

## Hydro Sector engagement over environmentally effective and cost-efficient sediment management at impoundments

### Section 1: Project Overview

#### Introduction

The Centre of Expertise for Waters (CREW) intends to commission a **capacity building project** within CREW's **Land and Water Resource Management** theme aligned with the Scottish Government's [Draft Energy and Just Transition Plan](#) to support Scotland's emissions reduction targets to net zero by 2045.

#### Aim and key questions

The project has two main aims. The first is a science communication exercise to raise awareness in the hydro sector of basic river geomorphological processes. This will provide a platform to help raise awareness of: (a) the ecological importance of sediment continuity to rivers and of the environmental risks of not properly addressing this in permit applications; and (b) of the commercial risks posed by climate change-related increases in the rate of sediment delivery to hydro and water supply impoundments. The second aim is to improve understanding and raise awareness of the cost effectiveness of different sediment management options available to address these risks. These improved levels of understanding will make the process of applying for, issuing, and reviewing permits more efficient for hydro-scheme operators and SEPA respectively.

Through consultation with relevant stakeholders<sup>1</sup> via workshops, questionnaires, and focus groups and by using the best available geomorphological, ecological, economic, and science communication knowledge and skills, the project will:

- Develop cost benefit analyses for a maximum of three case studies (low, medium, and high fluxes of sediment) for the range of sediment management techniques referred to in a recent [CREW report](#) (Williams *et al.* 2022), in consultation with operators, using existing data and rigorous economic techniques. For each case study, a suite of scenarios should be applied to assess the cost-benefits of (i) doing sediment management mechanically, (ii) of retrofitting existing structures with hydraulic sediment management capabilities, and (iii) of building new structures with such capabilities incorporated from the outset. The studies should examine the effects on costs of preventative sediment management, i.e. tree planting of the riparian corridor and hillslopes connected to the river to stabilise existing or potential future sediment sources. Finally, the studies should also look at the effect of ease of site access on the costs of doing sediment management for (i) to (iii). It is envisaged that one visit to each case study site may be required to support the sediment budget modelling and subsequent cost benefit analysis<sup>2</sup>.
- Share information and knowledge to allow operators to make environmentally and commercially informed decisions about how best to do sediment management at their facilities. To include, producing one video<sup>3</sup> (c. 5–10-minute) suitable for hydro-scheme operators (and interested members of the public) covering sediment management best

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<sup>1</sup> Stakeholders for this project include the Scottish Hydro Sector, the wider UK Hydro Sector, fisheries organisations, and interested recreational users of the environment.

<sup>2</sup> Please see funding section for budget allowance for site visits. To be discussed at pre-contract meeting.

<sup>3</sup> To be discussed at pre-contract and project steering group meetings.

practices, and presentation of essential information in one other format e.g., infographics, photo case book, to be discussed and agreed with the project steering group.

The key questions to be addressed are:

- To what extent are hydro-scheme operators aware of the hydrological and geomorphological impacts of climate change and of the associated risks to their operations over decadal to century time scales?
- To what extent are operators aware of the effects of their activities on sediment transport and the consequent effects on river habitats and species in adjacent river reaches?
- To what extent are the operators aware of the different sediment management options available to them and to what extent have they considered using them at their sites?
- What are the potential cost-benefits of applying these different options and to what extent are the operators aware of them?

## Background & knowledge gap

The Climate Change (Scotland) Act 2009 was amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, increasing the ambition of Scotland's emissions reduction targets to net zero by 2045. The Scottish Government's [Draft Energy and Just Transition Plan](#) sets out how they plan to achieve this. This includes targets for increased renewable energy developments, including hydroelectric developments. The hydro sector has a vital role to play in providing clean energy to fight against climate change, so it is essential it continues to do so sustainably and cost-effectively.

Sustainable use and conservation of the water environment need to take account of climate change. Ensuring that hydro schemes do not interrupt natural patterns of sediment movement will improve the resilience of river habitat and biota to the effects of climate change, so it is essential that permits issued by SEPA make provision for appropriate sediment management. Many hydro permits do not currently do this effectively. Some operators may not fully appreciate the morphological impacts of their activities, nor the commercial risks to which they may be exposed because of climate change.

Removing sediment that accumulates at impoundments prevents it being transported further downstream, which can adversely impact habitat and biota. Some operators are aware of these risks, but others may not be. Removing this sediment imposes a maintenance and financial burden on operators that is likely to increase in future due to climate change. A recent [CREW project](#) summarised existing sediment management techniques and provided state-of-the-art guidance on reintroducing sediment downstream. The cost-benefits of these techniques over decadal to century time scales are unknown and would be quantified through a series of case studies, developed by working collaboratively with operators.

SEPA has a statutory duty to protect and maintain a safe, healthy, and sustainable environment for the people of Scotland and to ensure that business and industry are aware of, and comply with, environmental regulations. SEPA's statutory duties include regulation of water resources activities according to the [Controlled Activities Regulations](#) and soon under the [Integrated Authorisation Framework](#) to ensure the sustainable use of the water environment, as required by the [Water Environment and Water Services \(Scotland\) Act 2003](#).

NatureScot's duties are fundamental to the successful implementation of environment and biodiversity-focused European and domestic legislation and strategies including the [Habitats Directive](#), the [Scottish Wild Salmon, Biodiversity](#) and [Environment](#) strategies, and [National Planning](#)

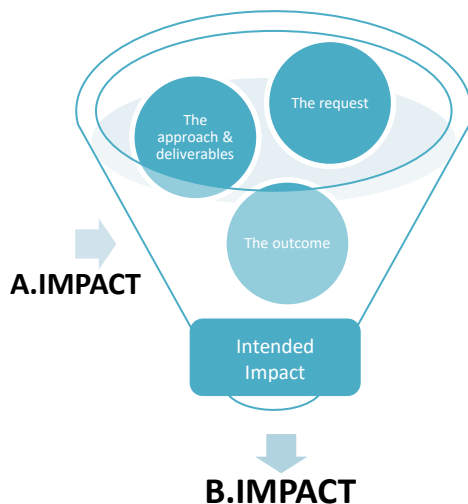
**Framework 4.** NatureScot’s statutory duties are to secure the conservation and enhancement, and foster understanding and facilitate the enjoyment, of Scotland’s natural heritage. It also has a duty to promote the sustainable use of Scotland’s natural heritage.

**Intended impact**

There are multiple pathways for a project to achieve impact, and multiple factors that can impact the project’s ability to achieve what it intends to do; both along the project lifecycle (A.IMPACT) and beyond project completion (B.IMPACT) (Figure 1).

The project deliverables (see following section) will be used to:

- Support hydro scheme operators to gain a better understanding of how rivers function ecologically and geomorphologically, enabling them to align their operations more easily with the requirements of environmental legislation and a range of environmental strategies and to understand why they are doing so.
- Support operators to deliver sediment management more consistently and potentially more efficiently using a wider range of techniques.
- Support SEPA and NatureScot to engage with potential applicants proactively, at a much earlier stage in the application process, leading to better quality permit applications and permits issued more quickly and more efficiently.
- Enable better quality discussions to take place between operators and regulators during the reviews of existing schemes.
- Support engagement with fisheries interests and recreational users of the environment around hydro schemes.



- **The request:** the problem/ gap that has been identified that drives the project.
- **The approach & deliverables:** the ‘methods’ that explain how the request is being answered and the ‘outputs’ that are tangible products delivered by the project.
- **The outcome:** this is directly correlated to the findings; this is short to mid-term change because of the research.
- **Intended impact:** Explicitly what this project intends to achieve to address, which is connected to the request.
- **Along impact:** the conditions and causal factors that can influence the project during its life cycle.
- **Beyond impact:** more significant wider change that occurs at a longer timescale following the project’s completion.

*Figure 1: Pathways to impact*

**These stakeholders are anticipated to be a key influence on this project:**

- Scottish Hydro Sector
- Wider UK Hydro Sector
- Water supply sector
- SEPA
- NatureScot
- Fisheries organisations
- Recreational users of the environment

In the longer term, the project will strengthen the ability of hydro scheme operators to submit permit applications that correctly identify the site-specific sediment management issues they need to address and that explain *how* they will address these issues in the most cost-effective and environmentally beneficial fashion. For sites in areas designated under the Natura 2000 legislation, this includes assuring the permit includes appropriate protections for species and habitats in the face of climate change.

### Deliverables

- Communications and impact plan – co-created with CREW at project start;
- A formal engagement exercise with Scottish operators to develop the cost benefit analyses. It is envisaged that one workshop and several meetings with operators at the start of and during the project will be needed.
- One 5-10 min professionally produced video covering sediment management best practice at impoundments, produced in collaboration with the operators (scope for sub-contract)<sup>4</sup>.
- In addition to the video, the essential information will also be produced in one other format, e.g., infographics, photo case book, etc. to be discussed and agreed with the project steering group.
- A final report of 20-30 pages, excluding annexes and the bibliography, and including:
  - Workshop outputs.
  - A cost benefit analysis of existing sediment management techniques and techniques for reintroducing sediment downstream<sup>5</sup>;
  - A framework for planning the sediment management aspects of a hydro or scheme application or permit review;
  - Cover image(s) with associated photo credits;
- A plain English summary of aims and results (up to 1 page);
- Website summary (200 words);

### Events/meetings

- Project Steering Group meetings (*throughout the project lifecycle*) (approximately 4, up to 2 in-person)<sup>6</sup>;
- One stakeholder-engagement workshop (*To include the stakeholders identified above*);
- A dissemination event/workshop.

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<sup>4</sup> To be discussed with the project steering group at the pre-contract meeting.

<sup>5</sup> It is envisaged that one visit to each case study site may be required to support the sediment budget modelling and subsequent cost benefit analysis.

<sup>6</sup> Please note, CREW requests a brief written update c. two weeks prior to project steering group meetings.

## **Section 2: Further information for applicants**

### **Project management**

Day-to-day communication will be between the research/review team (the contractor) and a CREW Project Manager and is likely to involve short catchups as agreed.

### **Project steering group**

A small group including representatives of Scottish Government and its delivery partners plus a CREW representative, will meet with the preferred bidder for a pre-contract meeting and provide feedback on the bidder's proposed approach.

### **Anticipated timescale**

The pre-contract start-up meeting will take place approximately **w.b. 20<sup>th</sup> Nov 2023**. The project will commence **c. w.b. Monday 11<sup>th</sup> Dec 2023**. The main report should be signed off by **end of October 2024**, with all other project outputs signed off by the CREW Director by **end of November 2024**.

### **Funding**

The maximum amount of funding available exclusive of VAT (where applicable) is **£155,000**.

This includes an associated costs (excluding sub-contractor) budget of **£5500** for:

- Up to two in-person project steering group room and equipment hire;
- One workshop room and equipment hire;
- One dissemination event room and equipment hire;
- Travel and subsistence for meetings and events.

In addition, a maximum of **£10,000** of the **total project budget** should be used to produce one professional and high-quality video (5-10 mins), which can be sub-contracted. To be discussed further at a pre-contract meeting.

In addition, a maximum of **£ 11,500** of the **total project budget** (including staff time, accommodation, travel and subsistence) could be used for site visits if required (one visit to a maximum of three case study locations is permitted). This can be sub-contracted. To be discussed further at a pre-contract meeting.

### **Submitting a proposal**

Please send a completed application form addressing the project requirements.

A copy of expectations and the award criteria are provided below for reference.

Proposals need to be submitted to [procurement@crew.ac.uk](mailto:procurement@crew.ac.uk) for evaluation **by Friday 20<sup>th</sup> October 2023, 15:00**. We aim to notify the preferred bidder by **10<sup>th</sup> November 2023**.

Please contact [procurement@crew.ac.uk](mailto:procurement@crew.ac.uk) by **Friday 13<sup>th</sup> October 2023** if you would like any clarification on any of the above. You should highlight any potential conflicts of interest in your proposal. For queries about what may constitute a potential conflict of interest please contact the CREW Deputy Manager ([Nikki.Dodd@hutton.ac.uk](mailto:Nikki.Dodd@hutton.ac.uk)).

## Expectations

No.	Criteria	Descriptor
1	Duration	The proposed duration will align closely to the details provided in the anticipated timescales section of the specification.
2	Staff time and effort	The proposed allocation of staff time and effort is appropriate and includes all deliverables. The proposal must also provide a commitment that named staff members will be available to work on the contract if the bid is successful. For any unnamed staff, appropriate risk identification and mitigation measures are provided.
3	Project costs	The estimated breakdown of project costs is realistic and inclusive of all deliverables.

## Award criteria

No.	Criteria	Descriptor
1	Understanding the project ask and policy background	The proposal should include an introduction which demonstrates a clear understanding of the project requirements. This should include an understanding of the policy background and the supporting role of this project; the need for this research; the project aim; and how the proposal will address this aim.
2	Proposed methodology	The proposal should demonstrate a high quality and workable methodology, including: how the evidence will be identified, collected, reviewed and assessed; consulting relevant stakeholders and/or experts where appropriate to address the key questions and produce the deliverables in the timescales required. It should explain the suitability, robustness and limitations of the proposed methodology.
3	Milestones	The project milestones are logical, practical and include all deliverables.
4	Project Management	The staff, resources and expertise are appropriate for conducting the proposed project. The proposal should name the project lead and outline their project management experience.
5	General and specific topic expertise and experience	The proposal should provide details of individual staff members who will work on this project and demonstrate how they will meet the project requirements, specifically: <ul style="list-style-type: none"> <li>- general research experience and expertise;</li> <li>- specific experience and expertise in fluvial geomorphology and in of sediment management at impoundments;</li> <li>- expertise in undertaking cost-benefit analyses in general and of undertaking environmentally related cost benefit analyses in particular.</li> <li>- expertise in science communication.</li> </ul>
6	General communication and deliverables	The proposal should describe the approach to producing the deliverables, which will be published on the CREW website. It should detail who will take lead responsibility for report-writing and overall report quality. It should provide examples of previously published best practices with sediment management at impoundments in which they have been involved.
7	Quality assurance	The proposal should provide details of quality assurance procedures to demonstrate how the contract will be continuously delivered to a high standard. It should specifically address issues of quality control at different stages of the project, including evidence gathering, analysis and report writing. It should include a timetable for delivery of tasks, project milestones and allocation of staff and staff time against each task, covering the duration of the contract.
8	Risk	The proposal should provide a risk assessment matrix detailing any risks identified in relation to the delivery of this contract, and proposed mitigation measures to minimise their probability and impact, focused particularly on risk to completion on time.

## **Annex A. Relevant reports, studies and policies**

Williams, R.D., Downs, P.W., Moir, H.J. and Lavarini, C. (2022), Sediment continuity through run-of-river hydropower schemes. CRW2019\_02. Centre of Expertise for Waters (CREW). Available online at: [crew.ac.uk/publications](http://crew.ac.uk/publications).

[Perfect, C., Addy, S. and Gilvear, D. \(2013\), The Scottish Rivers Handbook: A guide to the physical character of Scotland's rivers, CREW project number C203002.](#) Available online at: [crew.ac.uk/publications](http://crew.ac.uk/publications).

SEPA's basic river processes presentation (to be provided by SEPA).