FEARNA STORAGE

Fearna Pumped Storage Hydro Scheme

CAR Licence Report

Appendix F – River Garry Sediment Augmentation Appraisal

September 2025

Quality Information

Prepared by	Checked by	Approved by
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01	September 2025	Issue to SEPA	[redacted]

Fearna Pumped Storage Hydro Scheme Geomorphology Report: C. River Garry Gravel Augmentation

[redacted]

August 2025

INTRODUCTION

[redacted] was commissioned by Gilkes Energy Ltd to undertake geomorphic assessments relating to waterbodies influenced by the proposed Loch Fearna pumped storage scheme on the River Garry system, Inverness-shire. This is separated into three discrete elements:

A. The stream crossings of the Southern Access Route (SAR).
B. The streams captured by the proposed extents of the scheme reservoir (i.e. the extension of Loch Fearna).
C. The opportunities for mitigative habitat enhancement in the River Garry downstream from Loch Garry.

This report relates to element C, a high-level identification of potential options for habitat mitigation (particularly, gravel augmentation) on the River Garry in the stretch downstream from the dam. Elements A and B are addressed in separate associated reports.

Habitat Mitigation Opportunities

1. The physical and ecological degradation of the Garry system is not as a direct consequence of the proposed Loch Fearna development but, rather, the longer-term effects of wider hydropower (HP) development on the Garry system; the Loch Cuaich and Lower Garry dams have been in place for over 70 years and have impacted flows and sediment transport continuity over that period. These physical impacts have important implications for instream/ riparian ecology and biodiversity throughout the Garry system. The proposed works described in this report would provide mitigation of the effects of HP development in the Garry system, providing an offset for impacts relating to the Loch Fearna scheme that cannot be mitigated locally.
2. Of particular concern has been the associated impact to salmonid habitats in the section of the River Garry downstream from the HP dam (OS NGR NH 2768 0190) to the outflow to Loch Oich (NH 3215 0130), a river length of ~5.9 km. While parr habitat is regarded as plentiful, spawning and fry habitats are limited, generally restricted to localised pockets in edges of the active channel; improving the availability of such habitats has the potential to improve salmonid production of the lower Garry, as well as general benefits to the biodiversity of the area.
3. The proposed general approach to habitat mitigation is one of gravel augmentation – replacing the lost sediment supply as a consequence of the HP structures to the river downstream of the Garry Dam. Depending on the potential for sediment transport in the lower Garry, two methods of undertaking this are possible:
    A. large-scale placement of alluvial sediment just downstream of the dam structures, to be reworked by high flows and naturally distributed downstream;
    B. localised placement of alluvial sediment to directly provide habitat at hydraulically appropriate locations.

    Depending on the outcome of more detailed assessments (see point 9, below), either or both of these methods can be applied to the lower Garry; Method B will likely have more immediate benefit while Method A can provide a longer-term supply of sediment to the study section of the river (i.e. in combination with B, potentially providing a more sustainable longer-term benefit).

4. Currently, the lower River Garry exhibits very little gravel/ cobble sized alluvial material stored within the active channel, with only localised pockets in sheltered margins of the wetted area. This indicates a very efficient sediment transport regime under flood conditions and the likely requirement that any localised gravel/ cobble augmentation is associated with some increased channel roughness. In such applications, integrating the gravel/ cobble augmentation with the implementation of Large Wood Structures (LWS) would likely best provide the required additional channel roughness. This would allow the greater potential for and duration of storage of augmented alluvial sediments, although the required specification of this would be determined through more detailed assessments (e.g. sediment transport modelling, see point 9). Furthermore, LWS provide other benefits, including the morphological evolution of the channel (i.e. leading to greater physical diversity, therefore, biodiversity) and direct habitat provision (e.g. cover/ refugia for fish, invertebrate habitat, perching for birds

etc). With proper design and implementation, LWS can remain stable in high energy rivers such as the Garry, providing long-term physical and ecological benefits. An example of this type of habitat improvement intervention on the HP-influenced River Shin is presented in Figure 1. The high energy environment of the River Garry would be considered in any decision to implement LWS and in their specific design (i.e. measures to maximise their stability). Furthermore, given the Garry is a premium river for paddle sports, the implementation of LWS would be considered in relation to risks to canoeists, rafters etc.

5. Table 1, Figures 2 to 5 and Appendix A (site-specific photographs) provide an initial high-level assessment of potential habitat mitigation locations on the lower Garry. This is based on a site visit conducted by [redacted] Ness Salmon Fishery Board, NSFB) on 29th July 2025 under conditions of good visibility and relatively low river flow.
6. One site was identified for Method A (i.e. upstream ‘seeding’ of the lower Garry), just downstream of the outflow structures from the Garry Dam and with good current access for machinery. In this location, a significant input of gravel/ cobble sized material (the volume and geometry to be determined after more detailed analyses, see point 9) would provide a source of alluvial sediment that, through reworking under high flow conditions, will supply downstream areas over time.
7. Potential Method B sites were identified where current channel conditions are close to providing salmonid spawning/ fry habitat but require some further supply and increased roughness to retain more sediment of the necessary calibre. The table list/ maps of the potential areas are not exhaustive but based on this preliminary field assessment from the site visit; further more detailed analyses (see point 9, below) will be required to arrive at a final short list of specific sites that are appropriate in terms of physical river processes for sediment augmentation/ LWS implementation and the specification of those measures.
8. An important consideration and potential constraint in the practical delivery of such works will be access to potential augmentation locations. Some of the potentially feasible sites identified here may be difficult for the required construction machinery to access and consultation on this issue with a contractor experienced in these types of works will be necessary at some stage to develop a final list of proposed sites for gravel/ cobble augmentation and/ or LWS implementation.
9. It will be necessary to conduct more detailed analyses to determine the appropriateness of Methods A and B (see point 3, above), the optimal locations for their implementation and the specification of that implementation. In relation to Method A, it needs to be assessed how the HP-managed hydrological regime will influence the transport of sediment added to the channel close to dam and what form this introduction of sediment should take (i.e. footprint/ geometry of implementation feature, size grade of added sediment). For Method B, appropriate specific implementation locations will need to be identified, where the required grade of sediment is relatively stable (i.e. potentially associated with the added roughness from LWS). For each of these identified sites, the specific footprint/ geometry of implementation, size range of introduced alluvial sediment (within the gravel and cobble size classes) and the number/ size/ configuration of associated LWS will be necessary as part of the design process. To develop these designs (both Method A and B), sediment transport/ morphodynamic modelling work will require to be undertaken, in combination with a more detailed walk-over geomorphic assessment (‘fluvial audit’). The modelling will need to be

supported with high resolution topographic/ bathymetric surveys and a detailed hydrological analysis, the latter importantly considering how HP manages flows (both high and low discharges). The designs produced will then need to be considered for access/ 'buildability', through liaison with an appropriate groundworks contractor.

Table 1. Summary of preliminary assessment of potential gravel augmentation/ LWS sites on the lower River Garry. Site specific photos are provided in Appendix A.

Site	OS NGR	Notes
1	NH 2773 0185	Potential large scale (i.e. Method A) gravel augmentation location.
2	NH 2776 0171	Method B.
3	NH 2782 0164	Method B. Also at riffle crest ~50 m downstream
4	NH 2798 0145	Method B. Downstream from this location
5	NH 2807 0156	Method B.
6	NH 2816 0147	Method B.
7	NH 2833 0071	Method B. Just on upstream side of coarse confluence bar form tributary (Allt na Caillaich), creating a hydraulic control.
8	NH 2838 0058	Method B. At head of riffle (possibly artificial) on river left.
9	NH 2998 0088	Method B. At entrance to river right side channel - great opportunity for habitat improvement.
10	NH 3177 0114	Method B. Already good spawning habitat - although works feasible here, perhaps better to leave as is.

Figure 1. Example of gravel augmentation/ LWS works on the River Shin, downstream of the HP dams.

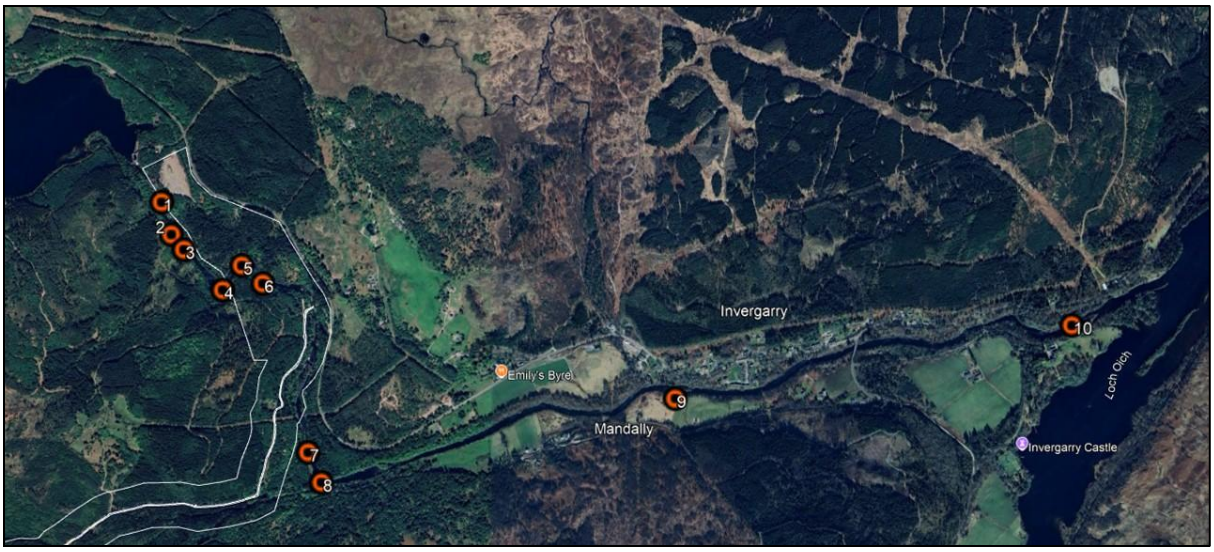

Figure 2. Location of the 10 preliminary locations identified for potential gravel augmentation works on the lower River Garry (refer to Table 1 for further information).

Figure 3. Location of potential gravel augmentation sites 1 to 6 (see Table 1).

Figure 4. Location of potential gravel augmentation sites 7 and 8 (see Table 1).

Figure 5. Location of potential gravel augmentation sites 9 and 10 (see Table 1).

APPENDIX A

Site photographs

Figure A1. Potential gravel augmentation location 1 (Method A), just downstream of Garry Dam outflow.

Figure A2. Potential gravel augmentation location 2 (Method B, refer to Table 1).

Figure A3. Potential gravel augmentation location 3 (Method B, refer to Table 1).

Figure A4. Potential gravel augmentation location 4 (Method B, refer to Table 1). At riffle crest and down through river right side of the channel.

Figure A5. Potential gravel augmentation location 5 (Method B, refer to Table 1) [redacted] for scale.

Figure A6. Potential gravel augmentation location 6 (Method B, refer to Table 1).

Figure A7. Potential gravel augmentation location 7 (Method B, refer to Table 1). Around margins of upstream half of tributary confluence bar.

Figure A8. Potential gravel augmentation location 8 (Method B, refer to Table 1).

Figure A9. Potential gravel augmentation location 9 (Method B, refer to Table 1). Likely requiring some localised reprofiled of entrance to the side-channel but with excellent potential for habitat improvement.

Figure A10. Potential gravel augmentation location 10 (Method B, refer to Table 1). Already relatively good spawning habitat, with the context of the lower River Garry.