8. Geology, Hydrology, Hydrogeology and Peat

8.1 Introduction

8.1.1 SLR Consulting has been commissioned by the Applicant to undertake an update of the geology, hydrology, hydrogeology and peat assessment contained in the 2025 Breezy Hill Energy Project Environmental Impact Assessment (EIA) Report (hereafter referred to as the 'EIA Report').

8.1.2 A description of the Proposed Development is provided in **Revised Chapter 2: Proposed Development**. Since submission of the EIA Report the following design amendments have been made:

- amendment to the proposed new access track towards turbine T1;
- revised location of turbine T2 which includes a new section of access track; and
- revised location of turbine T13 which includes a new section of access track which will require an additional watercourse crossing.

8.1.3 This chapter considers the potential effects of the revised Proposed Development with respect to geology, hydrology, hydrogeology and peat. This assessment should be read in conjunction with Revised EIA Report Volume 3, **Technical Appendices 8.1** to **8.8.**

8.1.4 The following figures have also been updated to support this assessment:

- Figure 8.1: Site Location and Study Area;
- Figure 8.2a-d: Hydrological Features;
- Figure 8.3: Superficial Geology;
- Figure 8.4: Peatland Classification;
- Figure 8.5: Peat Depth Plan;
- Figure 8.6: Bedrock Geology:
- Figure 8.7: Hydrogeological Features;
- Figure 8.8: Watercourse Crossing Locations;
- Figure 8.9: Private Water Supply Risk Assessment; and
- Figure 8.10a-d: Potential Groundwater Dependent Terrestrial Ecosystems (GWDTEs).
- Figure 8.11: Peat Slide Likelihood

8.2 Legislation, Policy & Guidance

8.2.1 Relevant legislation, planning policies and guidance documents have been reviewed and taken into account as part of this assessment, including those

considered as part of the EIA Report. No additional legislations, planning policies and guidance documents have been considered.

8.2.2 In November 2025, the Environmental Authorisations (Scotland) Regulations (EASR) was extended to include water activities and will replace the CAR authorisations.

8.3 Consultation

8.3.1 Consultation, regarding geology, hydrology, hydrogeology and peat, with statutory consultees that was received prior to the EIA Report submission are outlined in **Chapter 8** of the EIA Report.

8.3.2 **Table 8.1** sets out relevant consultee responses with respect to geology, hydrology, hydrogeology and peat following the EIA Report submission.

Table 8.1: Consultation Responses

Consultee	Consultation Response	Applicant Action
Ayrshire Rivers Trust 03 June 2025	It is imperative that forestry operations follow 'UKFS Guidelines on Forests and Water' which describe how to comply with water environment protection requirements. Furthermore, detailed supplementary guidance can be found in Forestry and Land Scotland's (formerly Forestry Commission) Managing Forest operations to protect the water environment' (2019) document. This document details the main threats to water quality and provides key planning and operational measures that must be in place to mitigate against these threats. Fresh brash is a major source of nutrients and should not be left in concentrated heaps near to watercourses or sites that drain to watercourses. Nutrient enrichment can lead to fungus growth and low oxygen levels of nearby and downstream watercourses. Prior to any felling activities, pollution mitigation measures need to be in place and during felling or harvesting operations, regular inspections of the condition and effectiveness of these measures must conducted.	Noted. It has been agreed as part of the EIA Report (see **Chapter 9** of the EIA Report) that good practice measures, including those outlined in UKFS Guidelines on Forestry and Water, regarding any forestry felling would be incorporated into the CEMP. This remains applicable for the Proposed Development.
	During the construction phase water management plans should consider all potential avenues for pollution to enter watercourses and have appropriate pollution controls and silt mitigation measures in place prior to commencement of works. This should include measures to address run-off from new road surfaces. Visual assessments of watercourses (downstream of onsite works) should be carried out daily to ensure pollution is not entering watercourses. Silt protection measures should have the capacity to deal with prolonged periods of heavy rain and should be regularly checked for their effectiveness, especially during and following periods of heavy rain. Recent pollution incidents in Ayrshire have been caused due to irregular checks and failed silt protection following heavy rain.	Noted. Good practice pollution prevention methods outlined in **Chapter 8** of the EIA Report will be incorporated into the final CEMP. These measures remain applicable for the Proposed Development.

Consultee	Consultation Response	Applicant Action
	Ecological monitoring needs take into consideration the cumulative impact of this development with any nearby developments (e.g. North Kyle Windfarm). Any watercourses that drain both developments could be adversely affected should either or both developments fail to adequately protect these watercourses. The monitoring programme must be designed such that sources of pollution, habitat degradation or any other adverse impact can readily identified and mitigation measures can be implemented.	As required by SEPA, a water quality monitoring plan will be prepared and agreed with SEPA, should the development be consented. It is anticipated that this will include a programme of pre-construction monitoring, over a period to be set out in the plan. The plan will take into consideration the historic mining on-site.
Ayrshire Rivers Trust 03 June 2025	The proposed development should have appropriate environmental risk assessments, a Water Quality and Fish Monitoring Programme (WQFMP) and suitable mitigation measures in place to protect fish, invertebrates and freshwater environments before any onsite work commences (including any vegetation clearance, tree felling or soil stripping). As part of a WQFMP electrofishing surveys are commonly used to assess fish populations and aquatic habitat can be monitored by sampling aquatic invertebrates, which serve as an indicator of ecosystem health. Following standard practice and to comply with Marine Directorate's "Monitoring watercourses in relation to onshore wind farm developments: generic monitoring programme" monitoring of fish and aquatic invertebrates should take place at least 12 months prior to the commencement of the development (including any vegetation clearance, tree felling or soil stripping) to establish an ecological baseline. Ideally baseline data should be collected for 2 years prior to allow data to be interpretated without the influence of natural annual fluctuations. Annual surveys during the construction and post-construction restoration period must take place and these surveys should extend for at least 12 months upon completion of the construction and post-construction restoration period. The WQFMP plan should include sites downstream and out with the development boundary in representative receptor watercourses as well as control sites. The electrofishing surveys must be conducted by experienced and Scottish Fisheries Co-ordination Centre (SFCC) team leader qualified staff. Furthermore, surveys must be carried out under license from Marine Directorate and both the local rivers trust and District Salmon Fishery Boards must be consulted with prior to surveys being carried out.	Noted. A water quality monitoring plan will be prepared and agreed with SEPA, should the development be consented. It is anticipated that this will include a programme of pre-construction monitoring, over a period to be set out in the plan. The plan will take into consideration the historic mining on-site. Electrofishing surveys were completed as part of the ecology baseline in the EIA Report (see Chapter 6 of the EIA Report).
Scottish Water 09 June 2025	Scottish Water has no objection to this proposal. Please read the following carefully as there may be further action required. A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water	Noted. No further actions required.

Consultee	Consultation Response	Applicant Action
	Framework Directive, in the area that may be affected by the proposed activity. For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system.	
The Coal Authority 09 July 2025	The Planning team at the Coal Authority have no objections to this project subject to; the recommended intrusive investigations being undertaken on site prior to commencement of the development to establish the risk posed by past coal mining activity, any necessary remedial works being informed by the findings of these carried out on site, and where necessary micro siting of the buildings/turbines taking account of the mine entries recorded to be present. The applicant should note that Permission is required from the Coal Authority Permit and Licensing Team before undertaking any activity, such as ground investigation and ground works, which may disturb coal property. Please note that any comments that the Coal Authority may have made in a Planning context are without prejudice to the outcomes of any Permit application.	Noted. It is confirmed that a geotechnical investigation and assessment of backfilled areas at the opencast site would be undertaken prior to construction.
	It should be noted that where SUDs are proposed consideration will need to be given to the implications of this in relation to the stability and public safety risks posed by coal mining legacy. The developer should seek their own advice from a technically competent person to ensure that a proper assessment has been made of the potential interaction between hydrology, the proposed drainage system and ground stability, including the implications this may have for any mine workings which may be present beneath the site.	Noted. Prior to construction a detailed drainage design, including any SuDS will be agreed prior to construction with consultees.
	It should be noted that wherever coal resources or coal mine features exist at shallow depth or at the surface, there is the potential for mine gases to exist. These risks should always be considered by the LPA. The Planning team at the Coal Authority, in its role of statutory consultee in the planning process, only comment on gas issues if our data indicates that gas emissions have been recorded on the site. However, the absence of such a comment should not be interpreted to imply that there are no gas risks present. Whether or not specific emissions have been noted by the Coal Authority, local planning authorities should seek their own technical advice on the gas hazards that may exist, and appropriate measures to be implemented, from technically competent personnel.	Noted. It is confirmed that a geotechnical investigation and assessment of backfilled areas at the opencast site would be undertaken prior to construction.
Scottish Environment Protection	We ask that the planning conditions in Appendix 1 below are attached to any consent if granted. If these will not be applied, then please consider this	Noted. No actions required.

Consultee	Consultation Response	Applicant Action
Agency (SEPA) 22 July 2025	representation as an objection. Please also note the advice provided below and in Appendix 2.	
NatureScot 31 July 2025	We advise that the impacts of this proposal on peat and carbon rich soils will be adequately overcome by siting, design and suitable mitigation, as required by Scottish Planning Policy.	Noted.

8.4 Assessment Methods & Significance Criteria

8.4.1 The methodology used for this assessment is the same methodology as presented within **Chapter 8** of the EIA Report.

8.5 Changes to Baseline Conditions

8.5.1 The Proposed Development, including amended locations of turbines T2 and T13, are located within the same surface water and groundwater catchments as the Proposed Development assessed in the EIA Report and underlain by similar geological conditions. There has been no change to the drainage pathways, water quality or water dependent designations since the Proposed Development was assessment in the EIA Report.

8.5.2 A review of the Carbon and Peatland 2016 mapping indicates that the amended location of turbine T2 is shown to be located within an area of Class 4 peatland compared to the previous layout assessed in the EIA Report which is located within an area of Class 3. The amended location of turbine T13 is shown to be located within Class 3 and Class 4 peatlands compared to the previous layout where it was entirely located within Class 4 peatlands. Class 3 peatland areas are not considered priority peatland habitats however soils may remain carbon-rich with areas of deep peat, whilst areas of Class 4 peatland are considered unlikely to represent peatland habitats.

8.5.3 Additional peat probing surveys have been undertaken for the new turbine areas and sections of access tracks. Probe depths of between 0.1m and 2.2m were recorded within these areas however the majority of peat depths recorded depths <1m, as shown on **Figure 8.5**. The deepest area of peat was recorded adjacent to an existing track which is proposed to be upgraded between turbines T2 and T5. Additional investigation of the underlying soils was undertaken at T2 and its access track by hand pits, confirming the absence of peat at this location.

8.5.4 No additional potential GWDTE communities have been identified within 250m of the Proposed Development. It was confirmed as part of the previous EIA Report that identified potential GWDTE areas are not considered to be groundwater dependent.

8.5.5 It is confirmed that no new development associated with the Proposed Development is located within the 50m watercourse buffers, except for the new watercourse crossing which is required to access the amended location of turbine T13. The location of the watercourse crossing is shown on **Figure 8.8** and

photographs and dimensions of the new watercourse crossing is shown in **Table 8.2**.

Table 8.2: Consultation Responses

Watercourse Crossing ID (shown on Figure 8.8)	WCX16
Watercourse Crossing Details	**Grid Reference:** E 246409, N 612127 **Status:** New **Watercourse Width:** 1.2m **Watercourse Depth:** 0.4m **Notes**: Watercourse located within a wider channel which is approximately 2.5m wide and 0.8m high.
Photograph Looking Upstream	
Photograph Looking Downstream	
Potential Crossing Type Likely Required EASR Authorisation	Culvert Registration

8.5.6 SEPA flood mapping indicates that amended turbine locations are not at risk of fluvial or surface water flooding. Approximately 75m of the existing access between

turbine T2 and T5 is shown to be at risk of surface water flooding with flood depths of between 0.3m and 1m deep.

8.5.7 Private water supply (PWS) source locations confirmed as part of the previous EIA Report are shown on **Figure 8.9**. It is confirmed that no development is proposed within 250m of the PWS sources and therefore in accordance with SEPA's guidance no further assessment is required.

8.5.8 The revised assessment has confirmed that there are no new or increased sensitivity geological, hydrological or hydrogeological receptors when compared to the EIA Report.

Carbon Calculator

8.5.9 The net emissions of carbon dioxide from the proposed amendments of the Proposed Development are expected to be 252,929 tonnes of CO2e, compared to the findings of the EIA Report which predicted 242,525 tonnes of CO2e. As such, the Proposed Development has a payback time of 2.0 years compared to the 1.9 years indicated in the findings of the EIA.

Aggregate Requirements

8.5.10 The estimated aggregate requirements for the Proposed Development are 202,801m^3 compared with 205,814m^3 for the Proposed Development. Based on **Technical Appendix 8.4: Borrow Pit Assessment** from the Proposed Development EIA, it is assessed that the three borrow pit search areas identified can supply all the aggregate required for the Proposed Development.

8.6 Assessment of Potential Effects

Construction Effects

Impacts on Surface Water Quality

8.6.1 Good practice and mitigation measures detailed within **Chapter 8** of the EIA Report remain wholly applicable and can be used to mitigate potential adverse effects on surface water quality. These will be included as part of the final CEMP which will be secured by a planning condition (post any consent) and would be prepared and agreed with statutory consultees prior to construction commencing. It is confirmed that the 50m watercourse buffer has been maintained for the proposed amendments to the Proposed Development, except for at the proposed

watercourse crossings, and as discussed in the EIA Report a programme of water quality monitoring is proposed prior to and during construction.

8.6.2 The proposed amendments to the Proposed Development do not change the findings of the EIA Report and therefore the significant effect remains minor adverse and not significant in terms of the EIA regulations.

Impacts on Surface Water Flow

8.6.3 As detailed in the EIA Report, runoff from permanent infrastructure will be controlled through suitable construction drainage provisions which will be confirmed and agreed as part of the final CEMP prior to construction. Any watercourse crossing will be designed prior to construction in accordance with good practice and regulated by SEPA's EASR authorisation process as required.

8.6.4 The proposed amendments to the Proposed Development do not change the findings of the EIA Report and therefore the potential effect remains minor adverse and not significant in terms of the EIA regulations.

Impacts on Groundwater Quality

8.6.5 As outlined in **Chapter 8** of the EIA Report mitigation measures will be included in the final CEMP to ensure groundwater quality is maintained during construction. These include measures to prevent leaching of any concrete during construction, ensure that any pollutants are stored and handled in accordance with good practice, include appropriate locations of refuelling of plants and vehicles and distribution of spill kits throughout the Proposed Development.

8.6.6 These measures remain wholly applicable for the Proposed Development. Therefore, the potential significance of effect of groundwater quality remained negligible and not significant in terms of the EIA Regulations.

Impacts on Groundwater Flow

8.6.7 The proposed amendments to the Proposed Development are located within the same groundwater bodies as those assessed in the EIA Report and mitigation measures will be implemented as part of the CEMP to ensure that groundwater flow is maintained during construction, as discussed in **Chapter 8** of the EIA Report. It is therefore considered that potential significant effects of groundwater flow would remain as negligible and not significant in terms of the EIA Regulations.

Removal and Impacts on Peat

8.6.8 As a result of the proposed amendments to the Proposed Development, the peat excavation and re-use volumes have been updated from those presented in

Technical Appendix 8.2 of the EIA Report. A comparison of the volumetrics is detailed in **Table 8.3**.

Table 8.3: Excavated and Re-use Volumes Comparison

Type	EIA Report (May 2025)	Proposed Development
Total Excavated Volumes (m^3)	240,679	239,453
Total Re-use Volumes (m^3)	240,679	239,453
Net Balance (m^3)	0	0

8.6.9 A review of **Table 8.3** confirms that approximately 239,453m^3 peat and soils would be disturbed as a result of the Proposed Development which is 1,226m^3 less compared to the Proposed Development layout assessed in the EIA Report.

8.6.10 The recommendations on excavations and re-use of soils and peat detailed in **Technical Appendix 8.2** of the EIA Report remain applicable and would be updated in a detailed Peat Management Plan which would be secured by a planning condition (post any consent) prior to construction commencing.

8.6.11 With regards to peat stability, the likelihood of a peat landslide occuring remains negligible to low when compared to the Proposed Development assessed in the EIA Report. Review of the proposed amendments to the Proposed Development indicates that there has been no change to the peat slide likelihood or the conclusions and recommendations within **Technical Appendix 8.3** of the EIA Report.

8.6.12 Subject to adoption of appropriate mitigation measures outlined in the **Technical Appendix 8.2** and **Technical Appendix 8.3** of the EIA Report the significance of effect remains as minor adverse and not significant in terms of the EIA Regulations.

Peat Landslide Impact on Watercourses

8.6.13 As shown in **Figure 8.11** the likelihood of a peat landslide occurring was deemed to be negligible to low across the Site. With the proposed amendments to the Proposed Development infrastructure avoiding areas of increased likelihood.

8.6.14 Based on the above, no increase in peat slide risk to watercourses has been identified and therefore potential significant effects remains as minor adverse and not significant in terms of the EIA Regulations.

Compaction of Soils

8.6.15 The amended layout of the Proposed Development does not change the outcomes of **Chapter 8** of the EIA Report and therefore significant effects regarding compaction of soils remains as negligible adverse and not significant in terms of the EIA Regulations.

Impacts to PWS

8.6.16 The amended layout of the Proposed Development does not change the findings of the EIA Report. No PWS sources are identified within 250m of the Proposed

Development and therefore in accordance with SEPA's guidance no further assessment is required.

Operational Effects

Impacts on Surface Water Flow

8.6.17 Mitigation measures to manage surface water drainage will be implemented during the construction phase and will continue during the operational phase, as discussed in **Chapter 8** of the EIA Report. Details of the surface water drainage will be confirmed prior to construction (should the development be consented) and will be agreed with statutory consultees and will include all elements of the Proposed Development. The amendments to the Proposed Development layout do not change the findings of the EIA Report with regards to operational effects on surface water flow and the potential effect would remain as negligible and not significant.

Impacts on Fluvial Geomorphology

8.6.18 The Proposed Development layout would require an additional watercourse crossing, as shown on 1:10,000 scale mapping, compared to the Proposed Development assessed in the EIA Report. All the proposed watercourse crossings will be managed in accordance with good practice and SEPA EASR authorisations to ensure that the capacities and efficiencies of the crossings are maintained as intended. Any damaged to watercourse crossings during operation should be repaired or replaced as required.

8.6.19 It is therefore considered that the revised layout of the Proposed Development would not change the findings of the EIA Report, and the potential effect would remain as negligible and not significant.

Impacts on Groundwater Flow and Drying Out of Peat

8.6.20 Drainage measures, such as cross drains, implemented during the construction phase will continue during the operational phase to ensure that surface water and shallow groundwater flow paths are maintained during operation of the Proposed Development, as outlined in **Chapter 8** of the EIA Report. These mitigation measures remain wholly applicable to the Proposed Development and therefore potential effects remains as minor adverse and not significant.

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

8.6.21 It is noted that the potential for a pollution event or significant increased sedimentation discharge is reduced during the operational phase as many of the activities which could result in such an event occurring does not occur during operation of the Proposed Development. Good practice measures outlined during the construction phase would be implemented as required and would be managed within an Operational Environmental Management Plan (OEMP). No change to the

battery storage facilities are proposed as part of the amendments to the Proposed Development.

8.6.22 It is therefore considered that the mitigation measures outlined in the EIA Report remain wholly applicable to the Proposed Development and therefore potential effects remains as minor adverse and not significant.

Decommissioning Effects

8.6.23 The amendments to the Proposed Development layout do not change the potential decommissioning effects outlined in the EIA Report. Potential effects will be similar as during construction and decommissioning of the Proposed Development would be undertaken in accordance with an approved Decommissioning Environmental Management Plan.

8.7 Mitigation

8.7.1 The embedded mitigation measures outlined in **Chapter 8** of the EIA Report remain wholly applicable for the Proposed Development. No additional mitigation measures are required.

8.8 Assessment of Residual Effects

8.8.1 The proposed amendments to the Proposed Developments do not change the findings of Chapter 8 of the EIA Report.

8.8.2 Potential effects on geology, hydrology, hydrogeology and peat as a result of construction, operation and decommissioning of the Proposed Development would remain as not significant in terms of the EIA regulations.

8.9 Assessment of Cumulative Effects

8.9.1 No additional potential cumulative receptors have been identified since the EIA Report was submitted. The amendments to the Proposed Developments are located within the same surface water and groundwater catchments and therefore the revisions to the Proposed Development layout do not change the potential cumulative effects outlined in the EIA Report.

8.10 Summary

8.10.1 The significance of effect as a result of the Proposed Development would remain as not significant.