Chapter 1 Purpose and Need

1.1 INTRODUCTION

New Jersey Transit Corporation (NJ TRANSIT[1]) proposes to design and construct the NJ TRANSITGRID TRACTION POWER SYSTEM (proposed Project), a first-of-its-kind "microgrid" designed to provide highly reliable power to support limited service in a core segment of NJ TRANSIT's and Amtrak's[2] critical service territory. As defined by the US Department of Energy (DOE), a microgrid is a local energy grid with "control capability," which means it can disconnect from the commercial power grid and operate autonomously (DOE 2014a).

The Federal Transit Administration (FTA) selected the NJ TRANSITGRID TRACTION POWER SYSTEM as one element of the "NJ TRANSITGRID" project, a Public Transportation Resilience Project in response to Hurricane Sandy. FTA's selection of the proposed Project makes it potentially eligible for funds made available under the Disaster Relief Appropriations Act of 2013 (Pub. L. 113-2). FTA's selection of the NJ TRANSITGRID project was published in Federal Register Notice Vol. 79, No. 214, 65762-65765 on Wednesday, November 5, 2014 (Table 1, Funding ID D2013-RESL-009 "NJ TRANSITGRID").

The proposed NJ TRANSITGRID Project selected by FTA consists of two elements.

1. NJ TRANSITGRID TRACTION POWER SYSTEM – The proposed Project would include a natural gas-fired electric power generating plant (referred to as the Main Facility), and the electrical lines, substations and other emergency generators to distribute the power to required areas (see Figure 1-1). The Main Facility would utilize combined-cycle technology resulting in power generation capacity of approximately 104 to 140 megawatts (MW). The preferred site for the Main Facility is in Kearny, Hudson County, New Jersey (see Figure 1-2).

2. NJ TRANSITGRID DISTRIBUTED GENERATION SOLUTIONS that would provide power to certain train stations, bus garages and other transportation infrastructure in northeastern New Jersey.

As the administer of potential federal funds, FTA is therefore the designated federal lead agency responsible for implementing the National Environmental Policy Act of 1970 (NEPA) pursuant to NEPA implementing regulations 40 CFR Part 1500-1508 and US Department of Transportation (USDOT)

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[1] NJ TRANSIT is a state-owned public transportation system that serves the State of New Jersey, along with portions of New York State and Pennsylvania. It operates bus, light rail, and commuter rail services throughout its service area, connecting major commercial and employment centers both within the state and in the adjacent major cities of New York City and Philadelphia. Covering a service area of 5,325 square miles, NJ TRANSIT is the largest statewide public transit system and the third-largest provider of bus, rail, and light rail transit by ridership in the United States.

[2] Amtrak, the National Railroad Passenger Corporation, is a passenger railroad service that provides medium- and long-distance intercity service in the contiguous United States and to three Canadian cities. In New Jersey, Amtrak operates approximately 110 trains daily. Under joint benefit and agreements, NJ TRANSIT operates more than 400 weekday trains along Amtrak's Northeast Corridor.

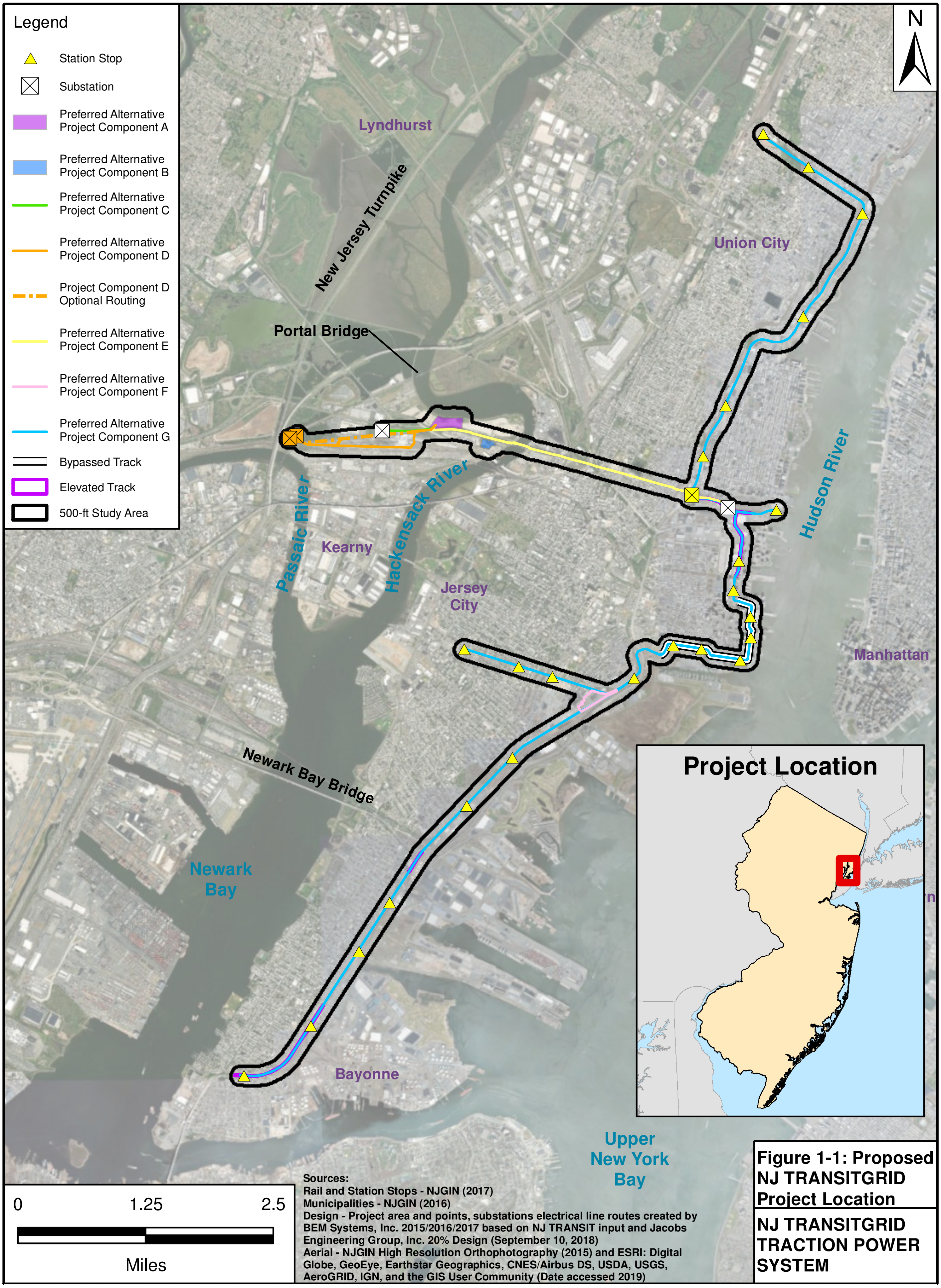

Figure 1-1: Proposed NJ TRANSITGRID Project Location

NJ TRANSITGRID TRACTION POWER SYSTEM

Sources:
Rail and Station Stops - NJGIN (2017)
Municipalities - NJGIN (2016)
Design - Project area and points, substations electrical line routes created by BEM Systems, Inc. 2015/2016/2017 based on NJ TRANSIT input and Jacobs Engineering Group, Inc. 20% Design (September 10, 2018)
Aerial - NJGIN High Resolution Orthophotography (2015) and ESRI: Digital Globe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (Date accessed 2019)

Path: \\atlas\GISDATA\Projects\NJ_Transit\Tier3\TransitGrid\2019_DraftEIS\Rev0\Figure1_1_ProjectLocation.mxd

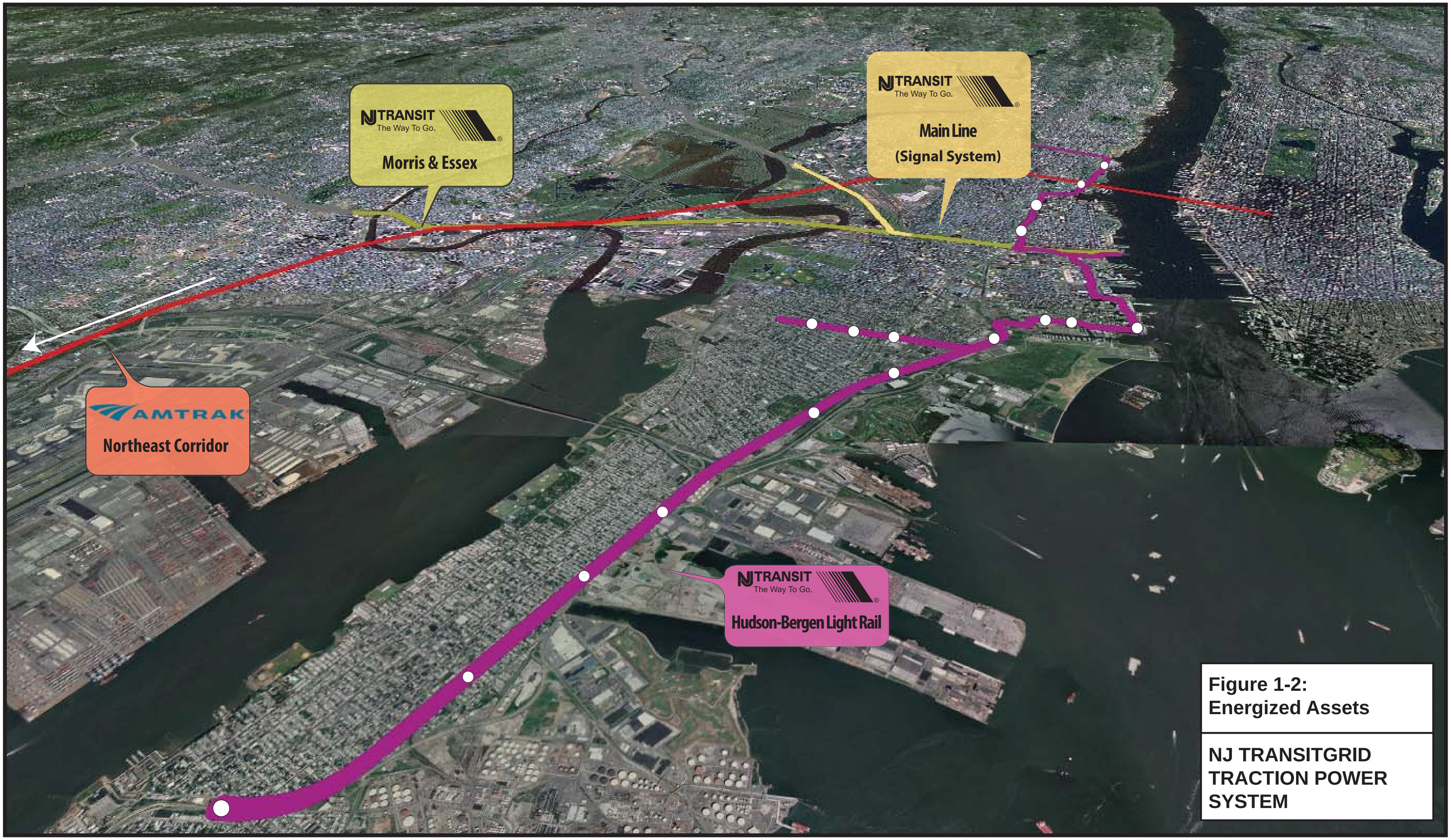

Figure 1-2:
Energized Assets

NJ TRANSITGRID TRACTION POWER SYSTEM

Note: Energized assets will also include some non-traction loads including: Hudson-Bergen Light Rail stations, Hoboken Terminal, and other signal power, tunnel ventilation, pumping, and lighting loads.

implementing regulations 23 CFR 771. Owing to the proposed NJ TRANSITGRID TRACTION POWER SYSTEM potential for significant environmental impacts, FTA has directed the preparation of this Draft Environmental Impact Statement (DEIS) for that element in accordance with 23 CFR 771.123.

The NJ TRANSITGRID DISTRIBUTED GENERATION SOLUTIONS elements would be constructed and function independently from the NJ TRANSITGRID TRACTION POWER SYSTEM project and provide independent utility with regard to mass transit resilience. Therefore, FTA has determined that the NJ TRANSITGRID DISTRIBUTED GENERATION SOLUTIONS elements will undergo separate environmental review pursuant to 23 CFR 771 and are not included in this DEIS.

Following the public review period (May 20, 2019 – July 19, 2019), comments on the DEIS will be considered in a Final EIS. The Final EIS and Record of Decision (ROD) will announce and explain FTA's decision and describe any commitments for mitigating potential social, economic, and environmental impacts.

This chapter presents the purpose and need for the proposed Project. It also identifies the goals and objectives that guide the development and evaluation of project alternatives, as described in Chapter 2.

1.2 PURPOSE OF THE PROJECT

The purpose of the proposed Project is to enhance the resiliency of the electricity supply to the NJ TRANSIT and Amtrak infrastructure that serves key commuter markets in New York and New Jersey to minimize public transportation service disruptions. The region's public transportation infrastructure is vulnerable to power outages due to the nature of the existing centralized power distribution system and the intensity and frequency of severe weather events.

The proposed Project would be designed to generate enough electrical power to maintain full operation of commuter and passenger rail service on key segments of the Amtrak Northeast Corridor, NJ TRANSIT Morris & Essex Line, and the NJ TRANSIT Hudson-Bergen Light Rail (HBLR) system (see Figure 1-2) indefinitely and without requiring electrical power from the commercial electrical grid. Specifically, the proposed Project is intended to produce and distribute enough electricity to provide traction (train locomotive) power to Amtrak's Northeast Corridor between New York Penn Station and County Yard/Jersey Avenue Station in New Brunswick, NJ (approximately 32.8 rail miles), NJ TRANSIT commuter rail service between Hoboken Terminal and Millburn Station in Millburn, NJ on the Morris & Essex Line (approximately 16.3 rail miles), and the NJ TRANSIT Hudson Bergen Light Rail (approximately 16.6 rail miles). The proposed Project would also be designed to support non-traction functions (NJ TRANSIT signal power, switches, tunnel ventilation, pumping, station and lighting loads) in the above rail segments and the signal system on a portion of the NJ TRANSIT Main Line from the intersection with the Morris & Essex Line to the Upper Hack Lift Bridge (approximately 2.5 rail miles) so that diesel trains can operate on that non-electrified segment during power outages.

To achieve this, NJ TRANSIT proposes to construct a microgrid. As defined by the U.S. Department of Energy (DOE), a microgrid is a local energy grid with control capability, which means it can disconnect from the traditional grid and operate autonomously (DOE 2014a). The overarching premise for the

the identified transportation assets during emergencies. The microgrid would be resilient, making the transportation system substantially less vulnerable to outages, and thereby able to provide reliable and safe service to commuters.

In addition to the equipment required for the microgrid, approximately four acres of land at the Main Facility site is proposed for a solar (photovoltaic cells) facility. The proposed Project also includes the installation of electrical lines, new substations, and natural gas-fired emergency generators at HBLR Headquarters (i.e., a nanogrid) to distribute the power to required areas, including the installation of electrical poles, where necessary.

The current premise for the proposed Project is for the microgrid to generate enough power in a resilient manner to replace power that NJ TRANSIT would otherwise purchase through the commercial grid. While the operation of the microgrid would require facility maintenance and the purchase of natural gas for power generation, it is expected that these operational costs will be offset by energy sales.

1.3 BACKGROUND

Over the course of two years (2011-2012), New Jersey experienced three major weather events that had direct impacts on the state's existing commercial power grid. In August 2011, Hurricane Irene brought devastating rains, winds, and flooding that resulted in more than 2.2 million people throughout New Jersey being left without power for up to eight days. Later that year in October, a large early snowstorm disrupted power to more than a million people for up to seven days. Lastly, Superstorm Sandy caused major damage in New Jersey and New York in the fall of 2012. The storm hit the area with maximum sustained winds of 70 miles per hour (mph), and was accompanied by a storm surge into the coastal regions of both states. The loss of rail service in its entirety for nearly a week challenged all prior expectations of the system's resilience. It resulted in power outages to approximately 2.6 million utility customers over a period of 15 days (with some outages lasting much longer) and caused an estimated $50 billion in damage and an even greater impact to the economy. In the project area, during Superstorm Sandy, PSE&G customers lost power for up to eight days.

The public transportation infrastructure that connects Manhattan with northern New Jersey across the Hudson River, which is critical from security and economic standpoints, was severely affected in each of these cases. The ensuing power outages affected a large percentage of this region's public transportation, operated by NJ TRANSIT, the Port Authority of New York and New Jersey (PANY&NJ), and Amtrak. NJ TRANSIT services that were impacted included NJ TRANSIT's light rail, bus service and commuter rail, as well as ferry facilities in the region. Public transportation service remained disrupted for a protracted period of time after the storms, especially Superstorm Sandy. Power was restored to NJ TRANSIT's HBLR three days after Superstorm Sandy. Limited Northeast Corridor service was restored four days after the storm, and full service was restored eighteen days after Superstorm Sandy. Partial service to the Morris & Essex Line was restored fourteen days after Superstorm Sandy and full service restored 34 days after the storm. There have also been non-weather-related power outages that affected rail operations. It took NJ TRANSIT about 36 hours to restore service after Hurricane Irene in 2011.

The electric rail lines operating between New Jersey and New York City job centers are critical to the region's transportation network. Of the approximately 400,000 daily trans-Hudson New Jersey commuters traveling to jobs in New York City, roughly 36 percent or 143,000 depend on rail service. When Superstorm Sandy caused the loss of regional electric power, the system service was interrupted and travelers were stranded. Many tried to use substitute buses and ferries, but encountered hours of delay. NJ TRANSIT's and PANY&NJ's main New York City bus terminal (Port Authority Bus Terminal) operates at capacity and could not absorb the additional travelers that are normally carried by rail.

Therefore, and post-Superstorm Sandy, DOE partnered with the State of New Jersey to examine the use of microgrids to help supply electricity during future extreme weather events. This proposed Project is a result of that partnership and is designed to meet the objectives of national and state energy goals by contributing to diverse portfolios of new, cleaner, and more resilient energy generation systems. While the DOE is not required to make a NEPA determination for the proposed Project, the DOE is a member of the Technical Advisory Committee (TAC), as described in Chapter 21, "Agency Coordination and Public Participation."

1.4 NEED FOR THE PROPOSED PROJECT

The need for the proposed Project is based, in part, on the vulnerability of the commercial electric power grid that serves NJ TRANSIT's and Amtrak's Northeast Corridor rail service. Power outages are occurring more frequently due to the nature of the existing centralized power distribution system and the intensity and frequency of severe weather events.

1.4.1 Severe Weather and the Existing Commercial Electric Grid

America's commercial electric grid comprises three smaller grids (referred to as "interconnections") that move electricity around the country. The Eastern Interconnection operates in states east of the Rocky Mountains, the Western Interconnection covers states between the Pacific Ocean and the Rocky Mountains, and the Texas Interconnection covers most of Texas. Severe weather is the number one cause of power outages in the United States, costing the economy between $18 and $33 billion annually in lost output and wages, spoiled inventory, delayed production and damage to grid infrastructure. Because the existing electric grid is so large and interconnected, it is vulnerable to widespread disruption from severe weather and physical or cyber-attacks (DOE 2014b). Microgrids are a leading technology in the effort to develop a more resilient electrical grid via the production of cleaner power in decentralized locations.

Currently, the existing commercial power grid relies heavily on mass burn power plants that are generally located far from population centers due to their size and environmental impact. The existing transmission and distribution grid distributes bulk power from the central power plants to load centers (i.e., transmission to substations) and from load centers to consumers (i.e., distribution via electrical lines). The existing network is somewhat inefficient between the power source and receivers, as significant energy losses occur in the transmission and distribution of electricity over relatively long distances. The existing commercial power grid is particularly vulnerable to severe weather resulting in, but not limited to, fallen trees, wildfires, and branches that can cause widespread power outages due to the extent of the large service territory and the corresponding length of the electrical lines.

There is also increasing concern that man-made events could put the existing commercial power grid at significant risk. Intentional attacks are a relatively new and emerging threat to power systems. A comprehensive study conducted by a special committee of the National Research Council and funded jointly by the National Academy of Science and the U.S. Department of Homeland Security entitled "Terrorism and the Electric Power Delivery System" (National Research Council 2012), provides compelling evidence that the cumulative threats to the electric power generating and transmission systems from physical and cyber-attacks could cause region-wide power outages that last days if not longer.

1.4.2 Frequency of Severe Weather Events Affecting NJ TRANSIT Service

As indicated above, Superstorm Sandy was only the latest of several major events affecting rail transportation in northern New Jersey. Hurricane Floyd in 1999, the Northeast Blackout in 2003[3], Hurricane Irene in 2011, the Halloween nor'easter following Hurricane Irene, and Tropical Storm Andrea in 2013 also caused major disruptions. Smaller but more frequent storms also caused outages that disrupted railroad operations. In the period between 2011 and 2013 alone, NJ TRANSIT recorded 49 power outages affecting rail operations just in the NJ TRANSITGRID TRACTION POWER SYSTEM service area alone (other than outages from either hurricane Irene and Superstorm Sandy), with a total duration of over 95 hours. This averages to 16 outages per year with an average duration of two hours, or about 32 hours per year of outages. The loss of rail service in its entirety for nearly a week challenged all prior expectations of the system's resilience. There is wide recognition that transportation resiliency in this critical area is a high priority.

1.4.3 Regional Mobility and Reliable Electric Power

Reliable electric power is essential to regional mobility. Along the Northeast Corridor, substitution of electric locomotives by diesel engines is not possible, as diesel trains are not permitted to operate in the Hudson River rail tunnels due to diesel exhaust. Furthermore, electric power is necessary to operate the signal system to safely route train movements, as well as ventilation equipment and pumps in the tunnels as required. Power is also necessary to support critical emergency activities in preparation for and recovery from flooding events, as maintenance facilities, pump stations, and emergency operation centers need to be energized to pump water from the tunnels and inspect equipment to return trains to revenue service. Despite the use of emergency diesel generators, which offer some degree of resilience (although extended use raises significant fuel availability and air quality concerns), the region's rail transportation system was largely shut down after Superstorm Sandy with substantial economic

[3] The Northeast Blackout of 2003 was not caused by a severe weather event. The blackout was due to infrastructure failure from a computer glitch as well as power lines that were compromised by overgrown trees.

consequences. The loss of rail service in its entirety for nearly a week challenged all prior expectations of the system's resilience.

1.5 PROJECT GOALS

The following goals and objectives were developed by NJ TRANSIT during the project scoping phase to guide the development and evaluation of the alternatives for NJ TRANSITGRID TRACTION POWER SYSTEM. These goals and objectives were first introduced to the public with publication of the Draft Scoping Document on January 7, 2016.

Project Goal No. 1: Provide a highly reliable parallel power source (to the existing commercial electric grid) to support the resilience of NJ TRANSIT's and Amtrak's public transportation services in northeastern New Jersey and New York.

- Utilize modern state-of-the-art resilient equipment;
- Incorporate advanced resilient safety technology;
- Minimize the length of electrical transmission lines to increase reliability; and
- Complement the projects in the NJ TRANSIT Resilience Program.

Project Goal No. 2: Achieve economic feasibility and cost-effectiveness.

- Generate power continuously (24/7);
- Minimize capital costs; and
- Minimize operating and maintenance (O&M) costs.

Project Goal No. 3: Expedite project delivery.

- Minimize construction risk;
- Minimize schedule risk; and
- Maximize efficiencies in the environmental review/permitting processes.

Project Goal No. 4: Minimize impacts to the natural and built environment.

- Minimize private property acquisition requirements to the extent feasible;
- Reduce direct and indirect sources of air emissions to the extent feasible;
- Minimize the need to construct in wetlands and open waters;
- Minimize impacts on parklands, open spaces and environmental conservation areas; and
- Minimize construction impacts to the extent feasible.