895 671992	Langside	Spring to the north-east of Knockmountain and to north-west of property and outwith the Study Area.

Designated Sites

7.59 Designated sites are shown on **Figures 7.1a-c**. The Study Area includes three SSSIs: Dargavel Burn SSSI, Formakin SSSI and the Inner Clyde SSSI. The Inner Clyde is also a SPA and a Ramsar site (see **Chapter 8 Ecology and Ornithology**).

7.60 The Dargavel Burn SSSI is designated for its valley fen. At 10.82ha it is considered to be one of the best examples of active valley fen in west central Scotland. The valley fen is a complex mosaic of communities comprising sedge-dominated mire, wet willow woodland, wet grassland and swamp. It was first designated in 1972. It runs adjacent and down gradient of the New 132kV OHL in the centre of the study area. The New 132kV OHL Poles 107 to 122 are within the study area or catchment of the Dargavel Burn SSSI.

7.61 The Inner Clyde SSSI is within 150m of the New 132kV OHL to the north of the eastern section of the route between 41 and 54. The Inner Clyde SSSI is 1,1813ha and extends 20km westward from Newshot Island to Craigendoran Pier on the north shore and to Newark Castle on the south shore. It contains extensive intertidal flats, which support large numbers of wintering waterfowl. The boundary of the Inner Clyde SSSI is coincident with that of the Inner Clyde SPA.

[2] Type A supplies are larger PWS, or those with a commercial activity, and are defined as Regulated supplies, which supply either a commercial activity or 50 or more people in domestic premises. These supplies are subject to regular testing by DGC. Type B supplies are smaller supplies that serve only domestic properties (<50 persons).

Groundwater and Groundwater Dependent Terrestrial Ecosystems (GWDTE)

7.62 The hydrogeology of the Study Area reflects the underlying geology: the extrusive volcanics are generally without groundwater except at shallow depth or within faults. However, rare springs may occur from systems of near surface fractures of weathered zones, with small yields. The water is generally weakly mineralised. Shallow groundwater is also likely to be present in the alluvial deposits along the river valleys.

7.63 The Study Area falls within the Kilmacolm and Langbank groundwater zones, as defined by SEPA. Where groundwater is available, it is considered to have 'good' water quality.

7.64 The Phase 1 Ecology survey described in **Chapter 8: Ecology and Ornithology** identified four areas of high GWDTE potential. These were inspected during the site investigations. These are illustrated on **Figures 7.5a-c** and include:

- A small area of wetland or potentially GWDTE is located downgradient of Pole 113 and the potential working area is within the edge of this potential GWDTE. This wetland area appears to be a man-made wetland rather than a natural wetland. The presence of the wetland aligns with the superficial geology showing an area of alluvium, so it is likely that any groundwater is shallow, perched, very limited with relatively short residence times. This wetland is considered to be man-made and dominated by surface water rather than groundwater.
- An area of wetland or potentially GWDTE is located between Pole 114 and 115 (and G054) approximately 35m distance from the nearest pole. This aligns with the superficial geology and topographical regime showing an area of alluvium associated with the adjacent watercourse channel, so it is likely that any groundwater is shallow, perched and very limited within the watercourse channel. Surface water from the watercourse channel is likely to dominate this area of wetland rather than groundwater.
- The western end of the Dargavel SSSI, categorised as 'F1 Swamp'. This aligns with the superficial geology showing an area of alluvium, so it is likely that any groundwater is shallow, perched and limited and that swamp is reliant on a mixture of surface water and groundwater. It is close to (approximately 50m) and down gradient from the installation of the New 132kV OHL Poles 115 to 117 (the removal of G054 and G055) and the associated access tracks.
- The marshy wetland area on Devol Moor upgradient of Pole 174 to 176. Two springs issue and converge upgradient of the New 132kV OHL alignment, and the habitat created is dependent on the spring sources and therefore is considered to be groundwater dependent. This area of groundwater dependent terrestrial ecosystem is located approximately 80m from the nearest pole, although there is a watercourse in between to intercept the shallow groundwater. The springs emerge in a topographical dip that links to the nearby watercourse and the poles are located outwith this topographical dip.

Existing 132kV OHL to be Decommissioned

7.65 In some areas, the Existing 132kV OHL to be decommissioned follows the same route as the New 132kV OHL. Baseline information has therefore not been duplicated for these areas, and reference has been made to the above information.

Topography

7.66 The topography for the Existing 132kV OHL generally follows the same pattern as the New 132kV OHL. However, although also starting in the gentle plains near Bishopton, it does not extend down to the M8 (south of the River Clyde) but instead runs across country further south, maintaining a minimum height of 35mAOD. Where the New 132kV OHL runs to the north of Barbeg and Burnmore Hills, the Existing 132kV OHL runs to the south, through rolling agricultural land past Meiklefield, Towncroft and Haddockston farms.

7.67 From here the two routes are approximately parallel and run along the Barochan / Dargavel Burn, but on opposite sides of the watercourse. The two lines are very close at the head of the valley, to drop and cross the Leperstone Reservoir. It also climbs to the north of Craigmarloch Wood to a height of 140mAOD. Unlike the New 132kV OHL, the Existing 132kV OHL stays higher from the crossing point of Auchenboothie Road, heading at a trajectory further north on Devol Moor. It crosses Devol Road at the apex at 205mAOD, before dropping to cross the moor to the Devol Moor Substation.

Watercourses and Surface Water

7.68 The main additional water feature is the Whitemoss Dam (**Figure 7.1e**), which is a large reservoir in the east of the Study Area, used for fishing. The Existing 132kV OHL traverses to the north and west of the dam, with two towers (G038 and G038a) to be decommissioned within its catchment. Additionally, there are two ponds at West Porton that are adjacent to the temporary access tracks for decommissioning, and three small ponds to the northwest of Whitemoss Dam, between the OHL and High Hatton.

7.69 In the centre of the Study Area (**Figure 7.1c-d**), similar to the New 132k OHL, the Existing 132kV OHL traverses two tributaries of the Dargavel Burn, although lower down, and then the burn itself. It stays on the south bank of the burn until Mid Glen Farm, where access tracks will be required to cross two small farm drains. For the next kilometre it is interwoven with the burn and the Dargavel SSSI as the Existing 132kV OHL crosses the burn five times, and has towers on both the south and north banks. The temporary access track to decommission the tower (G052) in the middle curve of the SSSI is proposed from the northeast, for tower G053 to the south of the SSSI is from the south and for G054 access is from the northwest avoiding crossings of the Dargavel Burn and minimising the requirement for temporary access into the SSSI area.

7.70 From here, as shown on **Figure 7.1a-b**, it follows the New 132kV OHL to Auchenbothie Road, crossing the Leperstone Reservoir. After the road it diverges to the north, meaning it crosses higher in the catchment of the Auchenbothie Burn, and the unnamed burn below the Devol Moor Substation.

Flood Risk

7.71 Based on a review of the SEPA flood risk mapping and site observations, the Existing 132kV OHL is high above the River Clyde, it is not susceptible to inundation from this source. The existing OHLs do traverse the Dargavel Burn, which will burst its banks in a significant flood event. However, as the burn sits within an established valley, flooding will not extend to the towers or their temporary access tracks for decommissioning.

7.72 The small watercourse and drains within the Study Area will increase in flow during a storm event, and the access tracks for decommissioning do cross a number of these. It is likely given the small size of these catchments and the underlying geology that the time to concentration will be short and any high flows and flooding equally short in duration.

Water Quality

7.73 Water quality is as per the New 132kV OHL alignment as discussed above.

Soils, Peat and Geology

7.74 The soils and geology of the Existing 132kV OHL follow the same pattern as the New 132kV OHL. The only notable exception is an additional small area of potential peat beneath the line on Devol Moor (**Figure 7.5a**). The access track for decommissioning crosses this area of potential peat between G073 and G074.

Water Supplies

7.75 As noted by Scottish Water during the formal scoping consultation (**Table 7.1**) there are no public drinking water catchments affected by the decommissioning of the Existing 132kV OHL. A Scottish Water Storage Tank exists adjacent to where the Existing 132kV OHL crosses Devol Road. At the time of the site visit there was a significant construction programme underway here with numerous vehicle movements.

7.76 The PWS in the vicinity of the Existing 132kV OHL are the same as those listed in **Table 7.6** and shown on **Figures 7.5a-f**. However, some of these supplies are in closer proximity to the Existing 132kV OHL than the New 132kV OHL, as follows:

- PWS 1 Cunston and West Kilbride spring source is down gradient of the access tracks for the decommissioning of two towers (G068 and G069).
- PWS 2 Cunston and West Kilbride is an alternative surface water supply, and its catchment contains access tracks for the demolition of two of the towers (G069 and G070). This catchment is marshy and peaty with small streams that require crossing.
- PWS 5 Mid Glen Farm has a water supply borehole supplying five properties located close to the temporary access track for the demolition of tower G048 on the existing 132kW OHL. This temporary access track and tower GO48 to be decommissioned will potentially be within the catchment of the supply.
- PWS 7 Yetson has a plastic pipe at shallow depth near tower G046 of the existing 132kW OHL. The temporary access track is not shown to cross the plastic pipe; however, the property has only a single day's supply in a holding tank so any disruption to the plastic pipe would be of high consequence.

7.77 Based on SEPA Guidance for assessing effects of development proposals on groundwater abstractions and PWS a 100m buffer and 250m buffer zone has been applied for all Existing 132kV OHL infrastructure to be decommissioned, including temporary access tracks. The 250m buffer is a conservative approach that considers all ground excavations are deeper than 1m, which may not be the case for the wood pole installations (see **Chapter 4**). However, the temporary access tracks are likely to require minimal, if any

excavations, and therefore will be less than 1m. Hence, using a 250m buffer across all project infrastructure is a conservative approach.

Designated Sites

7.78 The Existing 132kV OHL Study Area passes through two SSSIs.

7.79 The Dargavel Burn SSSI, designated for its valley fen feature is discussed above. The existing 132kV towers G052 and G054 are located within the Dargarvel SSSI boundary and existing 132kV towers G052 to G056 are within the catchment of the Dargarvel Burn.

7.80 The Formakin SSSI is designated for 6.77ha of grassland assemblages. It is the best example of lowland acid grassland in Renfrewshire. Dry and herb rich acid grassland covers most of the site, with patches of scrub and bracken. One of the towers (G040a) to be removed, and its associated temporary access track, is within this SSSI.

Groundwater and Groundwater Dependent Terrestrial Ecosystems (GWDTE)

7.81 The underlying hydrogeology for the Existing 132kV OHL is the same as the New 132kV OHL. However, the Existing 132kV OHL has a different layout with regards to GWDTE, as shown on **Figures 7.5a-c.** In particular:

- Decommissioning of the towers (G054 and G055) on the north western boundary of the Dargavel SSSI is also the boundary of an area identified as a potential GWDTE. As discussed above this is likely to be shallow, perched, very limited groundwater body within the alluvial deposits in the river valley and watercourse valleys. It is likely to be dominated by surface water, however there may be some minor groundwater influence and there is a sensitive receptor in the SSSI.
- The decommissioning of the Existing 132kV OHL across Devol Moor crosses the upper catchment of two springs, down gradient of the area of marsh that is likely to be groundwater dependent. The temporary access track between G073 and G074 requires no excavation works and is located over 100m from this GWDTE.

The 'Do Nothing' Scenario

7.82 Consideration of the 'do nothing' scenario that acknowledges the absence of the New 132kV OHL assumes that the Existing 132kV OHL is still required to be removed and replaced. Without the New 132kV OHL, the main change to the future baseline would be as a result of climate change. Scottish Planning Policy states that the "*planning system should promote a precautionary approach to flood risk from all sources, including coastal, water course (fluvial), surface water (pluvial), groundwater, reservoirs and drainage systems (sewers and culverts), taking account of the predicted effects of climate change*."

7.83 In April 2019, SEPA published new guidance on climate change in Scotland that provides a regional-based approach to climate change effects. For river catchments over 50km^2, the peak (200 year) design flow should be increased by 44% in the Clyde River Basin to account for projected climate change increases to the year 2100. In addition, the peak rainfall intensity allowance for the west region of Scotland is 55% to the year 2100. Thus, this part of Scotland is likely to get wetter with higher peak flows in the rivers in the future.

7.84 If nothing is done now, it is recommended that future site drainage and watercourse crossings consider future estimates of increased precipitation and flow and follow an adaptive approach.

Project Design Considerations

New 132kV OHL

7.85 During the detailed routeing stage, a buffer of at least 20m was applied to all watercourses and waterbodies identified from Ordnance Survey maps and the site walkover survey. A larger buffer of 50m was applied to the Dargavel Burn and the Dargavel SSSI. Pole locations, working areas and access routes have been designed to be outwith the buffers of the watercourses and waterbodies where possible.

7.86 Potential GWDTEs have been identified and where possible the wood poles, working areas and access tracks have been designed to avoid these taking in account other environmental and technical constraints.

7.87 Information on the PWS within the Study Area has been collected and the sources of the PWSs and their catchments have been avoided where possible, with existing access tracks being used where present to reduce potential ground disturbance.

7.88 The alignment was moved further north away from the Dargavel SSSI and Dargavel Burn. The alignments of the temporary access tracks adjacent to the watercourse near Barbeg Cottage and across the catchment of PWS 1 were also altered to reflect the sensitivity of these receptors.

Existing 132kV OHL to be Decommissioned

7.89 The Existing 132kV OHL towers require decommissioning as part of the new Erskine to Devol 132kV OHL commissioning. This includes accessing areas within the Dargarvel and Formakin SSSI and their catchments and accessing areas potentially within peatland and in close proximity to potential GWDTEs, PWS sources and piping.

7.90 During the detailed temporary access routeing stage, access to sensitive areas have been considered. For example, several options were investigated into the track routing for towers G051 to G055 within or near to the Dargavel SSSI. Those towers north of the Dargavel SSSI will be accessed from the north and the tower south of the Dargavel Burn will be accessed from the south. The final layout was designed to minimise the disturbance of the SSSI and crossings of the Dargavel Burn.

Infrastructure Location Allowance

7.91 A 50m Infrastructure Location Allowance (or micrositing allowance) will be used, as explained in **Chapter 4: Project Description**. However, it should be noted that micrositing of infrastructure further within the watercourse, waterbody, PWS and GWDTES buffers will not be undertaken. Micrositing will be undertaken to move infrastructure further away from sensitive water features, PWSs, marshy areas and identified potential GWDTEs (the springs in the western area and the Dargavel Burn SSSI), where possible.

Embedded Mitigation Measures

7.92 As noted in **Chapter 4**, mitigation has been embedded through the design process for a range of assessment topics and those assessments have been undertaken and are presented on the basis that the embedded mitigation forms an integral part of the EDM Project. However, specific additional mitigation measures ('additional mitigation') are also proposed to prevent, reduce and offset likely adverse effects which could not be avoided through design.

7.93 This chapter therefore recognises:

- Embedded mitigation – items that are embedded through the design of the EDM Project forming an integral part of it and which will be delivered during the construction process as detailed below; and
- Additional mitigation – items that are further required to mitigate the likely adverse effects of the EDM Project and which will be implemented to avoid, reduce or offset these effects identified in relation to particular topics. The additional mitigation measures are detailed in relation to specific likely adverse effects identified below.

7.94 A Construction and Decommissioning Environmental Management Plan (CDEMP), a template of which is provided at **Appendix 4.1**, will be developed and agreed with Inverclyde Council, Renfrewshire Council and SEPA in advance of the works. The CDEMP will establish a framework to ensure that health and safety and environmental best practices are adopted throughout the works. The CDEMP will include the approved Pollution Prevention Plan (PPP) and Site Waste Management Plan (SWMP).

7.95 Given SPEN's commitment to, and prior experience of, implementing accepted good practice during construction and operation, and the current regulatory context, many potential effects on the water environment can be avoided or reduced. With respect to the current regulatory context, since the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended in 2013 and 2017) (CAR) came into force, CAR authorisation will be required in relation to a number of activities e.g. engineering works in inland waters and wetlands. Consultation with SEPA throughout the construction and decommissioning process will be undertaken in relation to those activities for which a licence or registration is required where sediment management near rivers less than three metres wide occurs. A Construction Site Licence (CSL) will be required from SEPA under the CAR Regulations in advance of the construction works, and will include a detailed PPP to ensure that any discharges of water run-off from the site to the water environment do not cause pollution. This will be prepared, and authorisation sought from SEPA, before construction commences.

7.96 As a consequence, a number of measures are not considered to be mitigation as such, but rather an integral part of the design/construction process; and these are therefore taken into account prior to assessing the likely effects of the EDM Project. However, where appropriate, additional mitigation measures are identified where required, prior to determining the likely significance of residual effects.

7.97 A number of embedded pollution prevention and control measures will be put in place during construction. These are incorporated into the project design and reflect best practice guidance and recognised industry standards, as well as SPEN's recent

experience of constructing OHLs. Many of the embedded measures mitigate several potential effects (e.g. mitigation to minimise sedimentation and pollution such as Sustainable Drainage Systems (SUDS) for construction compounds or stoned laydown areas which can also serve to attenuate surface water run-off and minimise flood risk). Embedded mitigation measures that are incorporated into project design include:

- measures to reduce effects on increased flood risk and increased run-off (such as the construction of SuDS);
- measures to reduce sedimentation and erosion (such as temporary hay bale barriers or silt and splash fences);
- measures to reduce pollution and accidental spillage (such as the safe storage of chemicals and fuels);
- watercourse crossings (including no works taking place within watercourses);
- peat management (such as micrositing infrastructure to avoid peat disturbance/excavation and unnecessary waste); and
- measures during forestry felling (including adherence to Scottish Forestry Guidelines e.g. to ensure protection and enhancement of the water environment).

7.98 Construction or upgrade of watercourse crossings on minor watercourses of the access tracks will follow general good practice. Fording of watercourses will be avoided. The type of temporary bridges proposed for new crossings are:

- narrow burns: a mat of timbers will be used, supported by steel beams; and
- larger watercourses: a steel plate decking including safety barriers either side will be used, supported by main support beams with steel cross members.

7.99 Neither of these bridging solutions will affect the bed and banks of watercourses. Design and implementation of crossings will follow best practice, including recommendations in SEPA (2010) Engineering in the Water Environment Good Practice Guide – River Crossings.

7.100 As part of embedded mitigation, temporary construction SUDS will be put in place where needed at watercourse crossings to ensure no sedimentation from construction works or pollution from plant or machinery enters the watercourse. This could include temporary hay bale barriers or silt and splash fences as there are no significant earthworks required for the temporary watercourse crossings.

7.101 Prior to construction, and on completion of ground investigations and micrositing, a site waste management plan will be produced as part of the CDEMP, including for site soil and peat management good practice as there is very little peat within the Study Area and very little earth works required for the New 132kV OHL. It will ensure that any minor amounts of excavated soils are appropriately managed and re-used.

7.102 The contractor will sign up to SEPA Floodline for the West Central Area, to provide advance warning for flooding in the Study Area so that no works is undertaken during flooding events or when flooding is forecasted.

Assessment of Effects

New 132kV OHL

7.103 The assessment of effects is based on the New 132kV OHL as outlined in **Chapter 4: Project Description**. Unless otherwise stated, potential effects identified are considered to be negative.

7.104 The sensitivity of receptors (within the Study Area) have been assessed and are summarised in **Table 7.7**, using the criteria in **Table 7.3**.

Table 7.7: Sensitivity of Receptors

Receptor	Sensitivity	Comment
Watercourses/Surface Water Bodies Clyde coastal waters River Clyde Barochan / Dargavel Burn and tributaries	Medium to High	The Dargavel Burn contains the Dargavel SSSI, a valley fen wetland around the headwaters of the burn. The Inner Clyde SSSI extends into the River Clyde adjacent to the Study Area. As designated sites, these are of very high sensitivity. Watercourses directly feeding into the SSSI and the larger watercourses and waterbodies (with catchments exceeding 10km^2) were all classified by SEPA as 'good' ecological potential, thus have a high sensitivity.
River Gryffe **Auchenbothie Reservoir** **Leperstone Reservoir** **Auchenbothie Burn and tributaries** **Unnamed streams and tributaries**		Their tributaries and the smaller watercourses and water bodies across the Study Area are not classified and are considered on medium sensitivity; although those that provide for private water supply are of higher sensitivity (as below).
Private Water Supplies	Medium	There are ten abstractions for private water supplies within the Study Area and two of these have new infrastructure within their potential source catchments (PWS2 (an alternative supply for Cunston and West Kilbride) and PWS 5 (an informal supply for the caravan at Leperstone Reservoir). These are all used for human consumption and most are untreated; therefore, the sources have a Medium sensitivity.
Flood Risk	None to Low	The development is not considered to have a negative effect on flood risk as there is no permeant land take proposed. However, construction activities will be with a flood plain for small sections and therefore should be considered during construction operations.
Soils and Peat	Low	Where present, peat is mostly shallow, modified through farming practices and very localised/ limited in extent.
Designated Sites	High	Dargavel Burn SSSI. The New 132kV OHL has been designed to avoid the SSSI area. Watercourses directly feeding into the SSSI are of high sensitivity as the SSSI is dependent on these.
Groundwater and Potential GWDTEs	Low to Medium	The project is located on low productivity aquifers of low sensitivity with the exception of important localised aquifers for PWS and GWDTEs which are considered as medium sensitivity receptors.

Construction Effects

Predicted Construction Effects

7.105 The main likely significant environmental effects (before mitigation) are predicted to occur during the construction phase. The activities that will occur during the construction phase that may have an impact on the water environment include: construction and upgrading of temporary access tracks; watercourse crossings; site clearance and forestry removal; use of heavy plant machinery; excavation of pole bases; and construction traffic although minimal.

7.106 Relevant to this chapter, the New 132kV OHL Project comprises:

- 182 new wooden poles and associated temporary working areas;
- approximately 16.30km of new access tracks (of varying types) of up to 5m width;
- a total of 21 watercourse crossings for the temporary access tracks, including:
  - 19 new temporary watercourse crossings;
- two existing watercourse crossings;
- approximately 6.00ha of forestry will be felled to enable the physical construction of the New 132kV OHL and to achieve the necessary wayleave requirements.
- a total temporary land take of approximately 27.00ha and permanent land take of 0.43ha.

7.107 Particular effects are noted within the following areas:

- Wooden Pole 38 to 54 and access track are within a known coastal flood risk area and therefore works should only be undertaken during dry conditions and at low tide times to reduce the risk of the temporary access routes becoming flooded.
- Wooden Poles 132 to 143 and temporary access tracks are potentially within the catchment of PWS 3 and Leperstone Reservoir.

- The existing and new temporary access track to Wooden Poles 153 to 156 cross the indicative underground piping route for PWS 1 and PWS 2.
- Wooden Pole 157 and associated temporary access track is just within the potential catchment of PWS 1.
- Wooden Poles 158 to 159 and associated temporary tracking are within the catchment of PWS 2.
- Across Devol Moor to the east of Devol Road - requires the temporary crossing of three watercourses and peaty marsh to install Wooden Poles 161 to 165. Vehicles used will be low pressure vehicles to prevent damage to the marsh/peaty ground and where required floating matting will be used to avoid soil compression.
- Effects during construction of temporary access tracks and excavation of the tower bases on surface water quality, private drinking water supplies and watercourse morphology.

Watercourse Crossings

7.108 The design of construction access sought to use existing access tracks as much as possible and avoid new temporary watercourse crossings, especially across larger watercourses. However, there were unavoidable crossings of small watercourses. New temporary watercourse crossings and the upgrade of existing watercourse crossings could potentially impact channel morphology during construction. The stringing of the new OHL over watercourses is unlikely to have any effect as it will be undertaken from the temporary working area or pulley areas located away from the watercourses.

7.109 The new temporary watercourse crossings are all over small watercourses (<3m wide) as in shown **Figures 7.5a-f**, and mostly shown on 1:25,000 or 1:10,000 scale Ordnance Survey maps, although some were only observed during the site visits. Of these crossings four will require authorisation under the CAR, but most are on minor watercourses and will be covered by SEPA's general binding rules (GBRs) or the whole watercourse crossings for the construction of the New 132kV OHL to be covered by a SEPA Complex Licence.

7.110 Of the watercourses crossed by existing tracks that require upgrade, the need for upgrade will be reviewed in detail at each crossing prior to construction. A CAR authorisation is not likely to be required for minor upgrade works to existing track crossings; however, this will be verified prior to construction in consultation with SEPA.

7.111 The new sections of OHL will also cross watercourses and water bodies. Details of stringing the New OHL over watercourses is described in **Chapter 4: Project Description** and no works will take place within the watercourses during this activity.

7.112 The effect on channel morphology (bank erosion and channel form) during construction is assessed to be of **minor** magnitude, as embedded measures, including a minimum 20m buffer zone and environmentally sensitive crossing design, have been incorporated into the EDM Project design. This will result in an effect of **minor** significance.

Water Quality

7.113 The potential effects on surface water quality during construction are:

- pollution of surface waters caused by the release of sediment to watercourses from excavated material during construction, plant movement on the access tracks, and the felling of forestry/vegetation;
- pollution of surface water caused by the accidental spillage or leak of oil or fuel leaks causing hydrocarbon pollution. Pollutants could enter watercourses directly or via overland flow pathways;
- there is also a risk posed by construction material spillages during the formation of the pole bases. It is noted that no concrete is to be used; and
- pollution/sediment run-off at existing watercourse crossings (where these are being upgraded) and during construction of new watercourse crossings for access tracks.

7.114 The potential effects on groundwater quality include:

- The risk of hydrocarbon pollution of groundwater resulting from accidental oil or fuel leaks from construction traffic and construction works.

7.115 Risks to surface water quality will be greatest when works involve the exposure of bare earth that could result in increased erosion and sedimentation. The increase in sediment concentration in runoff from construction areas and access tracks may result in excessive levels of suspended sediment in watercourses. This can have an indirect effect on watercourse ecology (**see Chapter 8: Ecology).**

7.116 Felling can result in increased surface water run-off and sediment run-off. Direct felling of an area of 6.0ha of forestry is required for the New 132kV OHL wayleave and temporary infrastructure. This includes an area of up to 0.3ha to be felled (or lost) as a result of future windthrow (refer to **Chapter 10: Forestry**).

7.117 On the basis that the embedded mitigation measures detailed above have been incorporated into the EDM Project design and there is a high degree of confidence regarding their effectiveness. The magnitude of the effect of increased sediment/silt runoff causing a deterioration in surface water quality in waterbodies and watercourses within and downstream of the site during construction is considered to be **minor** and temporary, therefore is considered to be of **minor** significance.

7.118 The embedded mitigation measures to minimise the risk of pollution and accidental spillage will minimise the likelihood and severity of such incidents happening; however, there is still a residual risk. The magnitude of effect of pollution of surface water and groundwater caused by the release of hydrocarbon pollution concrete, resulting from accidental oil or fuel leaks or spillages, is considered to be of short duration and **minor** and is therefore considered to be of **minor** significance.

7.119 There is not considered to be a significant effect on any receptors and the effects on water quality is assessed to be of **minor** significance.

Private Water Supplies

7.120 There are ten known PWS sources within one kilometre of the New 132kV OHL (see **Figure7.5a-f** and **Table 7.6**), which source their water either from groundwater, springs or surface watercourses. As noted in **Table 7.7**, the sensitivity of each PWS is medium.

7.121 An assessment of PWS sources and supplied properties was carried out based on proximity to the New 132kV OHL Project infrastructure and flow path analysis from the infrastructure/construction areas to the PWS (**Table 7.8**).

Table 7.8: Private Water Supply Flow Path Analysis for the EDM Project

PWS No.	Supply Name	Flow Path Analysis	Significance of Effect
PWS 1	Cunston and Kilbride	This is a spring source with an undefined catchment, but is likely to be shallow and is up gradient of access routes and wooden pole installation points. The pipeline between the source and the properties are crossed several times by the access track however and this has the potential to damage the supply line. The access tracks for Poles 154-157 crosses the indicative underground PWS piping for PWS1 and 2: there are potentially four existing crossings and one new crossing; and the pipeline is very close to the installation point for Pole 156. The access tracks use existing tracks where possible and new tracks are temporary will only be used for a short period of time, and will be fully reinstated after use. The magnitude of potential effect is assessed to be **minor**; however, this is the primary water source for two properties with a medium sensitivity, and the access tracks are directly adjacent to the supply collection point.	**Minor**
PWS 2	Cunston and Kilbride	This is an alternative surface water supply source to the properties using PWS1. There is a flow path for sediment or pollutants from the construction access tracks and Pole 158. Additionally, as noted for PWS1 the pipeline between the source and the properties are crossed several times by the existing access track and new temporary sections of track and this has the potential to damage the supply line. Pole 158 is very close to the watercourse source and the track to pole 158 crossing the watercourse that is the PWS 2 source. The catchment for the water supply is likely to include all poles from 157-160 and the associated access track. The track for Pole 156 and 157 crosses potentially crosses the PWS 2 pipeline. It is noted that the access tracks will only be used for a short period of time and the pole excavation and installation is for a very short period, however there is potential for effects on the water supply, albeit the backup supply, so it is of medium sensitivity. The magnitude of the potential effect is assessed to be **minor.**	**Minor**
PWS 3	Cloak Road Caravan	The stream collection is informal, thus is difficult to conclusively say whether the supply will be vulnerable on any given day. It is downgradient of the New 132kV OHL. This catchment includes Poles 135-141 and associated access track. Given the informal nature of this water collection and the distance between infrastructure and the source, the magnitude of potential effect is assessed to be **minor.**	**Minor**
PWS 4	North Glen Farm	Up-gradient and over 200m from project infrastructure; no flow path. Magnitude of potential effect is assessed as **negligible.**	**None**

PWS No.	Supply Name	Flow Path Analysis	Significance of Effect
PWS 5	Mid Glen Farm	On the opposite valley side from the project; potential groundwater connectivity but unlikely to be direct. Magnitude of potential effect is assessed as negligible.	**None**
PWS 6	Barscube	Up-gradient and over 300m from project infrastructure; no flow path. Magnitude of potential effect assessed as **negligible**.	**None**
PWS 7	Yetson Farm	On the opposite valley side from the decommissioning; no flow path. Magnitude of potential affect assessed as **negligible**.	**None**
PWS 8	Barbeg Cottage	Based on the location of the shallow groundwater source and the hydrogeological regime based on the topography and geology of the area. The Barbeg PWS source, whilst within 250m of the infrastructure, it is not considered to be hydraulically connected to the New 132kV OHL and associated tracks. Magnitude of potential effect assessed as **negligible.** The indicative catchment of PWS 8 is shown in green on **Figure 7.6a**..	**None**
PWS 9	Auchentiber Farm	Borehole to the north-east of the property, pumped to holding tank to the north-west and uphill of the property. Pole 182 and the Devol sub-station are potentially with the catchment of the water supply. The new wooden pole 182, the new temporary construction compound and existing sub-station (no works is proposed on the substation) are upgradient (approximately 400m, 425m and 350m distance respectively) of the borehole source. Overall, infrastructure is over 250m distance away. Magnitude of potential effect assessed as **minor**.	**Minor**
PWS 10	Langside	Spring within a separate sub-catchment, no flow path. Magnitude of potential effect assessed as **negligible**.	**None**

Flood Risk

7.122 In accordance with the Risk Framework within SPP, new development should generally be limited to areas outside the medium risk 200-year (0.5% Annual Probability (AP)) functional floodplain. Therefore, floodplains were avoided as far as practicable during the routeing and design process of the New 132kV OHL. However, Poles 42-55 are located within the 200-year floodplain for the coastal River Clyde.

7.123 The New 132kV OHL is 'essential infrastructure' under the SEPA Flood Risk and Land Use Vulnerability Guidance and the guidance notes that essential infrastructure can be in medium to high risk flood areas (i.e. >0.5% AP) if a flood risk location is required for operational reasons and an alternative lower-risk location is not available.

7.124 Additionally, given the short timeframe required to install the wooden poles, and that once they are installed, they are not vulnerable to low-velocity flooding, the significance of flood risk is considered to be **none.**

7.125 The development is not considered to have a negative effect on flood risk as there is no permanent land take proposed. The construction activities, however, will be within a flood plain for small sections and therefore should be considered during preparation of the construction method statement.

Runoff Rates and Groundwater Recharge

7.126 Compaction of soils and increased areas of hardstanding reduces the infiltration rate leading to a greater rate and volume of surface water runoff. Clear felling forestry and other vegetation can also lead to an increase in surface water runoff rates. This results in a "flashier" catchment response and could increase flood risk downstream. The magnitude of the change will be small and temporary due to the small area of semi-permeable surfaces compared to the total catchment areas.

7.127 The construction of infrastructure, such as temporary access tracks, could affect (block or realign) natural flow pathways, resulting in changes to the local runoff rate and volume and potentially resulting in the change in contributing catchment areas. This would also have an effect on the rate and volume of water reaching receiving watercourses and other downstream receptors.

7.128 The New 132kV OHL temporary infrastructure, such as construction compounds and proposed stoned laydown areas will incorporate simple SUDS and other embedded mitigation measures to minimise the risk of increased run-off and flood risk and the discharge of attenuated surface water runoff from the working areas into the watercourses will be limited to greenfield runoff rates entering each watercourse from the site at present.

7.129 With embedded mitigation measures, the effect of site clearance, felling and construction on run-off rates is considered to be of negligible magnitude, and the significance will be none on watercourses downstream of the connection.

7.130 Wooden pole foundations are unlikely to affect groundwater levels due to their limited size and depth. If there is any noticeable change, this is considered to be very local in extent, of short duration and is considered to be of negligible magnitude and a significance of **none**.

7.131 Groundwater abstractions (for PWSs) have been assessed separately above where PWSs are within 1km of the New 132kV OHL.

Soils and Peat

7.132 There will be some minor alteration of the superficial geological environment through the localised, temporary excavation of soil, subsoil and peat (where present) to install the new wooden poles and temporary access tracks. Activities that have the potential to alter soils and subsoils include:

- earthworks and site drainage;
- excavation and removal of soils for poles;
- the disturbance and loading of soils and peat by temporary vehicle tracking; and
- forest felling activities.

7.133 As already noted, there are only three small, discrete areas of peat within the Study Area, which have been altered / modified by livestock grazing and drainage. Therefore, these peat deposits are considered to be of low sensitivity.

7.134 Temporary storage of any soils or peat (although not anticipated) would be close to where it is to be reused, that is within the working areas and not located on existing peat deposits, within 20m of a watercourse or sensitive ecological habitat.

7.135 Creosote treated timber poles will not be used in accordance with current best practice guidance.

7.136 On the basis that the embedded mitigation measures have been incorporated into the EDM Project design and there is a high degree of confidence regarding their effectiveness, the magnitude of the effect on soils and peat is negligible to minor. Peat is not present along most of the New 132kV OHL route and where present, it is limited to small areas of shallow peat that have been modified. Therefore, the effects on soils and peat are assessed as **Minor** to **None**.

Designated Sites

7.137 The New 132kV OHL Wooden Poles 107 to 122 are within the Study Area or catchment of the Dargavel Burn SSSI and Wooden Poles 41 to 54 are within 150m of boundary of the Inner Clyde SSSI.

7.138 The New 132kV OHL has been designed to avoid any direct negative effects on the SSSIs.

7.139 There will be no significant earthworks within the catchment of the SSSIs as access tracks and working areas are temporary comprising floating matting or low-pressure vehicles and any excavation required for the wooden poles will be minimal.

7.140 On the basis that the embedded mitigation measures have been incorporated into the EDM Project design and there is a high degree of confidence regarding their effectiveness, the significance of the effect on the designated sites is **none** to **minor**.

GWDTEs

7.141 The Phase 1 Ecology survey described in **Chapter 8: Ecology and Ornithology** identified four areas of high GWDTE potential. Of these four, one is considered to be potentially groundwater fed and potentially connected to the New 132kV OHL development based on the hydrogeological regime:

- The western end of the Dargavel SSSI, categorised as 'F1 Swamp' is likely to be reliant on a mixture of surface water and groundwater. It is close to (approximately 50m) and down gradient from the installation of the New 132kV OHL Poles 115 to 117 (the removal of G054 and G055) and the associated access tracks.

7.142 The effects on the designated sites are discussed above. On the basis that the embedded mitigation measures have been incorporated into the EDM Project design and there is a high degree of confidence regarding their effectiveness, the significance of the effect on the GWDTE is **minor.**

Proposed Mitigation

7.143 Due to the design of the project and incorporation of embedded mitigation there are no potentially significant effects on hydrology, water quality or PWSs. Details of the embedded mitigation will be set out in detail prior to construction in the CDEMP including the PPP, and construction method statements. An example of a CDEMP is provided in **Appendix 4.1.**

7.144 In addition, further investigation of the location of PWS pipework and infrastructure will be carried out prior to construction commencing and micrositing of the temporary access tracks within the Infrastructure Location Allowance (ILA) to avoid damaging any PWS pipework/infrastructure.

7.145 Identified sensitive springs and flushes, PWS 1 and 2 source (Cunston and West Kilbride) and PWS 3 Cloak Road Caravan source will be taped off to avoid any interaction of vehicles or materials, and additional measures (including silt fences, bale barriers, sensitive drainage design) will be put in place during earthworks works near these areas where required.

7.146 Where peat or marshy ground is present (three localised areas discussed above) floating temporary infrastructure or low pressure vehicles will be used so that the excavation of peat is avoided and there is minimal disturbance or compaction of this wetter ground.

7.147 Felling will be undertaken utilising a mixture of mechanical harvesting, mulching and hand felling techniques as shown in **Photos 4.5-4.7**. Hand felling techniques will be used within and in the proximity of the sensitive receptor of the Dargarvel Burn SSSI.

7.148 Further ground investigation and micrositing will be undertaken for the temporary track locations to determine the most suitable temporary track route and type so disturbance to ground conditions are avoided or minimised.

Residual Construction Effects

7.149 Following implementation of embedded mitigation and these additional mitigation measures (location/site-specific), the significance of residual construction effects are either **minor** or **none**.

7.150 The residual effect on effect on water quality of downstream watercourses and waterbodies is considered to have a significance of **minor to none**. Minor where; infrastructure within the Dargavel Burn SSSI catchment; infrastructure within the Inner Clyde SSSI catchment; infrastructure within the catchment of surface water PWSs 2 and 3; watercourse crossings: infrastructure in close proximity to the Leperstone Reservoir, and, infrastructure in close proximity to main watercourses and their tributaries.

7.151 Residual effects on effects on channel morphology (bank erosion and channel form and effects on run-off rates and flood risk is **none**.

7.152 The residual effects on groundwater levels and recharge is **minor** as the site is located on a groundwater drinking water protection area and infrastructure is located within the Dargavel Burn SSSI catchment and in proximity to potential GWDTEs identified.

7.153 The residual effect on peat is **none** to **minor**. Minor at locations of infrastructure where peat or wetlands is present and cannot be avoided.

7.154 The residual soil and water effects on wetlands/marshland or potential GWDTEs in the Dargavel SSSI during construction is assessed to be of **minor** significance because only minor small earthworks for wooden poles are taking place within the catchment of the SSSIs.

7.155 The residual effect on PWS quality and supply is considered to have a significance of **none** for PWS 4, 5, 6, 7, 8, and 10 and **minor** for PWS 1, 2, 3 and 9.

Decommissioning of Existing 132kV OHL

Decommissioning Effects

Predicted Decommissioning Effects

7.156 The temporary access tracks and tower locations for the removal of the Existing 132kV OHL are shown in **Figures 7.1a-c**. Due to the need for temporary crossings of watercourses and marshes in some specific areas, and the excavation of the existing tower bases to a maximum depth of 1m, the following effects have been assessed for the decommissioning of the Existing 132kV OHL:

- effects on channel morphology (bank erosion and channel form) during construction and use of the temporary access tracks;
- the decommissioning of 62 steel towers;
- a total of 8 watercourse crossings for the temporary access tracks, including:
  - 6 new temporary watercourse crossings;
  - 2 existing watercourse crossings; and
- a total temporary land take of approximately 5ha.

7.157 Effects are assessed in the following areas:

- Existing towers G060 to G064 and temporary access tracks are potentially within the catchment of PWS 3 and Leperstone Reservoir.
- Existing tower G040a is within the Formakin SSSI designated for being the best example of lowland acid grassland in Renfrewshire.
- Existing tower G048 and associated temporary access track is within close proximity to PWS 5.
- Existing towers G052 and G054 are located within the Dargavel SSSI– the area is marshland and traversed by small watercourses.
- Existing tower G068 and the associated existing and new temporary access track are within the catchment of PWS 1.
- The existing and new temporary access track to existing tower G067 and G068 crosses the indicative underground piping route for PWS 1 and PWS 2.
- Across Devol Moor to the west of Devol Road will require temporary crossing of marshy/peaty ground to access existing towers G072 to G074.
- Effects during construction of temporary access tracks and excavation of the tower bases on surface water quality and private drinking water supplies.

Watercourse Crossings

7.158 Given that in general the temporary bridges to be used for crossings do not affect the banks or bed of the channel or existing crossings, the effects on channel morphology (bank erosion and channel form) during construction is assessed to be of **negligible** magnitude and significance is **none**.

7.159 The sensitivity of the watercourses and waterbodies is 'Medium to High' Given the short duration of the works at each location for tower removal, the effect on surface water quality, assuming embedded mitigation measures are in place, is assessed to be of **minor** magnitude resulting in an effect which is **minor**.

7.160 Two existing towers are within Dargavel SSSI and the existing OHL crosses and re-crosses the burn. Removal of these towers may have short-term temporary effects on the marshlands and wetlands during removal. The magnitude of potential effect is **minor**. The effect before mitigation is **minor.**

7.161 The potential effects of removal of the Existing 132kV OHL on PWSs are summarised in **Table 7.9.**

7.162 As noted in **Table 7.7** above, the sensitivity of each PWS is medium.

Table 7.9: Private Water Supply (PWS) Flow Path Analysis for the Decommissioning of the Existing 132kV OHL

PWS No.	Supply Name	Flow Path Analysis	Significance of Effect Prior to Mitigation
PWS 1	Cunston and Kilbride	This is a spring source with an undefined catchment, but is likely to be shallow. There is a potential flow path for sediment or pollutants from the decommissioning of the existing tower G068, existing access tracks and the construction of the new temporary access tracks. However, access routes for removal are temporary, will only be used for a short period of time, and will be fully reinstated after use. The excavations for tower removal will not exceed a depth of 1m. The magnitude of potential effect is assessed as **minor** as no new temporary access track are proposed within the catchment; however, this is the primary water source for two properties with a medium sensitivity, and the access tracks are directly adjacent to the supply collection point.	**Minor**
PWS 2	Cunston and Kilbride	This is a surface water source directly down gradient of access routes and tower removal for two towers (G069 and G070). The existing access routes traverse through the water supply streams, therefore new crossings will be required. Access routes for removal will only be used for a short period of time and excavations for tower removal will not exceed a depth of 1m. This is the	**Minor**

PWS No.	Supply Name	Flow Path Analysis	Significance of Effect Prior to Mitigation
		secondary source for the two properties. The pipeline for the supply crosses the proposed access tracks twice so there is a potential for some disturbance of the pipe without further mitigation. There is potential for an effect on this water supply, albeit it is the backup supply, and therefore of medium sensitivity. The magnitude of the potential effect is assessed to be **minor.**	
PWS 3	Cloak Road Caravan	The stream collection is informal, thus it is difficult to conclusively say whether the supply will be vulnerable on any given day. It is downgradient of the Existing OHL towers (G060 to G063) and associated temporary track. Given the informal nature of this water collection and the distance between infrastructure and the source, the magnitude of potential effect is assessed to be **minor.**	**Minor**
PWS 4	North Glen Farm	On the opposite valley side from the decommissioning and with no flow path. The magnitude of potential effect is assessed as **none**.	**None**
PWS 5	Mid Glen Farm	There are various temporary access tracks and one tower (G048) that are within the 250m radius of the borehole that is considered to be located in relatively shallow bedrock. There is a potential (unlikely) pathway for contamination should a pollution incident occur. This supply is the source for five properties and is treated with a filter and UV. The magnitude of the potential effect is assessed as **minor.**	**Minor**
PWS 6	Barscube	On the opposite valley side from the decommissioning with no flow path. The magnitude of potential effect is assessed as **negligible**.	**None**
PWS 7	Yetson Farm	There are no towers within the catchment of the PWS. However, the piping to the tank at the house could be vulnerable if heavy machinery drives over it. This is unlikely as the proposed access track is some distance from the piping. The magnitude of potential effect is assessed as **negligible.**	**None**
PWS 8	Barbeg Cottage	Up gradient and on the opposite site of the B789 from this PWS with no flow path. The magnitude of potential effect is assessed as **negligible**.	**None**
PWS 9	Auchentiber Farm	Borehole to the north-east of the property, pumped to holding tank to the north-west and uphill of the property. Existing tower G076 is to be removed and a stoned laydown area constructed upgradient and within the potential catchment of the borehole. The working areas are over 250m from the borehole supply. Therefore, the magnitude of potential effect is assessed as **minor**.	**Minor**
PWS 10	Langside	Spring within a separate sub-catchment with no flow path. The magnitude of potential effect is assessed as **negligible**.	**None**

Runoff Rates and Groundwater Recharge

7.163 Compaction of soils and increased areas of hardstanding reduces the infiltration rate leading to a greater rate and volume of surface water runoff. Clear felling forestry and other vegetation can also lead to an increase in surface water runoff rates. This results in a "flashier" catchment response and could increase flood risk downstream. The magnitude of the change will be small and temporary due to the small area of semi-permeable surfaces compared to the total catchment areas.

7.164 The construction of infrastructure, such as temporary access tracks, could affect (block or realign) natural flow pathways, resulting in changes to the local runoff rate and volume and potentially resulting in the change in contributing catchment areas. This would also have an effect on the rate and volume of water reaching receiving watercourses and other downstream receptors.

7.165 The Existing 132kV OHL decommissioning temporary infrastructure, such as construction compounds and proposed stoned laydown areas will incorporate simple SUDS and other embedded mitigation measures to minimise the risk of increased run-off and flood risk and the discharge of attenuated surface water runoff from the working areas into the watercourses will be limited to greenfield runoff rates entering each watercourse from the site at present.

7.166 With embedded mitigation measures, the effect of site clearance, felling and construction on run-off rates is considered to be of **negligible** magnitude, and the significance will be **none** on watercourses downstream of the connection.

7.167 The excavation of existing foundation are unlikely to affect groundwater levels due to their limited size and depth. If there is any noticeable change, this is considered to be very local in extent, of short duration and is considered to be of **negligible** to **minor** magnitude with a significance of effect of **none** to **minor**.

7.168 Groundwater abstractions (for PWSs) have been assessed separately above where PWSs are within 1km of the Existing 132kV OHL.

Soils and Peat

7.169 There will potentially be some minor alteration of the superficial geological environment through the removal of existing tower foundations and temporary access tracks. Activities that have the potential to alter soils and subsoils include:

- earthworks and site drainage;
- excavation and removal of soils for existing tower foundation removal;
- the disturbance and loading of soils and peat by temporary vehicle tracking; and
- forest felling activities.

7.170 As already noted there is only small, discrete area of peat within the Study Area for the decommissioned route, which have been altered / modified by livestock grazing and drainage. Therefore, these peat deposits are considered to be of low sensitivity.

7.171 Should any existing towers be found to have been treated with lead paint, soil samples will be collected from the nearby surface soil for analysis and / or the surface topsoil around the tower will be scrapped off and removed off site for appropriate disposal in accordance with current best practice guidance.

7.172 Assuming the embedded mitigation measures as detailed above are incorporated into project design and are effective, the magnitude of the effect on soils and peat is negligible to minor as peat is not present along most of the route required to decommission the existing towers. Where peat is present it is limited to small areas of shallow peat that have been modified. Therefore, the effects on soils and peat is **minor** to **none**.

Designated Sites

7.173 The Existing 132kV OHL towers G052 to G054 are located directly within Dargavel Burn SSSI and towers G040a is located within the Formakin SSSI.

7.174 The removal of the Existing 132kV OHL towers has been designed to avoid any direct negative effects on the SSSIs by minimising the temporary access tracking required and avoiding any watercourse crossings with the SSSIs. Existing tower foundations within the SSSIs will not be fully removed to avoid ground disturbance.

7.175 The Existing 132kV OHL towers G052 to G054 are located within Dargavel Burn SSSI catchment. Temporary access tracking to these locations avoids crossing the SSSI and approach towers from further away from the SSSI to minimise indirect effects.

7.176 Small sections of temporary track will enter the Dargavel SSSI to access these towers. Vehicles used will be low pressure vehicles to prevent damage to the marshland and where required floating matting will be used.

7.177 There will be no significant earthworks within the SSSIs or catchments of the SSSIs as access tracking and working areas are temporary comprising floating matting or low pressure vehicles. No excavation below ground level will be undertaken to remove the existing tower foundations within the SSSIs. Where there is minimal earthworks required to remove the existing tower foundations within the catchments of the SSSIs, the above embedded mitigation for run off, groundwater recharge and soil will be incorporated.

7.178 Assuming the embedded mitigation measures as detailed above are incorporated into project design and are effective, the significance of the effect on the designated sites is **none** to **minor**.

GWDTEs

7.179 The Phase 1 Ecology survey described in **Chapter 8: Ecology and Ornithology** identified four areas of high GWDTE potential. Of these four, one is considered to be potentially groundwater fed and potentially connected to the Existing 132kV OHL towers to be decommissioned based on the hydrogeological regime:

- The western end of the Dargavel SSSI, categorised as ‘F1 Swamp’ is likely to be reliant on a mixture of surface water and groundwater. It is close to (approximately 50m) and down gradient from the removal of G054 and G055 and the associated access tracks.

7.180 The effects on the designated sites are discussed above. On the basis that the embedded mitigation measures have been incorporated into the EDM Project design and there is a high degree of confidence regarding their effectiveness, the significance of the effect on the GWDTE is **minor**.

Proposed Additional Mitigation

7.181 Additional or specific mitigation will be put in place at sensitive areas, including marsh/watercourse crossings as follows:

- Existing tower G040a is within the Formakin SSSI designated for being the best example of lowland acid grassland in Renfrewshire. Vehicles used will be low pressure vehicles to prevent damage to the grassland and where required floating matting will be used. Reconnaissance on foot prior to vehicular access will be undertaken by an ecologist.
- Existing tower G048 and associated temporary access track is within close proximity to PWS 5. Ground investigation and reconnaissance on foot prior to vehicular access will be undertaken.
- Existing towers G052 and G054 are located within the Dargavel SSSI– the area is marshland and traversed by small watercourses. The access tracks to these towers have been designed to avoid the Dargavel SSSI and watercourses crossings where possible. Small sections of temporary track will enter the Dargavel SSSI to access these towers. Vehicles used will be low pressure vehicles to prevent damage to the marshland and where required floating matting will be used. No watercourses crossing within the SSSI are required. The existing tower foundations will remain in-situ as requested by SNH in consultation and to prevent disturbance of the ground conditions within the SSSI. No earthworks are required within the SSSI. Ground investigation and reconnaissance on foot by ecologists and engineers prior to vehicular access will be undertaken. Further consultation will be undertaken with SNH in advance of the works and appropriate mitigation put in place (e.g. timing of removal; see **Chapter 4** for specific decommissioning process, **Chapter 8: ecology** and **Ornithology**).
- Existing ower G068 and the associated existing and new temporary access track are within the catchment of PWS 1. The existing and new temporary access track to existing tower G067 and G068 crosses the indicative underground piping route for PWS 1 and PWS 2.
- Across Devol Moor to the west of Devol Road will require temporary crossing of marshy/peaty ground to access existing towers G072 to G074. Vehicles used will be low pressure vehicle to prevent damage to the marsh/peaty ground and where required floating matting will be used to avoid soil compression.

7.182 In addition, further investigation of the location of PWS pipework and infrastructure will be carried out prior to decommissioning and micrositing of the temporary access tracks within the Infrastructure Location Allowance to avoid damaging any PWS pipework/infrastructure.

7.183 Identified sensitive springs and flushes, PWS 1 and 2 source (Cunston and West Kilbride) ,PWS 3 Cloak Road Caravan source and PWS 5 Mid Glen source will be taped off to avoid any interaction of vehicles or materials, and additional measures (including silt fences, bale barriers, sensitive drainage design) will be put in place during decommissioning works near these areas where required.

7.184 Where peat or marshy ground is present (one localised area discussed above) floating infrastructure will be used so that no peat will be excavated, and there is minimal disturbance or compaction on this wetter ground.

Residual Decommissioning Effects

7.185 The residual effect on surface water quality of downstream watercourses and waterbodies at sensitive locations (where temporary crossings may be required) is assessed as be **minor** to **none**. Minor where: infrastructure is located within the Dargavel Burn SSSI catchment; infrastructure is located within catchment of surface water PWSs 2 and 3; at watercourse crossings; and infrastructure in close proximity to the Leperstone Reservoir.

7.186 Residual effects on effects on channel morphology (bank erosion and channel form and effects on run-off rates and flood risk is assessed to be **none**.

7.187 The residual effects on groundwater levels and recharge is **minor** as the site is located on a groundwater drinking water protection area and infrastructure is located within the Dargavel Burn SSSI catchment and in proximity to potential GWDTEs identified.

7.188 The residual effects on peat is assessed to be **none** to **minor.** Minor at locations of infrastructure where peat or wetlands are present and cannot be avoided.

7.189 The residual soil and water effects on wetlands/marshland in the Dargavel SSSI and the grasslands in the Formakin SSSI site during removal is assessed to be of **minor** significance because they are highly sensitive areas, but no earthworks are taking place within the SSSIs.

7.190 The residual effect on PWS quality and supply is assessed to be **none** for PWS 4, 6, 7, 8, and 10 and **minor** for PWS 1, 2, 3, 5 and 9.

Interrelationship between Effects

7.191 Excessive levels of suspended sediment in watercourses as a result of construction activities can have an indirect effect on watercourse ecology and fish (see **Chapter 8: Ecology**). However, management of construction runoff and pollution control measures will be in place. It is considered there will be no significant residual effect on water quality of the downstream watercourses.

Further Survey Requirements and Monitoring

New 132kV OHL and Decommissioning of Existing 132kV OHL

7.192 These further survey monitoring requirements apply to both the New 132kV OHL and the decommissioning of the Existing 132kV OHL.

7.193 Further ground investigation and/or Ecological Clerk of Works (ECoW) and Engineer walkover will be undertaken to determine suitable temporary tracking methods before work commences.

7.194 Further ground investigation surveys will be undertaken by the contractor to further assess the distribution and type of marsh and peatland to microsite the temporary access tracking and to determine the best type of temporary access to preserve the existing ground conditions and habitats, in particular, the three peatlands areas, the Formakin SSSI and Dargavel SSSI.

7.195 Further surveying will be undertaken prior to construction to find the locations of the PWS 1 and 2 underground piping route so this pipeline can be appropriately protected.

7.196 Monitoring of water quality of the following PWSs will be undertaken before, during and after construction/decommissioning to ensure no contamination of the supplies. Monitoring will be undertaken by an ECoW (or equivalent) and monitoring locations will be identified in the CDEMP for:

- PWS 1 and 2; Cunston and Kilbride;
- PWS 3; Cloak Road Caravan; and
- PWS 5; Mid Glen.

7.197 If the water quality deteriorates during construction (e.g. discoloured, high sediment content, hydrocarbons) an emergency water supply will be installed at the PWS property, such as portable bowsers, to ensure minimal disruption of supply. The contractors will have an emergency supply of bowsers ready to deploy to affected PWS, if required.

7.198 The appointment of an ECoW will be made with responsibility for monitoring compliance with environmental legislation and additional mitigation (specific) including the CDEMP. An ECoW will be on site throughout the construction/decommissioning periods of the EDM Project to monitor the effectiveness of the temporary SUDS and pollution control measures.

Summary of Significant Effects

7.199 There are no significant effects predicted to the soil and water environment in relation to the construction of the New 132kV OHL or decommissioning of the Existing 132kV OHL following application of the embedded mitigation and additional mitigation outlined earlier in this chapter.

References

[i] SEPA (2009) The Flood Risk Management (Scotland) Act 2009.

[ii] SEPA (2017) Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended 2013 and 2017) (CAR).

[iii] Scottish Government (2003) Water Framework Directive (2000/60/EC) (WFD), and Water Environment and Water (Scotland) Act (WEWS Act) 2003.

[iv] Scottish Government (2012) Pollution Prevention and Control (Scotland) Regulations 2012.
[v] Scottish Government (2017) The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the 2017 EIA Regulations').
[vi] UK government (1974) Control of Pollution Act 1974 (as amended) Part II: Pollution of Water.
[vii](SEPA (2007) Surface Waters (Fish Life) (Classification) (Scotland) Directions 2007.
[viii] Scottish Government (2001) The Water Supply (Water Quality) (Scotland) Regulations 2001.
[ix] European Commission (1998) European Drinking Water Directive (Council Directive 98/83/EC).
[x] Scottish Government (2017) Private Water Supplies (Scotland) Regulations 2017.
[xi] Scottish Government (2007) Water Environment (Drinking Water Protected Areas) (Scotland) Order 2007.
[xii] European Environment Agency (2006) Groundwater Daughter Directive (2006/118/EC) (GWDD).
[xiii] SEPA (2009) The Scotland River Basin District (Classification of Water Bodies) Directions 2009.
[xiv] Scottish Government (2009) The Scotland River Basin District (Surface Water Typology, Environmental Standards, Condition Limits and Groundwater Threshold Values) Directions 2009.
[xv] Scottish Government (2014) The Scotland River Basin District (Standards) Directions 2014
[xvi] Scottish Government (2011) The Waste Management Licensing (Scotland) Regulations 2011.
[xvii] SEPA (The Scottish Environment Protection Agency (SEPA)'s Guidance for Pollution Prevention (e.g. PPG1 (2013 withdrawn 2015), GPP2 (2017), GPP4 (2017), GPP5 (2017), PPG6 (2014 withdrawn 2015), GPP8 (2017), GPP21 (2017), GPP22 (2018) and GPP26 (2019)).
[xviii] Scottish Government (2013). Planning Advice Notes (PANs) and Guidance (including PAN 51 Planning, Environmental Protection and Regulation; PAN 1/2013 Environmental Impact Assessment; PAN 69 Planning and Buildings Standards Advice on Flooding; and PAN 79 Water and Drainage).
[xix] Scottish Government (2012). Scottish Executive: River crossings & migratory fish: Design guidance, 2012.
[xx] SEPA (2018). Technical Flood Risk Guidance for Stakeholders, version 10 (SEPA, July 2018).
[xxi] SEPA (2018). Water Environment (Controlled Activities) (Scotland) Regulations 2011 - A Practical Guide, Version 8.2 February 2018.
[xxii] SEPA (2015) Position Statement to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2005, WAT-PS-06-02: Culverting of Watercourses - Position Statement and Supporting Guidance, Version 2, June 2015.
[xxiii] SEPA (2010): Engineering in the Water Environment Good Practice Guide – River Crossings, WAT-SG-25, 2010
[xxiv] SEPA (2019): Engineering in the Water Environment Good Practice Guide – Temporary Construction Methods, WAT-SG-29, 2009
[xxv] SEPA (2018): Sector Specific Guidance: Construction Sites, WAT-SG-75, 2018
[xxvi] SEPA (2009): Policy No. 19, Groundwater protection policy for Scotland, 2009.
[xxvii]SEPA (2006): Special requirements for civil engineering contracts for the prevention of pollution, WAT-SG-31, 2006.
[xxviii] SEPA (2017): Land Use Planning System, SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, 2017.
[xxix] SEPA (2018) Flood Risk and Land Use Vulnerability Guidance, version 3, February 2018.
[xxx] SEPA (2010) Regulatory Position Statement – Developments on Peat.
[xxxi] Forestry Commission (2017) The UK Forestry Standard.
[xxxii] Scottish Water (2015); standards and policies, including Sewers for Scotland 3rd edition, 2015 and Water for Scotland 3rd edition.
[xxxiii] CIRIA (2015: The SUDS Manual (C753).
[xxxiv] CIRIA (2006): Control of water pollution from linear construction projects. Technical guidance (C648).
[xxxv] CIRIA (2006): Control of water pollution from linear construction projects. Site guide (C649).
[xxxvi] CIRIA (2001): Control of water pollution from construction sites: Guidance for consultants and contractors (C532).
[xxxvii] CIRIA (2016): Groundwater Control – design and practice (C515).
[xxxviii] SEPA (2017). Peatland Survey. Guidance on Developments on Peatland. Scottish Government, Scottish Natural Heritage.
[xxxix] Scottish Renewables, SNH, SEPA & Forestry Commission Scotland. (2019). Good Practice during Windfarm Construction.
[xl] Scottish Natural Heritage (2018). A Handbook of Environmental Impact Assessment, 5th Edition.
[xli] DEFRA (2009). Code of Practice for the sustainable use of soils on construction sites.
[xlii] Scottish Government (2018) Marine Scotland: Scoping advice on information required in environmental impact assessment reports in relation to assessing risk to freshwater and diadromous fish and associated fisheries (Scottish Government, April 2018.