Assessing Future Socio-Economic Water Demand in Scotland: Drivers and Patterns

Section 1: Project Overview

Introduction

The Centre of Expertise for Waters (CREW) intends to commission a **capacity building project** aligned with CREW's **Hydrological Extremes, Coasts and Risk Management** theme**.** The project aims to provide a national assessment of future socio-economic demands on Scotland's water resources, identifying key drivers and patterns.

Background

Scotland's water resources are a vital national asset, underpinning environmental sustainability, public health, economic productivity, and climate resilience. However, pressures on water availability are increasing as a result of climate change, population growth, land use change, and evolving industrial demands. Therefore, there is an urgent need to understand not only the physical availability of water, but also the socio-economic demands placed upon it.

Building on SEPA's ongoing work to map current and future water availability under short- and long-term future climate change projections, this project will provide a complementary and essential layer of insight by assessing who needs water, for what purposes, and where pressures are most acute or emerging. This national assessment will identify patterns of water demand across key sectors including, but not limited to, agriculture, whisky production, energy, hydrogen, hydropower, data centres, and domestic use, thereby supporting evidence-based water resource planning and decision making in Scotland.

Knowledge gap

Scotland currently lacks a comprehensive national assessment of future socio-economic demand for water. While SEPA's ongoing work will provide projections of water availability under future climate change scenarios, combined with current abstraction data, there is no integrated evidence base that considers how future water demand may evolve. In particular, there is a limited understanding of potential future pressures including who may need water, for what purpose, where pressures may be most acute, and how these demands may evolve under different socio-economic and technological scenarios.

Reducing this evidence gap will support the ability of government and regulators to:

- Align water resource planning with climate adaptation strategies and River Basin Management Plans (RBMPs);
- Support proportionate, risk-based regulation and catchment scale interventions;
- Inform strategic planning and investment decisions for Government and Local Authorities, as well as for water-dependent sectors such as agriculture, energy, whisky production, and emerging industries (e.g. hydrogen and data centres).

This project will address this gap by building on earlier work in this area by combining socio-economic data, future demographic trends, climate projections, and evidence on emerging technologies and

industries, with the current understanding of future hydrological trends, to provide insights into future water demand patterns. In doing so, the project will identify key drivers of change. This integrated evidence base will directly complement SEPA's availability mapping, supporting the strategic management of climate resilient water resources and informing policy, regulation, and investment decisions.

Drivers of this project

Climate Adaptation and Resilience

The Scottish Government's climate adaptation strategies require robust evidence to support water resource management, in the context of increasing variability and extremes of resource. Understanding water demand is key to ensuring water allocation supports resilience across sectors and users.

Policy Alignment

The integration of water resource planning within River Basin Management Plans (RBMPs) offers a strategic opportunity to align Scotland's commitments under the Water Framework Directive with national climate adaptation strategies (such as SNAP 3) as well as with international frameworks for disaster risk reduction (such as the Sendai Framework). A robust evidence base is required to support effective policy alignment and inform planning and investment decisions that reflect water demand realities.

Regulatory Reform and Catchment Management

SEPA's regulatory reform agenda and the RBMP process require a deeper understanding of water use pressures to support proportionate, risk-based regulation and catchment-scale interventions.

Economic Development and Natural Capital

Water is a key enabler of Scotland's economic activities and ambitions, particularly in rural development, food and drink, energy, and tourism. In the absence of a national assessment, there is a risk of uncoordinated development, inefficient resource use, and increased vulnerability to drought and other climate impacts on water security. A national demand assessment will help ensure water is managed as a strategic natural capital asset.

Data Gaps and Decision Support

While mapping from SEPA and others aims to provide a foundation for understanding availability, there is currently no comprehensive national picture of future socio-economic water demand. This project will contribute towards filling that gap, supporting decision-makers with integrated evidence for policy, regulation, and investment decisions.

Aim

This project aims to provide a national assessment of future socio-economic demands on Scotland's water resources, identifying key drivers and patterns. Using available data, the project will explore future trends and examine how water demand may evolve under different scenarios, highlighting evidence gaps that need to be addressed to guide investment and resilience planning.

The project will require robust data analysis and synthesis to develop defensible insights from diverse datasets and stakeholder evidence. This work will complement SEPA's water availability mapping and support strategic decision making on water allocation, regulation, and climate adaptation.

Specifically, this project will[1]:

- Assess socio-economic water demand across Scotland's key sectors including, but not limited to, public water supplies, agriculture, energy, whisky production, emerging industries;
- Then infer how future water demands vary spatially and seasonally;
- Analyse and synthesise data on key drivers influencing demand (e.g. climate change, population growth, land-use change, industrial trends, business and government ambitions) and consider how demand may evolve under different socio-economic and climate scenarios;
- Identify evidence gaps and additional data needs to improve projections and guide resilience planning;
- Where possible, ensure alignment and integration with SEPA's water availability mapping to maximise the value of both strands of work.

To address the project aim, the following questions should be addressed:

1. What data are available to inform how the patterns of water demand across Scotland's key sectors (e.g. agriculture, energy, whisky production, industry, domestic use etc.) may vary spatially and seasonally in the future?

2. What future demand patterns can be inferred from the available data, and what are the key drivers underpinning these patterns?

   a. Where are socio-economic demands on water resources projected to be most concentrated or most vulnerable to change (e.g. under different climate, land use and economic scenarios)?

   b. What assumptions underlie these conclusions, with what level of confidence and associated uncertainties?

3. What are the implications of these patterns for Scotland's water security, environmental flows, and the availability to abstract water?

4. What additional data and evidence are required to answer these questions and guide public and private investment decisions in water infrastructure and resilience?

[1] Please note the following is <u>out of scope</u> for this project:

- Detailed catchment-based analysis.
- Water availability modelling, already covered through work by SEPA.
- Detailed hydrological modelling or engineering design for solutions.
- Recommended regulatory changes or operational water allocation decisions.
- Recommended cross-sector collaboration frameworks and data-sharing mechanisms.
- Full economic valuation of water resources or cost benefit analysis of interventions.
- Development of new hydro-climatic projections.

Deliverables

- **Targeted stakeholder engagement** with key public bodies (e.g., Scottish Government and relevant agencies such as SEPA and Scottish Water), to support data identification, interpretation and alignment with existing work.
    - This is expected to include early-stage expert elicitation and scoping discussions to ensure appropriate use of available data and methods.
- **Spreadsheet database (e.g. excel format)** directly supporting Research Question 1, containing collated and structured data on socio-economic water demand by sector, geography and seasonality.
- **Final report** up to 30 pages, excluding annexes and the bibliography, that addresses the project aim and key research questions (Q1-4) and:
    - Presents a national assessment of future socio-economic water demand, including key drivers, patterns and future implications;
        - Provide a structured analysis and synthesis of all collated data, identifying patterns, relationships, and uncertainties that inform the assessment of future water demand.
    - Includes visual outputs and infographics (e.g. maps, charts and diagrams) illustrating potential future pressures on water resources across Scotland including:
        - Illustrative scenario outputs (e.g. demographic changes, growth in specific industries or technologies etc.)
        - Visualisation of where issues are arising and where any pressure points may exist
    - Includes data mapping outputs, linked with the spreadsheet database, comprising:
        - A structured description (metadata) of all datasets used (sources, assumptions, linkages to other datasets, and limitation);
        - Identification of data gaps and uncertainties that should be addressed in future research or monitoring;
    - Provides a concise set of recommendations,
    - Includes cover image(s) with associated photo credits.

  Annexes should be used for detailed methods or supporting technical material.

- **Policy Brief** up to 3 pages, summarising key findings and implications for decision makers.
- **Plain English summary** describing the project aims and key findings (up to 1 page)
- **Website summary** (approximately 200 words)
- **Communications and impact plan**, developed with support from CREW at the start of the project and refined throughout delivery.

Meetings

- **3 Online Project Steering Group meetings**, throughout the project lifecycle[2]

[2] Please note, CREW requests a brief written update c. two weeks prior to project steering group meetings.

Intended impacts

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).

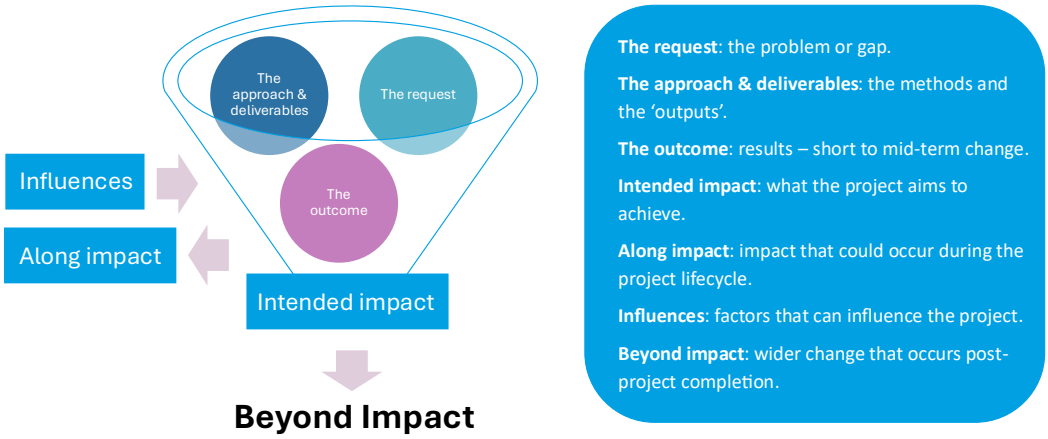

Figure 1:Pathways to impact

Along Impact *(A.Impact)*:

These stakeholders will be part of the project steering group: Scottish Water, SEPA, and teams across Scottish Government.

Beyond Impact *(B.Impact)*:

The project will improve understanding of how socio-economic drivers shape future water demand across Scotland, helping to shift thinking from water scarcity as a purely hydrological issue to one that considers the sustainable use of water. By bringing together evidence on future demand pressures, the project will support more informed public, stakeholder, and industry discussions on sustainable water use and increase awareness of the implications of different future scenarios for water availability.

The findings will inform SEPA's regulatory reform agenda and support proportionate, risk-based approaches to abstraction licencing and catchment scale interventions. The outputs will contribute to future frameworks that embed sustainable water use, climate adaptation, and cross-sectoral collaboration into policy delivery. Insights will guide policy development across agriculture, energy, and industry, ensuring water is managed as a strategic natural capital asset and supporting cross-government priorities for net zero, economic development, and environmental protection.

The project will provide evidence to inform national water resource planning and climate adaptation objectives, supporting the integration of water resource planning within RBMPs, aligning with Water Framework Directive (WFD) and Scotland's climate and biodiversity adaptation strategies. Scenario based insights will inform land-use planning and investment in green infrastructure, helping Scotland maintain biodiversity, enhance resilience, and deliver sustainable water management at both national and catchment scales. By integrating demand projections with SEPA's water availability mapping and RBMPs, the project may support prioritisation of nature-based solutions such as wetland restoration, riparian planting, and peatland restoration.

Section 2: Further information for applicants

Eligibility

CREW Capacity Building funding is open to applications from **all relevant Scottish HEIs and Research Institutes (approved subcontractors)**. One eligible organisation must lead the bid, however an eligible organisation can sub-contract work in accordance with the Grant Terms which would include putting in place an appropriate agreement with the relevant sub-contractor(s) (updated December 2022). Any UK based HEI, RI or SME can be sub-contracted. Where successful, CREW funding would be subject to agreement to the CREW Grant Offer Letter and T&Cs ("Grant Terms"). CREW encourages applications from experienced to early career researchers (ECRs) under the supervision and mentorship of experienced researchers.

Expectations and award criteria

A copy of expectations and the award criteria are provided on page 7-8 respectively.

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.

Communications and impact

CREW's impact officer will engage with the research team and project steering group on any agreed upon comms and impact activities throughout the project and for post project evaluation.

Project steering group

A CREW representative, and representatives of Scottish Government and its delivery partners, will form part of the project steering group. They will meet with the preferred bidder(s) for a pre-contract meeting. A pre-contract meeting between will take place approximately **wb. 25th May 2026.**

Anticipated timescale (c. 7.5 months)

- The project will commence on the **8th June 2026,** depending on contract processing and signage.
- The 1st PSG meeting should be held **in August 2026.** *Project progress should be presented, with an opportunity for the Project Steering Group to review any initial work in progress.*
- A first draft of the report and spreadsheet database should be submitted **by the 25th September 2026.** *Please allow 2 weeks for the project steering group to review the drafts.*
- The 2nd PSG meeting should be held **mid-October 2026,** following the project steering group review period.
- A second draft of the report and spreadsheet database, and a first draft of the policy brief should be submitted **by the 20th November 2026.** *Please allow 2 weeks for the project steering group to review the drafts.*
- The 3rd PSG meeting should be held **the wb.14th December 2026**, following the project steering group review period.
- A final copy of all draft outputs (report, database, policy brief and plain English summary) should be submitted **by the 11th January 2027.** *Please allow 2 weeks for the project steering group to review the drafts.*
- All final project outputs should be submitted **by the 29th January 2027** for final sign off by the CREW Director and formatting.

Funding

The maximum amount of funding available **exclusive of VAT** (where applicable) is **£115,000.**

Submitting a proposal

Please complete a **CREW Capacity Building Application form** outlining your proposal.

Proposals need to be submitted to Procurement@crew.ac.uk for evaluation **by 15:00 on 21st April 2026.** We aim to notify the preferred bidder the **wb. 11th May 2026.**

Please contact Procurement@crew.ac.uk **by 14th April 2026** 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 Manager (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 provides 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, 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: - general research experience and expertise; - specific experience and expertise on the topics of water resource management, hydrology, economics, data science and spatial analytics.

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 reports 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

Relevant works, include but are not limited to:

a. National Strategy for Economic Transformation (NSET)
b. Scottish National Adaptation Plan (SNAP3)
c. River Basin Management Plans (RBMPs)
d. Climate Change Committee (CCC) assessments
e. Scottish Water – Long-term Water Resource Planning
f. Scottish Government Hydrogen Action Plan
g. Scotch Whisky Association sectoral ambitions
h. Agriculture and food production ambitions
i. Data centres, digital infrastructure and industrial growth