

EXECUTIVE SUMMARY

1.0 Introduction

The mission of the Federal Emergency Management Agency (FEMA) is to reduce the loss of life and property and protect our institutions from all hazards by leading and supporting the nation in a comprehensive, risk-based emergency management program of mitigation, preparedness, response, and recovery. Beginning September 17, 2017, Hurricane Maria caused significant damages to Puerto Rico (“Commonwealth”). President Donald J. Trump issued a disaster declaration for Hurricane Maria on September 20, 2017 encompassing the entire territory. The declaration authorized federal public assistance to affected communities and certain non-profit organizations per FEMA, and in accordance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1974 (42 U.S.C. 5172) as amended; the Sandy Recovery Improvement Act of 2013; and the Bipartisan Budget Act of 2018 (Public Law 115-123). The Central Office of Recovery, Reconstruction and Resiliency (COR3) is the Recipient for FEMA grants and multiple agencies may be subrecipients for specific projects.

This Programmatic Environmental Assessment (PEA) is prepared in accordance with Section 102 of the National Environmental Policy Act (NEPA) of 1969, as amended; and the Regulations for implementation of the NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508). The purpose of this PEA is to consider the potential environmental impacts of potential project alternatives, including a no action alternative, and to determine whether to prepare a Finding of No Significant Impact or an Environmental Impact Statement. In accordance with above referenced regulations and FEMA Directive 108-1 and FEMA Instruction 108-1-1, FEMA, during the decision-making process, evaluates and considers the environmental consequences of major federal actions it funds or undertakes.

If a proposed project meets the scope, impacts, and mitigation covered in this PEA, then FEMA will only prepare a record of environmental consideration (REC) as required, in addition to all applicable federal, state, and local consultations and permits. FEMA will prepare a REC for projects that meet FEMA’s statutory or categorical exclusions that otherwise do not necessitate higher levels of NEPA review. If the scope of an action triggers additional analysis, FEMA will engage in the appropriate analysis or consultation requirement, prepare a REC, a tiered Environmental Assessment (EA), or Supplemental EA (SEA) under this PEA with the additional information.

2.0 Purpose and Need

Hurricane Maria’s wind, rain, and floodwater damaged many of the Commonwealth’s utilities. The purpose of this action is to provide grant funding to restore damaged utilities and increase their resiliency for future weather events. Under the Stafford Act, FEMA has authority to provide funding for cost-effective hazard mitigation and resiliency measures for facilities damaged by Hurricane Maria. Additionally, FEMA is authorized to provide funding to eligible grant Recipients and Subrecipients for cost-effective activities that have the purpose of reducing or eliminating risks to life and property from hazards and their effects. In addition, the Public Assistance Alternate Procedures provided by the Bipartisan Budget Act of 2018, along with Stafford Act sections 404

and 406 hazard mitigation, encourage flexibility in recovery. Geography, climate, and demographic trends have led to the development of a complex infrastructure of utility systems across Puerto Rico. Aging infrastructure, the need for increased capacity, and damage due to disaster events all have the potential to limit the ability of these utility systems to function as designed. Failure of these systems can cause injury, loss of life, and environmental issues. For example, failing transmission lines may start fires or present an electrocution risk, or waste systems may discharge pollutants into waterways. Should utility systems fail, local governments may be unable to provide critical services including fire suppression, emergency communication, power generation, potable water, and wastewater treatment. Additionally, the lack of utilities such as electricity and water can be life-threatening for at-risk populations like the elderly, young, and the sick. In an effort to restore these services and/or mitigate these impacts, federal agencies led by FEMA may provide funds for utility system restoration, replacement, upgrade, expansion, redesign, or relocation.

The need for the action is to re-establish a safe and reliable network of utilities (through repair, replacement, or relocation) in order to reconnect the communities affected by the storm with safe and efficient delivery of energy, water, sewer service, and communications, and help reduce the potential for future damages by upgrading damaged utilities in accordance with current engineering codes and standards. The grant funding is necessary to address these concerns and reduce the damage and disruption caused by future disasters throughout the Commonwealth.

3.0 Description of Alternatives

The action alternatives developed for this PEA are responsive to the Purpose and Need. They were prepared to be technically and economically feasible and are consistent with the objective of improving the resiliency of the Commonwealth's utility networks. Additionally, the alternatives analysis includes a No Action Alternative, also known as the "Future without Federal Project Condition."

3.1 Actions Not Covered as Alternatives

Recipients and Subrecipients of federal grant funding may repair utilities to pre-disaster condition or with minor mitigation upgrades under programs like FEMA's Public Assistance Alternatives Procedures (PAAP) or hazard mitigation grant program (HMGP). Some of these types of projects may fall into a Statutory Exclusion or a Categorical Exclusion (CATEX) under the NEPA Department of Homeland Security, FEMA Directive 108-1, as amended October 2018. FEMA will evaluate these projects accordingly. If projects fall within the allowance of existing FEMA CATEXs, they will not be considered under this PEA and no further NEPA review is necessary resulting in a REC.

FEMA will fully evaluate projects involving major upgrades, expansion, and redesign work in undisturbed areas or that may be too extensive for inclusion under this PEA to determine the appropriate level of NEPA review. FEMA will review projects that include work that exceeds five acres in previously disturbed areas and up to two acres for undisturbed land on a case-by-case basis to determine if they are consistent with this PEA. If the proposed project exceeds these constraints,

FEMA will determine if the project's impacts are in alignment with what has been determined herein and what, if any, additional NEPA documentation is required.

3.2 Alternative 1: No Action Alternative

The Council of Environmental Quality (CEQ) regulations require an environmental analysis of the No Action Alternative to serve as a benchmark against the Action Alternatives. The CEQ defines the No Action Alternative as the environmental baseline conditions that would result if none of the other alternatives occur. Under the No Action Alternative, FEMA would not provide grant funding and the local governments of Puerto Rico would have to fund the projects from other sources.

Selection of the No Action Alternative would simply maintain the existing conditions which would impact the ability of the Recipient and Subrecipient to address its infrastructure needs and mitigate potential hazards. The No Action Alternative would not include additional funding for the repair or replacement of temporary emergency measures. As such, the temporary emergency measures FEMA funded would remain in their current state. The No Action Alternative does not meet the project's purpose and need, or objectives.

3.3 Alternative 2: Repair, Replacement, and Upgrade of Utilities

This Alternative applies to the repair, replacement, and upgrading of an existing utility within a maintained Right of Way (ROW) at an existing location. Standard actions include mobilization, establishment of a staging area, and post-construction site restoration. Construction activities may entail using large cranes, excavators, dump trucks, jackhammers, skid-steer loaders, bulldozers, cement trucks, pickup trucks, and flatbed trucks. Potential actions may involve minor excavations, permanent access roads, placement of concrete footers and pads or fill material, and construction of a new facility at an existing site with ground disturbance up to five acres in previously disturbed areas and two acres in previously undisturbed areas. Non-recyclable waste material disposal will occur at onshore facilities licensed by the Puerto Rico Environmental Quality Board (PREQB) to receive such materials. Existing disturbed sites, such as empty lots or maintained cleared areas, receive preference for staging areas, when available. Temporary staging areas and access roads can be up to five acres for previously disturbed areas that require minimal clearing and up to two acres for undeveloped land requiring clearing, grubbing, or ground disturbance.

Repair, Replacement, and Upgrading of Utility Lines: Principle activities will involve replacing or hardening existing direct-embedded poles with enhanced support such as perimeter injected concrete grout or other soil stabilization methodologies; upgrading damaged poles, structures, insulators and hardware to a higher wind loading standard; strengthening utility poles with guy wires; and installation of underground power lines in select areas prone to damage by high winds. All activities may require maintenance or reconstruction of access to the utility structures if the disturbance is within the geographical thresholds stated above. This Alternative includes equipment upgrades only, not substantial deviations of footprint. Upgrading or rebuilding up to 20 linear miles of pipeline, transmission or distribution line, which may involve minor linear variations to accommodate current codes and standards, if done within the previously developed

road, pipeline, or powerline ROW, and align with current Department of Energy standards. The following are typical activities associated with utility line projects:

- **Utility Pole Installation:** New monopoles will be either pre-stress spun concrete poles or steel poles as required by current codes and standards to provide strength, durability, and long service life. Fiber optic lines may replace overhead ground wires or otherwise installed on electrical infrastructure along with their corresponding splice boxes. The installation of utility poles may require minor excavation of soil as poles will most likely involve placement in holes augured by auger rig equipment. Large steel monopoles will require concrete pours to anchor the base below ground as well as a concrete pad surrounding the base at ground level. The typical depth of utility pole installation may vary between 5 and 14 feet below land surface (PREPA 2000).
- **Trench Installation:** The placement of utilities and other utility-related equipment in trenches may require the excavation of soil and pavement. The Recipients and Subrecipients will install underground lines in trenches. Based on Puerto Rico Electric Power Authority (PREPA's) typical design standards for buried utilities, trenches may extend to depths up to 55 inches below ground surface with widths of approximately 12 inches (PREPA 2000). Upon placement of the utilities in the trenches, the contractor will backfill the excavated material over the utilities unless otherwise directed by licensed engineers. Associated actions may involve the maintenance of vegetation.
- **Directionally-Drilled Installations:** Directional drilling methods utilize steerable drilling systems to install both small and large diameter lines. Typical hole diameter is between 1 inch to 5 inches along the proposed design centerline. Boring depths will be dependent on-site conditions.

PREPA has standard design requirements for overhead transmission, distribution lines, and underground transmission lines. The applicable ROW standard for overhead utilities involving the primary and secondary distribution of power is 10 feet. For the overhead transmission of power, the ROW width depends on the voltage of power transmitted and if the project is in a rural or urban area. The applicable ROW standards for overhead transmission of power are as follows:

- For ROW widths involving the transmission of 38 kilovolts (kV), the applicable standard is 25 feet in urban areas and 50 feet in rural area;
- ROW widths involving the transmission of 115 kV, the standard ranges from 30 to 40 feet in urban areas and 100 feet in rural areas;
- For ROW widths involving the transmission of 230 kV, the standard ranges from 40 to 60 feet in urban areas and 100 feet in rural areas; and
- Finally, ROW width standards for 345 kV is 50 to 70 feet for urban areas and 100 to 200 feet in rural areas (PREPA 2007).
- For the underground transmission of power, the ROW's vary between 20 feet for the lower voltages and 50 feet for the highest voltages (PREPA 2007).

Hazard Mitigation for Power Generation and Substations: Critical components of power generating stations, such as turbines and boilers are often located outside structures and in areas susceptible to weather, salt mist, and flooding. Power substations usually are comprised of a fenced outdoor yard containing switches, transformers, circuit breakers, capacity banks, control buildings, and other appurtenances. Standard activities include mobilization, establishment of a staging area, waste disposal, and post construction site restoration. Project areas clearing of vegetation and rock, graded, graveled, and fencing will occur. The site clearing and grading would occur prior to building new infrastructure. The gravel source would be from a local gravel quarry within the Commonwealth of Puerto Rico. The following are typical activities associated with the hardening of facilities that contain power generation or transmission and distribution:

- **Installation of Flood Barriers:** Associated activities will include installation of perimeter flood walls which may be comprised of either wire mesh-lined flood barriers or concrete walls. Associated actions may include the design of flood barriers using federal and local flood modeling.
- **Installation of High Capacity Pumps:** Complete with elevated backup generators; installation of redundant power sources, including onsite elevated stand-by generation; and elevation of structures that may house various components of the power generation system or substation.
- **Reconstruction of communication systems:** Reconstruction of existing communication towers, access, sites, and control buildings, installation of fiber optic cable either on overhead utility structures or underground.

Replacement of Stormwater, Potable Water, and Wastewater Systems: Upgrades to potable water and wastewater systems will involve open cut trenching and replacement of existing pipes with right-sized piping that meets current codes and standards. Associated activities may involve establishment of staging areas; removal of piping and pumps; installation of piping and pumps; and the disposal of old piping, broken pavements, and old pumps. Stormwater systems would include conduits, canals, water overflow ponds, trenches, and gutters, manholes, grates, and other appurtenances. Site work may include surface grading, conduit replacements, trenching, concrete applications, cutting and resurfacing of pavement or curb and gutter, and hardware placement.

Standard activities include mobilization, establishment of a staging area, waste disposal, and post-construction site restoration. Associated activities include electrical work and plumbing. The following are projects classes typical of Stormwater, Potable and Wastewater Conveyances:

- **Sewer System:** The installation specifications for modern sewer systems rely upon pipelines referred to as force mains and operate by a series of pumps and lift station. The diameter of pipes used in the construction of force mains are typically between 2 and 36 inches. Although force main pipes installation is just below the land surface, trench dimensions will be dependent on pipe diameter and site conditions (USEPA 2000).
- **Potable Water:** Potable water lines are determined by site conditions and standards and codes. Potable water lines can vary greatly with typical lines being between a ½ inch and 12 inches. The installation of potable water pipes requires the excavation of trenches 2

meters wider than the diameter of the pipe (PRASA 1975). Typically trench depth will be dependent on pipe size and site conditions as well as the anticipated loads on the pipe and the material constituent of that pipe. In areas where trucks are likely to drive over the system, the trench may have to be deeper or the pipe constructed out of more durable material.

- **Stormwater:** Upon reaching the main storm drainage system, stormwater conveyance is along and through the ROW to its discharge point via storm drains connected by access holes or other access structures. Some situations require stormwater pump stations also be a part of the conveyance system and temporary holding ponds to receive excessive water during an event. The installation of stormwater pipes requires the excavation of trenches 2 meters wider than the diameter of the pipe (PRASA 1975). Stormwater pipes can vary between 4 and 60 inches in size. Trench depth would be dependent on pipe size, material, and site conditions. In areas where trucks are likely to drive over the system, the trench depth may be deeper, or the pipe constructed out of more durable material.

Pump Stations and Wastewater Treatment Facilities: Wastewater systems include collection sewers, pump stations and treatment facilities. This PEA considers ground disturbance for pump stations and treatment facilities up to five acres. There are two basic stages in the treatment of wastes, primary and secondary, outlined here. In the primary stage, solids are allowed to settle and removed from wastewater. The secondary stage uses biological and chemical processes to further treat wastewater. The primary activity will be the upgrading of pumps and associated piping. The following are typical scopes of work for projects occurring at pump stations and wastewater treatment facilities:

- **Replacement of Pumps and Associated Piping:** This activity will include the removal and disposal of old pumps and piping, installation of pumps and piping that meet current codes and standards, installation of electrical and control systems, and backup power supplies.
- **Upgrade of Primary and Secondary Treatment:** This includes the addition of advanced treatment techniques that would allow treatment of effluent used in industrial, agricultural, and recreational purposes, and for drinking water.
- **Facility Hardening:** Associated activities will involve raising equipment to elevation above the floodplain, installing backup power supply, flood prevention barriers, and flood proofing existing buildings.

3.4 Alternative 3: Realignment or Relocation of Utilities

This Alternative includes utility realignment or relocation according to the needs of subrecipients and engineering recommendations. This may involve relocation of utilities up to 200 feet from an existing ROW; FEMA will evaluate to determine if greater distances are consistent with this PEA on a case-by-case basis. Relocated utilities may be either abandoned in place or removed and disposed in accordance with applicable laws. All relocated lines will connect to points along the existing system. The specific activities, disposal, staging, and acreage limits discussed in Alternative 2 apply to this Alternative as well.

Realigned or Relocated Linear Utilities: Standard activities include mobilization, establishment of a staging area, waste disposal, and post-construction site restoration. Principle activities will involve installing new utility poles, conductors, or conduit routing. For utility lines servicing critical facilities or in high wind-prone areas, power lines and fiber optic lines may include underground installation. The PREPA standard designs discussed in Alternative 2 will also apply to this Alternative. Permanent single-site work (such as substations), temporary access, and staging areas may have ground disturbance up to five acres in previously disturbed areas and two acres in previously undisturbed areas. The typical activities associated with utility line projects would be the same as described for Alternative 2 except that construction of pipelines or electric powerlines approximately 10 miles in length or less.

Realigned or Relocated Wastewater, Potable water, and Stormwater Systems: Standard practices will involve the realignment and relocation of wastewater, potable, and stormwater systems. The principle activities will involve open cut trenching for the placement of utilities that meets current codes and standards. Standard construction practices will include project mobilization, establishment of a staging area, waste disposal, and post construction site restoration. Typical site work will involve surface grading, conduit placements, electrical work, plumbing, trenching, concrete and pavement applications, and hardware placement. The typical activities associated with wastewater, potable, and stormwater projects are the same as described in Alternative 2.

Power Generation: The primary activity will be the installation of on-site supplemental generation at critical facilities. On-site backup generation may involve combined heat and power systems, rooftop solar, fossil fuel powered standby generators, battery storage, and building energy management systems. Associated actions will involve the construction of on-site fuel storage, installation of transmission and distribution lines, and construction of substations or switch stations. Typical construction practices include minor excavations, placement of concrete footers and pads or fill material, grounding mats, and construction of new facilities at an existing site. This PEA does not include construction of new utility-scale generation such as power plants, or wind or solar farms that market and distribute power to the system. The following are typical activities associated with the types of supplemental power generation projects covered by this Alternative:

- **Solar Photovoltaic (PV):** Projects that involve the development of solar PV systems will include the installation of solar panels, battery storage, feeder automation control systems, load control equipment, and similar technologies. Solar PV array installation will be on stable, durable structures that can support the array and withstand wind, rain, hail, and corrosion. Battery storage of solar PV energy will be in a facility located outside of or protected from the flood zone.
- **Standby Generators:** Fossil fuel-powered generators will be located within the boundaries of existing facilities. The addition of new standby generators will require new electrical systems and controls. The type of concrete foundation would depend on the facility and generator specifications, as well as the bearing capacity of underlying soils and would include piles, pile caps and elevated slabs. Design and construction criteria will be based on recommendations from licensed professionals. New standby generators support may require existing utility repair, replacement, or rerouting.

- **Conversion of Fuel Source:** This PEA allows for small non-power marketing plants the conversion from diesel to natural gas is a common practice that requires the reconfiguration of the generator's mechanics. The intention of this PEA is not for conversion of large public market supply power plants from coal to natural gas or other similar actions. Associated actions permissible under this PEA include installing structures that can contain the fuel source and piping that extends from the storage container to the generator. Altering the mechanics, of the system may require additional modifications to the system controls.

Pump Stations and Wastewater Treatment Facilities: The primary activity will be the installation of new pumps, piping, electrical, control systems, and backup power sources for pump stations and wastewater treatment facilities. Potential actions include minor excavations; placement of concrete footers, pads, or fill material; and the construction of new on-site facilities. The following are typical activities associated with pump station and wastewater treatment facilities:

- **Installation of Pumps and Associated Piping:** The primary activity will be installing new pumps and piping per codes and standards. Pump and pipe size will be based on recommendations from licensed engineers. Installation of electrical and control systems including a backup power source. Associated activities would include installing a primary and backup power source. Standby power may require the installation of an above ground storage tank to for the purpose of storing fuel.
- **Construction of Enclosures:** New structures to accommodate the required system controls, pumps are likely to be in new separate, standalone buildings; however, some existing building layouts may offer enough space to accommodate the new systems. Building sizes would vary by individual developments but would likely be between 250 and 2000 square feet. It is possible that some facilities may have to exceed 2000 square feet. Newly constructed facilities will be outside of the flood zone or protected to similar standards.
- **Facility Hardening:** Associated activities will involve raising equipment to elevation above the floodplain, installing backup power supply, flood prevention barriers, and flood proofing existing buildings.

3.5 Alternative 4: Combination of the Alternatives

This Alternative includes some combination of the No Action, Replacement, and/or Relocation alternatives. Individual utility segments can remain in their existing location and condition, if FEMA and the Recipients and Subrecipients determine that No Action is the safest, most cost-effective alternative. Some projects, depending on scope of work, may require replacement or relocation of contiguous portions of the utility to mitigate risk and restore infrastructure. This Alternative is for the purpose of providing the post-disaster recovery effort with flexibility in the planning and decision-making process to address such contingencies.

4.0 Description of Evaluated Resources

Geology, Topography, and Soils: The principal physiographic feature of Puerto Rico is the Cordillera Central and the Sierra de Cayey, which form a continuous mountain range extending in an east-west direction nearly the entire length of the island. Farmland Protection Policy Act (FPPA) of 1981 (7 U.S.C. § 4201 et seq.) protects prime and unique farmlands and farmlands of state and local importance from conversion to non-agricultural uses. Prime farmland is land with the best physical and chemical characteristics for the production of food, feed, forage, fiber and oilseed crops. Prime farmland is either used for food or fiber crops or is available for those crops; it is not urban, built-up land, or water areas.

There may be soil disturbance and changes to topography; however, FEMA anticipates that these impacts will be less than major. FEMA anticipates that Alternatives 2 and 3 will have minor, long-term impacts on geology and soils, negligible to minor, long-term impacts on prime or important farmland, and no impacts to seismicity should occur. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Air Quality: The Clean Air Act of 1970 (42 USC 7401–7661 [2009]) is a comprehensive federal law that regulates air emissions from area, stationary, and mobile sources. The act authorized the US Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards to protect public health and the environment. The Clean Air Act’s criteria pollutants include carbon monoxide, lead, nitrogen oxides, ozone, particulate matter, and sulfur dioxide. As of March 21, 2019, the USEPA’s Green Book lists Puerto Rico for nonattainment of two criteria pollutants, lead and sulfur dioxide. Construction activity would be temporary and, by implementing best management practices (BMPs), impacts on air quality would be negligible to minor. The removal or relocation of utility infrastructure would likely cause a short-term increase in fugitive dust and vehicular emissions; however, mitigation measures such as dust suppression techniques and worker transportation plans would limit adverse impacts during construction activities. Long-term adverse impacts would be negligible to minor. Beneficial impacts may occur as less efficient equipment is replaced.

Water Quality/Water Resources: Puerto Rico has considerable variability in water resources due to geology, hydrology, and topography. The U.S. Geological Survey classifies approximately 3,500 sq. km of hydrogeologic units within the Commonwealth as intergranular or fissured. These hydrogeologic units form the principal aquifer systems throughout Puerto Rico and the outlying islands.

The designated Wild and Scenic Rivers in Puerto Rico include the Rio Mameyes, Río de la Mina, and a section of the Río Icacos. These three rivers are located within the El Yunque National Forest. Any relocation or construction utilities in El Yunque National Forest would require an additional analysis under NEPA beyond this PEA. Such an analysis would involve the U.S. Department of Agriculture, U.S. Forest Service’s participation. However, some relocation actions may occur under this PEA without additional NEPA analysis, if proper coordination and consultations occur.

During construction, negligible to minor adverse short-term impacts to water quality may occur through the transmission of sediment, debris, oils, and hazardous substances into surface waters from runoff and sedimentation. Alternative 2 may have adverse negligible long-term impacts to water quality and water resources. Additional compaction of soils or the installation of new impervious surfaces may impact groundwater recharge.

The process of relocating utilities within a new or expanded ROW as part of Alternative 3 would have similar impacts as those described for Alternative 2. Alternative 3 may have negligible to minor direct or indirect impacts on water resources, including wetlands and waterways. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Wetlands: Wetlands are areas saturated or inundated by surface or ground water with a frequency enough to support, or that under normal hydrological conditions does or would support, a prevalence of vegetation or aquatic life typically adapted for these soil conditions. Puerto Rico's wetlands are diverse, consisting of coastal and inland forested and herbaceous communities. For instance, the Commonwealths currently maintains 16,556 acres or 6,700 hectares of mangroves and 741 acres or 300 hectares of bloodwood swamps also known as *Pterocarpus* forests. EO 11990 Wetlands Management requires federal agencies to avoid funding activities that directly or indirectly support occupancy, modification, or development of wetlands, whenever there are practicable alternatives. FEMA uses the 8-Step Decision-Making Process to evaluate potential effects on, and mitigate impacts to, wetlands in compliance with EO 11990. FEMA anticipates short-term and long-term negligible to minor direct and indirect impacts on wetlands, streams, and other waters of the U.S. from the Action Alternatives. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Floodplain: The EO for Floodplain Management 11988 requires federal agencies to avoid, to the extent possible, long-term and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development, wherever there is a practicable alternative. FEMA uses the 8-Step Decision-Making Process to evaluate potential effects on, and mitigate impacts to, floodplains in compliance with EO 11988. Following Hurricane Maria, floodplain FIRM maps for the Commonwealth were re-evaluated and re-mapped based on high-water-marks from the storms.

Alternative 2 would have short-term, negligible impacts on floodplains, and floodways due to the type of actions covered by this PEA, mitigation measures, and requirements to comply with local and federal permits and procedures. The process of relocating utilities within a new or expanded ROW under Alternative 3 would have similar impacts and mitigation measures as those described for Alternative 2. However, the process of expanding a ROW and the removal and disposal of out-of-service utilities may require a larger construction area. As a result, floodplains may have short-term and long-term minor impacts from this Alternative. If the increase in footprint results in added impervious areas or trenching for new placement of underground utilities, the nearby floodplains could experience long-term, adverse minor impacts. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Coastal Resources: Pursuant to the Coastal Zone Management Act of 1972, as amended, the Commonwealth of Puerto Rico has a federally approved Coastal Management Plan. The Puerto Rico Coastal Zone Management Program defines the coastal zone as the strip of land extending 1,000 meters landward from the coastline, as well as additional distances necessary to include key natural systems such as rivers streams, wetlands, or other areas influenced by the tide. The Coastal Barrier Resources Act (CBRA) of 1982 created designated areas under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) that are ineligible for both direct and indirect federal expenditures without consultation from USFWS. There are 8,431 hectares classified as coastal barriers, located primarily in the south and northeast portions of the Commonwealth. There are 70 Coastal Barrier Resources System (CBRS) units: 41 federally protected CBRS units and an additional 29 Otherwise Protected Areas.

For Alternatives 2 and Alternatives 3, FEMA anticipates short-term and long-term negligible to minor adverse impacts to the CZMA. Based on this PEA's geographical constraints, there will be no direct impacts to resources covered under CBRA Alternative 2 and Alternative 3 activities. For projects that have the potential to indirectly impact Other Protected Areas and CBRS units, FEMA will review each project location on a case-by-case basis to determine eligibility in coordination with USFWS. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Vegetation: EO 13112, Invasive Species, states that an invasive organism is a species that grows or spreads aggressively in its new environment and causes environmental and/or economic harm. EO 13112, enacted February 3, 1999, was issued to prevent the introduction of invasive plant and animal species, providing resources for their control, and diminishing their main economic and ecological impact. Within the Commonwealth of Puerto Rico, there are 3,500 vascular plant species. These species include flowering plants, gymnosperms, ferns, and allies. As of 2017, local reports indicate that over 1,000 non-native plants exist in Puerto Rico. Invasive and exotic plants represent about a third of total plant diversity on the islands.

Alternative 2 would likely result in short-term negligible impacts to terrestrial vegetation during construction activities. However, mitigation of impacts would occur through permit requirements and BMPs. FEMA anticipates Alternative 3 would have effects similar to those discussed under Alternative 2; however, the relocation and realignment of utilities may result in minor impacts to vegetation. FEMA anticipates no long-term, adverse impacts; however, beneficial impacts to vegetation may occur in the long-term as native species become established. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Wildlife and Fish: Puerto Rico hosts about 5,847 native species of fish, mammals, birds, reptiles, insects, and amphibians. Of the 5,847-animals, there are seven native freshwater fish, 15 terrestrial and marine mammals, 190 birds, 51 reptiles, and 18 amphibians. The Draft Comprehensive Wildlife Plan revisions of 2017 shows some slightly different data, stating there are 15 mammals, nine native freshwater fish, 190 birds, 54 reptiles, 19 amphibians, and 5,573 insects (PRDENR 2017).

Alternative 2 would likely result in adverse short-term, negligible to minor impacts to wildlife habitat from construction activities. Similarly, FEMA anticipates that Alternative 3 would also

result in adverse short-term, negligible to minor impacts to wildlife habitat during construction activities. As some Alternative 3 actions would result in the permanent conversion of land, these activities would likely result in direct adverse long-term negligible to minor impacts to wildlife and fish habitat. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Threatened and Endangered Species: The Endangered Species Act (ESA) of 1973 provides a program for the conservation of threatened and endangered (T&E) plants and animals and their habitats. The lead federal agencies for implementing ESA are the USFWS and the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS). Protected and sensitive biological resources include federally listed T&E species as well as, proposed and candidate species designated by the USFWS and NMFS. Sensitive habitats include those areas designated by the USFWS as critical habitat protected by the ESA and sensitive ecological areas as designated by Commonwealth or federal rulings. Designated critical habitat is a term defined and used in the ESA that outlines specific geographic areas that contain features essential to the conservation of a T&E species and that may require special management and protection.

Based on this PEA's project thresholds, federal ESA consultation process, conservation measures, and NPDES permitting requirements, Alternative 2 may have an adverse, negligible to minor short-term and long-term impact on T&E species covered under the ESA. Alternative 3 actions, such as the construction phase, permanent conversion of land, and operations of new systems, would constitute short-term and long-term adverse negligible to minor impacts under the ESA. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Cultural and Archeological Resources: Puerto Rico's overall viewshed is dominated by urban development, coastline, and mountains. The Cordillera Central (Central Mountain Range) spans the island from east to west and separates the more arid south from the more tropical north. At its highest point (Cerro De Punta), the mountains reach 4,390 ft. Ruta Panorámica is a 165 mile stretch of highway running roughly east-west through the Central Mountain Range, connecting ridgelines, towns, and natural reserves. Other visual resources include elements incorporated into this PEA, including vast cultural and historic resources dating from pre-colonial Taíno carvings, Spanish Colonial forts, and historic districts.

There are approximately 2,500 archaeological sites reported for Puerto Rico in the State Historic Preservation Office (SHPO) and the Institute for Puerto Rican Culture, with similar settlement patterns characteristic of Caribbean geography, which are defined by the geographical areas where they are located. Typical areas where ancient human settlements were located are very similar to the currently inhabited areas. FEMA has a Second Amendment Programmatic Agreement, dated November 13, 2019 (FEMA-Puerto Rico SHPO Programmatic Agreement for Section 106 Review, May 2016, Amended April 2018), with SHPO to fulfill its responsibilities for Section 106 under NHPA. Through consultation and mitigation, the Action Alternatives may have a negligible to moderate impact on historic structures. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Environmental Justice: EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. FEMA anticipates jobs related to the recovery are likely to be available for all education and skill levels. The increase in construction jobs would be a short-term benefit in nature and upon completion of the recovery projects, employment conditions would likely return to a pre-disaster state. As such, FEMA anticipates an increase in construction jobs from the post-Hurricane Maria recovery would likely have a less than major beneficial impact on Puerto Rico's economy. The benefits of resiliency improvements would be long-term and depending on existing conditions could have a range of beneficial impacts from minor to moderate depending on the action's effects. Short-term negligible to minor adverse impacts to effected populations may occur during construction due to service interruption, road detours, and building construction. At the programmatic level, short-term minor adverse impacts may occur at any applicable location within the Commonwealth. Alternative 2 would not disproportionately single out low income or minority populations for adverse impacts from the construction of proposed actions due to the extent of the damage. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Land Use and Planning: Comprehensive land use plans in Puerto Rico determine land use within the vicinity of urban and rural areas, in addition to the specification of the types of present and future land use. FEMA anticipates Under Alternative 2, the replacement of existing utilities would be in-kind, although with minor upgrades possible. During construction, temporary staging areas and access roads would have an adverse short-term, minor impact on land use. Some projects; however, may require small portions of new ROW due to upgrades. This may lead to adverse negligible to minor long-term changes in land use. Alternative 3 would have an adverse short-term, minor impact on land use from the installation of new utilities. The occupation of new ROWs and project areas may cause adverse long-term, minor impacts to land use as restrictions on future development would likely exist. Additionally, FEMA anticipates that the removal of utilities would cause an adverse negligible to minor long-term impact on the former locations of relocated utilities. In some cases, the action would essentially revert the land to previous uses or the Recipient and Subrecipient may be able to be reuse the parcels for other industrial purposes. In both cases, the Commonwealth could derive negligible, long-term benefits from the actions. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Noise: The PREQB regulates noise pollution in Puerto Rico under the Noise Pollution Control Regulation 2011. Noise from the construction of the Action Alternatives may have adverse short term, minor impacts on persons who live and work nearby. FEMA anticipates no long-term adverse impacts from noise to local populations. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Transportation: Puerto Rico administers the Commonwealth's transportation assets through the Department of Transportation and Public Works (PRDTOP). The PRDTOP is comprised of the Puerto Rico Highway and Transportation Authority (PRHTA), the Puerto Rico Port Authority, the Maritime Transport Authority, and the Metropolitan Bus Authority. The PRHTA is a government-

owned corporation charged with constructing, operating, and maintaining roads, bridges, avenues, highways, tunnels, public parking, tolls, and other transit facilities within the Commonwealth.

During the construction phase of utility projects, FEMA anticipates short-term, minor impacts to transportation facilities from Alternatives 2 and 3 proposed actions. This would occur in areas where there is a nexus between utilities or proposed utilities and transportation infrastructure. Alternative 3 proposed actions may cause adverse, long-term negligible to minor impacts to the Commonwealth's transportation network. The impact would be associated with future repairs of utilities in areas where none had previously existed. The action alternatives would result in Puerto Rico's utilities and their supporting infrastructure becoming more resilient and less likely to experience substantial damage from future events. Beneficial impacts would result from utilities being more resilient and less likely to cause disruptions to the Commonwealth's transportation network. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Public Services and Utilities: Public services and utilities serve all aspects of the Commonwealth's social infrastructure which includes facilities and institutions such as emergency services, schools, and hospitals. Alternatives 2 and 3 may result in delays or interruptions to utilities during their repair, upgrade, replacement, and relocation. Alternatives 2 and 3 may cause an adverse short-term, minor impact to public services located within the project area. Temporary road closures would cause short-term, minor impacts. FEMA anticipates that Alternative 2 would have no adverse, long-term impacts to public services and utilities, as well as, the communities they support. The Action Alternatives would have long-term beneficial impacts, such as, a more reliable and resilient utilities infrastructure, utilities being up to current codes, and hardened against future disasters. FEMA anticipates that the Commonwealth would experience long-term, negligible beneficial impacts resulting from improving the energy efficiency of their utility networks. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Public Health and Safety: Within the Commonwealth of Puerto Rico, the primary protective and health services include fire protection, law enforcement, and medical emergency services. With regards to worker safety, the U.S. Congress enacted the Occupational Safety and Health Act (OSHA) of 1970, 29 U.S.C. § 651 et seq. (OSHA) to assure safe and healthful working conditions for working men and women. Potential adverse impacts to worker safety would be short-term and minor. During the construction phase, utility interruption could cause minor potential delays in fire, emergency, and law enforcement services. The disruptions in service from upgrading utilities would cause only short-term, negligible to minor adverse impacts. FEMA anticipates that the results of Alternatives 2 and 3 actions would cause no adverse, long-term impacts to the administration of public health and safety services. The Commonwealth's residents may experience long-term benefits to their health and safety from the application of more resilient utilities. Based on the current situation of Puerto Rico's utility networks, this would result in long-term benefits to the health and safety of Puerto Rico's communities. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Hazardous Materials: Hazardous substances and/or materials includes any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that pose a substantial present

or potential hazard to human health and the environment. Safety and occupational health issues include exposure to natural hazards, single and long-term exposure to asbestos, lead, radiation, chemicals, and other hazardous materials; and injuries or deaths resulting from a one-time accident.

For the Action Alternatives, FEMA anticipates that the use of new materials that are up to current codes and standards, properly trained and equipped personnel, PREQB-licensed disposal facilities, and development of SPCC plans, would minimize both adverse short-term and long-term impacts to human health and the environment to a level of less than major. Short and long-term beneficial impacts to the environment and human health would come from the removal of old equipment that could potentially leak hazardous materials. If the Recipient and Subrecipient encounter soil and water contaminated medium, additional beneficial impacts would come from the treatment and removal of the contaminated material from the environment. The potential impacts of Alternative 4 would be similar to the impacts identified in Alternatives 2 and 3.

Cumulative Impacts: According to CEQ regulations, cumulative impacts represent the “impact on the environment which results from the incremental impacts of the action(s) when added to other past, present, and reasonably foreseeable future actions, regardless of what federal and non-federal agencies or person undertakes such other actions. FEMA anticipates that the Action Alternatives in this PEA would not result in major cumulative impacts since FEMA is funding actions that involve the repair, replacement, or rehabilitation of projects that are similar in function, size, and locality to the existing systems.

5.0 Permits and Conditions

The Recipient and Subrecipient are responsible for obtaining all applicable Federal, State, and local permits, and other authorizations for project implementation prior to construction and adherence to all permit conditions. Any substantive change to the approved scope of work will require re-evaluations by FEMA for compliance with NEPA, other associated laws, and EOs. The Subrecipient must also adhere to the BMPs presented herein. Failure to comply with grant conditions may jeopardize Federal funding. The PEA contains a list of 17 Conditions. The Conditions, which the Recipients and Subrecipients would be responsible for adhering to, would require projects to avoid, minimize, or mitigate project impacts to below a level of major, as assessed under NEPA by FEMA, and are a condition of funding.