SEPA Reference: CAR/L/5011121
AECOM Project Number: 60570241

Hydrology Supplementary Information

Project name	Client	Subject	Date
Balliemeanoch Pumped Storage Hydro	ILI Pump Storage Hydro PLC	CAR Application Request for Further Information	06 March 2026

Prepared by	Checked by	Verified by	Approved by
[redacted]	[redacted]	[redacted]	[redacted]

1. Introduction

An application for the discharge and abstraction of water for the Balliemeanoch Pumped Storage Hydro Scheme (the Proposed Development), under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) (the Application), was submitted to the Scottish Environment Protection Agency (SEPA) in June 2025. Following an initial review of the application submitted by AECOM on behalf of Intelligent Land Investments Ltd (the Applicant), SEPA have formally written to the Applicant dated 17 December 2025, detailing their Request for Further Information.

Subsequently, a meeting was held between SEPA, AECOM and the Applicant on 22nd January 2026. In this meeting, it was concluded that much of the information requested by SEPA was presented as part of the Environmental Impact Assessment Report (EIAR) and would be provided to SEPA via a supplementary submission.

This technical note (TN) sets out the Applicant's response to SEPA's queries raised in relation to hydrology and signposts where this information can be found in the EIAR and, for ease of review, provides this information as per the following appendices.

- Appendix A Balliemeanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Main Report Chapter 12: Water Resources and Flood Risk
- Appendix B Balliemeanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendices Appendix 12.1 Water Resources Assessment.
- Appendix C Balliemeanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendices Appendix 12.2: Flood Risk Assessment.
- Appendix D Balliemeanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 3: Figures
- Appendix E Modelling Input Data

Please note Appendix A, Appendix B, Appendix C and Appendix D are from the original EIA application and do not reflect the reduced design as submitted by the Applicant as part of the FEI, and reflected by the CAR submission.

2. SEPA Request – Hydrology

Table 1, below, details the Applicant's response to SEPA's response to the CAR application, specifically relating to hydrology. Information relating to request 1.9 is contained in **Section 3** below. The relevant documents (excluding the CAR License Supporting Document) cross referenced within AECOM responses can be found in the Appendices included with this Technical Note.

Table 1. Hydrology Response to 'Request for Further Information'

Ref.	SEPA Comment	AECOM Response	Relevant Document Cross Reference	Actions / Notes
1.1	When available, the proposed 12 months of flow data for the Allt Beochlich should be provided and the subsequent long term flow duration curve used to set final compensation flow values. Data should be collected in line with: SEPA annex-a-hydrological-information.pdf. 12 months of raw 15min stage data should be submitted along with spot gauging's, supporting information on gauging station location and any assumptions, limitations or adjustments made to the data.	The applicant is committed to undertaking 12 months of flow modelling for Allt Beochlich prior to construction, with the information provided to SEPA as noted in their response. This should be included as a condition of the CAR License for the Proposed Development.	-	This was deemed acceptable by SEPA in the meeting of 22/01/26, but SEPA note that the CAR will be based on information provided, and most likely need to be varied following completion of monitoring.
1.2	Please provide further clarification on proposed compensation flows to Allt Beochlich.	Preliminary details of proposed compensation flow to Allt Beochlich are set out in the **CAR License Supporting Documentation**. Additionally, as set out in Section 5.6 of the **CAR License Supporting Documentation** "Prior to any filling, an agreement would be reached with the operator of microhydro run of river station at Allt Beochlich, to continue to provide the necessary flow to this station"" As such, final details of the compensation flow to Allt Beochlich will be confirmed following completion of the 12-month flow modelling noted in 1.1 and therefore should be included as a condition of the CAR License for the Proposed Development.	CAR License Supporting Document (Rev B September 2025) • Section 5.6: Details of the Controlled Activity – Construction • Section 5.7: Details of the Controlled Activity – During Operation. • Table 5-8: Monthly Average Compensation Flows	
1.3	Please confirm if you are proposing ongoing background monitoring to enable natural flow patterns to be mimicked for compensation flows?	The flow monitoring will not continue past the 12-month monitoring as agreed to in 1.1.		
1.4	Please confirm how existing downstream users of the waterbody are to be protected (existing licensed hydro scheme, please note this scheme has an RBMP measure against it, any compensation flow regime provided by the proposed Balliemeanoch scheme should ensure that the RBMP improvement objective being met is not compromised).	As set out in Section 5.6 of the **CAR License Supporting Documentation** "Prior to any filling, an agreement would be reached with the operator of microhydro run of river station at Allt Beochlich, to continue to provide the necessary flow to this station". As such, final details of the compensation flow downstream will be confirmed following completion of the 12-month flow modelling and will support any RBMP measures that the existing station have against it. AECOM have engaged with the operator of the existing hydro scheme to understand the RBMP commitments that are in place. This should be included as a condition of the CAR License for the Proposed Development.	CAR License Supporting Document (Rev B September 2025) • Section 5.6: Details of the Controlled Activity – Construction	
1.5	In addition to the current operation and proposed operations model, a natural baseline model is also required. Full justification of the data used, operational scenarios(s) tested, and any limitations should be provided. In	The baseline hydrology for Loch Awe is set out in the CAR **License Supporting Documentation**, which **states** "The outflow from Loch Awe based on the	CAR License Supporting Document	

Ref.	SEPA Comment	AECOM Response	Relevant Document Cross Reference	Actions / Notes
	particular, clarification on how the change in storage volume is derived should be submitted.	change in volume of stored water together with inflows will take into account all outflows, including abstraction and discharges from the Cruachan PSH, the Awe Barrage hydro scheme and any compensation flows. The baseline scenario therefore captures existing hydro electric and pump storage operations linked with Loch Awe." The baseline scenario therefore captures existing hydro electric and pump storage operations linked with Loch Awe." It is therefore assumed that the baseline scenario consists of natural in-flows to Loch Awe, the existing hydro assets on the loch, including Cruachan PSH, and the Awe Barrage.	(Rev B September 2025) • Section 5.4: Hydrology, sub-section Baseline Conditions Appendix B: BM EIA Appendix 12.1 Water Resources Assessment: • Section 2: Baseline Conditions • Section 3: Assessment Methodology	
1.6	The proposed operations model should reflect best understanding of the likely operation of the scheme rather than a uniform operation scenario as currently presented. Please amend and re submit the model to demonstrate this.	The model reflects the worst-case operational scenario.		SEPA indicated that they were satisfied with the worst-case model scenario approach and confirmed that no additional modelling is required. However, information has been requested around what AECOM/ILI view the likely operational regime to look like, and clarification on operating hours is needed.
1.7	The current operational model should include the cumulative impact of all licensed pressures i.e. also include the influence from the Cruachan PSH and compensation requirements for Awe barrage.	The current operational model includes both Cruachan and Awe Barrage		SEPA indicated that they were happy this was the case during the call on 22/01/26.
1.8	All input data used for modelling should be submitted along with model outputs and the model itself where practicable.	Refer to Appendix E		
1.9	Currently submitted modelling appears to only cover 11 years 2014 to 2025. A timeseries of at least 30 years should be modelled to determine the natural and current flow/level statistics. Please re-run and submit updated modelling to cover a minimum 30-year period.	Modelling has been completed with an extended 30-year timeseries. Refer to section 3.1 for more information.		
1.10	Information is required to demonstrate how proposed operational levels in Loch Awe will mitigate against any impact to existing users of the water environment.	This has been provided in the EIA documents appended to this TN.		

3. Hydrology Supporting Information Requirements

3.1 Supporting Information SEPA Request 1.9

3.1.1 Introduction

The impact of the Development on flood risk and water resources used a water balance model as described in Chapter 3 of Appendix B: Water Resources Assessment of the CAR application and Balliemeanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendices Appendix 12.1 Water Resources Assessment. The period of record analysed covered 01/01/2014 – 31/01/2025. SEPA have requested that the period of record used in the analysis be extended to 30 year and accordingly, we have remodelled both the baseline and with Development scenarios based on the period from 01/01/1995 - 31/01/2025.

For the Development scenario, the model simulates the operation of the pump storage scheme based on the following thresholds:

Table 2: Proposed "hands off" thresholds

Season	Lower threshold (AOD)	Upper threshold (AOD)
April-Sep	35.87	37.2
Oct-March	35.56	37.2

In the absence of a more detailed generation profile linked to the energy market, a standard daily patter of generation and pumping was assumed (hereinafter referred to as 10 and 10):

- 10 hours generation at 301 m^3/s
- 10 hours pumping at 301 m^3/s
- 2 hours pause between cycles

It was agreed with SEPA at the meeting with the Applicant on 22nd January 2026 that full generating cycles would be relatively rare and testing the impact against the 10 and 10 profile represents a worst case scenario.

The generation profile is amended within the model to account for curtailment of generation either when loch levels exceed the upper threshold or when the headpond is empty, and of pumping either when loch levels are below the lower thresholds or when the headpond is full.

3.1.2 Impact on loch levels

The impact of the Development on loch levels based on the 30 year analysis period is shown in the stage duration curve in Figure 1. Note that the baseline stage duration curve is based on modelled rather than observed levels in order that it can be directly compared with the "With Development" modelled scenario.

This shows the percentage of time that the loch is at different levels. Because of the high and low "hands off" thresholds, the highest and lowest loch levels experienced are unchanged. For higher levels greater than the 50th percentile (i.e. exceeded 50% of the time) and less than the 90th percentile, there is minimal impact on levels. Generally, the impact appears to be less based on the 30 year analysis period, compared to the previous 10 year analysis period. The mean or average loch level (i.e. exceeded 50% of the time) is very slightly reduced from 36.32mAOD to 36.31mAOD (previously 36.36 to 36.33 mAOD for the 10 year analysis period). Maximum differences lie around the 70th percentile with a reduction of 70mm from 36.21mAOD to 36.14mAOD.

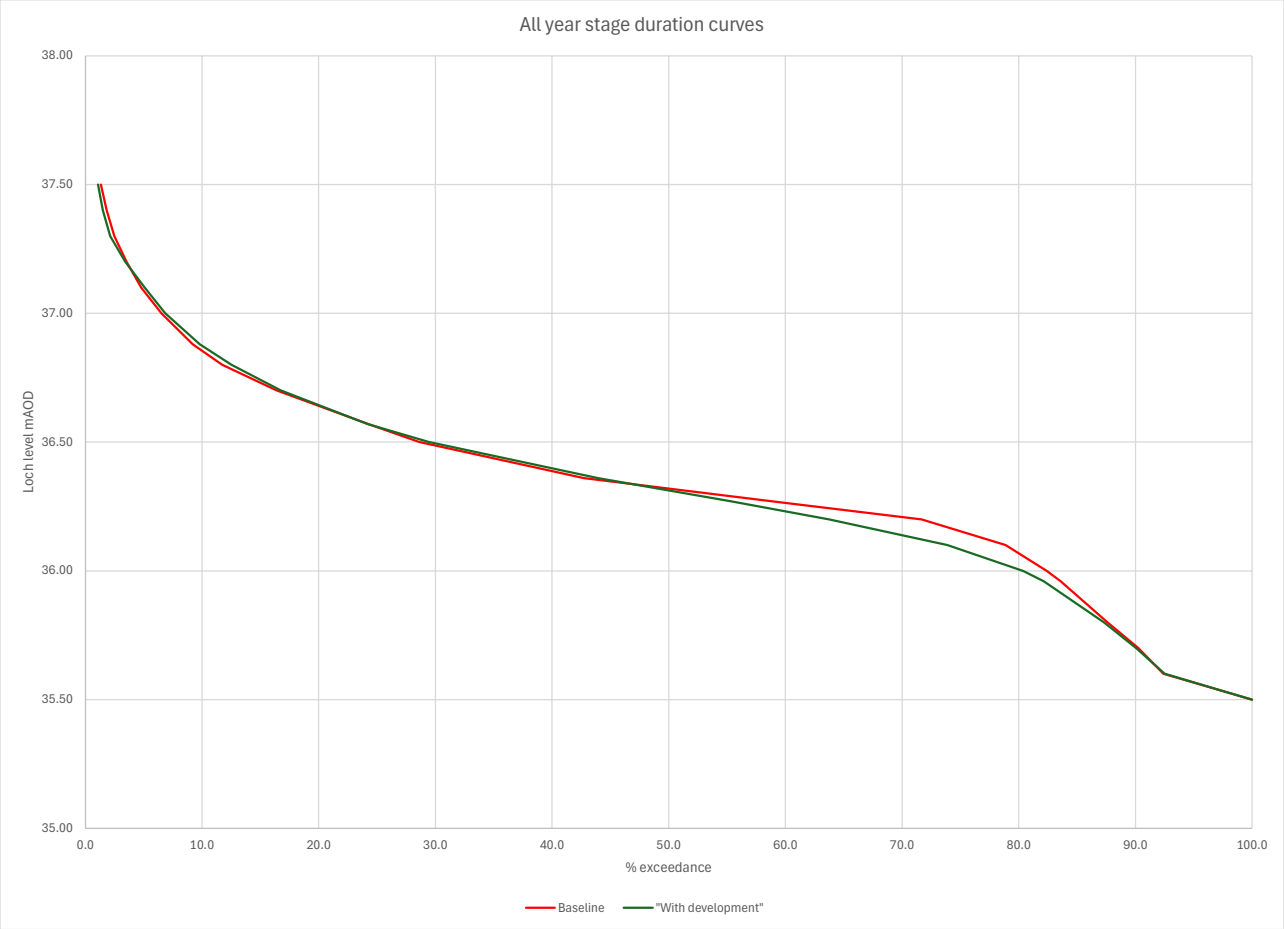

Figure 1: Stage duration curves: Baseline and with Development

3.1.3 Impact on flood events

Previously, the most severe 8 flood events within the 10 year analysis period were analysed. Two further significant events within the 30 year period prior to 2014 were assessed – 12th February 1998 and 14th December 2006. The results along with the previous results are shown in **Table 3** shows the impact on water levels in Loch Awe for each event.

It can be seen from the results in **Table 3** that with the exception of the 2014 event where levels remain the same, the impact of the Development is to reduce the peak loch level, and consequently the outflow. Both the additional floods analysed resulted in a reduction in peak loch level. This is because during flood events the Development would stop generating and so is not actively adding water, and may only extract water, but also because the operation of the project creates different starting water levels before flood events occur. **Figure 2** illustrates this impact for the February 1998 flood event.

The Development therefore does not exacerbate existing flood impacts and may provide a flood reduction benefit for some events. As such the proposals comply with bullet point 2 in Policy 22 of NPF4.

Table 3: Impact of Development operation on Loch Awe levels during historic flood events

Rank	Flood event	Modelled flood level (no scheme) mAOD	Modelled flood level (propose scheme operating) mAOD	Change in peak flood levels (mm)
1	08/10/2023	39.047	39.044	-3
2	**14/12/2006**	**39.040**	**39.013**	**-27**
3	08/10/2018	38.906	38.889	-17
4	26/10/2014	38.797	38.797	0
5	**12/02/1998**	**38.703**	**38.610**	**-93**
6	06/03/2015	38.627	38.536	-91
7	31/12/2024	38.417	38.369	-48
8	05/12/2015	38.583	38.523	-60
9	12/09/2020	38.525	38.458	-67
10	29/03/2021	38.356	38.195	-161

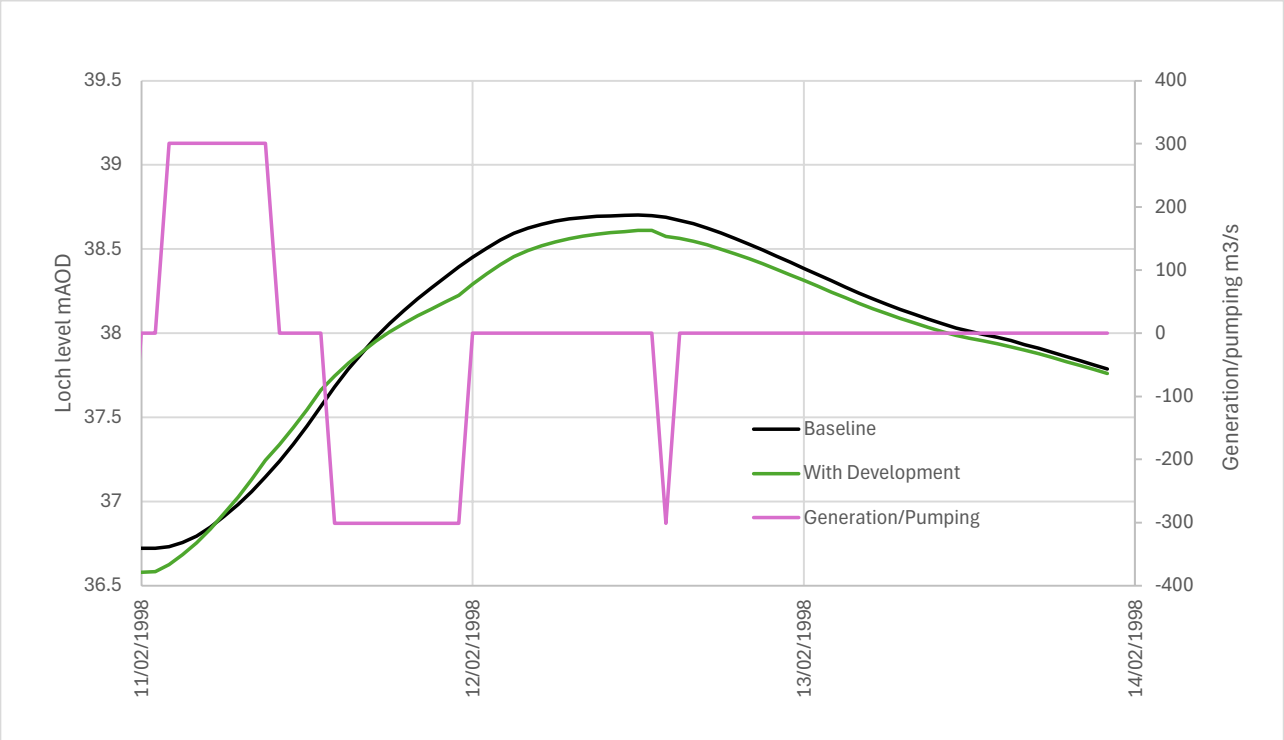

Figure 1: Impact of Development on flood event on 12th February 1998

3.1.4 Impact on barrage operation

SSER operate the flood gates at Awe Barrage to release additional flow when loch levels exceed 37.06mAOD during April to September and 36.57mAOD during October to March. The impact of the Development under the proposed operating regime (Table 4) on the frequency of operation of the gates under these rules was analysed, comparing them to the existing baseline frequency of operation.

Table 4: Percentage time barrage operates and loch levels are within operational window

	Baseline	With Development
Barrage operation	11% (10 year analysis 12%)	11% (10 year analysis 12%)
% time within SSE operating window	55% (10 year analysis 57%)	51% (10 year analysis 54%)

With the Development in operation, the frequency of barrage operation is essentially unchanged and there is therefore no impact on SSER operations with regard to the barrage. The impact is negligible from an environmental perspective.

3.1.5 Impact on low flows

We have assessed the impact of the Development on the basis of the lower limit proposed being 35.87mAOD during April to September and 35.56mAOD from October to March.

Two additional severe historic droughts in the extended 30 year record in February 1995 and February 2021 were analysed for the Development. We do not have details of the compensation arrangements at the Awe Barrage and have therefore assumed a minimum outflow level of 35.5mAOD. At this level and below, it is assumed there is zero outflow from the loch, although in reality there will likely be flow through the compensation outlet. Analysing the number of days that the loch level is at or below 35.5mAOD during these drought events in comparison to the baseline highlights the impact of the Development during low flow events. As seen in **Table 5**, the number of days that the loch falls below 35.5mAOD is actually reduced with Development operation. This is because the last operation prior to the drought event will be generation, not pumping, which raises water levels above the baseline. The Development therefore provides a benefit to SSER in terms of maintaining compensatory and freshet releases. Overall, there is a slight reduction in the percentage of time that the loch level hits this level over the period analysed from 4% to 3%.

Table 5: Number of days at or below 35.5mAOD

	Baseline	With development
February 1995	**20.5**	**19.4**
February 2021	7.3	6.1
December 2005	**7.0**	**5.1**
March 2018	6.6	4.6

Appendix A Balliemeanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Main Report Chapter 12: Water Resources and Flood Risk

Please see accompanying document / folder.

Appendix B Balliemeanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendices Appendix 12.1 Water Resources Assessment.

Please see accompanying document / folder.

Appendix C Balliemeanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendices Appendix 12.2: Flood Risk Assessment.

Please see accompanying document / folder.

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Appendix D Balliemeanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 3: Figures

Please see accompanying document / folder.

Appendix E Modelling Input Data

Please see accompanying document / folder.