

Annex L - Hydrology Methodology

February 2023



North Argyll 275 kV Upgrade: Crossaig Substation Environmental Appraisal

Annex 1 - Methodology

February 2023



Table 6.2.1 Estimating the Sensitivity of Receptors

Sensitivity of Receptor	Definition
High	<ul style="list-style-type: none"> • A large, medium or small waterbody with a SEPA water quality classification of 'High' or 'Good'; • The hydrological receptor and downstream environment has no or limited capacity to attenuate natural fluctuations in hydrochemistry and cannot absorb further changes without fundamentally altering its baseline characteristics / natural processes; • Aquifer classified by the British Geological Survey (BGS) as 'moderately or highly productive aquifer' and is of local or regional importance. May affect statutorily designated nature conservation sites or local areas of nature conservation dependent on groundwater; • The hydrological receptor will support abstractions for public water supply, or private water abstractions which supply more than 25 people and / or 100 livestock (at any given point in the year) and/ or is used for the mass-production of food and drinks; • GWDTEs which are classified by SEPA as "highly groundwater dependent" and have no (<1 %) or minor (1 -25 %) functional impairment by man-made influence (such as drainage or forestry); • The hydrological receptor is of high environmental importance and is designated as European or International Importance such as a Special Area of Conservation (SAC), Special Protection Areas (SPA) or Wetland of International Importance (Ramsar), or is of national importance such as a Site of Special Scientific Interest (SSSI) and National Nature Reserves (NNR); • The receptor act as an active floodplain or other flood defence, or is located within an active flood plain, in accordance with SPP 2014; • Soil type and associated land use are highly sensitive (e.g., peat/blanket bog); • Class 1 or 2 priority peatland, carbon-rich and peaty soils cover >20% of the development area; • Areas containing geological or geomorphological features considered to be of national importance (e.g., geological SSSIs); and/or • Receptor contains areas of regionally important economic mineral deposits.
Medium	<ul style="list-style-type: none"> • A large, medium or small waterbody with a SEPA water quality classification of 'Moderate'; • The hydrological receptor and downstream environment will have moderate capacity to attenuate natural fluctuations in hydrochemistry but cannot absorb certain changes without fundamentally altering its baseline characteristics / natural processes; • Aquifer of limited value (less than local) and is classified by the BGS as a 'low productivity aquifer' as water quality does not allow potable or other quality sensitive uses. Exploitation of local groundwater is not far-reaching. Local areas of nature conservation known to be sensitive to groundwater effects; • GWDTEs/ wetlands which are classified by SEPA as "highly groundwater dependent" but have moderate (25 % - 50 %) functional impairment by man-made influence (such as drainage or forestry);

Sensitivity of Receptor	Definition
	<ul style="list-style-type: none"> • GWDTes which are classified by SEPA as “moderately groundwater dependent” have no functional impairment by man-made influence (such as drainage or forestry); • The hydrological receptor does not act as an active floodplain or other flood defence but is considered to provide some degree of natural flood management (e.g., peat soils); • The hydrological receptor is of local environmental importance (such as Local Nature Reserves (LNR)); • Soil type and associated land use are moderately sensitive (e.g. commercial forestry); • Class 1 or 2 priority peatland, carbon-rich and peaty soils cover <20% of the Proposed Development; • Class 3 and 5 peatland areas, carbon rich and peaty soils; • Receptor contains areas of locally important economic mineral deposits; and/or • Areas containing geological features of designated regional importance including Regionally Important Geological/geomorphological Sites (RIGS), considered worthy of protection for their historic or aesthetic importance.
Low	<ul style="list-style-type: none"> • A large, medium or small waterbody with a SEPA water quality classification of ‘Poor’ or ‘Bad’; • The hydrological receptor and downstream environment will have capacity to attenuate natural fluctuations in hydrochemistry but can absorb any changes without fundamentally altering its baseline characteristics / natural processes; • Poor groundwater quality and / or very low permeability make exploitation of groundwater unfeasible. Changes to groundwater not expected to affect local ecology; • The hydrological receptor does not support abstractions for public water supply or private water abstractions; • GWDTes which are classified by SEPA as “highly groundwater dependent” but have major (>50%) functional impairment by man-made influence (such as drainage or forestry); • GWDTes which are classified by SEPA as “moderately groundwater dependent” but have functional impairment by man-made influence (such as drainage or forestry); • GWDTes which are classified by SEPA as “highly or moderately groundwater dependent” but are ombrotrophic; • The hydrological receptor does not act as an active floodplain or other flood defence; • The hydrological receptor is not of regional, national or international environmental importance; • The hydrological receptor is not designated for supporting freshwater ecological interest; • Geological features or geology not protected and not considered worthy of specific protection; • Soil type and associated land use not sensitive to change in hydrological regime (e.g. intensive grazing); and/or • Receptor contains Class -2, -1, 0, and 4 non-peatland areas, with no carbon-rich and/or peaty soils.

Sensitivity of Receptor	Definition
Negligible	<ul style="list-style-type: none"> The receptor is resistant to change and is of little environmental value.

Table 6.2.2 Magnitude of Potential Impacts

Magnitude of Effects	Definition
High	<ul style="list-style-type: none"> A short or long-term major shift in hydrochemistry or hydrological conditions sufficient to negatively change the ecology of the receptor. This change will equate to a downgrading of a SEPA water quality classification by two classes e.g. from 'High' to 'Moderate'; A sufficient material increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with SPP); A major loss of (greater than 50 % of study area) or total loss of highly dependent and high value GWDTE, or where there will be complete hydrological severance which will fundamentally affect the integrity of the feature; A major permanent or long-term negative change to groundwater quality or available yield; The yield of existing supplies may be lost or major long-term or short-term reduction in quantity and/ or deterioration in quality; Changes to groundwater quality or water table level that will negatively alter local ecology or will lead to a groundwater flooding issue; Major or total loss of or alteration to peatland resource such that post development characteristics or quality will be fundamentally or irreversibly changed; Long term/permanent change to human or environmental health; Catastrophic failure of site infrastructure due to ground instability; Long term/permanent change to baseline resource; and/or Major or total loss of a geological site or mineral deposit, where the value of the site would be severely affected.
Medium	<ul style="list-style-type: none"> A short or long term non-fundamental change to the hydrochemistry or hydrological environment, resulting in a change in ecological status. This change will equate to a downgrading of a SEPA water quality classification by one class e.g. from 'High' to 'Good';

Magnitude of Effects	Definition
	<ul style="list-style-type: none"> • A moderate increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with SPP); • A loss of part (approximately 10 % to 50 % of study area) of a moderately dependent and moderate value GWDTE – significant hydrological severance affects the integrity of the feature, but it could still function; • Changes to the local groundwater regime that may slightly affect the use of the receptor; • The yield of existing supplies may be reduced or quality slightly deteriorated; • Fundamental negative changes to local habitats may occur, resulting in impaired functionality; • Loss of, or alteration to the baseline resource such that post development characteristics or quality will be partially changed; • Mid-term/permanent change to human or environmental health; • Ground failure that requires remediation but does not cause catastrophic failure of site infrastructure; • Mid-term/permanent change to baseline resource; and/or • Partial loss of a geological site or mineral deposit, with major effects to the settings, or where the value of the site would be affected.
Low	<ul style="list-style-type: none"> • A detectable non-detrimental change to the baseline hydrochemistry or hydrological environment. This change will not result in a downgrading of the SEPA water quality classification; • A marginal increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with SPP); • A detectable but non-material effect on the receptor (up to 5 %) or a moderate effect on its integrity as a feature or where there will be a minor severance or disturbance such that the functionality of the receptor will not be affected; • A detectable effect on a GWDTE (loss of between 5 % - 10 % of study area) or a minor effect on a GWDTE’s integrity as a feature or where there will be a minor severance or disturbance such that the functionality of the receptor will not be affected; • Changes to groundwater quality, levels or yields do not represent a risk to existing baseline conditions or ecology; • Small loss of soils or peatland, or where soils will be disturbed but the value not impacted; • Short-term change to human or environmental health; • Ground settlement/subsidence that does not adversely affect site infrastructure or require remedial action; • Short-term change to baseline resource; and/or • Small effect on a geological site or mineral deposit, such that the value of the site would not be affected.

Magnitude of Effects	Definition
Negligible	<ul style="list-style-type: none"> • No perceptible changes to the baseline hydrochemistry or hydrological environment; • No change to the SEPA water quality classification; • No increase in the probability of flooding onsite and offsite; • A slight or negligible change from baseline condition of geological resources; • Change hardly discernible, approximating to a 'no change' in geological condition; • Minimal detectable effect on a GWDTE (between to 0.1 % - 5 % of study area) or no discernible effect on its integrity as a feature or its functionality; • Minimal or no change to soils or peatland deposits; • Minimal or no change to human or environmental health; • Minimal or no change to ground stability; • A very slight change from the baseline conditions. The change is barely distinguishable, and approximates to the 'no-change' situation; and/or • Minimal or no change to a geological site or mineral deposit.

Table 6.2.3 Framework for Assessment of the Significance of Effects

Magnitude of Effect	Sensitivity of Resource or Receptor			
	High	Medium	Low	Negligible
High	Major	Moderate	Moderate	Minor
Medium	Moderate	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible