Funding Opportunity Announcement (FOA):
FOA #: NAWI-BP12020

Key Dates for this Funding Opportunity Announcement	
Funding Opportunity Announcement Released	August 28, 2020
Concept Papers Due	September 21, 2020*
Encourage/Discourage Decision Notification	Week of November 16th, 2020
Full Proposals Due	January 11, 2021*
Pre-Selection Clarifications, if needed	Between last week of February and first week of March 2021
Expected Date for Selection Notification	March 2021
Anticipated Project Start Date	June 2021

*Due 5:00pm PT

- Interested applicants must submit a Concept Paper by 5:00pm PT, on September 21, 2020, to be eligible to submit a Full Proposal.
- To apply to this FOA, applicants must register with and submit application materials through NAWI Exchange at https://nawi.inforeadv4.com/ NAWI's online application portal.
- Applicants must designate primary technical and business points-of-contact in NAWI Exchange with whom NAWI will communicate to conduct negotiations. If the application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the selection.

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1 Executive Summary

Solicitation Title	National Alliance for Water Innovation Funding Opportunity Announcement (FOA): Funding #: NAWI-BP12020
Means of Submission	Electronic – NAWI Exchange
Total Amount to be Awarded	Up to $8,000,000 federal funds with a minimum of 25% cost share.
Anticipated Awards	Between 4 and 12 awards
Period of Performance	Up to 24 months (split into 12-month budget periods)
Performance of Work in the United States	Unless a waiver is provided, Lead Organization must show that 100% of the direct labor cost for the project (including Participating Organizations labor) will be incurred in the United States and its territories.
Cost Share Requirement	A minimum of 25% cost share is required.
Application Forms	Required forms for Applications are available on https://NAWI.inforeadv4.com/
Questions:	Submit questions to NAWI-FOA@lbl.gov. Questions and answers will be posted on https://NAWI.inforeadv4.com/.

1.1 Background

The National Alliance for Water Innovation (NAWI or Hub) was established to support the US Department of Energy's efforts to advance transformational technology and innovation to meet the nation's need for safe, secure, and affordable water. Lawrence Berkeley National Laboratory ("LBNL"), managed and operated by The Regents of the University of California, was selected to operate NAWI. Details of the NAWI research vision and mission can be found at www.nawihub.org.

Proposers are encouraged to view recorded presentations about the program and research priorities.

- NAWI Research Program – released 20-06-17: https://vimeo.com/430106267
- Process Innovation and Intensification (PI&I) – released 20-07-10: https://vimeo.com/437258004
- NAWI Materials and Manufacturing – release 20-08-22: https://vimeo.com/449893826
- Roadmapping and Integrated Data and Analysis (IDA) – released 20-05-12: https://vimeo.com/418249112/fbadc9e506
- NAWI Alliance Orientation and Discussion – released 20-06-30: https://vimeo.com/434115461
- General intro to NAWI – released 20-02-21: https://vimeo.com/393080271

The strategic goal of NAWI is to conduct early-stage applied research Technology Readiness Level 2 – 4 (TRL 2 – 4) leading to a portfolio of technologies that enable pipe parity for 90% of nontraditional water sources – water sources that are currently not treated and reused. A

nontraditional water achieves pipe parity when the marginal intensity (i.e., cost/energy intensity/failure rate/etc.) of supplying water from the nontraditional source is lower than that of the next available traditional source. Technologies that facilitate fit-for-purpose treatment and local reuse of nontraditional waters will be essential to meeting these pipe parity goals. Cost effective and energy efficient brine management is a critical element of this decentralized reuse paradigm.

1.2 NAWI Hub Technical Performance Metrics (TPMs)

To measure performance, the NAWI Hub has established technical performance metrics, derived from the concept of "pipe parity". Pipe parity is defined as technology solutions for treating and reusing non-traditional water sources that are competitive with conventional water sources for specific end-use applications. Specific pipe parity metrics of interest include:

- Cost: Cost metrics can include levelized costs of water treatment as well as individual cost components, such capital or operating and maintenance (O&M) costs
- Energy: Energy metrics can include the total energy requirements of the water treatment process, the type of energy required (e.g., thermal vs. electricity), and the degree to which alternative energy resources are utilized.
- Water intensity: Water metrics can include the total amount of input water needed for a process, the percentage of water recycling that occurs, and the degree to which alternative water resources are utilized.

System reliability and resilience: System reliability and resilience metrics can include factors related to the likelihood of a water treatment system not being able to treat water to a specified standard at a given moment, how quickly the system can restart operations after being shut down for a given reason, the degree to which the process is vulnerable to supply chain disruptions, and the ability to withstand environmental, climate, or hydrological disruptions.

Adaptability: Adaptability metrics can include the ability to incorporate variable input water quality; the ability to incorporate variable input water quantity flows; the ability to produce variable output water quality; and to operate flexibly in response to variable energy inputs.

Resource recovery: Resource recovery metrics can include the ability to recover valuable materials from water and wastewater streams and the ability to recover energy from treatment processes.

Externalities: Externality metrics can include air emissions, greenhouse gas emissions, waste streams, broader water system impacts, broader societal and health impacts, and ecological services impacts.

Other factors that could be of interest include the degree to which chemical inputs are needed, the ease of operation and level of oversight needed, the physical footprint of the technology, how well the technology integrates with existing infrastructure, how consistent the technology is with existing regulations and water rights regimes, and the level of social acceptance.

All applications should focus on enabling greater utilization and reuse of non-traditional water sources, while discussing how the technological innovations address one or more pipe parity metrics. Applicants are encouraged to consider tradeoffs or synergies among multiple metrics and to add additional performance metrics, whenever possible.

1.3 Project Call Purpose

The purpose of this FOA is to enable, encourage, and accelerate transformative scientific advances directly relevant to concentrated brine management technologies using tools from materials sciences and engineering, chemical science and engineering, bioscience and engineering, manufacturing science and engineering and computational science and engineering. The focus of this FOA is on TRL 2 – 4 research.

We expect projects to accelerate breakthroughs in areas relevant to the NAWI mission by addressing problems with scope, complexity and risk that are beyond the capabilities of a single investigator.

We look for projects which integrate synthesis, characterization, theory, techno -economic analysis, and computation to illuminate fundamental processes and accelerate the rate of technology development.

We seek projects that will have large impact across multiple source waters and water use sectors.

The NAWI Hub is seeking proposals that directly address the knowledge gaps that have been identified and clearly deliver impact aligned to the NAWI performance metrics outlined in section 1.2.

Successful projects will include collaborations among/between industry, academia, national laboratories, trade associations, and other stakeholders that can advance NAWI-relevant technologies. The Hub strongly encourages teaming between universities, national laboratories, and companies as an effective strategy for the successful advancement of NAWI-relevant technologies. Teams with access to adjacent supply chain technologies, vital technical expertise, or unique facilities can accelerate technology development, build long-lasting partnerships, and strengthen the NAWI ecosystem.

The remainder of this document outlines the following: 1) eligibility, 2) funding available, 3) cost share requirements, 4) period of performance, 5) FOA process, proposal review and award process, 6) proposal submission and award process, and 7) the proposal requirements, including evaluation criteria and formatting requirements.

1.4 Challenge Area and Area of Interests

1.4.1 Technical Justification for the FOA Subject:

As noted above, the strategic goal of NAWI is to conduct early-stage applied research leading to a portfolio of technologies that enable pipe parity for 90% of nontraditional water sources. A nontraditional water supply achieves pipe parity when the key metrics (i.e., cost/energy intensity/failure rate/etc.) of supplying water from the nontraditional source is equivalent to that of the next available traditional source. Technologies that facilitate fit-for-purpose treatment and local reuse of nontraditional waters will be essential to meeting these pipe parity goals. Cost effective and energy efficient brine management is a critical element of this decentralized reuse paradigm, but improvements relevant to small scale systems are also likely to benefit water production from large-scale desalination systems.

Present desalination technologies produce concentrated brine[1] waste streams that are costly to manage and dispose of at any scale. Water treatment facilities must balance expensive brine transport (e.g., trucking; brine lines; discharge permitting) against expensive, energy intensive, or capacity limited disposal options (e.g., thermal zero or minimal liquid discharge; injection wells; evaporation ponds). Coastal desalination facilities and brine discharge lines face significant permitting challenges and costly environmental impact mitigation efforts. The dissolved solids concentration of wastewater streams from mining, oil and gas, and geologic carbon sequestration often exceed the salinity threshold for energy efficient membrane-based treatment technologies, necessitating the direct diversion into thermal evaporation processes for brine concentration. For these reasons, water treatment practitioners have said that "brine management is the Achilles' heel of desalination."

State-of-the-art brine management schemes minimize cost in three ways. First, they minimize the volume of retentate diverted to evaporative brine concentrators. Leading industry experts express hope that innovative pretreatment and treatment technologies will enhance water recovery in the treatment step, introduce non-thermal brine concentration technologies, or cost-effectively combine brine concentration and crystallization. Direct diversion of brine retentate to brine crystallization will require retentate concentrations of > 250 g/L total dissolved solids.

The second approach to reducing costs is to leverage steep economies of scale in thermal brine concentration and crystallization technologies. This necessitates transportation networks for moving salty wastewaters to centralized treatment facilities and reduces the likelihood of on-site water reuse. Industry experts familiar with mechanical vapor recompression and other evaporative processes would gladly expand their use at smaller scale treatment facilities if they were more cost effective.

Finally, state-of-the-art facilities like the Edward C. Little Water Recycling Facility (owned and operated by West Basin Municipal Water District in El Segundo, California) reduce the economic burden of concentrate management by deriving value from several constituents in their feedwater, or "squeezing the most out of each drop of recycled water". Whether by creating waters of varying quality, identifying high value end uses for select constituents, or selling concentrate streams to industrial users, these treatment systems leverage the principles of industrial ecology to stay economically competitive. Some industry leaders believe that "brine valorization is a dead end with significant investment for little payout." Others believe that valorization is possible by "designing a complete process where ***every*** element [in the feedwater] has a home, even if that home is deep well injection."

While these state-of-the-art brine management approaches are viable for large, centralized facilities, process intensification will be essential to supporting concentrate management needs in small-scale facilities. Several opportunities exist to move beyond state-of-the-art brine management approaches (Table 1), including novel systems, processes, and materials for minimizing brine production, concentrating brines to higher salinities, and valorizing brine constituents. Ultimately, solutions will be based on their potential to reduce the cost and aggregate energy intensity of small desalination systems.

[1] Herein we define "brine" as water with a salinity greater than 75 g/l of any origin or source.

Table 1: Opportunities for intensified concentrate management.

Approach	Attributes	Opportunities
Evaporative processes e.g., mechanical vapor compression (MVC), humidification/dehumidification	Phase transition, steep economy of scale, expensive materials	Modularity, low-cost thermal materials, small scale systems, harnessing renewables
Membrane processes using novel combinations of driving forces e.g., reactive membrane distillation, osmotically assisted reverse osmosis (RO)	Novel driving forces and new combinations of traditional driving forces	Process optimization in multi-stage design, cost reductions, tailored membrane properties
Operational innovations e.g., batch and semi-batch RO, flow reversal RO, high pressure RO	Manipulate the induction time for scaling, extend the operational range of the system	Integrated pretreatment, operando monitoring, predictive capabilities
Electrically-driven processes e.g., Electrodialysis (ED)	Silica and chlorine tolerant, divalent separation for high recovery RO	Low cost ion exchange membranes, high permselectivity with low membrane resistance and water transference
Cycling and extraction processes e.g., solvent extraction	Possible advantages where low-temperature heat widely available, solvents non-hazardous	>99.99% solvent recovery, long solvent lifespan, low temperature swings, high water miscibility
Innovative pretreatment e.g., selective removal prior to or during treatment	Softening technologies often chemically intensive, avoid (or encourage) precipitation of hazardous contaminants	In-situ chemical generation

1.4.2 Key scientific and technical challenges in intensified brine management:

Tools from the materials sciences, chemical sciences, biosciences, imaging sciences, and manufacturing sciences will be critical to accelerating transformative scientific advances directly relevant to concentrated brine management solutions. Breakthrough technologies are likely to draw upon fundamental and applied research capabilities, including:

Fundamental Understanding of Solution and Material Properties in High Salinity Environments: Electrolyte chemistry is essential to designing and optimizing desalination processes, especially those that use a wide range of temperatures and pressures to concentrate the feed by 2-10x. Widely used solution thermodynamics models (e.g., Pitzer, e-NRTL, OLI) are valuable for determining the activity coefficients, phase equilibria, and thermophysical properties of complex inorganic solutions, but they lack a kinetic component that could inform the design of brine concentration processes with precisely controlled residence times. They are also unable to account for the effects of co-occurring substances such as colloids, organics, and microbes that are widely present in desalination feed streams. Better understanding of these fluids from a molecular to macroscopic level is necessary in order to reliably predict and control the emergence of structures and phases in these complex environments.

Similarly, we lack a complete understanding of the performance and robustness of organic and inorganic materials used in brine concentration processes. For example, corrosion, yielding, thermal shock, swelling, solvation, and other types of material fatigue are critical barriers to the cost-effective treatment of high salinity brines. Predicting and measuring these materials properties under realistic temperatures, pressures, and salinities would provide insight into materials design and selection, while advances in manufacturing science may enable the cost-effective use of new classes of materials. In short, manufacturing components from innovative materials that are robust, manufacturable, and low-cost will significantly improve the performance of existing separations processes.

Fundamental Understanding of Heat and Mass Transfer in Brine Concentration Processes: Most membrane and thermal process designs are heat and mass transfer limited. For example, increasing membrane permeability may not increase water productivity if resulting increases in concentration polarization raise the effective osmotic pressure difference across the membrane. Computational tools will assist in designing and manufacturing processes to mitigate mass transfer limitations, especially tools that accurately account for thermophysical properties of solution, fouling and scaling, three-dimensional entrance and exit effects, cross-flow configurations, and other unique attributes of manufacturable module designs. Facile approaches for measuring heat and mass transfer in complex geometries and at high salinities common to membrane modules and heat exchangers will also help to validate computational models and explore the performance of unit processes under realistic operating conditions.

Fundamental Understanding of Combined Driving Forces for Novel and Intensified Process Designs: Evaporative processes that use a vapor pressure driving force for brine concentration and crystallization often suffer low thermodynamic efficiencies of separation. Substituting or augmenting vapor pressure with hydraulic, electrochemical,

osmotic, biochemical, centrifugal, or other driving forces may open pathways for substantial cost savings in small-scale or distributed applications. To date, there has not been a comprehensive assessment of the combined or stand-alone separation potential of these driving forces for high salinity brines. Advanced materials that respond to one or more driving forces to adaptively tune solute rejection in real-time, and/or that react and separate while sensing and communicating their real-time performance, may also open new brine concentration pathways.

Fundamental Understanding of Non-Steady State Performance of Separation Processes: Brine concentration processes may not operate at steady-state. Fluctuations in incoming water quality may require modulation of process operating conditions, or process designers may choose to leverage non-steady state operation as a tool for disrupting boundary layer formation, fouling and scaling, or degraded material performance. High-fidelity experimental and computational and platforms for describing and measuring the performance of materials and processes under non-steady state operation may be particularly valuable for optimizing brine concentration process operation.

Fundamental Understanding of Inter-Process Dependency: Intensifying pretreatment, desalination, brine concentration, and brine crystallization processes into a single unit process may not be cost-effective. For treatment trains that involve multiple unit processes, or unit processes that involve multiple components, there is often a tight coupling between the materials and process performance between stages. We lack a comprehensive platform for describing this inter- and intra-process dependency, especially one that includes water quality perturbations, non-steady state process operation, or material dependent phenomena like aging.

Applied Understanding of Economically Viable End-Points for Brine Constituents: Rigorous techno-economic analyses (TEA) of brine treatment trains are rarely available to researchers. Robust market analysis of both high value, low concentration (e.g., rare earth elements) and low value, high concentration (e.g., NaCl) products from concentrated brines can be used to inform system designs that minimize the costs of treatment. Detailed TEA of the potential for valorizing brine constituents, minimizing constituent disposal, and optimizing the scale of brine concentration units will also be imperative in identifying high impact future research.

1.4.3 Priority Area of Interest for this FOA:

We seek innovative brine management solutions for high salinity streams, with particular focus on halving the treatment cost of saline streams between 75,000 and 250,000 ppm total dissolved solids (TDS). These solutions could involve: system designs that couple brine treatment with other value-creating processes, such as metal recovery, chemical synthesis, and flexible operations for grid integration; modeling and simulation efforts to understand and overcome heat and mass transfer barriers to process and materials performance; process configurations that combine multiple driving forces, dramatically lower the cost of modular brine crystallization units, and control inorganic scaling; and materials and manufacturing innovations that extend the pressure tolerance of spiral-wound reverse osmosis (RO) membranes/modules, reduce the membrane structural parameter, reduce the synthesis and processing costs of ion exchange membranes, and enable

prediction and operando characterization of chemical and material properties in brine concentration systems. Priority areas of interest are detailed below. Projects that span one or more areas of interest will be prioritized, but any transformative TRL 2 – 4 proposal for dramatically reducing the total cost of brine concentration and crystallization will be considered:

Area of Interest BP1-1: Novel processes and operational modes that leverage a fundamental understanding of the thermodynamics and kinetics of inorganic scaling processes in ultra-high salinity brines. Brines typically contain high levels of sparingly soluble species (e.g., silica and divalent ions such as calcium, barium, and strontium). Precipitation of these species during brine concentration can significantly hinder process efficiency. Current solution models exhibit limited accuracy in describing chemical speciation and precipitation kinetics of brines over broad concentration ranges (10X or more), over a range of temperatures and pressures relevant to process conditions, or in the presence of other colloidal, organic, or biological species. Next generation solution models must describe the molecular-to-macroscopic properties of hypersaline solutions under conditions relevant to brine concentration and elucidate mechanisms of homogeneous and heterogeneous nucleation and growth of crystalline (e.g., calcium, barium, and strontium sulfates) and amorphous (e.g., silica) scales. We seek proposals that leverage these next generation solution models to inform the design and operational modes of brine treatment process design and operation.

Area of Interest BP1-2: Experimentally validated computational models for optimizing heat and mass transfer rates in hypersaline conditions and complex geometries. Heat and mass transfer limitations hinder the efficiency of high salinity brine concentration processes. Methods for computationally describing and experimentally validating heat and mass transfer coefficients in hypersaline environments and complex geometries relevant to brine concentrators or crystallizers may elucidate novel process designs and operational modes. We seek proposals that leverage an improved understanding of heat and mass transfer at high salinities to optimize component design (e.g., feed spacers, heat exchangers) and process operation (e.g., non-steady state operation) for reduced process cost and improved separation performance.

Area of Interest BP1-3: Process and material innovations enabling low cost concentration of high salinity waters. We seek proposals for process and material innovations that enable brine concentration to 250 g/L TDS for direct input into a brine crystallizer. These innovations must offer substantial cost reduction over the best available process (i.e., mechanical vapor compression (MVC)) in both small-scale and large-scale operations and will ideally be modular in design. Because of the inherent low energy efficiency of evaporative technologies, we are especially interested in processes that leverage hydraulic pressure, osmotic pressure, electric potential, or other driving forces. Proposed innovations may be a standalone single process or a hybrid treatment train that uniquely combines several processes operating with different driving forces. We are also interested in materials innovations that substantially reduce the capital and operating costs of existing processes. Proposed innovations may enhance the performance (e.g., thermal conductivity, permeability, etc.), durability, and cleanability of materials in contact with hypersaline brines and must have a viable pathway to scalable manufacturing.

Area of Interest BP1-4: Reducing the lifecycle costs of small volume salt crystallizers. We seek methods for dramatically reducing the capital and operational costs of existing technologies for small volume salt crystallization or the development of novel, low-cost crystallizers applicable to small scale waste streams. New technologies may leverage a single driving force or combination of driving forces, including thermal energy. Technologies that use low temperatures and pressures are highly encouraged to allow the use of low cost, corrosion-resistant materials (e.g., fiber reinforced plastics). Other approaches that combine the brine concentration and crystallization stages into one process are also of great interest, as such technology will eliminate the need for scale reducing pretreatment. We also seek the development of low-cost corrosion-resistant and nonstick materials that will enhance the reliability of combined brine concentration and salt crystallization technologies.

Area of Interest BP1-5: Techno-economic analysis of novel brine waste valorization schema, detailing the end point for all constituents in the feedwater brine. Economical management of concentrated brines may be facilitated by identifying valuable uses or low-cost disposal options for each brine constituent. Much in the way that crude oil in the petroleum refining process is economically transformed into a diverse suite of useful products, we are interested in proposals for brine waste valorization that minimize overall costs by considering the optimal phase, speciation, and concentration of each component in relation to its final end use or disposal location. In doing so, these models must explicitly consider the transportation, aggregation, storage, treatment, concentration, use, and/or disposal of each constituent in the feed and the scale of the market for relevant products. We are especially interested in schema that incorporate novel technologies and methods for maximizing the value of recovered products, while also considering the end point for all (valuable and non-valuable) constituents and generated streams.

2 Registration Requirements

There are several one-time actions that must be completed before submitting an application in response to this solicitation, which are as follows:

Register and create an account on NAWI Exchange at [https://nawi.inforeadv4.com/]. Each organization or business unit, whether acting as a team or a single entity, should only use one account as the point of contact for each application submission.

- **Applicants should not wait until the last minute to begin the submission process.** During the final hours before the submission deadline, applicants may experience server/connection congestion that prevents them from completing the necessary steps in the NAWI Exchange to submit their applications.
- Submission of an application and supplemental information under this solicitation through electronic systems used by this solicitation, including NAWI Exchange, constitutes the authorized representative's approval and electronic signature.
- Once the Concept Paper or Full Proposal is submitted in NAWI Exchange, applicants may revise or update that submission until the expiration of the deadline. To make changes to a submitted Concept Paper or Full Proposal, an applicant must request the application be returned by sending a request to NAWI-FOA@lbl.gov. If changes are

made to the Concept Paper or Full Proposal, the applicant must resubmit using NAWI Exchange before the applicable deadline.

Questions related to the use of NAWI Exchange website should be submitted to NAWI-FOA@lbl.gov.

Applicants are encouraged to review the posted questions and answers daily. Please be as specific as possible when asking questions to ensure that questions will be adequately addressed. Failure to be specific may result in additional time to address the question or require further correspondence for further clarification regarding the submitted question(s).

All questions and answers related to this solicitation will be posted at NAWI.infoready4.com. The NAWI will respond to questions within three business days, unless a similar question and answer have already been posted on www.NAWI.infoready4.com**.**

3 Cost Sharing

The cost share must be at least 25% of the total project costs. Cost share must be calculated based on the total allowable costs for the applicable entity and must come from non-Federal sources unless otherwise allowed by law. (See 2 CFR Part 200 for the applicable cost sharing requirements.)

All proposals must meet the required 25% cost share. Proposals that exceed the required cost share will review more favorably.

The Lead Organization is solely responsible for managing cost share contributions by the project team and enforcing cost share obligation assumed by Participating Organizations.

3.1 How Cost Sharing is Calculated

As stated above, cost sharing is calculated as a percentage of the Total Project Cost. Following is an example of how to calculate cost sharing amounts for a project with $1,000,000 in federal funds with a minimum 25% non-federal cost sharing requirement:

Formula: Federal share ($) divided by Federal share (%) = Total Project Cost

Example: $1,000,000 divided by 75% = $1,333,333

Formula: Total Project Cost ($) minus Federal share ($) = Non-federal share ($)

Example: $1,333,333 minus $1,000,000 = $333,333

Formula: Non-federal share ($) divided by Total Project Cost ($) = Non-federal share (%)

Example: $333,333 divided by $1,333,333 = 25%

3.2 Cost Share Allocation

Each Project Team is free to determine how much each organization will contribute towards the cost share requirement. The amount contributed by an individual Organization may vary, as long as the cost share requirement for the project as a whole is met.

3.3 Cost Share Types and Allowability

Every cost share contribution must be allowable under the applicable Federal cost principles.

Project teams may provide cost share in the form of cash or in-kind contributions. Any partial donation of goods or services is considered a discount and is not allowable.

Cash contributions include, but are not limited to personnel costs, fringe costs, supplies and equipment costs, indirect costs, and other direct costs.

In-kind contributions are those where a value of the contribution can be readily determined, verified and justified but where no actual cash is transacted in securing the goods or services comprising the contribution. Allowable in-kind contributions include but are not limited to the donation of volunteer time, the donation of space, or use of equipment.

Project teams may use funding or property received from state or local governments to meet the cost share requirement, so long as the funding was not provided to the state or local government by the federal government.

The Recipient may not use the following sources to meet its cost share obligations, including, but not limited to:

- Revenues or royalties from the prospective operation of an activity beyond the project period;
- Proceeds from the prospective sale of an asset of an activity;
- Federal funding or property (e.g., federal grants, equipment owned by the federal government); or
- Expenditures that were reimbursed under a separate federal program.

Project teams may not use the same cash or in-kind contributions to meet cost share requirements for more than one project or program.

Cost share contributions must be specified in the project budget, verifiable from the organization's records, and necessary and reasonable for proper and efficient accomplishment of the project. As all sources of cost share are considered part of the total project cost, the cost share dollars will be scrutinized under the same federal regulations as federal dollars to the project. Every cost share contribution must be reviewed and approved in advance and incorporated into the project budget before the expenditures are incurred.

3.4 Cost Share Verification

Cost share must be verified with a cost share commitment letter upon submission of the Full Proposal. Upon selection for award negotiations, applicants may be required to provide additional information and documentation regarding their cost share contributions.

4 Application and Submission Information

4.1 Application Process

The application process will include two phases: A Concept Paper phase and a Full Proposal phase.

Only applicants who have submitted an eligible Concept Paper **and are encouraged** to submit a Full Proposal will be eligible to submit a Full Proposal. Discouraged Concept Papers are not eligible to submit a full proposal.

All submissions must conform to the form and content requirements, including maximum page lengths, and must be submitted via NAWI Exchange. Acceptance of late submissions will be at NAWI's discretion. NAWI reserves the right to reject any submission, to waive any minor irregularities, or to cancel this FOA at any time prior to award without cost to NAWI. NAWI will not reimburse any firm for preparation costs or any other costs related to the participation in this FOA.

4.2 Pre-Selection Clarification

NAWI may determine that pre-selection clarifications are necessary from one or more applicants. These pre-selection clarifications will solely be for the purposes of clarifying the application and will be limited to information already provided in the application documentation. Information provided by an applicant that is not necessary to address the pre-selection clarification question will not be reviewed or considered. A pre-selection clarification will be carried out through written responses. Estimated timing of pre-selection clarifications, if needed, is identified on page 1 of the FOA.

The information provided by an applicant to NAWI through pre-selection clarifications is incorporated in its application and contributes to the merit review evaluation and NAWI's selection decisions. If NAWI contacts an applicant for pre-selection clarification purposes, it does not signify that the applicant has been selected for negotiation of award or that the applicant is among the top ranked applications. Applicants will have at least five (5) business days to respond.

NAWI will not reimburse applicants for expenses relating to the pre-selection clarifications, nor will these costs be eligible for reimbursement as pre-award costs.

If NAWI determines that revised proposals are necessary, NAWI may solicit them from only those applicants deemed (based upon evaluation of the current submission) to have a reasonable chance to be selected for award. NAWI reserves the right to make no awards, a single award, multiple awards, award a part or portion of a proposal, or reject any and all proposals in whole or in part as a result of this solicitation, if it is in the best interest of NAWI.

4.3 Restriction on Disclosure and Use of Proposal Data

LBNL/NAWI will safeguard any commercial or financial data or information contained in proposals from disclosure, when marked in accordance with paragraph (e) of Federal Acquisition Regulation clause 52.215-1, from dissemination outside LBNL/NAWI or the Government. Such data or information includes (i) trade secrets or (ii) commercial or financial information which is privileged or considered business confidential, either of which is developed at private expense.

LBNL/NAWI will endeavor to properly maintain such data and information to the same degree as its own data and information and not disclose such data or information to individuals other than those involved in the evaluation of the submission or involved with the award negotiations. These individuals will be bound by an obligation of confidentiality to use such data or information solely for the purpose of evaluation of the proposal or negotiating the award. Submission material received will be retained and disposed of in accordance with requirements in LBNL's prime contract with DOE.

4.4 Use of Product or Process with Patent Position

If an applicant intends to use a product or process in which there is a patent position, the proposal should so indicate and list patent applications and/or patents granted (including dates, numbers, and descriptions), and whether the Government has rights related to the patents.

4.5 Submission Format Requirements

An Application ID will be issued when a Concept Paper is submitted. This Application ID must be included with all Full Proposal documents, as described below.

The Concept Paper and Full Application must conform to the following requirements:

Each must be submitted in PDF format unless stated otherwise;

Each must be written in English;

All pages must be formatted to fit on 8.5 x 11-inch paper with margins not less than one inch on every side;

Use Times New Roman typeface, a black font color, and a font size of 12 point or larger (except in figures or tables, which may be 10-point font). A symbol font may be used to insert Greek letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 or larger. Footnotes and endnotes are counted toward the maximum page requirement.

For Concept Paper documents, the lead technical point-of contact's last and first name AND the lead organization's name should appear in the upper right corner of the header of every page ("Last Name, First Name; Org"; Example: Smith, Jane; University of State).

For Full Proposal documents, the Application ID must be prominently displayed on the upper right corner of the header of every page.

Page numbers must be included in the footer of every page.

Each submission must not exceed the specified maximum page limit, including charts, graphs, maps, and photographs, when printed using the formatting requirements set forth above and single-spaced. If applicants exceed the maximum page lengths, NAWI will review only the authorized number of pages and disregard any additional pages.

Applicants are responsible for meeting each submission deadline. Applicants are strongly encouraged to submit their Concept Papers and Full Proposal at least 24 hours in advance of the submission deadline.

All Concept Papers and Full Proposals that pass the eligibility review will undergo comprehensive technical merit review according to the criteria identified in the solicitation.

Note the maximum file size that can be uploaded is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the maximum page limit specified in the solicitation, it must be broken into parts and denoted to that effect.

For example:

ApplicationID_LeadOrganization_XXX_Part_1

ApplicationID_LeadOrganization_XXX_Part_2

4.6 Concept Paper, Full Proposal, and Financial Templates

The application forms, templates, and instructions are available at www.NAWI.infoready4.comNAWI.infoready4.com. Two Appendices to this FOA are also included in NAWI Exchange, Appendix A contains the Technical Narrative outline for a Concept Paper while Appendix B contains the Technical Narrative outline for submission of a Full Proposal.

5 Application Review Information

The evaluation process consists of multiple phases; each includes an initial eligibility review and a thorough technical review. Rigorous technical reviews of eligible submissions are conducted by reviewers that are subject matter experts. Ultimately, the Source Selection Committee considers the recommendations of the reviewers based on their evaluation of the proposal submitted against the evaluation criteria in sections 5.1 and 5.2, along with other considerations such as Other Selection Factors (Section 5.2.2), in determining which applications to select. The following adjectival ratings will be used to rate the evaluation factors:

Superior	10	• Comprehensively addresses all aspects of criterion • Contains significant strengths • Has no notable weaknesses • Leaves no doubt of applicant's capability to perform the criterion
	9	• Comprehensively addresses all aspects of criterion • Has significant strengths • Contains only a few easily corrected weaknesses • Strengths far outweigh the weaknesses • Leaves no doubt of applicant's capability to perform the criterion
Good	8	• Addresses all aspects of the criterion • Contains only a few easily correctable weaknesses • Strengths outweigh the weaknesses • Demonstrates applicant's capability to perform the criterion
	7	• Addresses all aspects of the criterion • Contains several correctable weaknesses • Strengths outweigh the weaknesses • Demonstrates applicant's capability to perform the criterion
Satisfactory	6	• Most aspects of the criterion addressed • Strengths slightly outweigh the weaknesses • Applicant will likely be able to perform the criterion
	5	
Marginal	4	• Some aspects of the criterion not addressed • Has one or more strengths and weaknesses • Weaknesses outweigh the strengths • Some doubt as to the ability to perform the criterion
	3	

Unsatisfactory	2	• Most aspects of the criterion not addressed • Contains significant weaknesses that would require a major revision • Applicant's ability to perform the criterion not demonstrated
	1	

5.1 Concept Papers

Concept papers will be evaluated against the technical criteria described in this FOA. This technical evaluation process will produce a list of encouraged Concept Papers. NAWI will consider the overall evaluation results and other selection factors as listed in section 5.2.2 to select a final set of encouraged Concept Papers to provide a Full Proposal. All criteria and sub-criteria are of equal weight.

Concept Paper Review Criteria

1. Relevance and Impact:
1.1 Does the proposed work have the potential to address a major gap in scientific knowledge or significantly advance a water treatment technology approach?
1.2 If successful, does the proposed work have the potential to transform utilization of non-traditional water sources?
1.3 Does the proposed work specifically address improvements to one or more pipe parity metrics?
1.4 To what extent does the proposal align with the goals defined in the NAWI FOA and NAWI challenge areas?
1.5 Is the current maturity level of the proposed research in the technology readiness level TRL range of 2 – 4? See Appendix C.
1.6 Is there a plausible pathway for commercialization of this technology?

2. Scientific/Technical Merit:
2.1 Does the proposed work explore original concepts or approach critical technical challenges in an original and transformative manner?
2.2 Is the concept technically sound?
2.3 Is the technical approach defined in the concept paper credible and is it likely to achieve the goals of the research?

3. Resources:
3.1 Is the team qualified to conduct the proposed R&D?
3.2 Are the requested resources adequate for successfully completing the proposed activities?
3.3 Does the team leverage unique strengths and include collaborative research among industry, academia, and national laboratory partners?
3.4 Is there a plausible pathway for commercial partnership and 25 percent cost share acquisition?

5.1.1 Compliance Review of Concept Papers

NAWI will perform a compliance review to determine that (1) the information required by this FOA has been submitted; and (2) all mandatory requirements are satisfied. Only Concept Papers meeting these review criteria will be considered during the Concept Paper scientific/technical review process.

5.1.2 Scientific/Technical Review Criteria of Concept Papers

NAWI will perform a scientific/technical review of Concept Papers based on the review criteria. All applications will be reviewed and evaluated in an encourage/discourage manner on an individual basis.

5.2 Full Proposal

Multiple peer reviewers will independently evaluate the applications in accordance with the technical review evaluation criteria described in this solicitation. Also, NAWI will complete a program relevancy/priority review process in accordance with the criteria described above. The Source Selection Committee will consider the overall evaluation results and other selection factors as listed in section 5.2.2 to ultimately select proposals for award negotiations.

All Full Proposals submitted will be reviewed by NAWI for 1) compliance and 2) for direct relevancy/priority to NAWI's mission and work scope. Additionally, each application will be evaluated and reviewed for technical merit as described in this solicitation by a panel of reviewers. Review of full applications shall be based on how well the applications meet or exceed the technical evaluation criteria provided below. All criteria and sub-criteria are of equal weight.

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Full Proposal Review Criteria

1. Relevance and Impact:
1.1 Does the proposed work have the potential to address a major gap in scientific knowledge or significantly advance a water treatment technology approach?
1.2 If successful, does the proposed work have the potential to transform utilization of non-traditional water sources?
1.3 Does the proposed work specifically address improvements to one or more pipe parity metrics?
1.4 To what extent does the proposal align with the goals defined in the NAWI FOA and NAWI challenge areas?
1.5 Is the current maturity level of the proposed research in the technology readiness level TRL range of 2 – 4? See Appendix C.
1.6 Is there a plausible pathway for commercialization of this technology?

2. Scientific/Technical Merit:
2.1 Does the proposed work explore original concepts or approach critical technical challenges in an original and transformative manner?
2.2 Does the proposal demonstrate a thorough understanding of the state of the art, challenges, technical considerations and is it technically sound?
2.3 Is the technical approach defined in the concept paper credible and is it likely to achieve the goals of the research?

3. Resources:
3.1 Is the team qualified to conduct the proposed R&D?
3.2 Are the requested resources adequate for successfully completing the proposed activities?
3.3 Does the team leverage unique strengths and include collaborative research among industry, academia, and national laboratory partners?
3.4 Does the project meet or exceed the required NAWI cost share requirements?

5.2.1 Compliance Review of Full Applications

Prior to a comprehensive merit evaluation, NAWI will perform a compliance review to determine that (1) the named applicant and PI have not changed from the concept paper or, if they have, NAWI has been notified and provided approval; (2) the information required by the announcement has been submitted; and (3) all mandatory requirements are satisfied. Only applications meeting these review criteria will be considered during the merit review and award selection decision.

5.2.2 Other Selection Factors

The Source Selection Committee may consider the following program policy factors in the selection process:

4. Other Selection Factors:
4.1 Degree to which proposed project optimizes/balances/maximizes use of available NAWI funding to achieve NAWI program goals and objectives, including how those R&D projects support water research.
4.2 It may also include research portfolio diversity, geographic distribution and/or how the projects support other complementary efforts that, when taken together, will best achieve program research goals and objectives.
4.3 Application selection may optimize appropriate mix of projects to best achieve NAWI and/or water research goals objectives.
4.4 Cost/Budget considerations, including availability of funding.

Any of the above factors may be independently considered by the Source Selection Committee in determining the optimum mix of applications that will be selected for support. These factors, while not indicators of the application's merit, may be essential to the process of selecting the application(s) that, individually or collectively, will best achieve the program objectives. Such factors are often beyond the control of the applicant. **Applicants should recognize that some very good applications might not receive an award because of program priorities and available funding.** Therefore, the above factors may be used by the Source Selection Committee to assist in determining which applications shall receive funding support.

6 Award Administration Information

6.1 Concept Paper Notifications

NAWI will notify applicants of its determination to encourage or discourage the submission of a Full Proposal via a notification letter by email or through the NAWI Exchange to the technical and business points of contact designated by the applicant in NAWI Exchange.

A notification encouraging the submission of a Full Proposal does not authorize the applicant to commence performance of the project.

Full Proposals will not be accepted from entities that were notified that their Concept Paper was discouraged.

6.2 Full Proposal Notifications

NAWI will notify applicants of its determination via a notification letter by email or through the NAWI Exchange to the technical and administrative points of contact designated by the applicant in NAWI Exchange. The notification letter will inform the applicant whether or not its Full Proposal was selected for award negotiations. Alternatively, NAWI may notify one or more applicants that a final selection determination on particular Full Proposals will be made at a later date, subject to the availability of funds or other factors.

6.3 Successful Applicants

Receipt of a notification letter selecting a Full Proposal for award negotiations does not authorize the applicant to commence performance of the project. If an application is selected for award negotiations, it is not a commitment by LBNL/NAWI to issue an award. Applicants do not receive an award until award negotiations are complete and the LBNL/NAWI executes the funding agreement.

We anticipate that the award negotiation process will take approximately 90 days. Applicants must designate a primary and a backup point-of-contact with whom LBNL/NAWI will communicate to conduct award negotiations. The applicant must be responsive during award negotiations (i.e., provide requested documentation) and meet the negotiation deadlines. If the applicant fails to do so or if award negotiations are otherwise unsuccessful, LBNL/NAWI will cancel the award negotiations and rescind the selection. LBNL/NAWI reserves the right to terminate award negotiations at any time for any reason.

6.4 Alternate Applicants

NAWI may designate certain Full Proposals as alternates. Applicants that fall into this category will be notified by email that a final selection determination on particular Full Proposal will be made at a later date, subject to the availability of funds or other factors.

6.5 Unsuccessful Applicants

NAWI shall promptly notify by email each applicant whose application has not been selected for award or designated as an alternate.

6.6 Type of Award Instrument

LBNL/NAWI will negotiate a subcontract or CRADA (Cooperative Research and Development Agreement) with each organization that is part of a project team. Subcontracts will be issued to organizations that are receiving federal funds from LBNL/NAWI. CRADAs will be issued to organizations that are performing work scope and only providing cost share (not receiving federal funds from LBNL/NAWI). The subcontract/CRADA will include mandatory flow-down terms. The Sample Subcontract and CRADA can be found at NAWI.infoready4.com. The R&D project Lead Organization will not issue agreements to the Participating Organizations. All organizations will execute a subcontract or CRADA from LBNL/NAWI. Organizations receiving federal/NAWI funds will execute a subcontract. Cost share only partners (not receiving federal/NAWI funds) will execute a CRADA.

DOE will fund a DOE/NNSA federally funded research and development centers (FFRDC) contractor through an EERE AOP (Annual Operating Plan) and non-DOE/NNSA FFRDC through an interagency agreement with the sponsoring agency.

Each organization must execute the Research Consortium Agreement. The Research Consortium Agreement can be found at NAWI.infoready4.com.

Each member must also become an Alliance Member and execute the Alliance Membership Agreement. Alliance Membership is free. The Alliance Membership process and forms can be found at NAWI.infoready4.com.

6.7 Summary of Required Documents

Document requirements at the **Concept Paper** phase. Applicants shall complete and submit the following enclosures. See Appendix A.
1. One Slide Overview (see template in NAWI Exchange; Right Column under Concept Paper Files) 2. Summary Budget (see template in NAWI Exchange; Right Column under Concept Paper Files) 3. Technical Narrative (2-page limit, see template in NAWI Exchange; Right Column under Concept Paper Files) 4. Project Overview (enter in the text box in NAWI Exchange; 250-word limit)

Document Requirements at the **Full Proposal** phase. Applicants shall complete and submit the following enclosures. See Appendix B.
1. One Slide Overview (see template) 2. Detailed Budget (see template) 3. Technical Narrative (see template; 10-page limit) 4. Cost Share Commitment Letters (see examples) 5. Biographical Sketches (2 pages max per key participant; compiled into one document) 6. Project Overview (enter in the text box in NAWI Exchange; 250-word limit)

Document requirements **after being selected for negotiations**. Applicants shall complete and submit the following enclosures.			
Overall Team	Subcontract Organizations (Orgs. that will receive NAWI/Federal Funds)	Cost Share Only Organizations (Orgs. that are only providing cost share. Orgs. will NOT receive NAWI/Federal Funds)	FFRDCs
1. Milestone Table and Statement of Project Objectives	1. Representations & Certifications Form (Rep-Cert Form) 2. Pre-award Survey of Prospective Subcontractor's Accounting System or	1. Sample CRADA and its Incorporated Documents, if needed 2. Alliance Membership Agreement 3. Consortium Agreement	1. Alliance Membership Agreement 2. Consortium Agreement 3. EERE AOP (Annual Operating Plan) or Interagency Agreement

	last two (2) year of Single Audit Reports 3. Cost Proposal 4. Employee-Vendor Relationships Certification 5. Model Small Business Subcontracting Plan (Required only from the successful non-small business offeror) 6. Cost Accounting Standards (CAS) Notices and Certification of Exemptions 7. Certificate of Current Cost or Pricing Data (COPD) 8. Alliance Membership Agreement 9. Consortium Agreement 10. Subcontract and its Incorporated Documents 11. Approved Intra-University Transfer Agreement which includes NAWI program requirements (Only for University of California) 12. Insurance Certificate Instructions, as needed		

7 Other Information

7.1 Foreign Work Waiver

Unless a waiver is provided, Lead Organization must show that 100% of the direct labor cost for the project (including Participating Organizations labor) will be incurred in the United States and its territories. If any project work will be done in a foreign country, NAWI will work with the project team to complete a Foreign Work Waiver (FWW) that will be submitted to DOE for review and approval. Please see the Consortium Agreement for more details on the Foreign Work Waiver.

7.2 Statement of Project Stewardship

NAWI will exercise normal stewardship in overseeing the project activities performed under NAWI awards. Stewardship activities include, but are not limited to, conducting site visits; reviewing performance and financial reports; providing assistance and/or temporary intervention in unusual circumstances to correct deficiencies that develop during the project; assuring compliance with terms and conditions; and reviewing technical performance to ensure that the project objectives are being accomplished during and after the project.

7.3 Post Award Technical Performance Monitoring & Reporting

NAWI will monitor the technical and cost performance of each project. NAWI Project Control Specialists will oversee the Hub-awarded projects and work with the PIs to ensure projects are executed on time, on budget, and consistent with the project statement of project objectives (SOPO). Project teams will submit the reports listed below to their identified Topic Area Lead and the NAWI Project Control Specialists to fulfill their reporting requirements.

Monthly Report - The Lead Organization will prepare a monthly report which will include high-level information.

Quarterly Technical Status Report & Financial Reports - The Lead Organization will prepare a Quarterly Report based upon the Quarterly Reporting Template. This information will be incorporated to the Quarterly report that NAWI submits to DOE.

Quarterly Technical Reviews (QTR) - The Lead Organization may be required to prepare a Quarterly Presentation which must include a Technical Status and a Financial Status to include detailed technology development status, schedule status and/or schedule modifications, project issues, budget expenditure, and cost share, etc.

Annual Reports - The Lead Organization may be required to prepare an annual report that will be presented at the Annual NAWI Hub Meeting.

Final Technical Report – At the completion of the NAWI Project, the Lead Organization will submit a Final Technical Report, which will provide a comprehensive, cumulative, and substantive summary of the progress and significant accomplishments achieved during the total period of the NAWI Project effort.

7.4 Generated Data

Data generated under the award that will be made public must be uploaded to the Water Data and Analysis Management System (Water-DAMS) repository. The Prime Recipient must upload data to NAWI no later than 60 days after the end of the quarter in which a complete data set is generated. The data must be sufficiently complete, in a format acceptable to DOE, and include all files required for an independent analyst to reproduce and verify the work. The data will be submitted to NAWI at [www.nawihub.org/waterdams]. While most data formats may be uploaded to the NAWI Water-DAMS repository, DOE prefers reusable, structured data that supports conclusions communicated in project quarterly and other reports. If the data are protected or subject to a moratorium, they will not be made publicly available until the moratorium has expired, and they will be held in a secure section of the NAWI. Protected Data will be treated according to the Intellectual Property Provisions.

7.5 Go/No-Go Review

Each project selected under this solicitation will be subject to a periodic project evaluation referred to as a Go/No-Go Review, which will be determined during award negotiations. Go/No-Go decisions will be made at each stage (at least one Go/No Go decision point for every 12 months). At the Go/No-Go decision points, project performance, project schedule adherence, meeting milestone objectives, compliance with reporting requirements, and overall contribution to the NAWI program goals and objectives will be evaluated. Funding beyond the Go/No-Go decision point (continuation funding) is contingent upon; (1) the availability of future-year budget authority; (2) Recipient's technical progress compared to the Milestone Summary Table of the award; (3) Prime Recipient's submittal of required reports; (4) Prime Recipient's compliance with the terms and conditions of the award; (5) The Go/No-Go decision; and (6) written approval of the next budget period.

As a result of the Go/No-Go Review, the following actions may be authorized: (1) continue to fund the project; (2) recommend redirection of work within the general scope under the project; (3) place a hold on funding for the project, pending further supporting data or funding; or (4) discontinue funding the project because of insufficient progress, change in strategic direction, or lack of funding.

The Go/No-Go decision is distinct from a non-compliance determination. In the event a Recipient fails to comply with the requirements of an award, NAWI may take appropriate action, including but not limited to, redirecting, suspending, or terminating the award.

7.6 Amendments

Amendments to this solicitation will be posted on the NAWI Exchange. However, if you register for email notifications for this solicitation in NAWI Exchange you will only receive an email when an amendment for the solicitation is posted. We recommend that you register as soon after the release of the solicitation as possible to ensure you receive timely notice of any amendments or other solicitations.

7.7 Evaluation and Administration of Non-LBNL/NAWI Personnel

In conducting the merit review evaluation, NAWI may seek the advice of qualified non-LBNL/NAWI personnel as reviewers. The Applicant, by submitting its application, consents to the use of non-LBNL/NAWI reviewers/administrators. All reviewers will sign conflict of interest and non-disclosure agreements prior to reviewing an application.

Appendix A: Concept Paper Technical Narrative Requirements

The Concept Paper must be submitted through the NAWI Exchange (NAWI.infoready4.com). The information below is provided for planning and information purposes.

The Concept Paper Technical Narrative submission is limited to **2 pages.** See Section 4.5 for formatting requirements.

1 PROJECT OVERVIEW

There is a 250-word limit for the Project Overview. The Project Overview does not count against the 2-page Concept Paper page limit. Paste the Project Overview text into the designated text box in NAWI Exchange.

1.1 Provide an overview of the proposed project. Include general background and technology, key outcomes, general benefits, etc. The project overview should not include any proprietary/business sensitive information.

2 PROBLEM STATEMENT AND GOAL

2.1 How does the proposed work address the Technical Area of Interest as described in the Funding Opportunity Announcement?

3 TECHNICAL APPROACH

3.1 What is the technical approach to solve the challenge?

3.2 How does the proposed work explore original concepts or approach critical technical challenges in an original and transformative manner?

3.3 What are the riskiest elements of your technical approach or plan?

3.4 Project Deliverables, i.e., what will be delivered upon successful completion of the project

4 PROJECT IMPACTS

4.1 How does the proposed work have the potential to address a major gap in scientific knowledge or significantly advance a water treatment technology approach?

4.2 How will the proposed work transform utilization of non-traditional water sources and impact pipe parity metrics?

5 ONE SLIDE OVERVIEW

This is not part of the 2-page Concept Paper page limit. Upload as Microsoft PowerPoint into NAWI Exchange. The template is available in NAWI Exchange.

Include the following information:

- Project Name
- Project Technical Point of Contact
- Problem statement
- Project goals
- Technical approach
- Potential impact
- Performers and roles
- Total Project Cost, % Cost Share, and Duration

6 BUDGET SUMMARY

This is not part of the 2-page Concept Paper page limit. Upload as Microsoft Excel into NAWI Exchange. The template is available in NAWI Exchange.

Appendix B: Full Proposal Technical Narrative Requirements

The Full Proposal must be submitted through NAWI Exchange (NAWI.infoready4.com).

The Full Proposal Technical Narrative is limited to **10 pages.** See Section 4.5 for formatting requirements.

1 PROJECT OVERVIEW

1.1 There is a 250-word limit for the Project Overview. The Project Overview does not count against the 10-page Full Proposal page limit. Paste into the designated text box in NAWI Exchange.

1.2 Provide an overview of the proposed project. Include general background and technology, key outcomes, general benefits, etc. The project overview should not include any proprietary/business sensitive information.

2 PROBLEM STATEMENT AND GOAL

2.1 How does the proposed work address the Technical Area of Interest as described in the Funding Opportunity Announcement?

3 BACKGROUND AND RATIONALE

3.1 What is the state of the art of research in this area?

3.2 What is the rationale for the proposed research objectives?

4 TECHNICAL APPROACH

4.1 How does the proposed work explore original concepts or approach critical technical challenges in an original and transformative manner?

4.2 What specific research tasks and methodologies will the proposed work deploy to address the technical challenge?

4.3 Project Deliverables, i.e., what will be delivered upon successful completion of the project

4.4 What is your vision for how this research will enable applied R&D (TRL 5 – 9)?

4.5 What are the riskiest elements of your technical approach or plan?

5 PROJECT TIMELINE AND MILESTONES

5.1 Please provide a high-level schedule of the proposed work and include key milestones.

6 PROJECT IMPACTS

6.1 How does the proposed work have the potential to address a major gap in scientific knowledge or significantly advance a water treatment technology approach?

6.2 How will the proposed work transform utilization of non-traditional water sources and impact pipe parity metrics?

7 PERFORMERS AND ROLES

7.1 Please describe the technical qualifications of the proposed team members and their respective roles in the proposed research

8 EQUIPMENT AND FACILITIES

8.1 Please describe the Project Team's existing equipment and facilities that will facilitate the successful completion of the proposed project; include a justification of any new equipment or facilities requested as part of the project.

9 BIOGRAPHICAL SKETCHES

9.1 Attach biographical sketches (no more than 2 pages each) for key participating team members as an appendix. The biographical sketches do not count towards the 10-Full Proposal page limit. Combine all biographical sketches into one document and upload into NAWI Exchange as one PDF file.

10 ONE SLIDE OVERVIEW

This is not part of the 10-page Full Proposal page limit. Upload as Microsoft PowerPoint into NAWI Exchange. The template is available in NAWI Exchange.

Include the following information:

10.1 Problem statement

10.2 Project goal

10.3 Technical approach

10.4 Potential impact

10.5 Performers and roles

10.6 Project cost, cost share, and duration

11 DETAILED BUDGET

This is not part of the 10-page Full Proposal page limit. Upload as Microsoft Excel into NAWI Exchange. The template is available in NAWI Exchange.

Appendix C: Technology Readiness Level Definitions

TRL 1:	Basic principles observed and reported
TRL 2:	Technology concept and/or application formulated
TRL 3:	Analytical and experimental critical function and/or characteristic proof of concept
TRL 4:	Component and/or breadboard validation in a laboratory environment
TRL 5:	Component and/or breadboard validation in a relevant environment
TRL 6:	System/subsystem model or prototype demonstration in a relevant environment
TRL 7:	System prototype demonstration in an operational environment
TRL 8:	Actual system completed and qualified through test and demonstrated
TRL 9:	Actual system proven through successful mission operations

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