NFEnergía LLC

San Juan Micro-Fuel Handling Facility

Resource Report 6
Geological Resources

Docket No.
CP21-___-000

September 15, 2021

NFEnergía LLC
SAN JUAN MICRO-FUEL HANDLING FACILITY
RESOURCE REPORT 6—GEOLOGICAL RESOURCES

Minimum Filing Requirements for Environmental Reports:	**Addressed in Section:**
1. Describe, by milepost, mineral resources that are currently or potentially exploitable—Title 18 Code of Federal Regulations ("CFR") part (§) 380.12 (h)(1).	Section 6.3
2. Describe, by milepost, existing and potential geological hazards and areas of nonroutine geotechnical concern, such as high seismicity areas, active faults, and areas susceptible to soil liquefaction; planned, active, and abandoned mines; karst terrain; and areas of potential ground failure, such as subsidence, slumping, and landsliding. Discuss the hazards posed to the facility from each one—18 CFR § 380.12 (h)(2).	Section 6.4
3. Describe how the project would be located or designed to avoid or minimize adverse effects to the resources or risk to itself, including geotechnical investigations and monitoring that would be conducted before, during, and after construction. Discuss also the potential for blasting to affect structures, and the measures to be taken to remedy such effects—18 CFR § 380.12 (h)(3).	Not Applicable, however blasting is addressed in section 6.5
4. Specify methods to be used to prevent project-induced contamination from surface mines or from mine tailings along the right-of-way and whether the project would hinder mine reclamation or expansion efforts—18 CFR § 380.12 (h)(4).	Not Applicable (see section 6.3)
5. If the application involves a liquefied natural gas facility located in zones 2, 3, or 4 of the Uniform Building Code's Seismic Risk Map, or where there is potential for surface faulting or liquefaction, prepare a report on earthquake hazards and engineering in conformance with "Data Requirements for the Seismic Review of liquefied natural gas facilities." National Bureau of Standards Information Report 84-2833. This document may be obtained from the Commission staff—18 CFR § 380.12 (h)(5).	Section 6.4.1 and Resource Report 13
6. If the application is for underground storage facilities: (i) Describe how the applicant would control and monitor the drilling activity of others within the field and buffer zone; (ii) Describe how the applicant would monitor potential effects of the operation of adjacent storage or production facilities on the proposed facility, and vice versa; (iii) Describe measures taken to locate and determine the condition of old wells within the field and buffer zone and how the applicant would reduce risk from failure of known an undiscovered wells; and (iv) Identify and discuss safety and environmental safeguards required by state and federal drilling regulations. 18 CFR § 380.12 (h)(6).	Not Applicable

NFEnergía LLC
SAN JUAN MICRO-FUEL HANDLING FACILITY
RESOURCE REPORT 6—GEOLOGICAL RESOURCES

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ACRONYMS AND ABBREVIATIONS

FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
g	gravity (peak ground acceleration)
km	kilometer
LNG	liquefied natural gas
MFH Facility	Micro-Fuel Handling Facility
mph	miles per hour
Mw	moment magnitude
NFEnergía	NFEnergía LLC
NOAA	National Oceanic and Atmospheric Administration
PGA	peak ground acceleration
PREPA	Puerto Rico Electric Power Authority
PRSMP	Puerto Rico Strong Motion Program
USGS	United States Geological Survey

NFEnergía LLC
SAN JUAN MICRO-FUEL HANDLING FACILITY
RESOURCE REPORT 6—GEOLOGICAL RESOURCES

6.0 RESOURCE REPORT 6—GEOLOGICAL RESOURCES

6.1 Introduction

NFEnergía LLC ("NFEnergía") is seeking authorization from the Federal Energy Regulatory Commission ("FERC") under Section 3 of the Natural Gas Act to continue operating the San Juan Micro-Fuel Handling Facility ("MFH Facility"), a liquefied natural gas ("LNG") import and regasification facility. The MFH Facility is located on approximately 6.1 paved and fenced acres of an industrial area at Wharves A and B of the Puerto de San Juan (Port of San Juan), Puerto Rico, which is situated among existing industrial uses in the north of Puerto Rico where it can supply power generation sources serving nearby load centers using minimal additional infrastructure. To operate the MFH Facility, "pocket-sized" LNG vessels (also called "shuttle vessels") bring LNG into the San Juan Harbor where the LNG is transferred from the shuttle vessel to a non-jurisdictional floating storage unit vessel that is semi-permanently moored adjacent to the MFH Facility site. The floating storage unit transfers LNG onshore where certain quantities remain liquefied and are transloaded onto trucks for over-the-road delivery to end users and certain quantities are regasified and made available to Units 5 and 6 of the adjacent San Juan Power Plant via a 75-foot long, 10-inch diameter segment of power plant piping. The MFH Facility has a regasification capacity of 130 million standard cubic feet per day and a truck loading capacity of 87.52 million standard cubic feet per day.

NFEnergía initially developed the MFH Facility to serve its commercial customers via a truck loading operation for distribution of LNG for regasification and use at behind-the-fence power generation facilities across Puerto Rico—typically multinational companies with manufacturing operations. In July 2018, Puerto Rico Electric Power Authority ("PREPA") issued a request for proposals to retrofit Units 5 and 6 of the San Juan Power Plant to enable dual-fuel capability and to supply PREPA with natural gas. NFEnergía participated in that competitive process and was chosen as the successful bidder. PREPA and NFEnergía entered into a contract to effectuate the award in March 2019 and the MFH Facility began operating in March 2020 and became fully operational in May 2020.

FERC's National Environmental Policy Act review process requires that an applicant submit an Environmental Report consisting of up to 13 individual resource reports. This resource report is consistent with and meets or exceeds all applicable FERC filing requirements. A checklist showing the status of FERC's filing requirements for Resource Report 6 (18 Code of Federal Regulations § 380.12) is included before the table of contents.

Resource Report 6 describes the geologic setting of the MFH Facility, potential mineral resources within the area, and geologic hazards that may affect operation of the MFH Facility. Measures to avoid or mitigate potential geological hazards and mineral resource impacts are also discussed. Other areas of consideration include paleontological resources and whether or not blasting would be required during the operation of the MFH Facility.

6.2 Geologic Setting

6.2.1 Regional Geology

Puerto Rico, the easternmost island of the Greater Antilles, is bounded on the north by the Puerto Rico Trench, on the south by the Muertos Trough, on the east by the Anegada Passage, and on the west by the Mona Canyon (United States Geological Survey ["USGS"], 1998).

Puerto Rico and its outlying islands are part of an island arc that largely consists of faulted and folded volcaniclastic and sedimentary rocks that have been locally intruded by igneous rocks. These rocks generally range in age from Cretaceous to Eocene, although some rocks of Early Cretaceous-Jurassic age are present in southwestern Puerto Rico. The volcaniclastic rocks form the mountainous and highly irregular central core of the island. Sedimentary rocks, which are mostly limestones of Oligocene to Pliocene age, overlie the volcaniclastic and sedimentary rocks in isolated areas. Thick alluvial deposits of Quaternary age, formed of material eroded from the volcaniclastic and sedimentary rocks, are along many stream valleys, especially in coastal areas. Widespread unconsolidated deposits that consist of coalescing alluvial fans or fan deltas, dune and beach deposits, marine terrace deposits, and landslide, swamp, and other miscellaneous deposits also overlie older rocks, especially in the northern and southern coastal areas of Puerto Rico (Miller et al., 1999).

In Puerto Rico, a thick limestone sequence that ranges in age from Oligocene to Pliocene overlies volcaniclastic rocks in a continuous belt along the north coast. Locally, limestone beds not differentiated occur in a discontinuous belt along the southwestern coast and in isolated areas in the interior (Miller et al., 1999).

6.2.2 MFH Facility Surficial Geology

According to the USGS Professional Paper 1159, the MFH Facility is located within the Coastal Plains (Lowlands) physiographic region of Puerto Rico that spans more than 300 miles around the rim of the island, 8 to 12 miles inland in the north and 2 to 8 miles in the south (see figure 6-1 in appendix 6A). The Coastal Plains region consists predominantly of sand and contains subordinate amounts of clay (USGS, 1980). These deposits form playa plains that slope gently from the foothills of the Upland region to the Atlantic Ocean. Most of the deposits are in flood plains and ancient distributaries of the rivers that drain into the Atlantic Ocean from upland.

The USGS geologic map of the San Juan Quadrangle (Pease and Monroe, 1977) indicates that the MFH Facility surface geology is underlain by one geologic map unit that consists of artificial fill material (see figure 6-2 in appendix 6A). The USGS describes the artificial material as follows:

- Af, Artificial Fill (Holocene)—sand, limestone, and volcanic rock as fill in valleys, swamps, and locally, a part of Bahía de San Juan (San Juan Bay). Generally, less than 16.4 feet thick.

During the geotechnical exploration program leading up to construction of the MFH Facility, a total of 17 shallow and deep boring tests were conducted. Based on the results of the boring tests, Jaca & Sierra (2019) also identified the following stratigraphy units to be present below the surface:

- Qs, Swamp Deposits (Holocene)—sand, muck, and clayey sand; generally underlain by peat formed in mangrove swamps. Most areas mapped as artificial fill are underlain by swamp deposits.
- QT t, Older Alluvial and Terrace Deposits (Pleistonce and Pliocene)—clay, silty, and sandy and mainly red or mottled red and light gray.
- Tc, Cibao Formation (Miocene and Oligocene)—chalk, soft, pale gray limestone and very pale orange sandy clay.

In general, the stratigraphy of the MFH Facility is characterized by an upper man-made fill, underlain by soft clayey swamp deposits with occurring sand lenses or pockets of variable thickness, followed by older alluvial and terrace deposits found in a consolidated state. The limestone horizon, interpreted to be consist with the Cibao formation, occurred at depths of 70 to 80 feet and extended to the bottom of the deepest boring of 120 feet beneath ground surface (Jaca & Sierra, 2019).

6.3 Mineral Resources

The predominant surface mineral mined in Puerto Rico is related to the manufacture of cement, which comprises the mining of limestone and limestone aggregate. According to the USGS Geology, Geochemistry, Geophysics, Mineral Occurrences, and Mineral Assessment of the Commonwealth of Puerto Rico Open-File Report 98-38 (USGS, 1998), most of the limestone and limestone aggregate quarries mine material from the Miceone Aymamón Limestone, primarily in the municipalities of Arecibo and Manati in the north central section of Puerto Rico, approximately 27 to 40 miles east of the MFH Facility. Other industrial minerals mined in Puerto Rico include dimension stone, silica sand, sand and gravel, aggregate, gypsum, barite, phosphate, clay and siltstone, and dolomite. No minable limestone occurs within the MFH Facility area (USGS, 1998).

In the Municipality of San Juan, siltstone is mined, but the closest quarry to the MFH Facility is approximately 3.3 miles southeast (see figure 6-3 in appendix 6A; USGS, 1998). Therefore, the MFH Facility will have no effect on mining activities or mineral resources.

6.4 Geological Hazards

Geologic hazards are natural, physical conditions that can result in damage to land and structures or injury to people. Such hazards include seismic hazards (e.g., earthquakes, ground faults, and soil liquefaction), coastal processes, ground subsidence, long-term sea level rise, landslides, mudslides, geomagnetic storms, tsunamis, and flash flooding. Any potential geological hazards within the MFH Facility area are discussed in the sections below.

6.4.1 Seismic Hazards

The USGS Seismic Hazard Map of Puerto Rico (USGS, 2003) indicates that the MFH Facility is in a high seismic risk region (figures 6-4 and 6-5). The figures indicate there is a 40 to

45 percent probability that a peak ground acceleration ("PGA") of 2 percent gravity ("g"[1]) will be exceeded in 50 years and 20 to 25 percent probability that a PGA of 10 percent g will be exceeded in 50 years for firm rock site conditions. Because the MFH Facility is located on soft soils, ground motions could be amplified by a factor of 2 or more.

NFEnergía commissioned Jaca & Sierra to conduct a site-specific seismic hazard analysis, involving field investigations and data evaluation. The analysis involved conducting a probabilistic seismic hazard analysis and site-specific response spectrum investigation at the MFH Facility. It also accounts for regional seismicity and geology, the expected recurrence rates and maximum magnitudes of events on known faults and source zones, the location of the MFH Facility with respect to these seismic sources, near source effects, and the characteristics of subsurface conditions. Details of the analysis are provided in Resource Report 13.

6.4.1.1 Ground Faults

Puerto Rico Island is located on the boundary between the Caribbean Sea and the Atlantic Ocean as the connecting link between the Greater and Lesser Antilles islands. The Greater and Lesser Antilles islands delimit the boundary between the North American and Caribbean tectonic plates. The North American plate moves west-southwestward relative to the Caribbean plate at a rate of approximately 19.4 millimeters per year (Jansma et al., 2000).

The seismicity of Puerto Rico is related to both the subduction of the North American plate interface with the Caribbean plate south of the Puerto Rico Trench and to the interactions of several probable microplates within the complex boundary zone. The following are associated to deformation along the North American and Caribbean plates: megathrust faulting along the plate interface; intraslab faulting within the subducting North American plate; strike-slip faulting along several structures, including the Septentrional fault, which is the main plate boundary structure in central Hispaniola; and the North and South Puerto Rico Slope fault zones and related structures. Other seismic sources are area sources related to microplate interactions, such as the Mona Passage to the west of Puerto Rico and the Anegada passage to the east (TERRATEC, 2018).

In addition to the offshore active faults, Puerto Rico has several relevant mapped onshore fault systems. Those of greatest concern for the engineering community are the following: the Great Northern Puerto Rico Fault Zone, the Great Southern Puerto Rico Fault Zone, and the Lajas Fault Zone. Some of these structures have unknown potential for large magnitude events, as there is no evidence of Holocene rupture. These inland fault segments of approximately 50 kilometers ("km") can produce moment magnitude ("Mw") 7.0 quakes and can potentially extend to the south-southwest region of Puerto Rico as part of a longer fault zone (Jansma and Mattioli, 2005).

6.4.1.2 Earthquakes

Puerto Rico has a long history of earthquakes, although large events are rare. It sits at the edge of the Caribbean tectonic plate, where that plate is colliding with the North American plate. Such tectonic boundaries host the vast majority of the world's quakes.

[1] PGA can be expressed as "g" (the acceleration due to Earth's gravity, equivalent to g-force).

In the last two decades, Puerto Rico and the Caribbean Region have experienced and documented several moderate magnitude (5.0 ≤ Mw ≤ 6.4) earthquakes that occurred in Puerto Rico and its Caribbean neighborhood producing PGA as large as 0.40 of g and intensities of VIII in the Modified Mercalli Intensity, causing severe damage in strategic facilities and causing alarm among the inhabitants (Huerta-Lopez et al., 2020).

During 2019, the Puerto Rico Strong Motion Program ("PRSMP") seismic network in charge of the operation of 113 permanent seismic stations instrumented with accelerometers deployed in Puerto Rico, the United States and British Virgin Islands, and the Dominican Republic, located a total of 6,510 earthquakes and tremors in the region of Puerto Rico and the Virgin Islands. Compared to 2018, the seismicity detected and located in 2019 increased and the month of greatest activity was December with 1,291 tremors, while in August the lowest seismicity was observed with 303 earthquakes. The region with the highest seismicity recorded during 2019 was the Mona Canyon with 1,288 seismic events, followed by the South of Puerto Rico region with 885 earthquakes. The depths of the tremors ranged from 1 km to 191 km and the magnitudes ranged from less than 4 to 6.0 Mw (PRSMP, 2021b).

According to PRSMP, in 2021 the strongest earthquake with estimated maximum intensity of V[2] in the Modified Mercalli Intensity, was recorded in May 2021, in the south region of Puerto Rico, approximately 15 km west-southwest of Ponce (PRSMP, 2021a).

6.4.2 Soil Liquefaction

Soil liquefaction is a phenomenon in which the strength and stiffness of a granular soil is reduced by intense and prolonged ground shaking, such as that experienced during a strong earthquake. It occurs in saturated soils—where the space between individual particles is completely filled with water. In normal circumstances, the water pressure is relatively low and the particles can pack together relatively tightly. However, strong ground motion can increase the water pressure to a level where the soil particles readily move apart, causing the soil to behave like a viscous liquid and leading to the loss of load-bearing strength.

Overall, the MFH Facility exhibits primarily non-cohesive soils. Site investigations (see Resource Report 13, appendix 13.1.1) indicate that the MFH Facility soils are characterized by an upper man-made fill material, underlain by soft clayey swamp deposits with occurring sand lenses or pockets of variable thickness, followed by older alluvial and terrace deposits found in consolidated state. Analysis of liquefaction made by Jaca & Sierra (2019) at the MFH Facility using standard penetration tests and cone penetration tests, including specific seismic hazard analysis for PGA for 10 percent probability of exceedance in 50 years, indicates that the potential for liquefaction at the MFH Facility is classified as moderate to high, with some areas classified as low.

Liquefaction prone soils are mostly found close to the existing bulkhead area where hydraulic fills from dredging were deposited. At most locations it is noted that the subsurface

[2] Moderate—Felt by nearly everyone; may awaken. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.

profiles have an increased depth of liquefaction prone sand towards the existing bulkhead (Jaca & Sierra, 2019).

6.4.3 Coastal Processes

6.4.3.1 Flooding

As depicted in figure 6-6 in appendix 6A, Federal Emergency Management Agency ("FEMA")—Puerto Rico Advisory Base Flood Elevations mapping indicates that the northern section of the MFH Facility, an area closer to San Juan Bay, is located within flood zone "VE" (flood elevation of approximately of 11.2 feet) and the southern section is located within zone "AE" (flood elevation of approximately 7 feet; FEMA, 2021). FEMA designates both zone categories as Special Flood Hazard Areas. Zones VE and AE correspond to the 1 percent annual-chance flood event, also referred to as the base flood or 100-year flood.

6.4.3.2 Hurricane-relate Flooding

During hurricanes or tropical storms, the combination of extremely strong winds and associated storm surge can cause extensive destruction to property and life. Storm surge is an abnormal rise of water generated by a storm, over and above the predicted astronomical tides. Storm surge is different from *storm tide*, which is defined as the water level rise due to the combination of storm surge and the astronomical tide. This rise in water level can cause extreme flooding in coastal areas, particularly when storm surge coincides with normal high tide, resulting in storm tides reaching up to 20 feet or more in some cases (National Oceanic and Atmospheric Administration ["NOAA"], 2014).

Historically, on average, Puerto Rico is hit or brushed by a tropical storm or hurricane every 3.31 years, with a direct hurricane hit (hurricane force winds sustained for at least several hours) every 12.42 years. Between 2000 and 2021, Puerto Rico was hit or brushed by 22 tropical storms or hurricanes of varying intensity. The average wind speed during a hit is 116 miles per hour ("mph"). The longest gap between storms was 22 years, from 1957 to 1978. The last tropical storm to affect the area was Tropical Storm Laura in 2020, with 40 mph winds (Hurricane City, 2021).

Five major hurricanes (Category 4 or greater) have made landfall in Puerto Rico since 1899 (NOAA, 2021a): an unnamed hurricane in 1899, an unnamed hurricane in 1928, an unnamed hurricane in 1932, Hurricane Hugo in 1989, and Hurricane Maria in 2017. Wind speeds during the 1899 hurricane reached 130 mph. Similar wind speeds, with gusts of 140 mph, were experienced during the 1928 hurricane. Wind speeds of 125 mph were experienced during the 1932 hurricane. Hurricane Hugo was a very large Category 5 hurricane that passed the northeast of San Juan, with wind speeds reaching 145 mph. Over 80 percent of the wooden structures on the islands of Culebra and Vieques were destroyed and more than 30,000 people were left homeless. Hurricane Maria was a very large Category 5 hurricane that made landfall south of Yabucoa. Hurricane Maria made landfall on Puerto Rico in September 2017 at high-end Category 4 status, bringing a large storm surge, very heavy rains, and wind gusts well above 100 mph, flattening neighborhoods and crippling the island's power grid. An estimated 2,982 fatalities and USD $90 billion in damage occurred as a result of the hurricane.

The MFH Facility is situated within an area that would be flooded by a Category 2 hurricane storm surge inundation height of at least 6 feet and up to 8 feet above ground level (see figure 6-6 in appendix 6A).

6.4.3.3 Tsunami-related Flooding

Tsunamis are ocean waves caused by large earthquakes and landslides that occur near or under the ocean. The MFH Facility is potentially vulnerable to inundation by a tsunami because of its proximity to the low-lying coastline of San Juan Bay. Since 1867, two tsunamis have been recorded to have affected the coast of Puerto Rico, causing death and destruction, one in 1867 and one in 1918. Although the source of the historical tsunamis have been local earthquakes, tsunamis could also be generated by regional and distant earthquakes, landslide, and—though much less likely in the case of Puerto Rico—by a volcanic eruption. The tsunami of 1867 registered a tidal wave of 20 feet (PRSMP, 2021b).

The regional tsunami hazard is primarily associated with potential submarine earthquakes from offshore faults associated with tectonic features around Puerto Rico: the Puerto Rico Trench, to the north; the Muertos Trough, to the south; the Anegada Passage, to the east; and the Mona Passage, to the west (Huerta-Lopez et al., 2020; USGS, 2021).

Based on information available to date, the potential for a tsunami in Puerto Rico cannot be discounted outright, although the rarity of such events recorded in the past suggest that the hazard potential for the MFH Facility is much less than that associated with hurricanes or tropical storms.

6.4.3.4 Long-term Sea Level Rise

Long-term sea level rise can affect coastal environments and communities through submergence of low-lying lands, beach erosion, conversion of wetlands to open water, exacerbation of coastal flooding, and salinity increases in estuaries and groundwater. Global sea level rise is attributable primarily to global warming and the resulting expansion of ocean water masses and the melting of polar ice. Coastal geologic processes can also contribute to localized sea level rise.

The relative sea level rise is a function of two factors: global sea level rise and land elevation changes caused by local subsidence or accretion. Based on NOAA National Centers for Environmental Information—State Climate Summaries (NOAA, 2021b), the relative sea level in Puerto Rico is predicted to rise 2.1 feet by 2060 and 4.9 feet by 2100. For the San Juan coastal area, the United States Army Corps of Engineers projected an intermediate relative sea level rise of 3.2 feet by 2150 (NOAA, 2021b; PRCCC, 2013). However, the current elevation of the MFH Facility is above the projected sea level rise, and therefore future climate change induced sea level rise will not significantly affect MFH Facility operations.

6.5 Avoidance and Minimization of Adverse Effects

NFEnergía has identified the following geological hazards, as events that may affect the operation of the MFH Facility:

- soil liquefaction and settlement from seismic events;

- flooding; and
- long-term sea level rise.

Discussion of how the MFH Facility was designed to mitigate the impacts from these geological hazards is provided in detail in Resource Report 13—Reliability and Safety.

6.6 Blasting

As the MFH Facility is already constructed and blasting activity is not required during operation, there will be no impacts from blasting for the continued operation of the MFH Facility.

6.7 Paleontological Resources

Fossils are the preserved remains or evidence of past life and the only direct means of documenting the history of life on Earth. The most common fossils are those of marine organisms because oceans cover over 70 percent of Earth and provide a more suitable environment for fossil preservation than most environments on land (LGS, 2002).

The Pleistocene- and Holocene-age surficial sediments (i.e., swamp, alluvial, and terrace deposits; see section 6.2) and underlying bedrock of the MFH Facility formed as a result of erosion and deposition in fluvial (rivers and streams), deltaic, and swampy settings in a humid climate, which promotes weathering processes. These terrestrial and transitional environments are not as conducive to the preservation of fossils as in the marine environment. As such, no sensitive paleontological resources are anticipated to be encountered in the MFH Facility. Further, operation of the MFH Facility will not require earth disturbance, limiting the potential to encounter paleontological resources.

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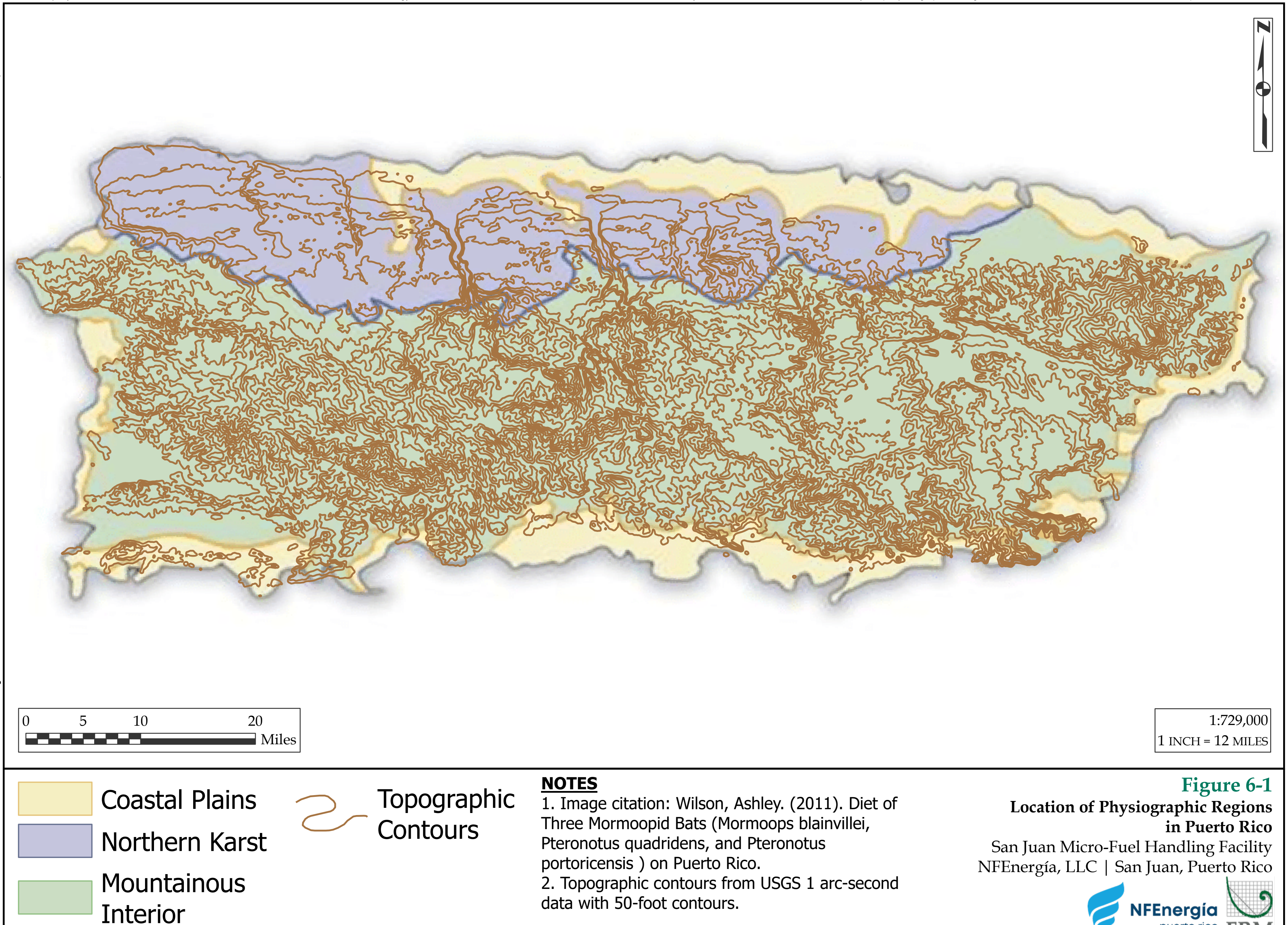
APPENDIX 6A FIGURES

APRX Path | Layout Name: \\usbdcfs02\data\Boston\Team\DMMV\Clients_L_P\New_Fortress_Energy\Puerto_Rico_FERC\APRX\2021\2021_06_New_Fortress_FERC_Analysis\2021_06_New_Fortress_FERC_Analysis.aprx | Geographical_Regions

Map Author: CAL.WILSON

Revised: 06/18/2021 | Scale: 1:729,000 when printed at 8.5"x11"

COORDINATE SYSTEM: NAD 1983 StatePlane Puerto Rico Virgin Islands FIPS 5200 Feet



NOTES

1. Image citation: Wilson, Ashley. (2011). Diet of Three Mormoopid Bats (Mormoops blainvillei, Pteronotus quadridens, and Pteronotus portoricensis) on Puerto Rico.
2. Topographic contours from USGS 1 arc-second data with 50-foot contours.

Figure 6-1
Location of Physiographic Regions in Puerto Rico
San Juan Micro-Fuel Handling Facility
NFEnergía, LLC | San Juan, Puerto Rico

NFEnergía puerto rico

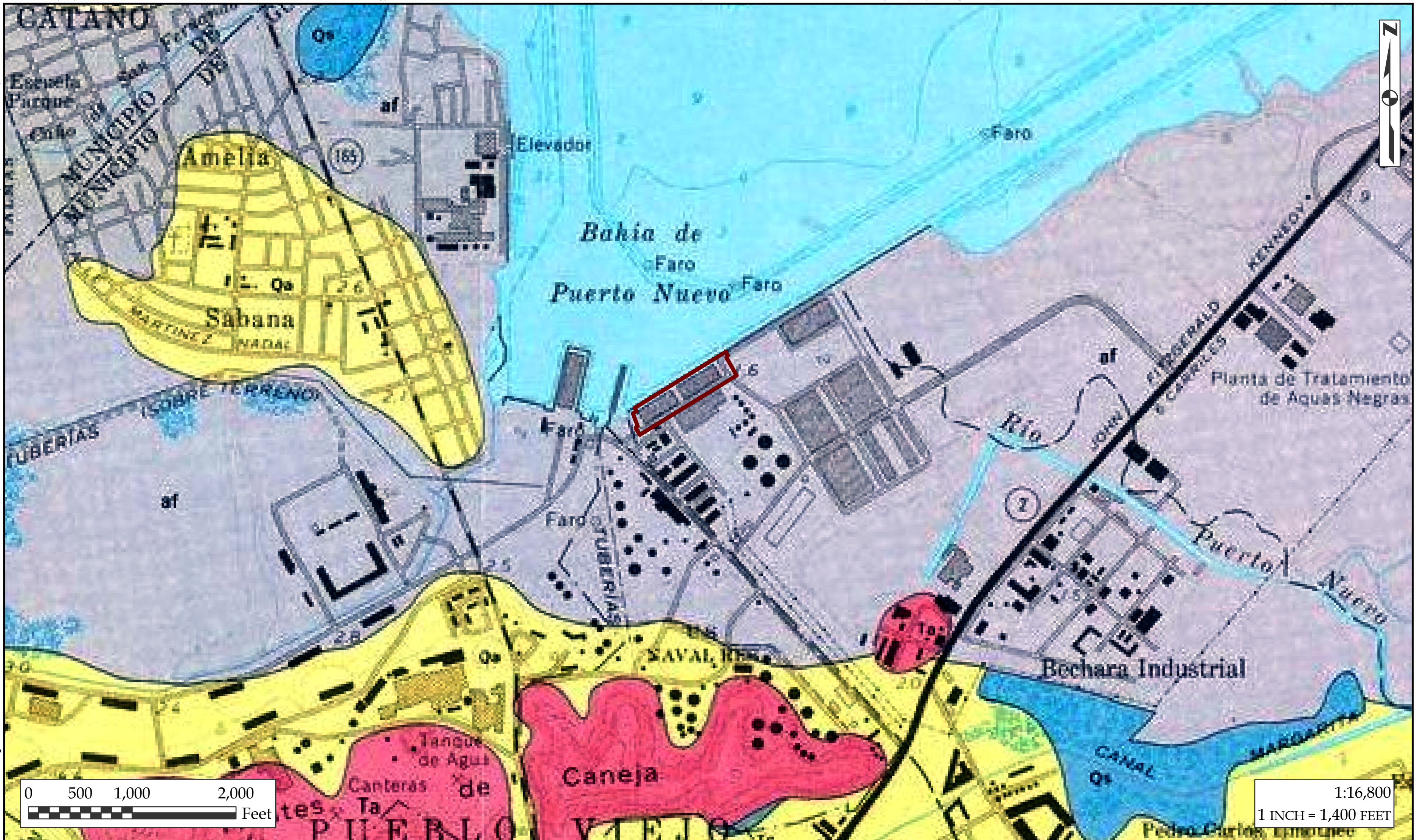
ERM

Source: The ERM Group

This information is for environmental review purposes only.

Revised: 08/26/2021 | Scale: 1:16,800 when printed at 8.5"x11"

COORDINATE SYSTEM: NAD 1983 StatePlane Puerto Rico Virgin Islands FIPS 5200 Feet



Site Boundary	Qs, Swamp Deposits
af, Artificial Fill	Ta, Aguada Limestone
Qa, Alluvium	Water

NOTES

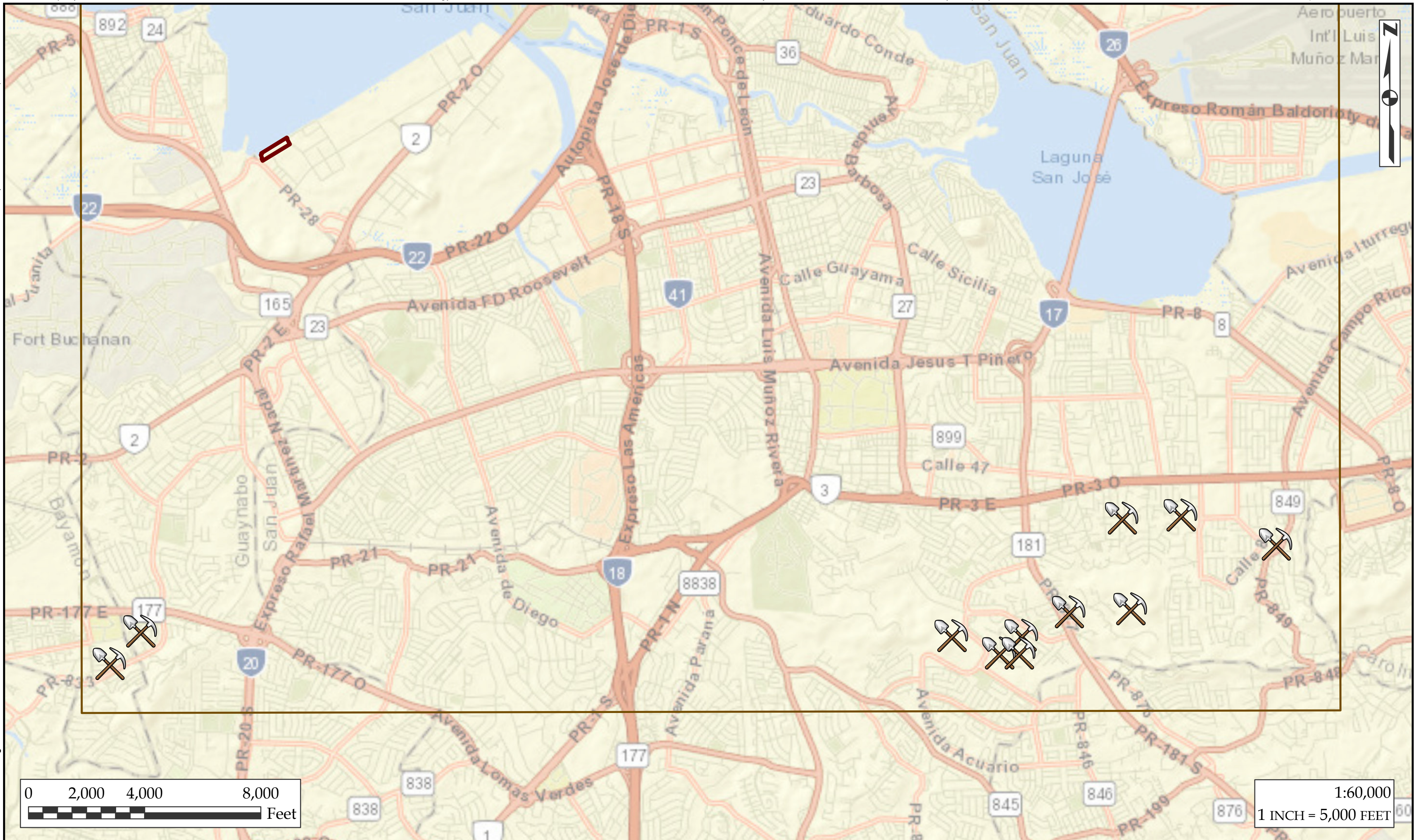
1. Image citation: Pease, M.H., Jr., and Monroe, W.H., 1977, Geologic map of the San Juan quadrangle, Puerto Rico: U.S. Geological Survey 1969, https://doi.org/10.3133/i1010.

Figure 6-2
Geologic Map of Puerto Rico
San Juan Quadrangle
San Juan Micro-Fuel Handling Facility
NFEnergía, LLC | San Juan, Puerto Rico

NFEnergía puerto rico
ERM

Revised: 06/18/2021 | Scale: 1:60,000 when printed at 8.5"x11"

COORDINATE SYSTEM: NAD 1983 StatePlane Puerto Rico Virgin Islands FIPS 5200 Feet



Siltstone Quarries	San Juan Quadrangle Boundary
Site Boundary	

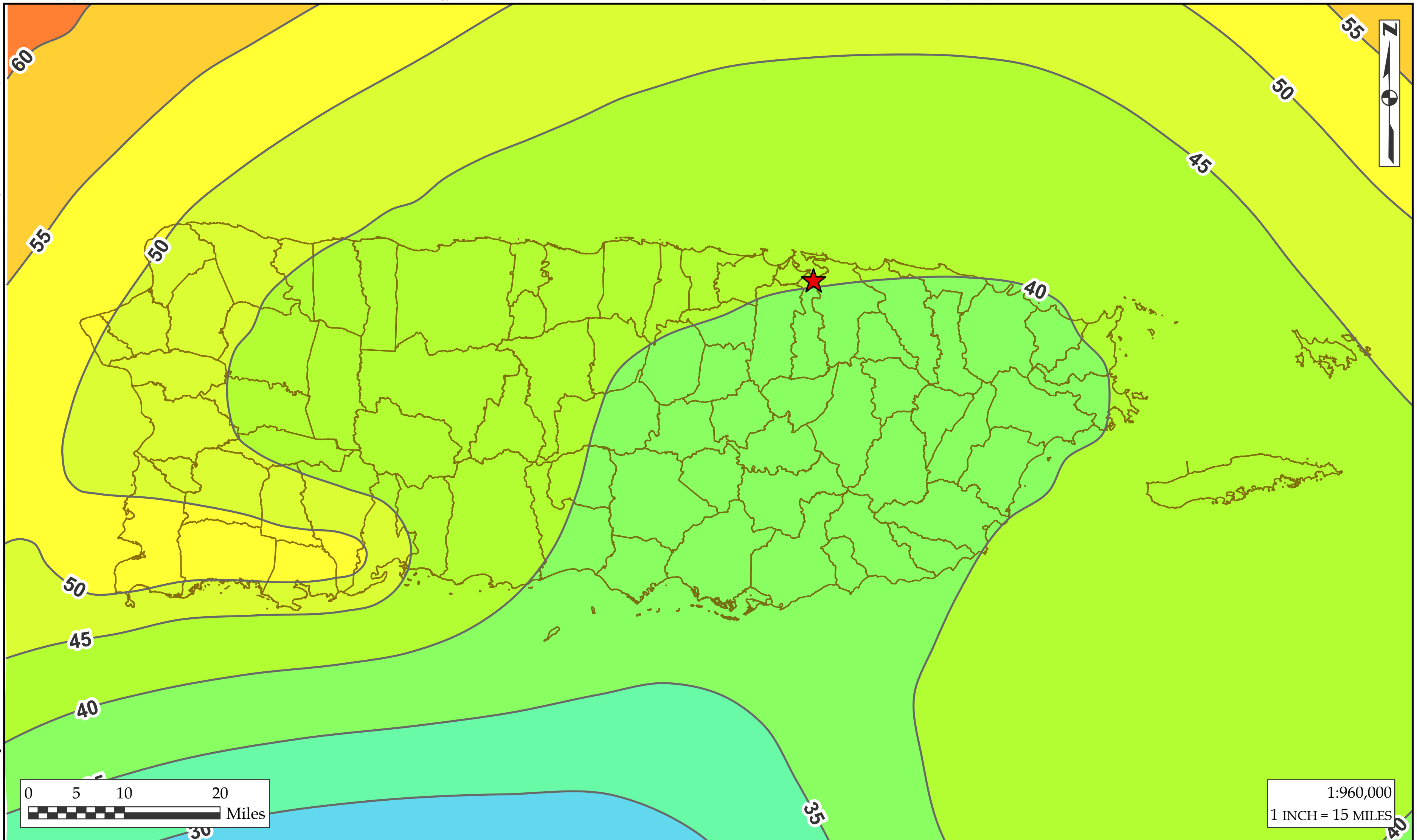
NOTES

1. Mine locations from USGS Mineral Resources Data System.
2. Closest siltstone mine to site calculated at 3.27 miles.

Figure 6-3
Siltstone Quarries in the MFH Facility Vicinity
San Juan Micro-Fuel Handling Facility
NFEnergía, LLC | San Juan, Puerto Rico

NFEnergía puerto rico
ERM

Revised: 06/18/2021 | Scale: 1:960,000 when printed at 8.5"x11"



COORDINATE SYSTEM: NAD 1983 StatePlane Puerto Rico Virgin Islands FIPS 5200 Feet

Puerto Rico Seismic Hazard -

2% in 50 years PGA Hazard (%g)

- 25 - 30 %
- 30 - 35 %
- 35 - 40 %
- 40 - 45 %
- 45 - 50 %
- 50 - 55 %
- 55 - 60 %
- 60 - 65 %
- ★ Site Location
- Municipalities

NOTES

1. Data citation: Shumway, A.M., 2019, Data Release for the 2003 Puerto Rico and U.S. Virgin Islands Seismic Hazard Model: U.S. Geological Survey data release, https://doi.org/10.5066/P9JYH45T

Figure 6-4

Seismic Hazard Map for Puerto Rico
2% Chance of Exceedance

San Juan Micro-Fuel Handling Facility
NFEnergía, LLC | San Juan, Puerto Rico

Source: The ERM Group

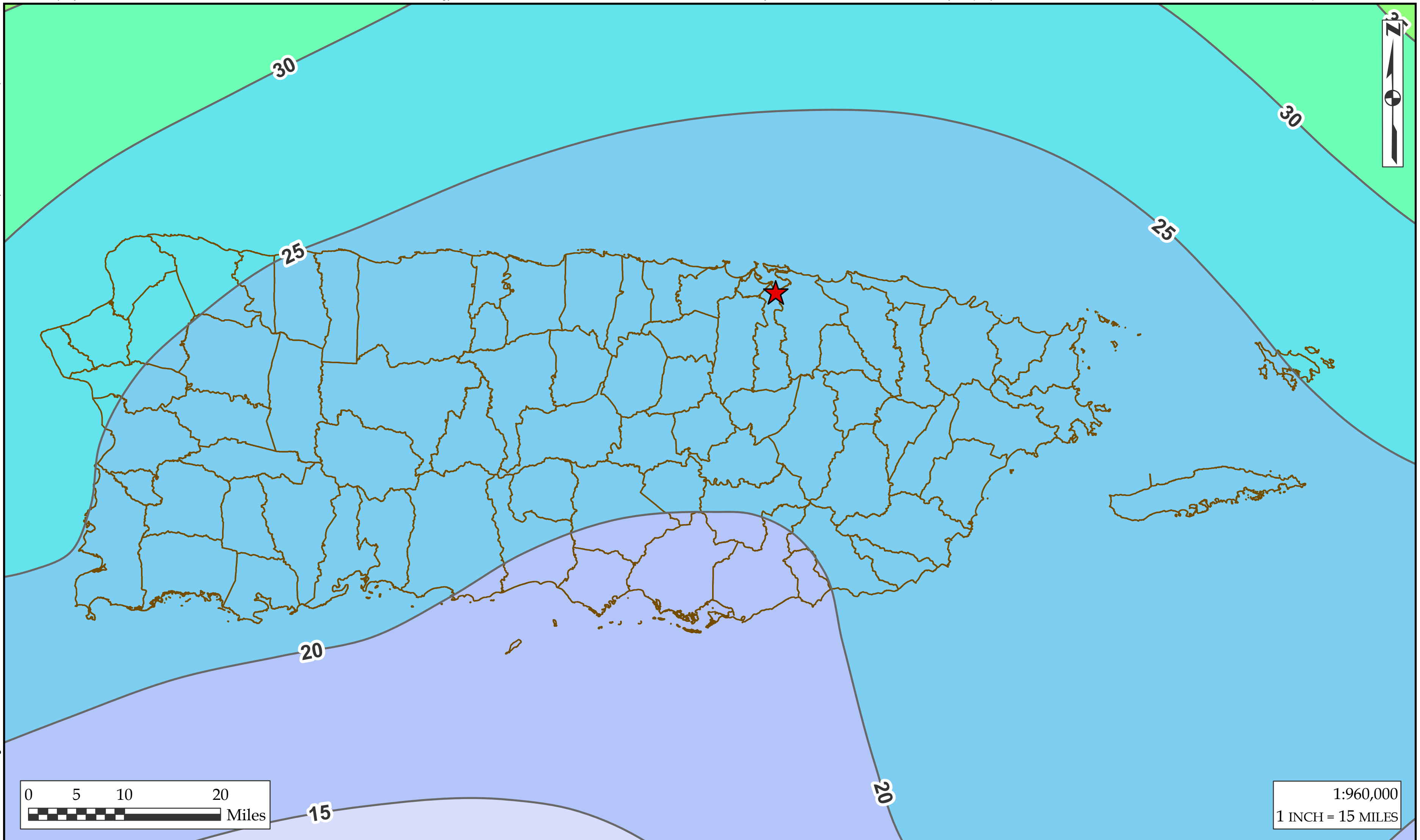
This information is for environmental review purposes only.

APRX Path | Layout Name: \\usbdcfs02\data\Boston\Team\DMMV\Clients_L_P\New_Fortress_Energy\Puerto_Rico_FERC\APRX\2021\2021_06_New_Fortress_FERC_Analysis\2021_06_New_Fortress_FERC_Analysis.aprx | Seismic_Hazard_10Percent

Map Author: CAL.WILSON

Revised: 06/18/2021 | Scale: 1:960,000 when printed at 8.5"x11"

COORDINATE SYSTEM: NAD 1983 StatePlane Puerto Rico Virgin Islands FIPS 5200 Feet



Puerto Rico Seismic Hazard -

10% in 50 years PGA Hazard (%g)

- 10 - 15 %
- 15 - 20 %
- 20 - 25 %
- 25 - 30 %
- 30 - 35 %
- 35 - 40 %
- Site Location
- Municipalities

NOTES

1. Data citation: Shumway, A.M., 2019, Data Release for the 2003 Puerto Rico and U.S. Virgin Islands Seismic Hazard Model: U.S. Geological Survey data release, https://doi.org/10.5066/P9JYH45T

Figure 6-5

Seismic Hazard Map for Puerto Rico

10% Chance of Exceedance

San Juan Micro-Fuel Handling Facility

NFEnergía, LLC | San Juan, Puerto Rico

Source: The ERM Group

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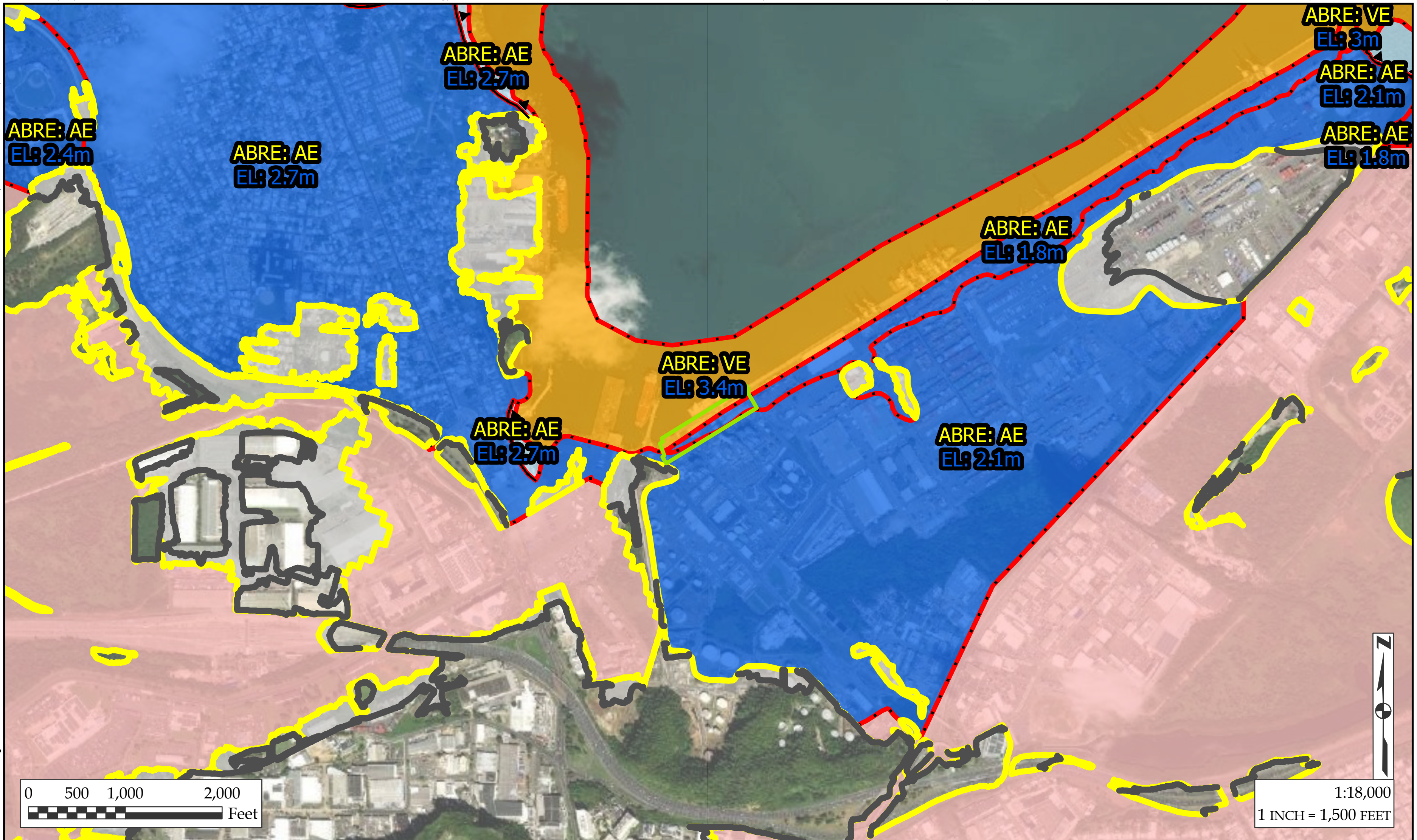
Revised: 06/18/2021 | Scale: 1:18,000 when printed at 8.5"x11"

COORDINATE SYSTEM: NAD 1983 StatePlane Puerto Rico Virgin Islands FIPS 5200 Feet



Site Boundary
Limit of Moderate Wave Action (LiMWA)
Zone/BFE Boundary

Flood Hazard Extent

1% Annual Chance Flood
0.2% Annual Chance Flood

Flood Hazard Zone

A
AE
Coastal A Zone
VE
X 0.2% Annual Chance Flood

NOTES

1. Data citation: FEMA, 2018, Advisory Base Flood Elevation (ABFE) Data: Puerto Rico Advisory Base Flood Elevation (ABFE) Data, accessed June 18, 2021, at https://gis.fema.gov/PuertoRicoABFEs.

Figure 6-6

FEMA Flood Zone Map - Facility Site

San Juan Micro-Fuel Handling Facility - NFEnergía, LLC
San Juan, Puerto Rico

NFEnergía puerto rico
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