Galileo 05 Limited

Lynemore Wind Farm

Additional Information Volume 2

Chapter 8: Hydrology, Geology, Hydrogeology and Peat

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8 HYDROLOGY, GEOLOGY, HYDROGEOLOGY AND PEAT

8.1 Introduction

8.1.0 This AI Report has been undertaken by Fluid Environmental Consulting (Fluid) and assesses the potential geological, hydrological, hydrogeological and peat impacts of the Revised Proposed Development, which comprises an amended layout to that of the EIA Proposed Development with a reduction of 14 turbines to 12 turbines. A detailed description of the Revised Proposed Development is contained within **AI Chapter 2: Revised Proposed Development**.

8.1.1 Inputs from East Point Geo were provided in relation to the peat landslide hazard risk assessment (PLHRA).

8.1.2 This chapter should be read in conjunction with **Chapter 8: Hydrology, Geology, Hydrogeology and Peat** of the EIA Report. Where information remains valid, in the context of the Revised Proposed Development it is not repeated.

8.1.3 This chapter is supported by **AI Figures 8.1 – 8.11** and **AI Technical Appendix Figures 8.6.1, 8.7.1, 8.4.6, 8.4.7, 8.4.10, 8.4.11** and **8.4.12** which are referenced throughout the text.

8.1.4 The following appendices are also referred to throughout the chapter with numbering consistent with the EIA Report Appendices:

- **AI Technical Appendix 8.2: Peat Survey Report**
- **AI Technical Appendix 8.3: Outline Peat Management Plan (OPMP)**
- **AI Technical Appendix 8.4: Peat Landslide Hazard Risk Assessment (PLHRA)**
- **AI Technical Appendix 8.5 Watercourse Crossing Inventory**
- **AI Technical Appendix 8.9 Correspondence with Consultees**[1]

Consultation Responses

8.1.5 In undertaking the assessment, consideration has been given to the consultation responses received on **Chapter 8: Hydrology, Geology, Hydrogeology and Peat** for the EIA Report as detailed in **Table 8.1: Consultation Responses to the EIA Report.** There have been responses from the following organisations:

- NatureScot on the 6th August 2025
- Scottish Environment Protection Agency (SEPA) on 12th June 2025

[1] **AI Appendix 8.9 Correspondence with Consultees** is an additional appendix following on from the EIA Report appendices, as part of this AI Report.

Table 8.1 Consultation Responses to the EIA Report

Consultee	Summary of Key Issues	Comments
NatureScot 6th August 2025	**Peat Restoration** Stated that they are not aware of any use of excavated peat which results in the successful restoration of peatland habitat and therefore do not support this strategy.	The Applicant acknowledges NatureScot's position regarding the use of excavated peat in peatland restoration. The restoration strategy for the Revised Proposed Development has been designed to follow current best practice and relevant guidance, including minimising the use of excavated peat for restoration purposes wherever possible. Where the use of excavated peat is proposed, this will be informed by site-specific conditions and will be subject to detailed design and monitoring, in consultation with NatureScot and other relevant stakeholders. The Applicant remains committed to working with NatureScot as further evidence and best practice emerge in this area. There is a developing body of evidence that the reuse of excavated peat for peat restoration can be successful based on the results of trials at Camster II wind farm, Golticlay wind farm and Viking wind farm on Shetland. It is therefore our opinion that this reuse is appropriate and offers opportunities to restore substantial areas of degraded peat on the site.
SEPA 12th June 2025	**Peat** Commented on the location of the access track and turbines in areas where peat depth >0.5.	The Revised Proposed Development has reduced the number of turbines from 14 to 12 and has altered the route of the access track to increase avoidance of peat. This is shown in **AI Figure 8.9 Estimated Peat Depth.** A formal response was provided to SEPA dated 12 December 2025 to present improvements and describe limitations where SEPA comments could not be fully addressed. A subsequent response was received from

Consultee	Summary of Key Issues	Comments
		SEPA dated 29th December 2025 which confirmed that the changes proposed were sufficient to address the SEPA holding objection. Correspondence with SEPA is provided in **AI Technical Appendix 8.9 Correspondence with Consultees**. It is understood that a formal response will be issued with conditions separately and in response to this AI submission.
Strathdearn Community Council	Comments relate to concern about the cumulative effect of hard surfaces and drainage changes on the watercourses. Also concerns regarding the infrastructure located on Class 1 peatland.	Detailed assessment of these effects has been provided in the EIA report which identified no signifcant effects on hydrology receptors or peat. The Revised Layout has further reduced the infrstructure footprint, reduced peat excavation volumes and reduced watercourse crossings.
Ironside Farrar	**Reference to peat clarifications**	A detailed response is provided in AI PLHRA Techinical Note Section 4.
Findhorn District Salmon Fisheries Board 16th June 2025	Potential Effects on Fish from the Proposed Development from sedimentation and the effect on baseflow from peat disturbance	A detailed separate response has been provided in **AI Technical Appendix 8.9 Correspondence with Consultees**.

Revised Proposed Development

8.1.6 The Revised Proposed Development has reduced the number of turbines from 14 in the Proposed Development to 12 and the access track from the public road has moved to the southeast. Along with other layout changes this has resulted in the removal of five of the original watercourse crossings, the relocation of two crossings and two new crossings.

8.1.7 The access track for the Revised Proposed Development totals 10.12 km in length with 800 m of it being floating track, a substantial reduction from the 13.1 km of access track associated with the EIA Proposed Development.

8.2 Potential Effects

8.2.1 The following effects were identified based on changes in the Revised Layout for consideration in this assessment:

- Erosion, sedimentation and pollution of watercourses.
- Direct effects during construction on the peat resource due to the excavation of peat.

8.3 Methodology

8.3.1 The AI assessment presented in this report uses the same assessment methodology as detailed in EIA Report **Chapter 8: Hydrology, Geology, Hydrogeology and Peat** for the EIA Proposed Development.

8.4 Updated Impact Assessment

Baseline Conditions

8.4.1 There has not been a change in baseline conditions since the submission of the EIA Report, however due to the change in the infrastructure additional information has been obtained on peat depth and the condition of the peat, as well as the interaction of infrastructure with peat, Groundwater Dependent Terrestrial Ecosystems (GWDTE), watercourse crossings and watercourses buffers.

Field Surveys

8.4.2 The field surveys carried out to inform the assessment, and their limitations are detailed in **Chapter 8: Hydrology, Geology, Hydrogeology and Peat** of the EIA Report. Additional field surveys for the Revised Layout include:

- Additional peat probing surveys in October 2025 and November 2025 during which a total of 1,499 additional probes were completed, resulting in a total of 10,097 probes across all campaigns. Further details in relation to the peat depth surveys are provided in **AI Technical Appendix 8.2: Peat Survey Report**.
- Identification and documentation of new watercourse crossing locations once the Revised Layout was finalised as provided in **AI Technical Appendix 8.5: Watercourse Crossing Inventory**.

Peat

8.4.3 The following summarises the results of the eight phases of peat survey campaigns across the site that were used to develop the interpreted peat depth model:

- Peat was found at approximately 79% of probe locations, with 50% of probe locations being peat <1.0 m deep; the maximum peat depth recorded from all probes was c. 6.5 m deep.
- Rate of refusal / the ‘feel’ method indicated the majority of probes to be located over rock, silt and grit.
- The coring results have generally verified the depth of penetration probing to be representative of peat depth with some areas of over estimation of peat related to silty clay substrate that is difficult to distinguish from peat through probing.
- There is no peat (0 – 0.5 m depth) at 35.7% of the surveyed area, peat (0.5 – 1.0 m depth) at 22.0% of the surveyed area and peat >1.0 m depth at 42.4% of the surveyed area.

8.4.4 Full results of the peat surveys are presented in **AI Technical Appendix 8.2: Peat Survey Report** and shown on **AI Figures 8.8: Peat Depth of Penetration and Probe Locations**, and the peat depth distribution across the Site is shown on **AI Figures 8.9: Estimated Peat Depth.**

8.4.5 The total volume of peat has been calculated for the Revised Proposed Development, this is detailed in **AI TechnicalAppendix 8.3** and can be summarised as:

- Total volume of peat excavated = 248,903 m^3
- Total volume of acrotelm excavated = 24,591 m^3
- Total volume of catotelm excavated = 224,312 m^3.

8.4.6 The total volume of peat calculated to be excavated for the Proposed Development was 269,830 m^3 which represented 3.1% of the total peat volume within the survey area (8,625,500 m^3). The total volume of peat calculated to be excavated for the Revised Proposed Development is 248,903 m^3 and therefore less than that of the EIA Proposed Development and represents 2.89% of the peat volume in the survey area.

8.4.7 Peat > 2.0 m is present across 2.02% of the Revised Proposed Development infrastructure compared to 2.71% of the EIA Proposed Development infrastructure. There was peat > 3.0 m across 0.01% of the EIA Proposed Development infrastructure however there is no peat > 3.0 m present across the Revised Development infrastructure.

Table 8.2 Comparison of Peat Volume and Footprint Interaction

	Original Proposed Development	Revised Proposed Development
Total Volume of Peat Excavated (m^3)	269,830 m^3	248,903 m^3
% of peat across survey area excavated	3.10 %	2.89 %
% of infrastructure footprint on peat >2.0 m	2.71 %	2.02 %
% of infrastructure footprint on peat >3.0 m	0.01 %	0%

8.4.8 The assessment of the sensitivity of the peat has not changed from the EIA Report and therefore the effect of the Revised Development is still a Minor (not significant) effect in relation to peat disturbance.

8.4.9 Peat reuse volumes upgradient of mineral bunds (fill) have reduced with the removal of the westernmost turbines and associated reuse upgradient of the T5 approach, and the realignment of the track west of T5 (with removal of the associated reuse area immediately west of T7). The total reuse volume has reduced from 18,745 m^3 (Table 6, OPMP) to 11,179 m^3 (Table 6 of AI OPMP) and the number of reuse locations has reduced (see **AI Figure 8.11**).

8.4.10 The proposed restoration methods using peat remain as described in the OPMP and OHEMP, i.e. peat translocation into areas of open ground, into areas of gullies within 15 m of proposed infrastructure and into adjoining gully sections of limited extent in areas of shallow gradient. The volumes proposed and the areas in which they will be placed have been recalculated following adjustments to several turbine positions and realignment of tracks. The breakdown of reuse volumes is provided in the updates to the OHEMP. The total volume proposed for restoring areas of open ground has reduced from 81,170 m^3 to 78,968 m^3 and the total volume proposed for gully repair has reduced from 23,140 m^3 to 22,245 m^3. There is no change to the proposed restoration methodologies. **AI Figure 8.11** shows the proposed reuse and restoration areas (both those utilising peat, and those being undertaken by more traditional methods). The total volume of peat to be used in restoration is 101,213 m^3, alongside the 11,179 m^3 used upgradient of mineral bunds.

Net Peat Balance

8.4.11 The total volume of peat predicted to be excavated, 248,903 m^3, exceeds the intended reuse volume within the temporary infrastructure area by 110,654 m^3. The remaining excavated peat will be used in bunded cells in four areas upgradient of raised infrastructure and across the Site for peat restoration as presented in Appendix 6.5 Outline HEMP and on **AI Figure 8.11**, which totals 112,391 m^3 and achieves a balance and demonstrates that all excavated peat can be appropriately reused on site.

8.4.12 The excavated peat volumes and reuse volumes are summarised in **Table 8.3** below.

Table 8.3 Net Peat Balance

	Acrotelem Volume (m^3)	Catotelm Volume (m^3)	Total Volume (m^3)
Excavated Peat	24,591	224,312	248,903
Peat Reuse	27,570	223,070	250,640
Total Balance	2,979	-1,242	1,737

Peatland Condition Assessment

8.4.13 The peat condition assessment for the site has been updated to cover the 250 m buffer associated with the Revised Layout **AI Figure 8.8.1**. The update has been undertaken using aerial imagery and the onsite data collected during the previous surveying. All of the newly mapped areas identify modified or eroding peat with the exception of some small areas of modified peat with near natural features retained to the south of T08 and west of the borrow pit over 100 m upgradient of either works and alongside an existing site track.

8.4.14 The Revised Layout has resulted in a move to the south away from modified peat with some near natural features retained (bog pools) to the north of T03 and continued interaction with modified peat with some near natural features retained at T10 and on the access track to the south of T12. The latter two contain fragments of blanket-bog habitats with occasional hummock-hollow formations. Areas of intact bog pools supporting Sphagnum cuspidatum were observed in these areas along with hummocks of Sphagnum capillifolium and Hylocomium splendens.

Peat Slide

8.4.15 **AI Technical Appendix Figure 8.4.7** shows the updated Factor of Safety ('FoS') Best Estimate and Low Estimate parameter assessments for the Revised Layout.

8.4.16 The top right inset of **AI Technical Appendix Figure 8.4.7** shows the updated crane-loaded FoS for the one section of floating track between T14 and T13.

8.4.17 As in the previous assessment, the Best Estimate parameters indicate the majority of the Site to be stable, with FoS >1.4. Localised areas of FoS <1.4 (marginal stability) are present below T1, on the gully sides of the Allt na Slanaich and in minor pockets elsewhere.

8.4.18 **AI Technical Appendix Figure 8.4.10** shows the updated likelihood results. As previously, likelihoods are generally Low or Very Low over the vast majority of the Site

with smaller areas of Moderate likelihood in local positions mid-slope, typically in association with drains.

8.4.19 The Revised Layout and reassessment of floating tracks have reduced the number of potential source zones down from 14 associated with the EIA Proposed Development to six identified zones:

- SZ1: within the main hardstanding footprint of T7.
- SZ2: bordering in an area of proposed fill on the upslope side of the track approaching T7.
- SZ3: under the floating track on approach to T13.
- SZ4: within the main hardstanding of T12.
- SZ5: within the ancillary hardstanding area of T12.
- SZ6: on the main access track above Allt na Loinne.

8.4.20 Risk is calculated as the likelihood of the peat slide (once it is assumed to have occurred) reaching the receptor, and the consequences should it do so (the EIA PLHRA provides further detail on the approach, which has been repeated based on the updated peat depth model, layout, FoS and likelihood assessments).

8.4.21 Receptors to potential runout are the Allt na Loinne Moire (from runout originating in Source Zones 3, 4, 5 and 6) and open slope habitats (from Source Zones 1 and 2). The open habitats are not designated but are priority peatland habitats and assigned a Medium sensitivity.

8.4.22 The Allt na Loinne Moire is not a designated watercourse and is assigned a Medium sensitivity in EIA Chapter 8 (and in the revised chapter). Accordingly, this receptor is assigned a Medium consequence score.

8.4.23 **AI Technical Appendix Figure 8.4.12** shows the calculated risks for the six runout zones. Risks are calculated to be Low in the runout zones nearest to their corresponding source zones, reducing to Negligible downslope. Risks are lower for the Revised Layout because the majority of the source zones in the EIA PLHRA were associated with crane-loaded floating track FoS <1.0 (modelled as a likelihood score of 4, i.e. 'high'). This is not the case for the Revised Layout in which floating track is largely avoided. The exception is Source Zone 3, however FoS here are 1.0–1.4 ('marginal stability') and therefore equivalent to a likelihood score of 3 (Moderate likelihood).

8.4.24 Based on the revised calculations, risks are lower for the Revised Layout than for the EIA Layout.

Groundwater Dependant Terrestrial Ecosystems

8.4.25 The Revised Layout reduces the number of potential GWDTE polygons from 43 polygons to 18 polygons within the track and infrastructure buffers, as presented on **AI Technical Appendix Figure 8.7.1**. A total of two of these are new potential GWDTE polygons within the track or infrastructure buffers.

8.4.26 The 25 polygons that are no longer within track and infrastructure buffers are: areas 7, 8, 26, 76, 88, 89, 100, 129, 138, 139, 140, 142, 143, 151, 153, 156, 161, 165, 166, 167, 169, 172, 187, 190, 193.

8.4.27 The two new polygons within track and infrastructure buffers are: 201 and 202.

8.4.28 The assessment of the potential GWDTE polygons associated with the Proposed Development are presented in **Appendix 8.7 Groundwater Dependant Terrestrial Ecosystems Assessment** of the **EIA Report**. None of these habitats were considered to be groundwater dependent and therefore no updated assessment is required for these polygons in relation to the Revised Proposed Development.

8.4.29 The two new polygons that are now within the buffer zone and not considered to be groundwater dependent are:

- polygon 202 is associated with surface water features within a topographical basin and is ruled out on the basis of being surface water or rainfall fed
- polygon 201 is located on superficial till deposits with very limited groundwater and is therefore considered to be supported by rainfall and surface water.

8.4.30 The Revised Proposed Development will therefore have no effect on any GWDTE as the habitats are either not groundwater dependent or they are not hydrologically connected to the Revised Development.

Watercourse Crossings

8.4.31 A total of seven watercourse crossings were included in the EIA Layout, of which all seven were entirely new. Five of these watercourse crossings have been removed in the Revised Layout: WC1, WC2, WC3, WC6 and WC7. All of these were new crossings of watercourses shown on 1:50,000 scale OS mapping.

8.4.32 The following watercourse crossing locations have been changed for the Revised Layout:

- Crossing WC4 of Allt na Slanaich, a 1:50,000 scale OS-mapped watercourse, has been moved 70 m north in the Revised Layout.
- Crossing WC5 of Allt na Slanaich, a 1:50,000 scale OS-mapped watercourse, has been moved 50 m north in the Revised Layout.

8.4.33 Two new watercourse crossings have been added to the Revised Layout: WC8 and WC9 these are both new crossings of watercourses shown on 1:50,000 scale OS mapping and are small crossings in the upper sections of minor tributaries. These are described further in **AI Appendix 8.5 Watercourse Crossing Inventory**. The total number of watercourse crossings for the Revised Proposed Development is four.

8.4.34 Aside from the watercourse crossings there are no encroachments of the 50 m buffers associated with all 1:25,000 scale OS mapped watercourses.

8.4.35 The changes to the infrastructure layout do not alter the assessment of hydrological effects presented in Chapter 8 of the EIA Report.

Private Water Supplies

8.4.36 None of the Revised Layout is hydrologically connected to the private water supplies identified in **Appendix 8.6 Private Water Supply Assessment** of the EIA Report. An updated assessment report is therefore not required. **AI Technical Appendix Figure 8.6.1** presents the private water supplies in the vicinity of the Revised Layout.

8.4.37 Due to the track layout changing to the east of the Site in the Revised Layout, the groundwater spring suppling Lynemore Cottage will need to be accurately located and protected from any impact of construction activities. It is located over 250 m from the access track of the Revised Proposed Development however a precautionary approach should be adopted and some additional protection or monitoring may be required.

8.5 Conclusions

8.5.1 The effects on Hydrology, Geology, Hydrogeology and Peat associated with the Revised Development are not considered to have changed from the Proposed Development which considered effects to be **Minor (not significant)**.

8.5.2 The removal of two turbines and associated track and avoidance of some areas of deeper peat has led to a reduction in effect on the peat resource and all excavated peat can be used appropriately on site, the effect remains **Minor (not significant)**.

8.5.3 The reduction in the number of watercourse crossings from seven to four and continued avoidance of watercourse buffers will reduce the impact of construction on the watercourses.

8.5.4 There are no GWDTEs that are considered to be groundwater dependent that are hydrologically connected to the Revised Development.

8.5.5 The Revised Layout has resulted in a reduction in the number of potential source zones from 14 to six. Risks are also lower for the Revised Layout because the majority of the source zones in the EIA PLHRA were associated with crane-loaded floating track, however the Revised Layout has largely removed floated tracks in these areas. The exception is Source Zone 3, which has a Moderate likelihood and therefore some additional mitigation as specified in the EIA Appendix 8.4 is required. Based on the revised calculations, risks are lower for the Revised Layout than for the EIA Layout.

8.5.6 The effects from sediment release, alteration of natural flow and potential pollution therefore all remain **Minor (not significant)**.

8.5.7 The only mitigation measures required in addition to those recommended in the EIA Report are:

- the requirement to identify the exact location of the Lynemore Cottage PWS so that it can be appropriately protected even though there is unlikely to be any effect
- micrositing of infrastructure in the vicinity of modified peat with near natural features retained to avoid the near natural features.

8.5.8 The additional mitigation, micro-siting, monitoring and management plans recommended in the EIA Report apply to the Revised Proposed Development and will maintain the significance of effects of the proposal on the hydrology and hydrogeology of the site to be **Minor.**