ANNEX I: TERMS OF REFERENCE NATIONAL ENGINEERING EXPERT

Background:

Fundación Chile will implement the project " Building a Climate" Resilient Water Investment Pipeline Program to "Maximize Water Preservation and Mobilize Private Finance in Chile" (CHL-RS-014), funded by the Green Climate Fund (GCF). The project aims to develop climate-resilient investment strategies for the water sector, mobilize private financing, strengthen national capacities, and prepare a Funding Proposal for the GCF. This consultancy will contribute to achieving the project's objectives, results, and deliverables.

Scope of work:

Analyze the hydraulic technologies and solutions available and applicable in Chile to support the design, analysis, and evaluation of the prioritized technologies for water investment lines. The consultancy will provide engineering structuring at thepre-feasibility and feasibility level, based on robust, proven, operable solutions adapted to national territorial, climatic, regulatory, and market conditions. It will compare technological alternatives; define design and performance criteria; verify their applicability, maturity, reliability, scalability, and operation and maintenance requirements; and prepare technical specifications and estimates that allow for the structuring of realistic and bankable portfolios. It will work in coordination with specialists in investment, finance, legal affairs, environmental and social safeguards, and climate change.

The consultancy shall provide all cost, volume and performance data required for the economic and financial analysis in a structured, model-ready Excel workbook, using the template agreed with the Economic and Financial Analysis Expert. Each parameter shall include, as applicable, units, base year, source and low/base/high values, with live and unlocked formulas where calculations are involved.

The consultant shall participate in at least four joint working sessions with the Economic and Financial Analysis Expert, covering: (i) the data protocol at inception; (ii) review of draft cost estimates; (iii) review of draft benefit quantification; and (iv) final validation of the cost and benefit streams used in the cost-benefit analysis.

Technical data required for the economic and financial analysis shall be delivered at least four weeks before the corresponding CBA and Funding Proposal milestones, in order to allow sufficient time for modelling, validation and integration.

The consultancy does not include detailed engineering, drafting, or certification of designs for construction, unless expressly agreed upon.

Deliverables under your direct responsibility:

- Inventory and comparative analysis of hydraulic technologies and solutions available in Chile and, where appropriate, of international solutions transferable to the national context, including suppliers, application references, level of maturity and enabling conditions.
- Technical criteria framework for evaluating and selecting alternatives: water performance, reliability, climate resilience, scalability, useful life, energy efficiency, territorial requirements, constructability, operation and maintenance, availability of spare parts and local capacities. The framework shall be developed in coordination with the Economic and Financial Analysis Expert so that technical criteria can be linked to relevant economic and financial decision metrics, including, where applicable, life-cycle cost per cubic metre preserved or supplied, incremental cost per tonne of CO2e avoided, and the main cost drivers affecting ENPV/EIRR and FIRR. Each criterion shall be expressed, where feasible, as a measurable indicator with defined units and data source, to enable least-cost and cost-effectiveness comparison of alternatives rather than relying solely on qualitative scoring.

- Technical evaluation of prioritized technologies and substantiated recommendation of technological solutions or configurations for each line of investment, including assumptions, limitations, technical risks and interfaces with permissions and safeguards. The recommendation shall be supported by a documented least-cost alternatives analysis, including the do-nothing/business-as-usual counterfactual and at least one lower-cost alternative per investment line, with comparable life-cycle costs and water performance for each option. This analysis shall provide the technical basis required to define the with-project versus without-project comparison, incremental cost and additionality rationale for the GCF Funding Proposal.
- Technical risks shall be reported, where feasible, with an indicative probability of occurrence and quantified consequences, such as expected downtime, percentage loss of performance or yield, and potential cost overrun, so that they can be incorporated into the project risk and sensitivity analysis.

- Structuring of conceptual engineering and pre-feasibility and feasibility studies of the prioritized lines and typologies: design bases and criteria, reference diagrams or configurations, preliminary dimensioning, functional specifications, auxiliary infrastructure requirements and phased implementation strategy. The phased implementation strategy shall include, for each typology, a year-by-year or quarter-by-quarter physical implementation and financial disbursement profile, including the

construction period, commissioning date and ramp-up period to full operating capacity. The analysis shall also state and justify the economic evaluation horizon in relation to the useful life of the main assets, and identify the residual or salvage value of assets at the end of the evaluation period.

- Preliminary technical estimates of CAPEX, OPEX, schedule, performance, useful life and operation and maintenance needs; verifiable indicators of water preserved, saved, recovered or provided and other technical inputs required for the economic, financial and climate evaluation.

  Water-related benefits shall be provided as an annual time series over the full evaluation horizon, under both with-project and without-project (counterfactual) conditions, reflecting ramp-up, performance or efficiency decay over asset life, and relevant system losses. Low/base/high values or plausible ranges shall be provided for key physical parameters to support sensitivity and risk analysis. Where relevant, performance shall also be differentiated for average, dry and extreme-dry hydrological conditions and under applicable climate scenarios. The analysis shall identify the type and location of water use displaced, preserved or supplied, including, as applicable, potable, irrigation, industrial or environmental uses.

  The consultant shall also provide energy intensity indicators, including kWh per cubic metre, fuel use and, where material, embodied emissions, to support the quantification of greenhouse gas emissions and potential mitigation co-benefits.

  CAPEX and OPEX estimates shall be presented in constant prices of a stated base year, in CLP and USD, stating the exchange rate and any UF conversion used and excluding inflation. CAPEX shall be disaggregated by relevant component, including, as applicable, civil works, equipment, piping, pumping, electromechanical systems, energy connections, land, engineering and supervision, permitting and contingencies, with physical and price contingencies shown separately.

  Imported or tradable and local or non-tradable shares shall be identified for relevant CAPEX and OPEX items, with VAT, import duties and other taxes and levies itemised separately. OPEX shall be split into fixed and variable costs and, where applicable, by key input such as energy, labour, chemicals and consumables, membranes or filters, spare parts, insurance and administration.

  The estimates shall include periodic replacement and major-maintenance schedules by asset, reflecting individual useful lives, as well as appropriate unit costs and cost curves to support scaling of the investment portfolio. All figures shall be traceable to documented sources, such as supplier quotations, recent public tenders, official reference prices or comparable projects, and recorded in an assumptions log.

- Final report with standardized technical data sheets, recommendations for further studies, information gaps, technical terms of reference and transfer of bases, assumptions, sources and tools to the project team. The final report shall include a consolidated and quality-assured assumptions and data log, provided in editable Excel format, containing at least: parameter, value, unit, base year, range, source, confidence level and responsible expert. It shall also include a brief note identifying material data gaps and, where feasible, the likely direction of bias associated with those gaps, to support replication, auditability and future updating of the economic and financial analysis and Funding Proposal.

Deliverables for which it will provide support:

- D6.1. Prioritization and selection of one or two areas with potential to become lines of investment, providing the feasibility and technological maturity assessment.
- D6.2. Technical specification and preliminary structuring of realistic and bankable project portfolios.
- D10.1–D10.3. Design of the investment line and its implementation strategy, using technical bases, costs, schedules, risks and performance indicators.
- D10.4. Preparation of the Funding Proposal to the GCF and its annexes, in technical and engineering matters. The expert shall provide the technical inputs required for the economic and financial analysis annex and respond to technical queries arising during its preparation, GCF review and subsequent iterations. Prior to submission, the expert shall validate the cost and physical-benefit streams used in the cost-benefit analysis and financial model.

Minimum requirements

- Professional degree in Civil Engineering, Hydraulic Civil Engineering, Environmental Engineering, Sanitary Engineering, Water Resources Engineering or another directly related engineering specialty.
- At least 10 years of relevant professional experience, including at least 7 years in the design, evaluation, implementation or operation of hydraulic infrastructure, systems or technologies.
- Demonstrable experience in Chile and knowledge of the technical, institutional, territorial and market conditions of the national water sector.
- Experience in alternatives analysis, conceptual or pre-feasibility engineering, design criteria and bases, preliminary sizing and CAPEX/OPEX estimates for water projects.
- Experience evaluating reliability, performance, technical risks, constructability, operation, maintenance and useful life of hydraulic technologies or infrastructure, including demonstrable experience in life-cycle cost analysis and in preparing

engineering cost and performance inputs for economic and financial appraisal, such as cost-benefit analysis, cost-effectiveness analysis or levelised cost of water. Experience in preparing bottom-up engineering cost estimates at pre-feasibility level, using a stated accuracy class or equivalent methodology, is also required.

- Ability to support recommendations with verifiable data, technical standards, project references and documented assumptions; experience in interdisciplinary work and meeting deadlines.

Language:

Professional Spanish and English, spoken and written.

Desirable requirements

- Postgraduate degree or specialization in hydraulic engineering, water resources, sanitary engineering, climate adaptation, resilient infrastructure or related areas.
- Experience in water supply and distribution, irrigation, sanitation, treatment and reuse, loss control, recharge or storage, transport, and piping systems, desalination or other solutions relevant to the lines prioritized by the project.
- Experience in climate adaptation projects, nature-based solutions, or integration of grey and green infrastructure.
- Knowledge of Chilean and international standards, sectoral permits, environmental assessment, engineering contracting and life cycle cost analysis methodologies.
- Experience providing technical and cost data to economic and financial specialists for the appraisal of projects financed by the GCF, multilateral development banks or other international climate finance institutions.
- Experience in drafting proposals for financing by international organizations is a plus.

Background information for applying

- Updated curriculum vitae, indicating months/years, functions and relevant projects.
- Brief letter of motivation and suitability to the profile (maximum 2 pages).
- List of up to five comparable projects, indicating client, year, function and technical scope.
- Availability and price proposal (indicate currency, taxes and format).
- Verifiable references and declaration of no conflict of interest.

Duration, level of effort and financial proposal

- The consultancy is expected to be carried out over approximately 18 months. The level of effort will be intermittent and will vary according to the project workplan, technical activities, deliverable schedule and review milestones.
- The consultant must ensure adequate availability during critical periods of analysis, preparation and integration of deliverables, coordination with the project team, preparation of the GCF Funding Proposal and related review iterations. The consultant shall remain available throughout the contractual period to respond to comments, clarification requests and reasonable revisions arising from the integration of deliverables and the preparation and review of the Funding Proposal.
- The consultancy will be contracted under a professional services arrangement. Payments will be linked to the delivery and acceptance of agreed outputs and milestones.
- Applicants must submit a financial proposal indicating the estimated total cost of the consultancy, considering the scope of work, deliverables and expected level of effort described in these Terms of Reference. The proposal must indicate the currency and applicable taxes.
- The proposed amount must include all costs necessary to perform the consultancy. No additional travel, accommodation or per diem expenses will be reimbursed for consultants residing outside Santiago in connection with meetings or in-person activities required under the assignment. These costs must be covered by the consultant and considered in the financial proposal.