GOVERNMENT OF PUERTO RICO
PUBLIC SERVICE REGULATORY BOARD
PUERTO RICO ENERGY BUREAU

IN RE: REVIEW OF THE PUERTO RICO ELECTRIC POWER AUTHORITY´S 10-YEAR INFRASTRUCTURE PLAN – DECEMBER 2020	**CASE NO.:** NEPR-MI-2021-0002 **SUBJECT:** Motion for Approval to Submit the Restoration and Hazard Mitigation of the Power Generation Water Supply Function Project to FEMA

MOTION FOR APPROVAL TO SUBMIT RESTORATION AND HAZARD MITIGATION OF THE POWER GENERATION WATER SUPPLY FUNCTION PROJECT TO FEMA

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COMES NOW GENERA PR LLC ("Genera"), as agent of the Puerto Rico Electric Power Authority ("PREPA"),[1] through its counsels of record, and respectfully submits and prays as follows:

1. On March 26, 2021, the Puerto Rico Energy Bureau ("Energy Bureau") issued a Resolution and Order in which it required PREPA to submit, for the Energy Bureau's review, any project proposed to be funded with Federal Emergency Management Agency ("FEMA") funds, or any other federal funding, at least thirty (30) calendar days before such project is submitted to the Puerto Rico Central Office for Recovery, Reconstruction and Resiliency ("COR3"), FEMA, or any other federal agency ("March 26th Order"). The March 26th Order further required PREPA to continue reporting to the Energy Bureau and FEMA, for a period of five (5) years, on the status

[1] Pursuant to the *Puerto Rico Thermal Generation Facilities Operation and Maintenance Agreement* ("LGA OMA"), dated January 24, 2023, executed by and among PREPA, the Puerto Rico Public-Private Partnerships Authority and Genera, Genera is the sole operator and administrator of the Legacy Generation Assets (as defined in the LGA OMA) the sole entity authorized to represent PREPA before the Energy Bureau with respect to any matter related to the performance of any of the O&M Services (as defined in the LGA OMA) provided by Genera under the LGA OMA.

and progress of all projects submitted for approval that had not yet been approved by the Energy Bureau.[2]

2. On July 31, 2026, the Governor of Puerto Rico issued Executive Order No. OE-2026-035 declaring a state of emergency regarding the use of water throughout Puerto Rico due to severe drought conditions, reduced precipitation, and critically low reservoir levels. The Executive Order recognizes that these conditions threaten the continuity of essential services, including the reliable provision of electric service, and directs government agencies to prioritize coordinated actions necessary to protect the health, safety, and welfare of the people of Puerto Rico. Accordingly, the prompt implementation of projects that increase the resilience, reliability, and sustainability of the Commonwealth's critical infrastructure is consistent with the public policy established by the Executive Order.

3. In compliance with the March 26th Order, Genera, as agent of PREPA, hereby submits as **Exhibit A** hereto, for the Energy Bureau's review and approval, the Initial Scope of Work ("Initial SOW") entitled *Restoration and Hazard Mitigation of the Power Generation Water Supply Function Through Construction of a 7.0-MGD Reverse Osmosis Facility at the San Juan or Palo Seco Power Plant***,** prior to its submission to COR3, FEMA, or any other applicable federal agency. Given the emergency circumstances currently affecting Puerto Rico, Genera respectfully requests that the Energy Bureau review and approve the Initial SOW on an expedited basis so that the project may proceed without unnecessary delay.

4. As described in the Initial SOW, the purpose of the proposed project is to restore the disaster-damaged reverse osmosis and process-water treatment function supporting critical

[2] On April 22, 2026, the Energy Bureau issued a Resolution and Order ("April 22nd Order"), in which it extended the March 26th Order's reporting period for an additional five (5) years. See April 22nd Order, p. 2. The Energy Bureau stated that all the other provisions of the March 26th Order would remain in full force and effect. *Id.*

power generation facilities and to incorporate hazard mitigation measures that will provide a reliable, redundant, and independent source of treated water. The proposed project will construct, expand, replace, relocate and make more resilient a reverse osmosis water-treatment system to make it capable of producing a minimum of 7.0 million gallons per day of net usable treated water. The final project location will be selected through a detailed alternatives analysis evaluating the San Juan and Palo Seco Power Plants and considering existing damaged systems.

5. Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act ("Stafford Act"), 42 U.S.C. § 5172, authorizes FEMA to provide assistance for the repair, restoration, reconstruction, or replacement of facilities damaged by a major disaster, including eligible hazard mitigation measures intended to reduce the potential for future damage.

6. Consistent therewith, the Initial SOW contemplates the implementation of FEMA Section 406, Hazard Mitigation measures to complement the costs associated with the proposed improvements and enhance the resiliency of the existing reverse osmosis function. In addition to repairing the existing reverse osmosis unit, the proposed project is intended to provide sufficient water production capacity to satisfy the total water demand of the Palo Seco Power Plant. The proposed project is also consistent with the objectives of Executive Order No. OE-2026-035 because it will strengthen Puerto Rico's ability to provide a resilient and independent water supply for critical electric generation facilities, thereby reducing reliance on limited potable water resources during the declared emergency while enhancing the reliability of essential electric service.

7. The proposed improvements are of particular importance because Puerto Rico's thermal generation facilities are among the largest consumers of water supplied by the Puerto Rico Aqueduct and Sewer Authority ("PRASA") in the northern region of Puerto Rico. Consequently,

increasing the reliability and resiliency of the reverse osmosis water supply function will not only support the continued operation of critical generation assets, but also promote a more efficient use and protection of this essential natural resource, ensuring the continued availability of the water resources necessary to support reliable electric generation operations, particularly during periods of drought such as those currently affecting Puerto Rico. Consistent with the Initial SOW, the proposed project is intended to reduce reliance on external water supplies, improve emergency operating capability, and strengthen the resilience of Puerto Rico's critical energy infrastructure. At a time when Puerto Rico remains under a declared state of emergency regarding the availability of water, the proposed project will significantly advance the public interest by reducing dependence on potable water supplied by PRASA, preserving scarce water resources for residential and other essential uses, and ensuring that critical electric generation facilities maintain a reliable and resilient water supply necessary to support continuous electric service. Expediting this project will therefore directly support the Government of Puerto Rico's emergency response efforts while providing substantial benefits to the people of Puerto Rico.

8. Accordingly, and in compliance with the March 26th Order and in light of the ongoing public emergency declared under Executive Order No.2026-035, Genera respectfully submits the Initial Scope of Work, attached as **Exhibit A** to this Motion, for the Energy Bureau's review and approval prior to its submission to COR3, FEMA, or any other applicable federal agency.

WHEREFORE, Genera respectfully requests that this Honorable Energy Bureau **take notice** of the foregoing; **approve** the Initial Scope of Work attached as **Exhibit A** to this Motion, entitled *Restoration and Hazard Mitigation of the Power Generation Water Supply Function*

*Through Construction of a 7.0-MGD Reverse Osmosis Facility at the San Juan or Palo Seco Power Plant***,** and **grant** such other relief as may be just and proper.

RESPECTFULLY SUBMITTED.

In San Juan, Puerto Rico, this 6th day of August 2026.

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CERTIFICATE OF SERVICE

We hereby certify that a true and accurate copy of this motion was filed with the Office of the Clerk of the Energy Bureau using its Electronic Filing System and that we will send an electronic copy of this motion to alexis.rivera@prepa.pr.gov; nzayas@gmlex.net; rcruzfranqui@gmlex.net; mvalle@gmlex.net; margarita.mercado@us.dlapiper.com; yahaira.delarosa@us.dlapiper.com; emmanuel.porrogonzalez@us.dlapiper.com.

In San Juan, Puerto Rico, this 6th day of August 2026.

/s/ Jorge Fernández-Reboredo
Jorge Fernández-Reboredo

/s/ José Javier Díaz Alonso
José Javier Díaz Alonso

/s/ Ernesto Raúl Ramos Maldonado
Ernesto Raúl Ramos Maldonado

Exhibit A

Initial Scope of Work for the Restoration and Hazard Mitigation of the Power Generation Water Supply Function Through Construction of a 7.0-MGD Reverse Osmosis Facility at the San Juan or Palo Seco Power Plant

FEMA INITIAL SCOPE OF WORK

7.0 MGD REVERSE OSMOSIS WATER SUPPLY SYSTEM

SAN JUAN OR PALO SECO POWER GENERATION FACILITY

1. Project Information

Applicant: Puerto Rico Electric Power Authority
Operator: Genera PR
Disaster: Hurricane María, DR-4339-PR
Facility: Power Generation Process-Water and Reverse Osmosis Systems
Potential Project Locations: San Juan Power Plant or Palo Seco Power Plant
FEMA Program: Public Assistance – Permanent Work
Project Delivery: Section 428 Alternative Procedures
Mitigation Component: Section 406 Hazard Mitigation
Category of Work: Category F – Utilities
Project Development Stage: Initial Scope of Work
Required Net Water Production: 7.0 million gallons per day
Equivalent Net Flow: Approximately 4,861 gallons per minute
Preliminary Gross Installed Capacity: 7.7 to 8.4 million gallons per day
Preliminary ROM Cost: $135 million
Initial ROM Cost Range: $95 million to $165 million

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2. Project Title

Restoration and Hazard Mitigation of the Power Generation Water Supply Function Through Construction of a 7.0-MGD Reverse Osmosis Facility at the San Juan or Palo Seco Power Plant

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3. Project Purpose

The purpose of this project is to restore the disaster-damaged reverse osmosis and process-water treatment function supporting critical power generation facilities and to incorporate hazard mitigation measures that will provide a reliable, redundant, and independent source of treated water.

The proposed project will construct, expand, replace, or relocate a reverse osmosis water-treatment system capable of producing a minimum of **7.0 million gallons per day of net usable treated water**.

The facility will be evaluated for construction at either:

1. The San Juan Power Plant; or
2. The Palo Seco Power Plant.

The final project location will be selected through a detailed alternatives analysis considering technical feasibility, FEMA eligibility, environmental impacts, intake and discharge requirements, existing infrastructure, hazard exposure, water-distribution requirements, life-cycle cost, construction feasibility, and operational resilience.

The project will combine restoration of the eligible disaster-damaged function under Section 428 with incremental Section 406 hazard mitigation measures designed to reduce the risk of future damage and loss of function.

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4. Facility Function

The San Juan and Palo Seco power generation facilities require a dependable supply of treated water to support critical generation processes and auxiliary systems.

The treated water may be used for:

- Boiler makeup;
- Steam-cycle makeup;
- Cooling-system makeup;
- Demineralized-water production;
- Emissions-control systems;
- Equipment cooling;
- Chemical-treatment systems;
- Equipment washing;
- Service-water systems;
- Fire-protection reserves;
- Emergency water supply; and
- Other power-generation operations.

The proposed system will provide a minimum net production capacity of:

- 7,000,000 gallons per day;
- Approximately 291,667 gallons per hour;
- Approximately 4,861 gallons per minute; and
- Approximately 2.555 billion gallons per year under continuous operation.

The term “net production” refers to the usable product water available after accounting for internal treatment-system consumption, filter backwashing, membrane flushing, cleaning, process losses, and other operational requirements.

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5. Disaster-Related Damage and Condition

Hurricane María damaged and degraded existing reverse osmosis and process-water treatment infrastructure supporting critical power generation operations.

The disaster exposed the facilities and associated systems to:

- Extreme wind;
- Wind-driven rain;
- Flooding;
- Water intrusion;
- Salt contamination;
- Coastal corrosion;
- Electrical surges;
- Loss of utility power;
- Uncontrolled shutdown;
- Roof and enclosure damage;
- Loss of ventilation;
- Extended inactivity;
- Interrupted maintenance;
- Instrumentation failure;
- Pump and motor damage;

- Damage to electrical panels and controls; and
- Degradation of membranes, pressure vessels, piping, and associated treatment equipment.

The disaster-related damage reduced the reliability, efficiency, operability, and remaining useful life of the existing water-treatment systems.

The Applicant will complete inspections, testing, engineering evaluations, and documentation necessary to distinguish disaster-related damage from predisaster deterioration, deferred maintenance, and unrelated deficiencies.

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6. Predisaster Function and Capacity

Prior to Hurricane María, the existing reverse osmosis and water-treatment infrastructure provided treated water for power-generation operations.

The Applicant will confirm the predisaster function, installed capacity, operating capacity, equipment configuration, recovery rate, and product-water quality using:

- Original design drawings;
- Technical specifications;
- Equipment data sheets;
- Manufacturer information;
- Historical production records;
- Operating logs;
- Maintenance records;
- Procurement records;
- Engineering reports;
- Operator interviews; and
- Available inspection documentation.

The confirmed predisaster capacity will establish the eligible Section 428 base restoration scope.

Any treatment capacity, redundancy, storage, protection, or system hardening above the confirmed predisaster configuration will be evaluated as an incremental Section 406 hazard mitigation measure.

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7. Current Operational Vulnerability

The existing water-treatment systems do not provide sufficient capacity, redundancy, reliability, or resilience to independently satisfy the long-term water requirements of the applicable generation facilities.

The plants remain vulnerable to interruption of the external water supply during:

- Drought conditions;
- Below-normal rainfall;
- Reservoir depletion;
- Water rationing;
- Public water-system failures;
- Pump-station outages;
- Water-main failures;
- Water contamination;
- Electrical outages;
- Future hurricanes;
- Flooding;
- Storm surge;
- Seismic events; and
- Other emergencies.

An extended interruption of treated process water could require generating units to reduce output or shut down.

The loss of generation could create cascading impacts on Puerto Rico's electrical system and affect facilities that depend on reliable electric service, including hospitals, water and

wastewater systems, telecommunications, emergency services, government facilities, transportation, and commercial operations.

Restoring the damaged systems only to their predisaster capacity would leave the critical generation function vulnerable to future water-supply interruptions.

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8. Proposed Project

The Applicant proposes to restore the eligible disaster-damaged water-treatment function and construct a resilient reverse osmosis water-production facility capable of providing a minimum of 7.0 MGD net.

The project may be located at either the San Juan Power Plant or the Palo Seco Power Plant.

The proposed facility will include, as applicable:

- Raw-water intake;
- Intake screening;
- Raw-water pumping;
- Pretreatment;
- Ultrafiltration or equivalent advanced filtration;
- Cartridge filtration;
- Chemical conditioning;
- High-pressure pumping;
- Reverse osmosis membrane treatment;
- Energy-recovery systems;
- Clean-in-place systems;
- Post-treatment;
- Product-water storage;
- Product-water pumping;
- Water-distribution connections;
- Brine or concentrate handling;

- Outfall or discharge facilities;
- Electrical distribution;
- Emergency power;
- Instrumentation;
- Programmable logic controllers;
- Supervisory control and data acquisition;
- Cybersecurity controls;
- Buildings and equipment enclosures;
- Flood protection;
- Wind hardening;
- Corrosion protection; and
- Associated civil, structural, mechanical, electrical, and control work.

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9. Section 428 Base Restoration Scope

The Section 428 base scope will restore the Hurricane María-damaged reverse osmosis and process-water treatment function to its confirmed eligible predisaster capacity and configuration.

The initial base scope may include:

9.1 Engineering and Damage Validation

- Review existing drawings, specifications, and records.
- Confirm predisaster function and capacity.
- Perform detailed condition assessments.
- Inspect mechanical, electrical, structural, instrumentation, and control systems.
- Test pumps, motors, drives, transformers, panels, and instrumentation.
- Evaluate membrane condition.
- Document corrosion, contamination, water intrusion, and equipment degradation.
- Develop damage descriptions and dimensions.

- Prepare repair-versus-replacement analyses.
- Develop final base restoration quantities and costs.

9.2 Demolition and Removal

- Isolate damaged systems.
- Drain and clean affected equipment.
- Remove damaged membranes, vessels, pumps, motors, piping, electrical systems, controls, and instrumentation.
- Remove corroded or contaminated materials.
- Dispose of removed materials in accordance with applicable requirements.
- Implement environmental and worker-protection measures.

9.3 Intake-System Restoration

- Repair or replace damaged intake pumps.
- Repair or replace screens and strainers.
- Repair damaged intake piping.
- Repair valves and actuators.
- Restore intake controls and instrumentation.
- Repair foundations and supports.
- Restore electrical service to the intake system.

9.4 Pretreatment Restoration

- Repair or replace damaged filtration equipment.
- Replace damaged filter media.
- Repair or replace chemical-feed systems.
- Repair cartridge-filter systems.
- Restore backwash systems.
- Restore flow, pressure, turbidity, conductivity, and water-quality monitoring.

9.5 Reverse Osmosis Restoration

- Replace damaged RO membranes.
- Repair or replace damaged pressure vessels.
- Repair or replace damaged high-pressure pumps.
- Repair or replace motors and variable-frequency drives.
- Repair energy-recovery devices.
- Repair process piping and valves.
- Repair clean-in-place systems.
- Restore membrane-flush and preservation systems.
- Restore process instrumentation and controls.

9.6 Product-Water Restoration

- Repair or replace product-water pumps.
- Repair product-water piping.
- Repair or replace damaged storage components.
- Restore product-water quality monitoring.
- Restore connections to the generation process-water systems.

9.7 Brine-System Restoration

- Repair or replace concentrate piping.
- Repair pumps, valves, and controls.
- Repair discharge or outfall components.
- Restore discharge monitoring.
- Restore sampling equipment.

9.8 Electrical and Controls Restoration

- Repair or replace damaged transformers.
- Repair motor-control centers.
- Replace damaged switchgear and panels.
- Replace damaged wiring and conduits.

- Repair programmable logic controllers.
- Restore SCADA communications.
- Replace damaged instrumentation.
- Restore alarms and automatic shutdown systems.

9.9 Structural Restoration

- Repair damaged foundations.
- Repair equipment supports.
- Repair damaged roofs, walls, doors, and louvers.
- Repair drainage systems.
- Restore protective coatings.
- Repair access platforms, stairs, ladders, and handrails.

9.10 Testing and Commissioning

- Conduct factory and field acceptance testing.
- Test pumps, motors, and electrical equipment.
- Pressure-test piping systems.
- Test membrane integrity.
- Calibrate instrumentation.
- Test controls and alarms.
- Perform water-quality testing.
- Conduct startup and commissioning.
- Demonstrate restored predisaster capacity.
- Train operators.
- Deliver operations and maintenance manuals.

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10. Section 406 Hazard Mitigation Scope

The Section 406 hazard mitigation scope will consist of the incremental measures necessary to reduce the risk of future damage or loss of function.

The proposed mitigation measures include:

10.1 Increase Net Production Capacity

Increase the treatment capacity to provide a minimum of 7.0 MGD of net usable product water.

The final gross installed capacity will be greater than 7.0 MGD to account for:

- System losses;
- Membrane fouling;
- Membrane aging;
- Variations in source-water salinity;
- Seasonal temperature changes;
- Filter backwashing;
- Clean-in-place operations;
- Maintenance;
- Pump degradation; and
- Equipment outages.

The initial design range will be approximately 7.7 to 8.4 MGD of installed product-water capacity.

10.2 Modular N+1 Redundancy

Provide multiple modular treatment trains so that the system can continue producing essential water while one treatment train is out of service.

Potential configurations may include:

- Five trains with four required and one standby;
- Six trains with five required and one standby;
- Seven trains with six required and one standby; or
- Another equivalent N+1 configuration.

The final configuration will be established during preliminary engineering.

10.3 Resilient Raw-Water Intake

Construct or expand the raw-water intake to supply sufficient feedwater for the proposed facility.

For a net product-water capacity of 4,861 gpm, the approximate feedwater requirement is:

- Approximately 9,722 gpm at 50 percent recovery;
- Approximately 10,802 gpm at 45 percent recovery; and
- Approximately 12,153 gpm at 40 percent recovery.

The intake system may include:

- New or parallel intake pipelines;
- Redundant intake pumps;
- Coarse and fine screens;
- Automatic screen cleaning;
- Marine-growth controls;
- Intake velocity controls;
- Corrosion-resistant materials;
- Water-quality monitoring;
- Automatic shutdown;
- Redundant electrical service; and
- Hurricane- and flood-resistant construction.

10.4 Enhanced Pretreatment

Provide pretreatment necessary to protect the RO membranes and maintain reliable production.

The pretreatment may include:

- Coagulation;
- Flocculation;
- Multimedia filtration;

- Ultrafiltration;
- Cartridge filtration;
- Antiscalant injection;
- Chlorination;
- Dechlorination;
- pH adjustment;
- Biological-growth control;
- Automated backwashing; and
- Source-water quality monitoring.

10.5 High-Efficiency RO Systems

Install modern RO equipment, including:

- High-efficiency membranes;
- Corrosion-resistant pressure vessels;
- High-efficiency high-pressure pumps;
- Variable-frequency drives;
- Energy-recovery devices;
- Automatic pressure and flow control;
- Membrane flushing;
- Clean-in-place systems; and
- Membrane-preservation systems.

10.6 Product-Water Storage

Provide sufficient storage to sustain critical operations during temporary treatment-system outages.

At 7.0 MGD, the approximate storage requirements are:

- Four hours: 1.17 million gallons;
- Eight hours: 2.33 million gallons;

- Twelve hours: 3.50 million gallons; and
- Twenty-four hours: 7.00 million gallons.

The final storage volume will be determined through an operational reliability and cost-effectiveness analysis.

10.7 Redundant Product-Water Distribution

Provide:

- Duty and standby transfer pumps;
- Parallel piping where feasible;
- Automatic pump sequencing;
- Isolation valves;
- Emergency bypasses;
- Pressure-control systems;
- Backflow prevention; and
- Interconnections with alternative water sources.

10.8 Brine Management

Provide a reliable and environmentally compliant brine or concentrate management system.

The conceptual concentrate flow may range from:

- Approximately 4,861 gpm at 50 percent recovery; to
- Approximately 7,292 gpm at 40 percent recovery.

The project will evaluate:

- Existing outfall use;
- Outfall expansion;
- New outfall construction;
- Diffuser systems;
- Brine blending;
- Salinity modeling;

- Discharge monitoring;
- Marine impacts;
- Required permits; and
- Alternative concentrate-management technologies.

10.9 Electrical Resilience

Provide:

- Redundant electrical feeders;
- Separate electrical buses;
- Redundant transformers;
- Automatic transfer equipment;
- Emergency standby generation;
- Uninterruptible power supplies;
- Surge protection;
- Voltage regulation;
- Harmonic protection;
- Elevated electrical equipment;
- Weather-resistant enclosures;
- Controlled shutdown; and
- Controlled restart.

10.10 Control-System Resilience

Provide:

- Redundant PLC systems;
- Redundant communications;
- SCADA integration;
- Remote monitoring;
- Historical data storage;

- Automatic alarms;
- Water-quality alarms;
- Remote shutdown;
- Automatic isolation;
- Treatment-train sequencing;
- Predictive maintenance monitoring; and
- Cybersecurity controls.

10.11 Wind and Flood Hardening

Provide:

- Wind-rated structures;
- Wind-rated doors and louvers;
- Reinforced roof systems;
- Improved drainage;
- Waterproof penetrations;
- Equipment anchorage;
- Flood barriers;
- Elevated electrical equipment;
- Watertight enclosures;
- Water-level alarms;
- Sump pumps; and
- Relocation of critical components outside vulnerable areas.

10.12 Corrosion Protection

Provide:

- Corrosion-resistant piping;
- Marine-grade materials;
- Protective coating systems;

- Cathodic protection;
- Corrosion-resistant fasteners;
- Nonmetallic cable trays;
- Dehumidification;
- Improved ventilation; and
- Materials suitable for coastal and saline environments.

10.13 Critical Spare Equipment

Provide an initial inventory of critical spare components, including:

- RO membranes;
- Cartridge filters;
- Pump seals;
- Bearings;
- Actuators;
- Instrumentation;
- PLC modules;
- Variable-frequency-drive components;
- Chemical-feed pumps;
- Valves; and
- Manufacturer-recommended startup spares.

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11. Location Alternative A – San Juan Power Plant

Under Alternative A, the 7.0-MGD RO facility will be constructed within or adjacent to the San Juan Power Plant.

The evaluation will consider:

- Proximity to the existing damaged RO system;
- Existing intake facilities;

- Existing outfall facilities;
- Existing electrical service;
- Existing tanks;
- Available land;
- Connections to generation systems;
- Flood exposure;
- Storm-surge exposure;
- Coastal corrosion;
- Construction access;
- Environmental requirements;
- Utility conflicts;
- Geotechnical conditions;
- Ability to maintain plant operations; and
- Future water demand.

Potential advantages may include:

- Direct restoration of the damaged function;
- Reduced product-water transmission requirements;
- Potential use of existing infrastructure;
- Direct connection to San Juan generation loads; and
- Reduced relocation eligibility concerns.

Potential disadvantages may include:

- Limited available land;
- Congested utility corridors;
- High coastal hazard exposure;
- Construction conflicts with existing operations; and
- Potential limitations of existing intake and discharge systems.

12. Location Alternative B – Palo Seco Power Plant

Under Alternative B, the 7.0-MGD RO facility will be constructed within or adjacent to the Palo Seco Power Plant.

The evaluation will consider:

- Available land;
- Intake feasibility;
- Outfall feasibility;
- Existing electrical service;
- Existing tanks and piping;
- Site elevation;
- Flood and storm-surge exposure;
- Environmental impacts;
- Construction access;
- Geotechnical conditions;
- Connections to generation systems;
- Product-water transmission requirements;
- Potential service to San Juan or other generation assets; and
- Long-term regional benefits.

Potential advantages may include:

- Additional available space;
- Improved modular construction opportunities;
- Potential separation from congested San Juan infrastructure;
- Potential regional water-supply benefits; and
- Improved construction staging.

Potential disadvantages may include:

- Need for a new intake;
- Need for a new outfall;
- New product-water transmission infrastructure;
- Easement requirements;
- Increased pumping-energy requirements;
- Relocation eligibility requirements; and
- Potential environmental permitting complexity.

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13. Distributed Alternative

The Applicant may also evaluate construction of smaller systems at both San Juan and Palo Seco whose combined net production equals or exceeds 7.0 MGD.

A distributed system may provide:

- Geographic redundancy;
- Reduced transmission requirements;
- Improved operational flexibility;
- Reduced single-point-of-failure risk;
- Separate service to each plant; and
- Improved emergency response capability.

This alternative may have higher capital and operating costs due to duplicate intake, treatment, electrical, control, staffing, and discharge infrastructure.

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14. Site Selection Criteria

The preferred project location will be selected based on:

- FEMA eligibility;
- Direct relationship to the damaged facility;
- Technical feasibility;
- Available land;

- Intake reliability;
- Outfall feasibility;
- Environmental impacts;
- Hazard exposure;
- Existing infrastructure;
- Electrical reliability;
- Water-distribution requirements;
- Construction feasibility;
- Permitting complexity;
- Initial capital cost;
- Life-cycle cost;
- Operation and maintenance cost;
- Energy consumption;
- Construction schedule;
- Long-term resilience; and
- Ability to support critical generation operations.

The Initial Scope will preserve both San Juan and Palo Seco as potential locations until the alternatives analysis is complete.

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15. Water Transmission

If the proposed RO facility is constructed at a location different from the principal point of water use, the project will include the transmission infrastructure necessary to deliver the product water.

The transmission scope may include:

- Large-diameter pipeline;
- Pump stations;
- Booster pumps;

- Pressure-control facilities;
- Intermediate storage;
- Isolation valves;
- Emergency bypasses;
- Road crossings;
- Utility crossings;
- Easements;
- Corrosion protection;
- Metering;
- Leak detection;
- SCADA integration; and
- Redundant pipeline segments where cost-effective.

The final scope must identify:

- The facilities that will receive the 7.0 MGD;
- The required flow to each facility;
- Pipeline alignment;
- Required pumping capacity;
- Storage requirements; and
- Emergency operating procedures.

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16. Project Phases

Phase 1 – Data Collection and Damage Validation

- Collect predisaster documentation.
- Confirm legal responsibility.
- Confirm facility ownership.
- Confirm disaster-related damage.

- Identify post-disaster repairs.
- Prepare damage descriptions and dimensions.
- Confirm predisaster function and capacity.

Phase 2 – Water-Demand Analysis

- Confirm water demand by generating unit.
- Identify average, peak, and emergency demand.
- Identify continuous and intermittent uses.
- Confirm required product-water quality.
- Evaluate water conservation.
- Evaluate water reuse.
- Confirm the 7.0-MGD net requirement.

Phase 3 – Site and Source-Water Investigation

- Perform San Juan site investigation.
- Perform Palo Seco site investigation.
- Characterize raw-water quality.
- Evaluate seasonal variability.
- Perform bathymetric studies where required.
- Perform geotechnical investigations.
- Evaluate intake feasibility.
- Evaluate outfall feasibility.
- Perform environmental screening.

Phase 4 – Alternatives Analysis

- Evaluate San Juan location.
- Evaluate Palo Seco location.
- Evaluate distributed treatment.
- Evaluate repair and expansion.

- Evaluate full replacement.
- Evaluate relocation.
- Evaluate water reuse.
- Evaluate transmission requirements.
- Compare capital and life-cycle costs.
- Select the preferred alternative.

Phase 5 – FEMA Scope and Cost Development

- Separate Section 428 and Section 406 costs.
- Develop a 428/406 cost matrix.
- Prepare the hazard mitigation proposal.
- Develop quantity takeoffs.
- Obtain vendor quotations.
- Prepare a detailed cost estimate.
- Develop escalation and contingency.
- Prepare the fixed-cost estimate.
- Prepare the cost-effectiveness analysis.

Phase 6 – Environmental and Historic Preservation Review

- Identify required permits.
- Evaluate marine impacts.
- Evaluate wetlands and floodplains.
- Evaluate coastal-zone impacts.
- Evaluate threatened and endangered species.
- Evaluate essential fish habitat.
- Evaluate historic and archaeological resources.
- Complete agency consultation.
- Obtain environmental approvals.

Phase 7 – Design

- Develop basis of design.
- Prepare 30 percent design.
- Prepare 60 percent design.
- Prepare 90 percent design.
- Prepare final design.
- Prepare technical specifications.
- Prepare commissioning requirements.
- Prepare operations and maintenance criteria.

Phase 8 – Procurement and Construction

- Procure long-lead equipment.
- Perform demolition.
- Construct intake infrastructure.
- Construct treatment systems.
- Construct product-water storage.
- Construct brine-management systems.
- Install electrical and control systems.
- Construct transmission infrastructure.
- Implement hazard mitigation measures.
- Maintain temporary water service.

Phase 9 – Testing and Closeout

- Conduct equipment testing.
- Conduct treatment-train testing.
- Conduct integrated system testing.
- Demonstrate 7.0-MGD net production.
- Demonstrate required product-water quality.

- Complete operator training.
- Submit as-built drawings.
- Submit operations and maintenance manuals.
- Complete FEMA closeout documentation.

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17. Initial Deliverables

The project will produce:

1. Predisaster function and capacity validation memorandum.
2. Disaster damage assessment.
3. Damage descriptions and dimensions.
4. Existing-condition drawings.
5. Water-demand analysis.
6. Water-balance analysis.
7. Source-water characterization report.
8. San Juan site evaluation.
9. Palo Seco site evaluation.
10. Intake feasibility analysis.
11. Outfall and brine-management analysis.
12. Product-water transmission analysis.
13. Alternatives analysis.
14. Preferred alternative recommendation.
15. Section 428 and 406 scope-separation matrix.
16. Section 406 Hazard Mitigation Proposal.
17. Benefit-cost or cost-effectiveness analysis.
18. Environmental and permitting matrix.
19. Basis of design report.

20. Preliminary engineering report.
21. 30, 60, 90, and 100 percent design documents.
22. Detailed quantity takeoff.
23. Detailed cost estimate.
24. Project schedule.
25. Procurement package.
26. Commissioning plan.
27. Water-quality test results.
28. Capacity performance test.
29. Operator-training documentation.
30. As-built drawings.
31. Operations and maintenance manuals.
32. Project completion report.
33. FEMA closeout documentation.

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18. Preliminary Design Criteria

Design Parameter	Initial Requirement
Net product-water capacity	7.0 MGD
Net product-water flow	Approximately 4,861 gpm
Gross installed capacity	Approximately 7.7–8.4 MGD
Treatment configuration	Modular N+1
Preliminary feedwater requirement	Approximately 9,700–12,200 gpm
Preliminary system recovery	40%–50%
Preliminary concentrate flow	Approximately 4,861–7,292 gpm

Design Parameter	Initial Requirement
Product-water storage	4–24 hours, subject to analysis
Electrical configuration	Redundant service and backup power
Controls	Redundant PLC/SCADA
Structural protection	Wind-, flood-, and corrosion-resistant
Major civil-component design life	Minimum 30 years
Water quality	Based on generation-process requirements
Potential project sites	San Juan or Palo Seco

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19. Preliminary Cost Estimate

The initial ROM cost range for the project is estimated as follows:

Project Alternative	Initial ROM Cost
Expansion at San Juan using viable existing infrastructure	$95M–$125M
New San Juan facility with major intake and outfall construction	$115M–$150M
New Palo Seco facility using available existing infrastructure	$105M–$140M
New Palo Seco facility with new intake, outfall, and storage	$125M–$165M
Distributed system at San Juan and Palo Seco	$135M–$190M

For preliminary FEMA programming, an initial project value of **$135 million** may be used until the site and preferred alternative are selected.

A conceptual cost allocation is:

Cost Component	Initial ROM
Planning, engineering, investigations, and permitting	$9M
Raw-water intake and pump station	$18M

Cost Component	Initial ROM
Pretreatment and ultrafiltration	$20M
RO trains, membranes, and pressure vessels	$28M
High-pressure pumps and energy recovery	$11M
Post-treatment systems	$6M
Product-water storage	$10M
Brine management and outfall	$14M
Electrical systems and backup power	$9M
Controls, SCADA, and cybersecurity	$4M
Civil, structural, and hazard hardening	$8M
Commissioning, training, and startup spares	$3M
Conceptual contingency	$15M
Initial ROM Total	**$155M**

The final estimate will be adjusted based on site selection, preliminary engineering, vendor quotations, environmental requirements, quantities, escalation, and construction phasing.

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20. Section 428 and Section 406 Cost Separation

The cost estimate will clearly separate the following:

Section 428 Base Restoration Costs

- Damage assessment;
- Eligible demolition;
- Repair of damaged components;
- Replacement of damaged components;
- Restoration of predisaster capacity;
- Restoration of predisaster intake;

- Restoration of predisaster discharge;
- Restoration of electrical systems;
- Restoration of controls;
- Eligible code-required work;
- Testing; and
- Commissioning.

Section 406 Hazard Mitigation Costs

- Capacity above predisaster capacity;
- Expansion to 7.0 MGD net;
- Additional treatment trains;
- N+1 redundancy;
- Additional intake capacity;
- Additional pretreatment;
- Expanded brine management;
- Product-water storage;
- Redundant electrical feeders;
- Emergency power;
- Flood protection;
- Wind hardening;
- Corrosion protection;
- Redundant pumps and piping;
- Hardened controls;
- Relocation to Palo Seco, if justified;
- Product-water transmission; and
- Other incremental resilience measures.

A detailed allocation matrix will be developed to allow FEMA to evaluate each component independently.

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21. Mitigation Nexus

Hurricane María damaged and degraded the reverse osmosis and process-water treatment infrastructure supporting critical electric generation.

The disaster demonstrated the vulnerability of the water-treatment function to:

- Hurricane winds;
- Flooding;
- Water intrusion;
- Salt contamination;
- Corrosion;
- Loss of electrical power;
- Loss of controls;
- Loss of pumping;
- Intake failure;
- Extended shutdown; and
- Interruption of the public water supply.

The proposed mitigation measures are directly connected to the damaged water-treatment function.

The project will:

- Restore damaged treatment capability;
- Protect repaired and replacement equipment;
- Increase capacity;
- Provide redundancy;
- Provide storage;
- Provide emergency power;

- Protect electrical and control equipment;
- Improve intake and discharge resilience;
- Reduce reliance on external potable-water supplies; and
- Reduce the likelihood that another disaster or drought will cause a loss of electrical generation.

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22. Cost-Effectiveness

The Applicant will demonstrate the cost-effectiveness of the Section 406 mitigation measures using FEMA-approved methods.

Potential benefits include:

- Avoided replacement-power costs;
- Avoided emergency-generation costs;
- Avoided generation losses;
- Avoided emergency water purchases;
- Avoided water-transportation costs;
- Avoided shutdown and startup costs;
- Avoided damage to generation equipment;
- Avoided load shedding;
- Avoided interruption of critical public services;
- Avoided economic impacts;
- Improved continuity of power generation;
- Reduced recovery time following future disasters; and
- Protection of the federal investment.

The analysis will evaluate the frequency, duration, and consequences of:

- Drought;
- Water rationing;
- Public water-system interruptions;

- Hurricanes;
- Floods;
- Electrical failures;
- Intake failures; and
- Other events capable of interrupting process-water production.

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23. Codes, Standards, and Permits

The project will be designed and constructed in accordance with all applicable eligible codes, standards, and permitting requirements.

These may include:

- Puerto Rico Building Code;
- International Building Code;
- International Existing Building Code;
- International Mechanical Code;
- International Plumbing Code;
- National Electrical Code;
- National Fire Protection Association standards;
- American Society of Civil Engineers standards;
- American Water Works Association standards;
- American Society of Mechanical Engineers standards;
- American Concrete Institute standards;
- American Institute of Steel Construction standards;
- Occupational Safety and Health Administration requirements;
- Environmental Protection Agency requirements;
- National Pollutant Discharge Elimination System requirements;
- Puerto Rico Department of Natural and Environmental Resources requirements;

- Coastal-zone requirements;
- Marine-resource requirements;
- Floodplain requirements;
- Utility requirements; and
- Manufacturer requirements.

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24. Initial Assumptions

This Initial Scope is based on the following assumptions:

1. The existing RO and process-water systems are eligible disaster-damaged facilities.
2. Hurricane María caused physical or disaster-related operational damage.
3. The damaged systems support an eligible public electrical-generation function.
4. The confirmed predisaster capacity is less than 7.0 MGD net.
5. Section 428 will restore the eligible predisaster function and capacity.
6. Section 406 will cover eligible incremental capacity, redundancy, hardening, and resilience measures.
7. The required net product-water capacity is 7.0 MGD.
8. The final product-water quality will be established by generation operations.
9. The project may be constructed at San Juan or Palo Seco.
10. Intake and brine-discharge feasibility must be confirmed before final site selection.
11. Environmental permits and consultations will be required.
12. Product-water transmission may be required depending on the selected location.
13. The project will be designed to maintain critical generation operations during construction.
14. The ROM estimate is conceptual and is not a final FEMA fixed-cost estimate.

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25. Information Required to Finalize the Scope

The following information is required:

- Predisaster RO capacity;
- Current RO capacity;
- Historical water production;
- Water demand by generating unit;
- Product-water quality requirements;
- Original drawings and specifications;
- Equipment inventories;
- Hurricane María photographs;
- Inspection reports;
- Repair records;
- Maintenance records;
- Intake capacity;
- Outfall capacity;
- Environmental permits;
- Electrical one-line diagrams;
- Storage-tank capacities;
- Available land at San Juan;
- Available land at Palo Seco;
- Flood and storm-surge elevations;
- Geotechnical information;
- Marine bathymetry;
- Potential transmission alignments;
- Existing utility conflicts;
- Vendor budget quotations; and
- Information on prior FEMA-funded repairs.

26. Initial FEMA Project Narrative

Hurricane María damaged and degraded the reverse osmosis and process-water treatment infrastructure supporting critical power generation operations in the San Juan metropolitan area.

The water-treatment function is necessary to produce treated process water for generating units and their associated auxiliary systems. The existing treatment systems do not currently provide sufficient capacity, redundancy, or resilience to independently support long-term critical generation requirements.

The generation facilities remain dependent on external water supplies and are vulnerable to drought, reservoir depletion, water rationing, public water-system failures, contamination, hurricanes, electrical outages, flooding, and other emergencies.

An extended loss of process water could force generating units to derate or shut down, causing the loss of critical electrical-generation capacity and potential cascading impacts throughout Puerto Rico.

The Applicant proposes to restore the eligible Hurricane María-damaged water-treatment function under the Section 428 permanent-work project and incorporate Section 406 hazard mitigation measures necessary to increase capacity, reliability, redundancy, and resilience.

The proposed project will provide a minimum net production capacity of **7.0 million gallons per day**, equivalent to approximately **4,861 gallons per minute** of usable treated water.

The project may be constructed at either the San Juan Power Plant or the Palo Seco Power Plant. The final location will be selected through an alternatives analysis evaluating FEMA eligibility, technical feasibility, existing infrastructure, environmental impacts, raw-water intake, brine discharge, electrical service, hazard exposure, water-distribution requirements, construction feasibility, life-cycle cost, and long-term operational resilience.

The proposed facility will include a resilient raw-water intake, advanced pretreatment, modular reverse osmosis trains, N+1 redundancy, energy-recovery systems, product-water storage, redundant transfer pumps, brine-management facilities, emergency electrical power, hardened controls, flood protection, wind protection, and corrosion-resistant materials.

The Section 428 base scope will restore the confirmed predisaster function and capacity of the damaged system.

The Section 406 hazard mitigation scope will provide the eligible incremental work required to increase capacity to 7.0 MGD net, provide redundancy and storage, protect critical

components, reduce dependence on external water supplies, and prevent future loss of electrical generation caused by inadequate process water.

The project will reduce the likelihood of forced generation outages, protect the federal recovery investment, improve emergency operating capability, and strengthen the resilience of Puerto Rico's critical energy infrastructure.

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27. Initial FEMA Scope Statement

The Applicant will perform all planning, engineering, investigation, environmental review, permitting, design, procurement, demolition, construction, installation, testing, startup, commissioning, and project-management activities required to restore the Hurricane María-damaged reverse osmosis and process-water treatment function and construct a resilient water-production facility capable of producing a minimum of **7.0 million gallons per day net**.

The project will be evaluated for construction at either the San Juan Power Plant or the Palo Seco Power Plant.

The Section 428 base scope will restore the damaged water-treatment system to its confirmed eligible predisaster function and capacity.

The Section 406 hazard mitigation scope will include the incremental work required to increase net treatment capacity to 7.0 MGD; provide modular N+1 treatment redundancy; expand or construct raw-water intake systems; provide advanced pretreatment; install reverse osmosis treatment trains; provide energy-recovery systems; construct product-water storage; provide redundant product-water pumping and transmission; expand or construct brine-management systems; provide redundant electrical service and emergency power; harden controls and instrumentation; protect critical equipment from wind, flooding, water intrusion, electrical disturbances, and corrosion; and complete all associated civil, structural, mechanical, electrical, instrumentation, environmental, testing, commissioning, and training work.

The final location, treatment configuration, installed gross capacity, storage capacity, intake flow, concentrate flow, distribution system, project quantities, fixed-cost estimate, and 428/406 cost allocation will be established through the alternatives analysis and preliminary engineering process.