August 2025

Glen Earrach Energy Pumped Storage Hydro Development

Additional Information

Glen Earrach Energy Ltd

3. River Ness Hydrology – Water Level Modelling

Glen Earrach AECOM

Quality information

Prepared by	Checked by	Verified by	Approved by
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Technical Director	Project Manager	Renewables & Energy Transition Practice Lead	Renewables & Energy Transition Practice Lead

Issue History

Issue	Issue date	Details	Authorised	Name	Position
1	August 2025	Submission	IG	Ian Gillies	Renewables & Energy Transition Practice Lead

Contents

1. Context

In March 2025, Glen Earrach Energy Limited ("the Applicant") submitted an application for consent under Section 36 of the Electricity Act 1989 and deemed planning permission under Section 57(2) of the Town and Country Planning (Scotland) Act 1997 (the "Section 36 Application") to the Energy Consents Unit (ECU) of the Scottish Government.

The Section 36 Application sought consent for the construction and operation of a new pumped storage hydro scheme on the Balmacaan Estate, to be known as the Glen Earrach PSH (the "Proposed Development"). The Proposed Development would have a storage capacity of approximately 34,000 megawatt hours (MWh) subject to the final configuration of the Headpond, Loch nam Breac Dearga. It would have approximately 2,000 megawatts (MW) of installed electrical pumping capacity and 1,800 MW of installed electrical generating capacity (both subject to final pump-turbine selection).

An Environmental Impact Assessment Report (EIAR) was provided with the application, detailing the results of a series of environmental studies undertaken to determine the likely significant effects of the Proposed Development on the environment under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the "EIA Regulations").

The EIAR was supplemented with the provision of Additional Information in June 2025, which included time series data for levels on Loch Ness.

2. Request

The Ness District Salmon Fishery Board (NDSFB) reviewed the submitted EIAR and the Additional Information and identified an area where further information would assist its assessment of hydrological impacts. On 9 July 2025, the NDSFB requested further additional information, specifically water resource modelling for River Ness levels under all scenarios presented in Additional Information Appendix 2 (Water Resources for Loch Ness):

- 2023 (entire year); 2023 (May–June); 2021 (entire year); 2021 (May–June); 2020 (January–March); 2017 (November).
- Additional modelling showing River Ness levels for April–May in 2023 and 2021 using the same scenarios.

The requested format was graphs showing river levels, and the preferred location was model outputs based on the SEPA flow gauge at Ness-side, where high-resolution river level data are available.

3. Approach and Data Sources

River levels at Ness-side have been derived from the modelled River Ness flows used in the EIAR by applying the SEPA Ness-side rating. Levels are referenced to the SEPA gauge datum of 6.8 mAOD and converted to Ordnance Datum. The Ness-side rating was supplied by SEPA (via FOI) on 27 August 2025.

4. Outputs Provided and Document Structure

This document provides the requested hourly time-series plots of actual River Ness levels at Ness-side for baseline and all scenarios.

- **Appendix 1** – Ness-side Rating Curve as provided by SEPA
- **Appendix 2** – Water Balance Model Extracts (River Ness levels at Ness-side).

5. Key Technical Notes

All modelling carried out to support the EIAR incorporates the proposed Dochfour Weir Upgrade, a variable weir mitigation, which operates seasonally (May to September) to isolate River Ness flows from PSH operations during summer months.

The provided model extracts demonstrate water level fluctuations under baseline conditions (which includes Foyers PSH), with the Proposed Development operation only, and in combination with the consented Loch na Cathrach PSH (formerly known as Red John PSH) and proposed Loch Kemp PSH.

6. Figure Index

7. Appendix 1 – Ness-side Rating Curve

The model extracts presented in Appendix 2 are calculated using the rating curve supplied by SEPA on 27 August 2025 for the Ness-side gauge.

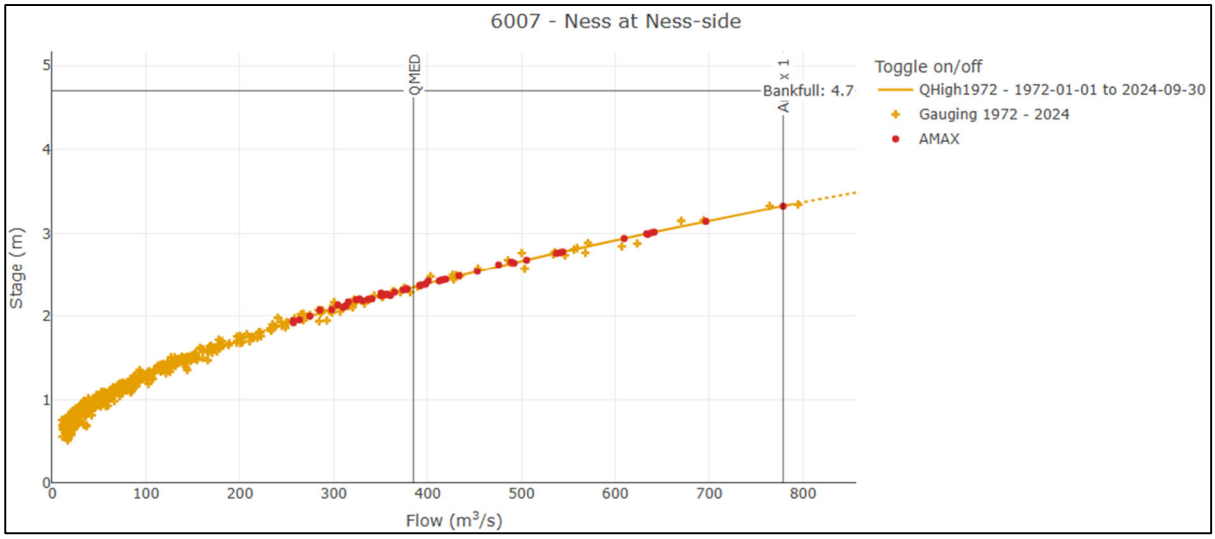

Figure A1-1 - SEPA Gauge 6007 (Ness at Ness-side) stage–discharge plot

Validity periods for Q/043.2 (0)

From	Transition from	Valid since	Valid to	Transition to	To
	042	08/03/2015 13:00:00			

Validity periods for Q/043.2 (1)

From	Transition from	Valid since	Valid to	Transition to	To
0.610 m <= SG <= 0.920 m	Q(SG) = 16.6747 * (SG + 0.335169)^3.72106 [m³/s]				
0.920 m < SG <= 0.980 m	Q(SG) = 47.5207 * (SG + 0.0054885)^2.60338 [m³/s]				
0.980 m < SG <= 3.185 m	Q(SG) = 100.561 * (SG - 0.324192)^1.86697 [m³/s]				
3.185 m < SG <= 4.000 m	Q(SG) = 112.693 * (SG - 0.345651)^1.7713 [m³/s]				

Figure A1-2 - Validity periods for Ness-side rating curve

8. Appendix 2 - Water Balance Model Extracts

Data Series Legend

- Upper Panel – levels in River Ness
  - **Dark blue line:** SEPA level (baseline conditions)
  - **Orange line:** Glen Earrach (GE) alone
  - **Light green line:** Glen Earrach + Loch na Cathrach (GE+LC)
  - **Light blue line:** Glen Earrach + Loch na Cathrach + Loch Kemp (GE+LC+LK)
- Lower Panel – GE station profile
  - **Dark green line:** Generation/pumping profile (flow)

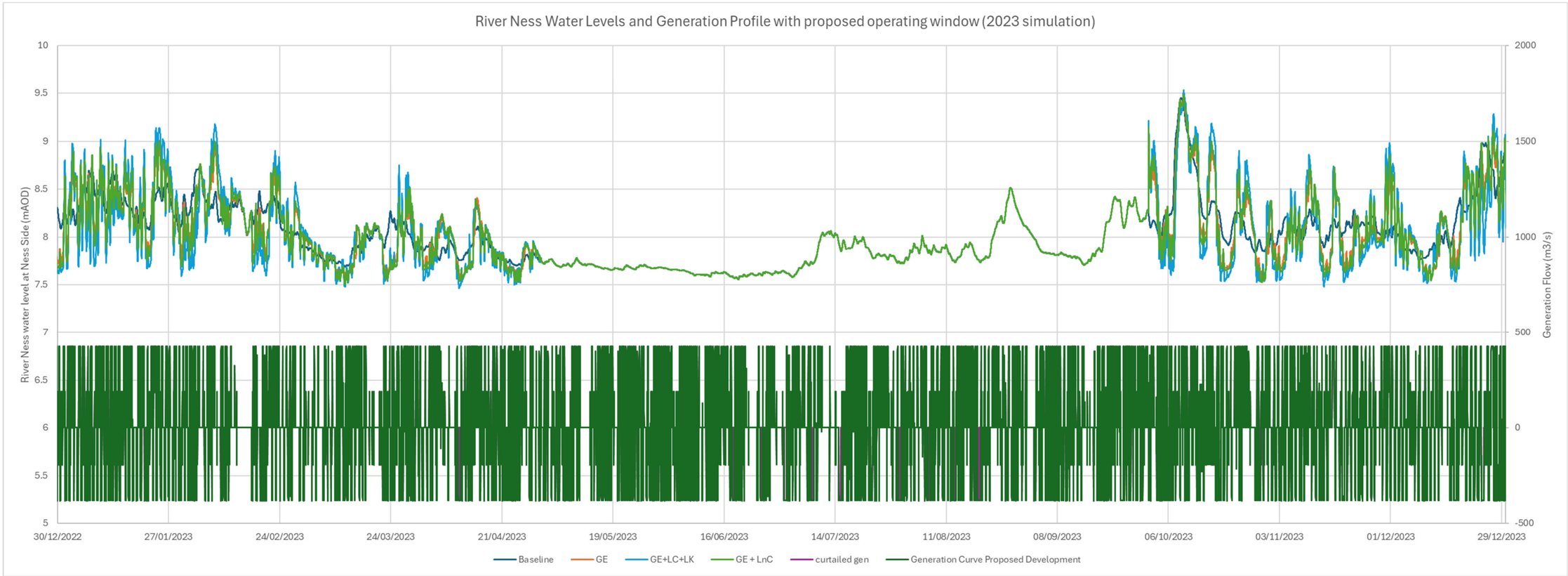

Figure A2-1 Entire year of 2023

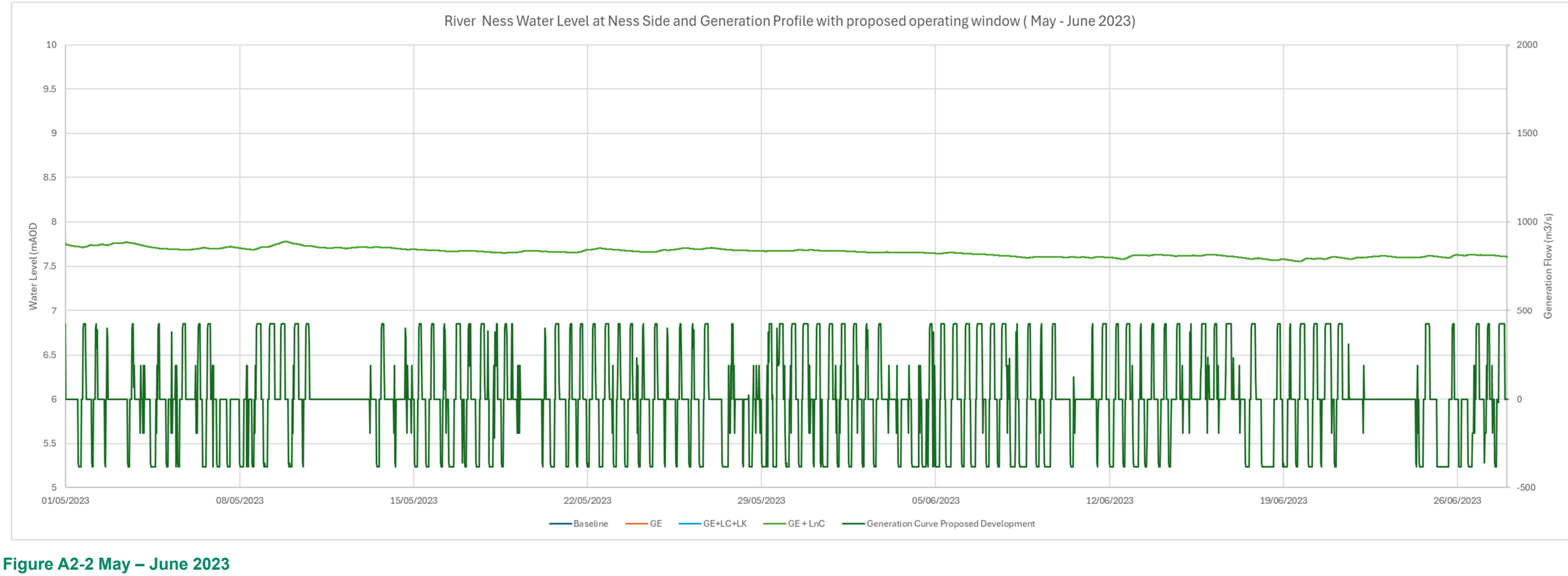

Figure A2-2 May – June 2023

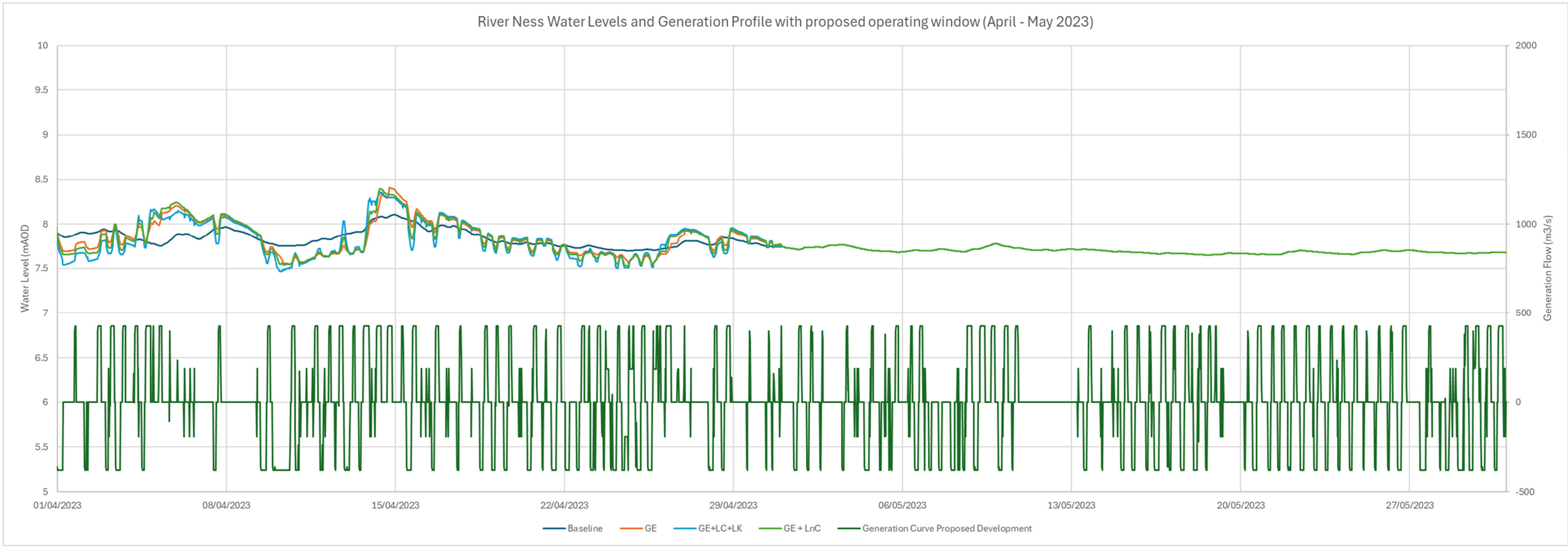

Figure A2-3 April – May 2023

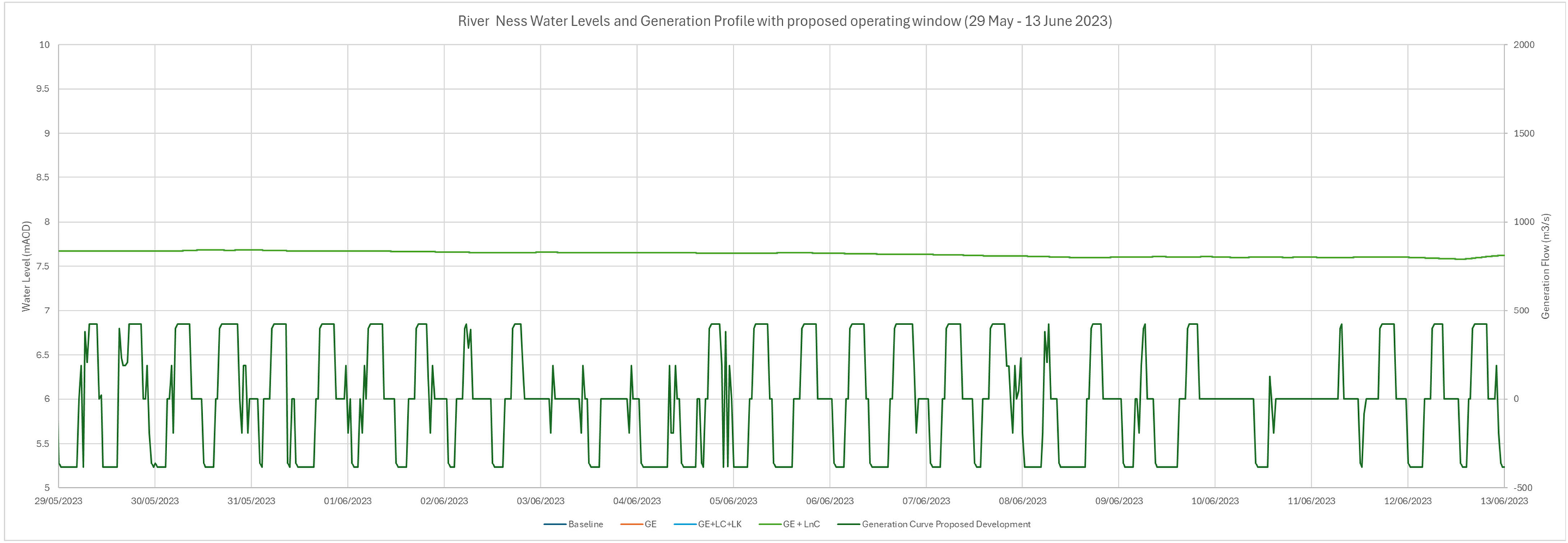

Figure A2-4 29 May – 13 June 2023

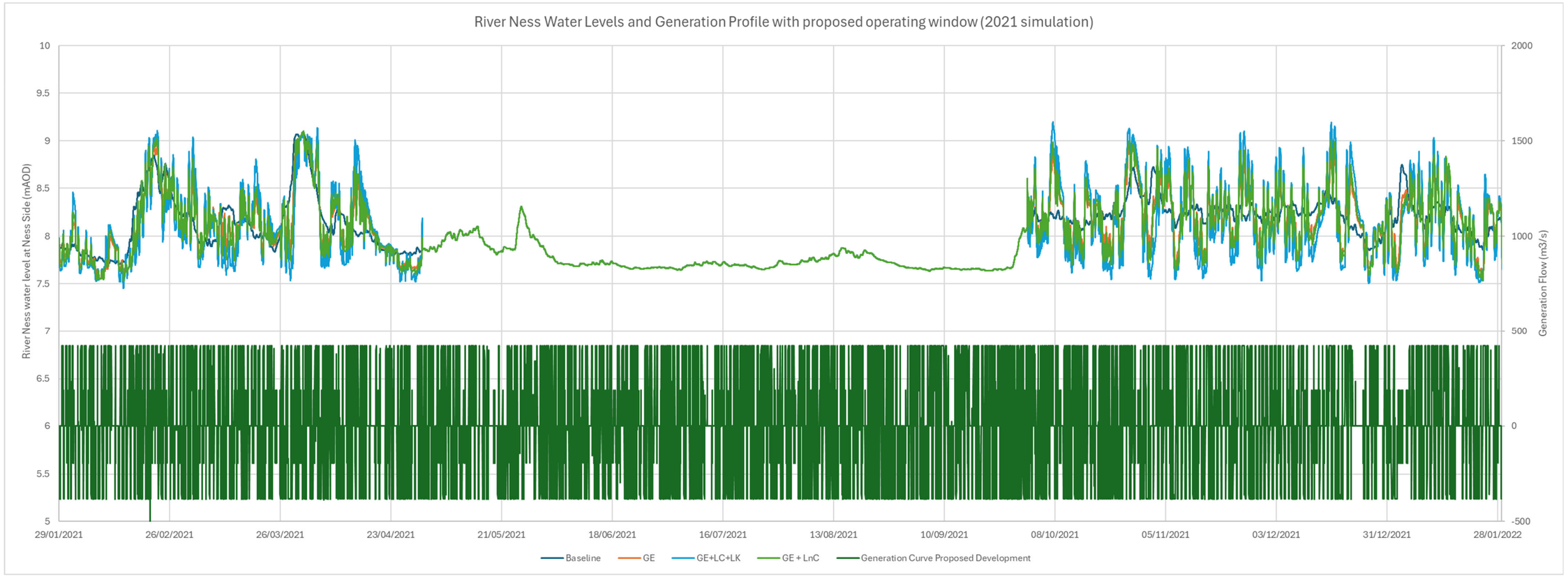

Figure A2-5 Entire year of 2021

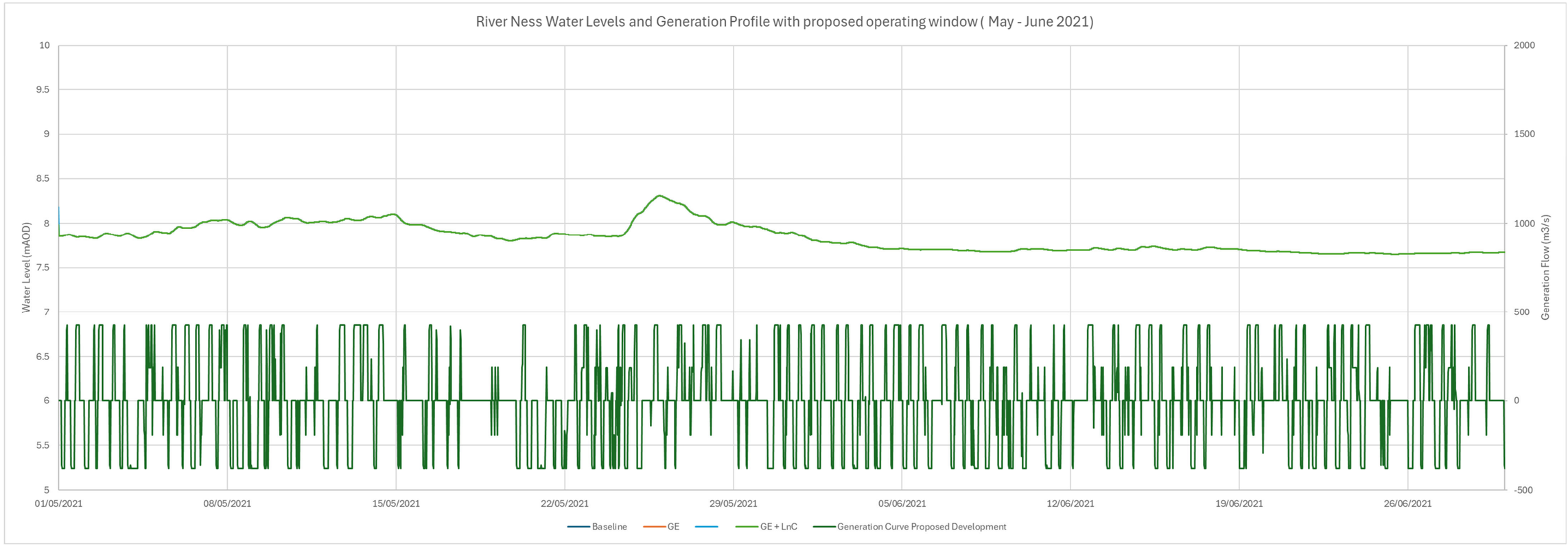

Figure A2-6 May - July 2021

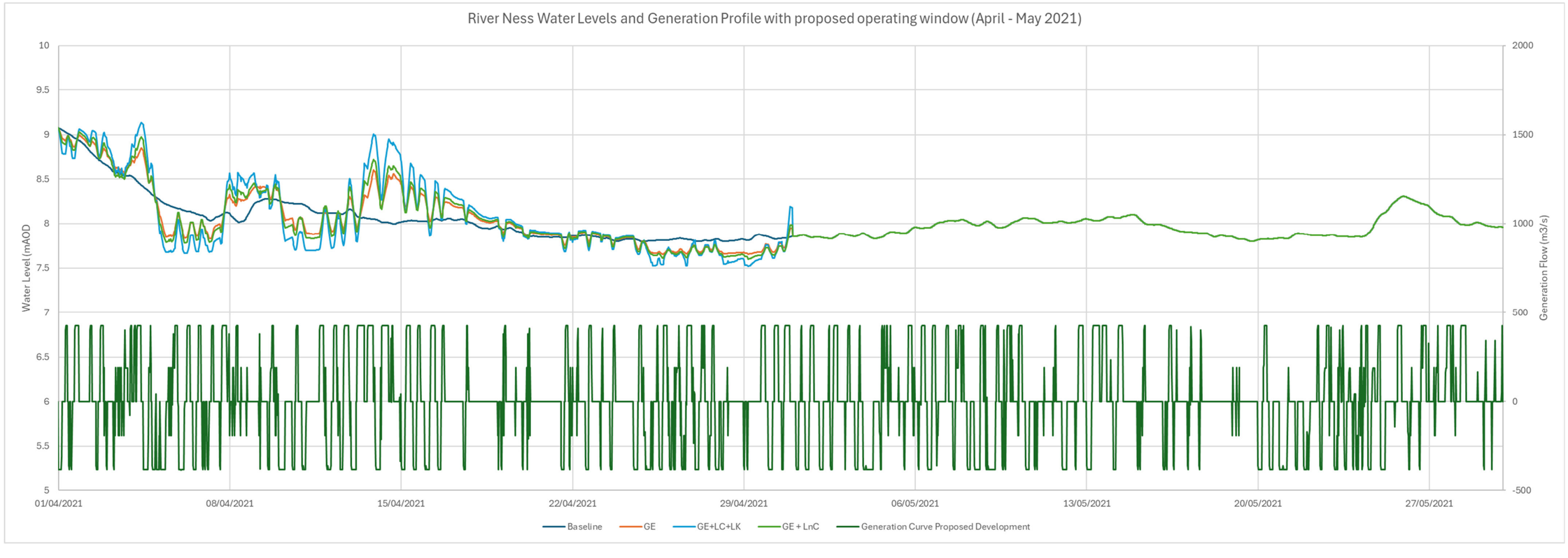

Figure A2-7 April - May 2021

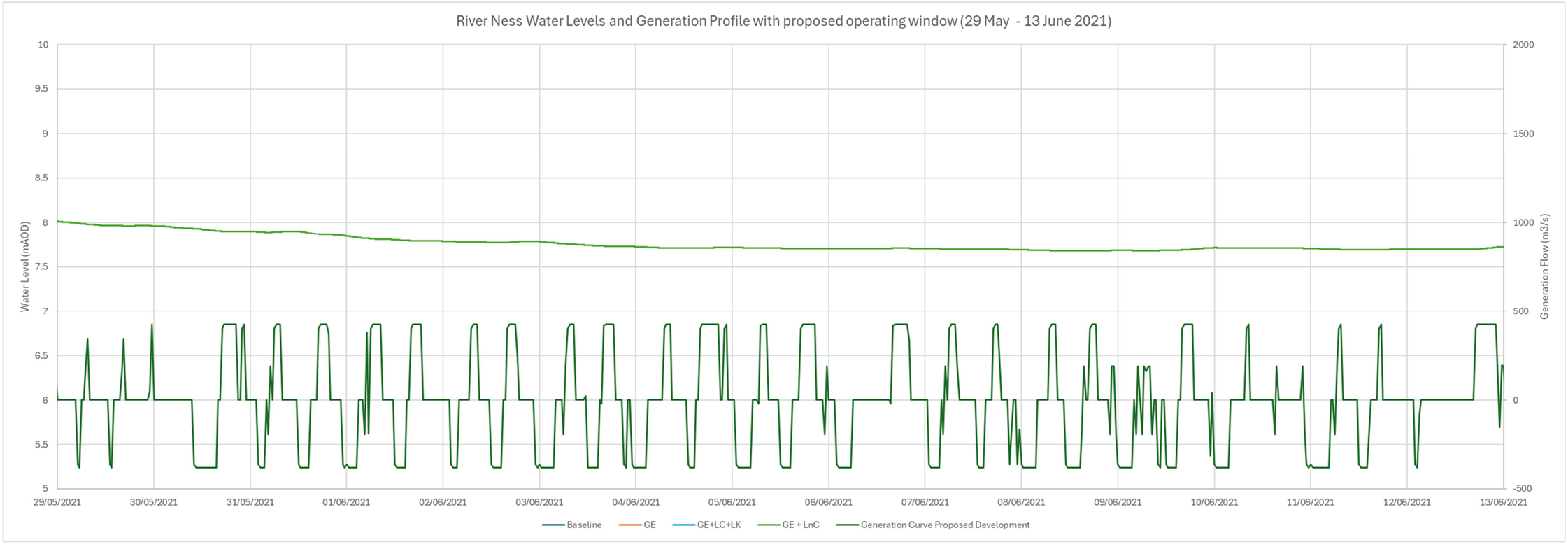

Figure A2-8 29 May - 13 June 2021

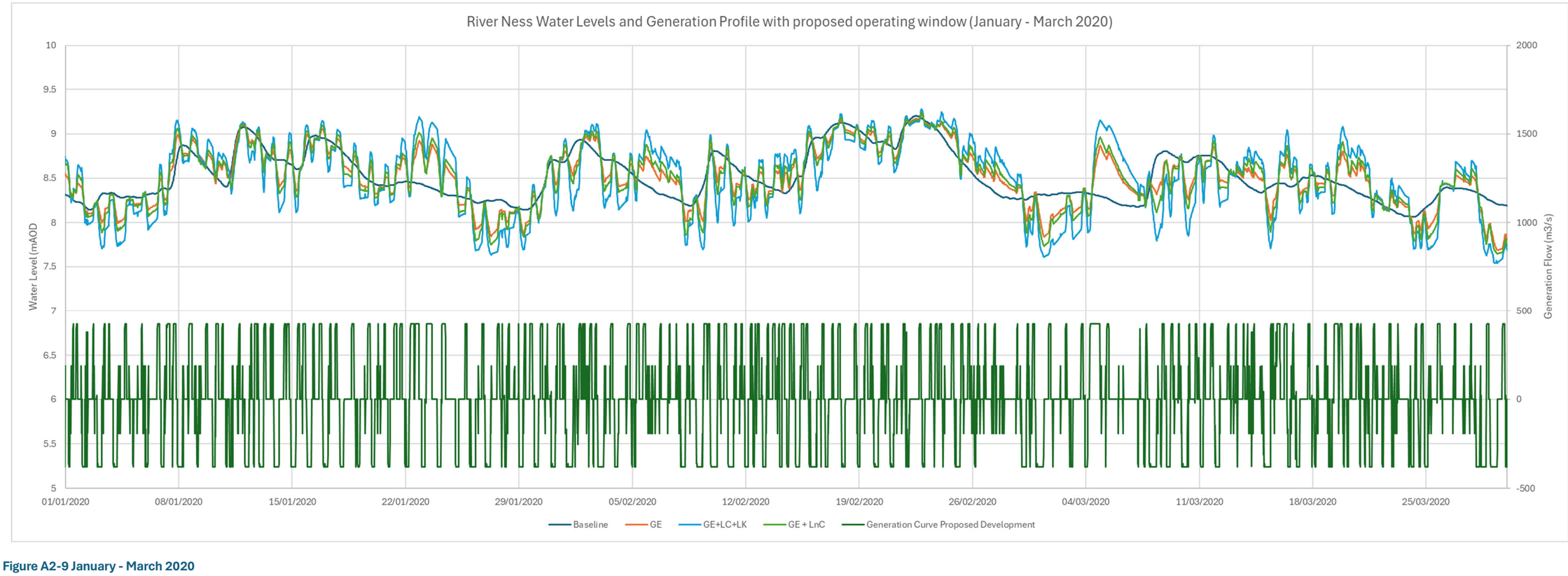

Figure A2-9 January - March 2020

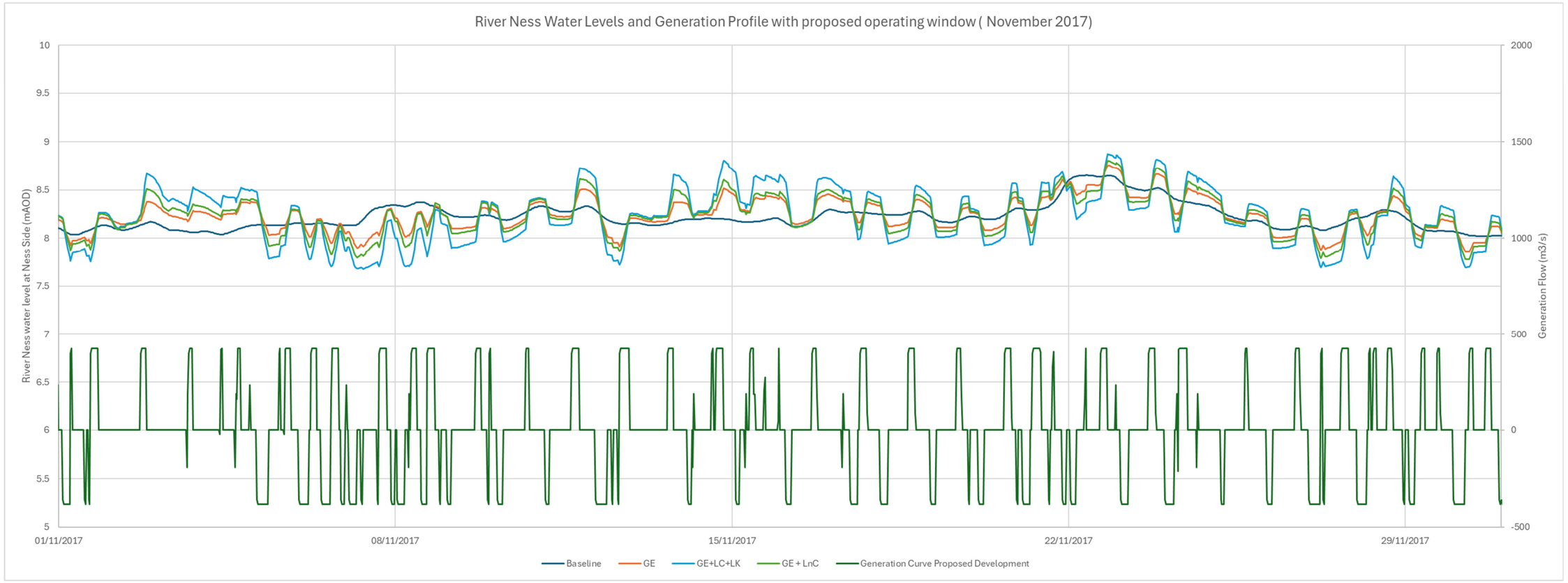

Figure A2-10 November 2017