

October 3, 2019

BY HAND DELIVERY AND ELECTRONIC MAIL

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

RE: Docket 4783 - Proposed FY 2019 Electric Infrastructure, Safety, Reliability Plan Responses to Division Data Requests – Set 4

Dear Ms. Massaro:

On behalf of National Grid,¹ I have enclosed ten (10) copies of the Company's responses to the fourth set of data requests issued by the Rhode Island Division Public Utilities and Carriers in the above-referenced docket.

This filing also contains a Motion for Protective Treatment of Confidential Information in accordance with Rule 1.3(H) of the Public Utilities Commission's (PUC) Rules of Practice and Procedure and R.I. Gen. Laws § 38-2-2(4)(A) and (B). National Grid seeks protection from public disclosure the confidential and privileged information contained in Division 4-2, Attachment DIV 4-2, and Attachment DIV 4-13. In compliance with Rule 1.3(H), National Grid has provided the PUC with one complete, unredacted copy of the confidential response in a sealed envelope marked "**Contains Privileged and Confidential Materials – Do Not Release,**" and has included redacted copies of the response for the public filing.

Thank you for your attention to this transmittal. If you have any questions, please contact me at 781-907-2121.

Very truly yours,



Raquel J. Webster

Enclosures

cc: Docket 4783 Service List
Leo Wold, Esq.
AI Content, Division

¹ The Narragansett Electric Company d/b/a National Grid (National Grid or the Company).

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The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4783
In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
Responses to the Division's Fourth Set of Data Requests
Issued on September 12, 2019

R-IV-1

Request:

Please update 4915-Attachment DIV 5-2 (PUC 3-4-19), in Excel format, provided by the Company in RIDPUC Docket No. 4915. Specifically, provide the FY 2019 actual spend, FY 2020 budget, FY 2020 forecast, and FY 2021-2025 forecast for all projects under each ISR grouping.

Response:

Please see Attachment DIV IV-1 for the requested information in Excel format. The company is providing Attachment DIV IV-1 on a USB Flash Drive.

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Redacted

R-IV-2

Request:

For FY 2014 – FY 2019, provide a reconciliation of projects subject to CIAC payments, for both new business and distributed generation, where the project cost was \$50,000 or more. For each project, provide the project name, brief description, total estimated project cost, commencement and completion dates, actual cost, project cost attributable to the customer (CIAC), actual CIAC payment amount and date received, and the amount of project cost exceeding the CIAC attributable to the Company. This data should exclude system improvements that would not be subject to CIAC.

Response:

As the CIAC reconciliation process differs between New Business and Distributed Generation, separate responses have been prepared for each.

New Business:

In accordance with RIPUC No. 2196 Terms & Conditions Line Extension Policy 3 for Commercial & Industrial Customers, the Customer has the option to request that the Company perform a one-time CIAC recalculation. This option is not available for Line Extension Policy 1 for Individual Residential Customers or Policy 2 for Residential Developments. Consequently, the Company only performs reconciliations upon request from the customer. All reconciliation requests are tracked by the Manager of Customer Connections. In FY14 – FY19, there was one request from a Policy 3 customer where the project was \$50,000 or more. The project name and descriptions are confidential; therefore, the Company is submitting this response pursuant to Motion for Protective Treatment and has provided a redacted version of this response for the public filing.

Project Name	Brief Description	Commencement Date	Completion Date	Estimated Cost	Estimated Revenue Justification	Project Cost Attributable to the Customer (CIAC)	Date Payment Received	Actual Costs	Actual Revenue Justification	Actual CIAC Amount	Project Cost Exceeding CIAC Attributable to Company
		1/16/2017	3/13/2017	\$116,811.07	\$44,313.37	\$72,497.70	6/20/2016	\$150,816.08	\$20,384.56	\$130,431.52	(\$57,933.82)

Distributed Generation

Prior to January 12, 2015, and in accordance with the Commission's Order in Docket No. 4483, the Company was only required to reconcile distributed generation (DG) projects at the end of the project upon the customer's request. Therefore, only a few DG project reconciliations were conducted prior to that date. In addition, projects are reconciled only if and when they have been completed. A list of all completed projects is shown in Attachment DIV IV-2. The list does not include projects that were cancelled. The project names and descriptions in Attachment DIV IV-2 are confidential; therefore, the Company is providing Attachment DIV IV-2 subject to a Motion for Protective Treatment, and has provided a redacted version of this attachment for the public filing.

On and after January 12, 2015, and in accordance with the Company's Standards for Connecting Distributed Generation, RIPUC No. 2163, the Company began reconciling all completed projects with respect to which the Company had received the application to interconnect on or after January 12, 2015. For larger (Standard) projects, the life cycle within the interconnection process – from application receipt through closure of financial work orders – can easily span more than two years.

Redacted

Project Name (Confidential)	Brief Description	Actual Cost	Total Estimated Project Cost	Actual CIAC Payment Amount	Date CIAC Payment Received	Project Cost Attributable to the Customer (CIAC)	Variance (Actual Cost - CIAC Payment)	Project Commencement Date	Project Completion Date
		41,694.46	56,850.00	56,850.00	2/3/2017	41,694.46	(15,155.54)	2/3/2017	9/13/2017
		29,638.95	59,500.00	59,500.00	6/19/2013	29,638.95	(29,861.05)	6/19/2013	2/10/2015
		284,274.94	226,160.00	226,160.00	12/24/2014	284,274.94	58,114.94	12/24/2014	5/27/2018
		3,816,323.13	3,786,485.00	3,786,485.00	8/18/2015	3,816,323.13	29,838.13	8/18/2015	7/8/2016
		477,420.72	474,309.00	474,309.00	7/20/2015	477,420.72	3,111.72	7/20/2015	8/10/2016
		325,315.26	356,361.00	356,361.00	11/5/2015	325,315.26	(31,045.74)	11/5/2015	7/10/2017
		84,745.81	223,256.42	223,256.42	3/11/2016	84,745.81	(138,510.61)	3/11/2016	12/22/2017

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Attachment DIV IV-2

Redacted

Project Name (Confidential)	Brief Description	Actual Cost	Total Estimated Project Cost	Actual CIAC Payment Amount	Date CIAC Payment Received	Project Cost Attributable to the Customer (CIAC)	Variance (Actual Cost - CIAC Payment)	Project Commencement Date	Project Completion Date
		55,689.26	57,282.00	57,282.00	9/22/2015	55,689.26	(1,592.74)	9/22/2015	8/10/2016
		71,425.62	67,622.00	67,622.00	7/24/2015	71,425.62	3,803.62	7/24/2015	8/21/2018
		241,416.64	197,513.52	197,513.52	11/16/2015	241,416.64	43,903.12	11/16/2015	1/2/2018
		70,087.31	63,236.00	63,236.00	4/25/2016	70,087.31	6,851.31	4/25/2016	8/28/2017
		150,256.55	132,079.00	132,079.00	7/8/2016	150,256.55	18,177.55	7/8/2016	6/26/2017
		74,306.93	58,860.00	58,860.00	2/16/2016	74,306.93	15,446.93	2/16/2016	8/11/2016
		75,043.20	53,039.91	53,039.91	4/21/2017	75,043.20	22,003.29	4/21/2017	12/13/2018
		108,133.33	106,201.00	106,201.00	8/3/2016	108,133.33	1,932.33	8/3/2016	1/18/2017
		467,200.58	533,933.00	533,933.00	6/6/2017	467,200.58	(66,732.42)	6/6/2017	8/21/2018
		176,337.95	160,117.60	160,117.60	5/19/2017	176,337.95	16,220.35	5/19/2017	10/18/2018

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
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Redacted

Project Name (Confidential)	Brief Description	Actual Cost	Total Estimated Project Cost	Actual CIAC Payment Amount	Date CIAC Payment Received	Project Cost Attributable to the Customer (CIAC)	Variance (Actual Cost - CIAC Payment)	Project Commencement Date	Project Completion Date
		65,120.99	65,136.50	65,136.50	8/2/2017	65,120.99	(15.51)	8/2/2017	12/20/2018
		66,644.96	60,088.00	60,088.00	1/4/2017	66,644.96	6,556.96	1/4/2017	7/27/2018
		124,744.23	102,562.88	102,562.88	5/1/2017	124,744.23	22,181.35	5/1/2017	12/22/2017
		44,277.67	102,562.88	102,562.88	5/1/2017	44,277.67	(58,285.21)	5/1/2017	12/22/2017
		97,882.54	66,841.17	66,841.17	4/21/2017	97,882.54	31,041.37	4/21/2017	10/22/2018
		41,674.86	54,412.85	54,412.85	4/21/2017	41,674.86	(12,737.99)	4/21/2017	10/22/2018
		52,102.60	50,434.81	50,434.81	4/21/2017	52,102.60	1,667.79	4/21/2017	10/22/2018
		379,678.90	309,833.72	309,833.72	7/28/2017	379,678.90	69,845.18	7/28/2017	12/6/2018
		247,510.73	362,283.30	362,283.30	4/7/2017	247,510.73	(114,772.57)	4/7/2017	12/6/2018
		841,150.69	737,573.27	737,573.27	4/18/2017	841,150.69	103,577.42	4/18/2017	12/22/2017

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R-IV-3

Request:

Referencing the Company's *Docket 4783 - Fiscal Year 2019 Electric Infrastructure, Safety, and Reliability Plan Reconciliation Filing*, Attachment PCE-1, page 6; please provide the following information on the increased issuance of transformers that contributed to the \$2.2 million over-budget in the Transformer Purchases category:

- a) A list of transformers purchased by voltage, kVA, UG/OH, and cost,
- b) Whether the transformer was a new installation, replacement, or added to inventory, and
- c) If a replacement, provide the rationale (failed equipment, capacity increase, voltage conversions, or other reason identified by the Company).

Response:

- a) See table below.

Overhead Line Transformers Purchased		
Voltage	Cost	Quantity
All Overhead	\$ 1,828,947.10	2,065
Single Phase		
10	\$ 85,911.94	149
25	\$ 779,417.42	1,092
50	\$ 773,878.74	755
100	\$ 77,666.00	37
167	\$ 47,416.00	17
250	\$ 55,818.00	14
500	\$ 8,839.00	1
Underground Line Transformers Purchased		
All Underground	\$ 1,574,542.29	370
Single Phase		
25	\$ 78,130.52	59
50	\$ 181,192.00	116
75	\$ 85,927.29	36
100	\$ 56,418.00	24
Three Phase		
150	\$ 228,113.18	40
300	\$ 389,470.15	53
500	\$ 248,817.47	23
750	\$ 103,757.27	9
1000	\$ 146,380.00	7
1500	\$ 30,946.41	2
2500	\$ 25,390.00	1
Total	\$ 3,403,489.39	2,435

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- b) & c) When transformers are purchased, they are capitalized per accounting policy. At the time of purchase, they are not classified by the type of capital project where they will be installed.

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R-IV-4

Request:

For the Damage/Failure category, provide the actual spend for each quarter of FY 2019.

Response:

Please see below for actual spend in each quarter of FY 2019 in the Damage Failure category.

FY 2019 ISR Damage/Failure Spending Category	
Q1	\$ 3,256,795
Q2	\$ 4,009,616
Q3	\$ 2,759,717
Q4	\$ 3,972,462
Total	\$ 13,998,590

R-IV-5

Request:

Provide a list of all projects performed under the Damage/Failure category in FY 2019, in Excel format, with the following information:

- a) Work Order Number
- b) Project Type
- c) Work Order Number Description
- d) Location
- e) Total FY 2019 Capital Spending
- f) Feeder
- g) Region
- h) Description
- i) Work Performed Due to
 - i. Failed Equipment
 - ii. Damaged Equipment, or
 - iii. Not Due to Failed or Damaged Equipment

Response:

Please see Attachment DIV IV-5 for a list of all projects performed under the Damage/Failure category in FY 2019, in Excel format.

The list contains 360 work orders with over \$100 of spending within the Damage/Failure spending rational, which represents approximately \$5 million of capital spending. These work orders do not include storm/weather related damage, property damage claims (i.e. motor vehicle accidents damaging equipment, third-party damage to underground equipment, etc.), or the Monthly Damage/Failure Confirming Work Orders. Please note that comprehensive descriptions of work for Monthly Damage/Failure Confirming Work Orders (CWO) were not included. Monthly CWOs are used to capture unplanned damage/failure work during the course of a given month. These work orders generally include high-volume, low cost repairs on the overhead distribution system that are in response to system or customer issue during normal business operation.

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After reviewing the 360 work orders, the Company identified 50 work orders, totaling approximately \$190,000 in FY 2019 capital spending, where a direct association with damage/failed equipment could not be determined.

Please note that as a part of the review the Company undertook of its Damage/Failure classification work, a recommendation was made to implement monthly reviews of the charges in the Damage Failure blanket to ensure that the new definition was being met. The Company is in the process of implementing those changes.

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R-IV-6

Request:

Referencing Attachment PCE-1, page 8; provide additional details on the \$1 million under-spend in the I&M inspection category.

Response:

In FY 2019, the I&M program was planned to be constructed later in the fiscal year due to other priorities for the resources occurring earlier in the year. Consequently, later in the fiscal year, a larger than anticipated amount of customer work emerged requiring re-allocation of resources over the program work.

R-IV-7

Request:

Referencing Attachment PCE-1, page 8; provide additional details on the work performed at South Street Substation including the rationale for accelerating work planned in FY 2020 to FY 2019, when it was determined that the work would be performed early, and a detailed comparison of actual cost for the work performed compared to the estimated cost. Provide the quantifiable cost savings achieved by performing the work early, or alternately, the additional costs or risks that would have been incurred by performing the work in FY 2020 as originally scheduled.

Response:

The South St. Project required the installation and cut-over of three new transformers (or three sections). The project was planned to complete one section cut-over per outage season. The transmission line outages required can only be obtained and approved during the spring and fall. During this sequencing or prior to all sections being cut over to the new building, there is exposure and risk to having two buildings operational (old and new). Temporary cables connecting the low side distribution systems and the protection systems are required. This creates operation complexities as well as non-standard cabling configurations.

During the first outage sequence in FY19, the Contractor working with the National Grid Team confirmed that there was an opportunity to accelerate the cut-overs since the first section was not as complex and was taking less time than initial anticipated. The Project Team made the decision during the first outage season to advance the cut-overs of the remaining sections to eliminate the need for temporary wiring configurations.

A comparison of the actual cost for the work performed compared to the estimated cost is below

	Actuals	Estimate
Labor / Benefits	\$ 2,121,848	\$ 1,777,083
Material	\$ 1,535,977	\$ 1,977,834
Contractor/Consultants	\$ 29,264,683	\$ 29,696,814
Transportation	\$ 111,654	\$ 344,004
Overheads	\$ 7,799,957	\$ 4,874,691

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The costs savings achieved through the acceleration cannot be quantified through Contractor costs as there were no credits obtained for early completion from the EPC vendor. There are indirect costs savings related to completing early for National Grid through savings on internal labor for project oversight, project management and overhead costs. The reduced time of completion resulted in an estimated savings of \$250K of internal labor and \$125K of overheads. This is estimated based upon the actual costs of oversight, management and overheads incurred per month during the cut-over construction.

The acceleration was an overall benefit to the project, reducing internal time required on the project and reducing operational and reliability risk due to temporary cable configuration exposure.

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R-IV-8

Request:

Referencing Attachment PCE-1, page 8; provide a detailed list of FY 2019 projects in the Asset Replacement – Distribution and Substation category, comparing budgeted and actual spend. Provide explanations for project variances that totaled \$1.2 million over budget.

Response:

Work under a blanket project, such as the asset replacement blanket, is usually of short duration and performed by local crews. These crews are also used for other blanket work such as reliability and load relief. While the asset replacement blanket was over budget, the reliability and load relief blankets were under budget by approximately \$600,000. Other key drivers in FY19 include increased overheads and some pole sets due to the new Verizon agreement, effective May 2018. While pole set costs go to the project to which those costs relate, either a specific project or blanket projects, the offsetting billing for Verizon pole sets is recorded in the New Business Residential blanket.

R-IV-9

Request:

Referencing the Company's *Docket 4783 - Electric Infrastructure, Safety, and Reliability Plan Quarterly Update – Fourth Quarter Ending March 31, 2019*, page 4; provide additional details on the rationale for accelerating the Franklin Square Breaker project which resulted in a \$1.1 million expenditure that was not budgeted in FY 2019. Provide the quantifiable cost savings achieved by performing the work early, or alternately, additional costs or risks that would have been incurred by performing the work at a later date.

Response:

The Franklin Square Breaker project was approved to be incorporated in the FY 2019 work plan in November 2018 to balance the discretionary portfolio and ensure that the design and materials were ready for Spring/Summer 2019 construction due to the long lead time nature of these breaker units. There were no quantifiable cost savings achieved or additional costs incurred by performing the work earlier than originally anticipated.

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R-IV-10

Request:

Referencing Attachment PCE-1, page 8-9; what portion of the \$1.6 million overspend for metalclad switchgear work was attributed to Lee Street? Provide the Company's rationale for "completing as much as Lee Street as possible" in FY 2019, including any quantifiable cost savings. Provide the current total budget and forecasted costs for both Lee and Cottage Street metalclad switchgear projects.

Response:

The \$1.6M overspend was all attributed to the Lee St project. The total overspend of the FY19 budget between Lee and Cottage St was \$1.2M. The company was able to resource and advance the Lee Street work earlier than had been anticipated. Also, the Cottage Street project is expected to be completed earlier than had been anticipated. There were no quantifiable costs savings as a result of these changes. The Lee and Cottage total budget including prior year costs is \$7.5M and the total forecasted costs is \$6.6M.

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R-IV-11

Request:

Provide the Company's most recent sanction papers for Southeast Substation. Is the project scheduled for a re-sanction, and if so, what is the anticipated timing?

Response:

Please see Attachment DIV IV-11 for Southeast Substation sanction papers. There is no scheduled re-sanction at this time.



Long: US Sanction Paper

Title:	New Southeast Substation	Sanction Paper #:	USSC-15-109v2
Project #:	C053657, C053658, C055683, C055563, C056343, C055583 and C061766	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric and Gas Co.	Date of Request:	7/22/2019
Author:	Maximovich, George	Sponsor(s):	Sedewitz, Carol A. VP Electric Asset Mgmt & Planning Gemmell, Brian VP Trnsmsn Asset Mgmt Plan & Del
Utility Service:	Electricity T&D	Project Manager:	Maximovich, George

Executive Summary

This paper requests Sanction of C053657, C053658, C055683, C055563, C056343, C055583 and C061766 in the amount of \$38.182M with a tolerance of +/-10% for the purposes of full implementation.

This sanction amount is \$38.182M broken down into:
\$33.642M Capex
\$0.781M Opex
\$3.759M Removal

With a CIAC/Reimbursement of \$0.000M
With a Salvage Value of \$0.000M

This project is in final design and/or has secured the necessary agency approvals to proceed and is ready to be released for construction. At this stage, re-evaluation of the project design would likely result in significant delays to the project schedule and an increase in cost. This project will be evaluated for any procurement or construction efficiency opportunities upon its release for construction.

Project Summary

This project addresses safety, asset condition, and reliability concerns associated with the Pawtucket No 1 indoor station on the four story brick building located on Tidewater Street on the west bank of the Seekonk River in the City of Pawtucket. Pawtucket No 1 supplies approximately 36,000 customers with a peak electrical demand of 109 MW. The project includes the installation of a new eight feeder 115/13.8 kV metal clad substation with two transformers and breaker and a half design on a site adjacent to the transmission right of way on York Avenue in the City of Pawtucket; the supply to the proposed station from the existing 115 kV lines crossing the site, X-3 and T-7; the rearrangement of the 13.8kV distribution system in the City of Pawtucket to transfer approximately 55 MVA of load from Pawtucket No 1 to the new substation; the construction of a new control house at the Pawtucket No 1 substation site to house the control equipment for the 115 kV station presently located in the indoor station building; the upgrade of 115 kV line protection for P-11 at Valley station; and the decommission and removal of the indoor station and the demolition of the four story brick building at Pawtucket No 1 substation.

Background

Pawtucket No. 1 station is located on Tidewater Street on the west bank of the Seekonk River in the City of Pawtucket. It consists of a four story brick building constructed in 1907 and an outdoor switchyard. It has

nineteen 13.8 kV distribution circuits that supply approximately 36,000 customers with a peak electrical demand of 109 MW. Three feeders supply a network in downtown Pawtucket with approximately 3 MW of load.

The brick building was part of a former power plant that was decommissioned in 1975 and is less than 25% utilized. This building houses indoor distribution switchgear and other electrical equipment. The electrical equipment still in service within the building is associated with both the indoor switchgear and the outdoor yard. Some electrical equipment associated with the former power plant has been abandoned in place.

The indoor substation was designed based on the standards at the time it was built. Operating and working in this station now requires special procedures and added safeguards to be followed. Additionally, it is challenging to find replacement parts for the equipment in the station since parts have to be custom made or salvaged from facilities that have been removed from service. The building layout is such that it precludes the implementation of modern installation standards in order to replace original equipment.

The breakers in the indoor substation consist of General Electric "H"-type circuit breakers ranging in age from 40 to 94 years old. The 1920 breakers are live-tank, oil-filled circuit breakers which are obsolete due to a lack of spare parts, slow operation, and the potential for failure. The 1970 breakers have a history of poor reliability especially during switching operations with three documented failures of the breaker motor and two documented failures of the trip/close coils.

A contingency at Pawtucket No.1 involving loss of a transformer or main bus would require significant load to be transferred to adjacent stations utilizing feeder ties. Pawtucket No. 1 only has weak ties to Valley St. station, therefore a significant amount of Pawtucket No. 1 load cannot be picked up during these contingencies. The projected bus loading and projected un-served load at Pawtucket No 1 for each bus section is shown in the table below:

Substation	Tranf. ID.	Rating (MVA)		2019 Peak Load		2019 Projected Un-Served Load Under Contingency	
		SN	SE	MW	% SN	MW	MWh Exposure
Pawtucket No. 1	T71	47.8	47.8	43.9	92%	17.3	445
Pawtucket No. 1	T73	47.8	47.8	35.0	73%	4.3	200
Pawtucket No. 1	T74	47.8	47.8	29.8	62%	23.7	576

National Grid's Distribution Planning Criteria recommends mitigating any un-served load exposure in excess of 10 MW or 240 MWh. The loss of the T71 transformer, the T74 transformer, or a bus section at Pawtucket No. 1 would result in outage exposures in excess of those recommended by distribution planning criteria.

Project Descriptions

Construct a new 115/13.8 kV metal clad substation, breaker and a half design, adjacent to the transmission right of way on York Avenue. The new station designated as Dunnell Park will have an ultimate layout for eight distribution circuits with two 115/13.8 kV 33/44/55 MVA LTC transformers and two station capacitor banks. The station will be supplied from two 115 kV transmission lines on the right of way, X-3 and T-7.

Rearrange the 13.8kV distribution system in the City of Pawtucket to transfer approximately 55 MVA of load from Pawtucket No 1 to Dunnell Park substation. The remaining Pawtucket No. 1 load will be rearranged and supplied from switchgear sections 73 and 74. The new station will supply the bulk of the load east of the Seekonk River while Pawtucket No. 1 will supply most of the load west of the Seekonk River.

Install a new control house at Pawtucket No. 1 to house the control equipment for the 115 kV station that is presently housed in the indoor substation building. EMS functionality will be expanded to provide remote status, control and monitoring of all switching devices, transformers, voltage regulation and battery systems. Alarming will include transformer low oil; transformer, circuit breaker, relay and battery system trouble. Monitoring will include voltage and current for all three phases and neutral, MW, MVAR, and MVA. Control will include trip and close on all switching devices; reclose on/off on circuit breakers; ground relay control on feeders for switching, and control of voltage regulation.

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Upgrade the 115 kV line protection for P-11 at Valley substation.

Remove the indoor station and all electrical equipment from the four story brick building, demolish the building and provide final grading and arrangement on this area at Pawtucket No. 1.

Summary of Benefits

This project addresses safety, asset condition, and reliability concerns associated with the Pawtucket No 1 indoor station. This work benefits all the customers in the City of Pawtucket and the surrounding areas.

Business and Customer Issues

There are no significant business or customer issues beyond what has been described elsewhere in this paper.

Alternatives

<i>Number</i>	<i>Title</i>
1	<p>Install a new Metal Clad 115/13.8 kV Station at the Pawtucket No 1</p> <p>This alternative proposes development of a new 115/13.8 kV metal clad substation, breaker and a half design, in the Pawtucket No. 1 yard. The station would be constructed with two 115/13.8 kV 33/44/55 MVA LTC transformers, eight distribution circuits and two station capacitor banks. After installation of the new switchgear, load at Pawtucket No 1 will be rearranged to allow for the elimination of the 71 bus.</p> <p>There are presently eight circuits on section 71, including three network feeders. The three network circuits are currently dedicated feeders with approximately 3.0 MVA of peak load. It is proposed to supply these network circuits from section 73. The remaining circuits will be resupplied from the new station. Three circuits in section 73 will be resupplied from the new station to free up feeders for the three network circuits. This work will reduce loading on section 73 below the rating of the 2,000 Amp bus.</p> <p>The distribution infrastructure from Pawtucket No 1 is all underground. Therefore, new manhole and ductline systems will be built from the new station out to city streets and intercept the existing underground system when practical. New underground feeder getaways will be installed from the new station and will intercept the existing cables or be routed directly to the riser poles.</p> <p>The existing manhole and ductline infrastructure predominantly consists of 3-inch conduits installed on city streets. Although the age of this infrastructure is unknown, based on the age of the indoor substation it would be reasonable to assume that the majority of this infrastructure dates back to the early 1900's. The 3-inch duct diameter is not suitable for routing of the proposed solid dielectric cables required for the new feeders. New 5 inch diameter duct is required for the new cable. This plan would install a new manhole and duct system necessary to bypass the limiting 3-inch infrastructure.</p> <p>The conceptual grade estimate for this plan was \$30.600M of which \$26.100M was capital, \$0.400M was O&M and \$4.100M was removal and the conceptual grade estimate for the recommended plan was \$23.000M of which \$18.100M was capital, \$0.300M was O&M and \$4.600M was removal. This alternative was estimated to be 33.0% more expensive than the recommended plan.</p>

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- 2 Non-Wires Alternative
The primary driver for this project is to address the asset condition, including the safety and reliability concerns with the Pawtucket No 1 indoor substation. Non Wires Alternatives are not applicable for this project. New supply and distribution infrastructure is the only reasonable alternative to address the asset conditions.

Related Projects, Scoring and Budget

Summary of Projects

<i>Project Number</i>	<i>Project Type (Elec only)</i>	<i>Project Title</i>	<i>Estimate Amount(\$M)</i>
C053657	D-Sub	Southeast Sub (D -Sub)	10.766
C053658	D-Line	Southeast Sub (D-Line)	10.618
C055683	D-Sub	Pawtucket No 1 (D-Sub)	4.056
Total:			25.440

<i>Project Number</i>	<i>Project Type (Elec only)</i>	<i>Project Title</i>	<i>Estimate Amount(\$M)</i>
C055563	T-Line	Southeast Sub (T-Line)	1.305
C056343	T-Sub	Southeast Sub (T -Sub)	3.094
C055583	T-Sub	Pawtucket No 1 (T-Sub)	7.370
C061766	T-Sub	Valley Sub P11 Upgrades	0.973
Total:			12.742

Associated Projects

<i>Project Number</i>	<i>Project Title</i>	<i>Estimate Amount (\$M)</i>
C053249	Robinson Ave Control House Upgrades	9.087
		9.087

Prior Sanctioning History

<i>Date</i>	<i>Governance Body</i>	<i>Sanctioned Amount</i>	<i>Potential Project Investment</i>	<i>Sanction Type</i>	<i>Sanction Paper</i>	<i>Potential Investment Tolerance</i>
5/13/2015	USSC	5.600	23.000	Partial Sanction	USSC-15-109	-25%/+50%

The variance between the initial potential project investment and this sanction was caused by:

1. Addition of new 115kV equipment on Pawtucket No. 1 and on the new Dunnell Park substation as result of the review of protection requirements for the project. The updated scope includes the installation of 115kV CCVT's, Line Traps, Line Tuners and related relaying and civil & structural work on X-3 and T-7 transmission line terminals on both substations (\$4.485M).
2. Additional civil and environmental scope of work on Pawtucket No. 1 based on the final location of the new control house inside the 100 year floodplain and the alignment with Tidewater Environmental Project requirements (\$4.865M).
3. Underestimation on the scope and level of effort on the distribution line work for the new feeders and distribution circuits rearrangement on the City of Pawtucket (\$4.517M).
4. Increase on equipment market value and other miscellaneous additional costs (\$1.315M).

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
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Key Milestones

<i>Milestone</i>	<i>Date (Month / Year)</i>
Partial Sanction	May, 2015
Project Sanction	July, 2019
Engineering Design Complete - EDC	August, 2019
Gate C1 - Approval to Progress to Field Execution	September, 2019
Construction Start	October, 2019
Ready for Load / Use	May, 2021
Construction Complete - CC	October, 2021
Gate D - Approval to Progress to Closeout	December, 2021
Gate E - Approval to Close Project	September, 2022
Project Closure Sanction	October, 2022

Next Planned Sanction

Date (Month/Year)	Purpose of Sanction Review
October, 2022	Closure

Category

Category	Reference to Mandate, Policy, NPV, or Other
<input type="radio"/> Mandatory <input checked="" type="radio"/> Policy-Driven <input type="radio"/> Justified NPV <input type="radio"/> Other	The investment is policy driven. The Asset Management & Engineering Business Management Standard (BMS 04) sets performance requirements for the "maintenance, repair, replacement, operations and retirement of assets".

Asset Management Risk Score: 44

PRIMARY RISK SCORE DRIVER

Reliability Environment Health & Safety Not Policy Driven

Complexity Level: 25

High Complexity Medium Complexity Low Complexity N/A

Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project: Yes No

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
Responses to the Division's Fourth Set of Data Requests

Current Planning Horizon

Distribution

\$M	Prior Yrs	Current Planning Horizon						Total
		Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	
CapEx	2.560	6.315	10.083	2.089	0.006	0.000	0.000	21.053
OpEx	0.006	0.111	0.449	0.108	0.000	0.000	0.000	0.674
Removal	0.065	0.153	1.542	1.953	0.000	0.000	0.000	3.713
Total	2.631	6.579	12.074	4.150	0.006	0.000	0.000	25.440

Transmission

\$M	Prior Yrs	Current Planning Horizon						Total
		Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	
CapEx	1.185	2.455	8.610	0.335	0.004	0.000	0.000	12.589
OpEx	0.003	0.012	0.088	0.004	0.000	0.000	0.000	0.107
Removal	0.000	0.006	0.032	0.008	0.000	0.000	0.000	0.046
Total	1.188	2.473	8.730	0.347	0.004	0.000	0.000	12.742

Capex	3.745	8.770	18.693	2.424	0.010	0.000	0.000	33.642
Opex	0.009	0.123	0.537	0.112	0.000	0.000	0.000	0.781
Removal	0.065	0.159	1.574	1.961	0.000	0.000	0.000	3.759
Total	3.819	9.052	20.804	4.497	0.010	0.000	0.000	38.182

Resources, Operations, & Procurement

RESOURCE SOURCING

Engineering & design Resources to be provided	<input checked="" type="checkbox"/> Internal	<input checked="" type="checkbox"/> Contractor
Construction/Implementation Resources to be provided	<input checked="" type="checkbox"/> Internal	<input checked="" type="checkbox"/> Contractor

RESOURCE DELIVERY

Availability of internal resources to delivery project:	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green
Availability of external resources to delivery project:	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green

OPERATIONAL IMPACT

Outage impact on network system	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green
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PROCUREMENT IMPACT

Procurement impact on network system:	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green
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Key Issues

1	Permitting is required for the proposed new Dunnell Park substation.
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In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
Responses to the Division's Fourth Set of Data Requests

- 2 Environmental, engineering design, permitting and construction coordination is required with Tidewater Environmental Project at Pawtucket No 1 substation.
- 3 Outages required on X-3, T-7 and P-11 transmission lines during construction activities on the new Dunnell Park substation and on Pawtucket No 1 and Valley substations will be coordinated with other projects in the same area.

Climate Change

- Contribution to National Grid's 2050 80% emissions reduction target: Neutral Positive Negative
- Impact on adaptability of network for future climate change: Neutral Positive Negative

List References

- 1 E18-0203, E18-0057, E18-0056, E18-0055, E18-0054, E18-0053, E-18-0052 4.4 Estimates, dated April 2019
- 2 Distribution Annual Plan 2019 - 2024
- 3 Pawtucket Area Study - December 2014
- 4 Conceptual Engineering Report and Estimates - May 2014

Safety, Environmental and Project Planning Issues

- Safety** A health and safety plan will be developed for all project areas and all National Grid safety and environmental rules will be followed. During the development of the Transmission and Distribution Line works the Process Hazard Analysis (PHA) will be considered.
- Environmental** Environmental, engineering design, permitting and construction activities will continue in coordination with Tidewater Environmental Project at Pawtucket No 1 substation.
- Project Planning** The Permitting & Licensing and Outreach team will continue working with Project Management to address any permitting, environmental or community issues.

Permitting

Permit Name	Probability Required	Duration to Acquire Permit	Status	Estimated Completion Date
EFSB Notice of Intent	Certain	3 months	In Progress	September, 2019
Historic Commission Review	Certain	2 months	Complete	January, 2019

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
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Rhode Island Coastal Resources Management Council (CRMC) Maintenance Assent Permit	Certain	3 months	In Progress	September, 2019
Local Soil Erosion and Sediment Control (SESC) Permit	Certain	3 months	In Progress	September, 2019
Rhode Island Department of Environmental Management (RIDEM) Oil and Hazardous	Certain	1 month	In Progress	August, 2019
Pawtucket Riverfront Commission – Development Plan Review	Certain	2 months	In Progress	September, 2019
Pawtucket Zoning Board of Appeals – Special use permit	Certain	3 months	In Progress	September, 2019
Pawtucket Planning Board Staff – Development Plan Review	Certain	1 month	In Progress	August, 2019
Pawtucket Street Opening Permit	Certain	3 months	In Progress	September, 2019
Building Permit	Certain	1 month	In Progress	October, 2019

Investment Recovery and Customer Impact

Investment Recovery

The transmission project split is 65.5% PTF and 34.5% Non-PTF. The PTF-related plant will be recovered through New England Power's Regional Network Service ("RNS") rates, whereas the Non-PTF plant will be recovered through the Local Network Service ("LNS") rates.

Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$6.220M.

Execution Risk Appraisal						
Risk Breakdown Structure Category	Qualitative Assessment / Risk Response Strategy					Risk Score
	Risk ID + Title	IF Statement	THEN Statement	Risk Response Strategy		
10. Line Outages	R1 - Outage Planning	If an outage is not approved	Then there will be schedule delay and extra expenses incurred	Accept	Reschedule the outage based on availability	4
10. Line Outages	R2 - Missed Outage	If an outage is cancelled or missed during construction	Then there will be schedule delay and construction cost impact due to mob/demobs, standby condition, equipment rental	Accept	Reschedule the outage based on availability	4
5. Environmental	R3 - Hazardous Material at Dunnell Park Property	IF unknown Hazardous Material or contaminated soils located during excavation of structures and utilities	THEN additional costs will be incurred related to proper handling, removal and disposal	Accept	No action	4
7. Procurement Contracts	R4 - Tarriff	IF a government tariff is passed	THEN the cost of equipment will increase and may be a delay in material delivery	Accept	No action	4
11. Construction	R5 - Unknown Existing Conditions	IF unanticipated facilities or conditions are encountered	THEN additional engineering will be required and the construction schedule will be delayed	Reduce	Verify accurate and current as-built drawings	6
4. Permitting	R6 - Noise and visual impact mitigation	IF residents oppose noise/dust associated with demolition of the four story brick building at Pawtucket No 1	THEN additional permitting will be required, work hours will be restricted, and the schedule will be delayed.	Accept	No action	4
11. Construction	R7 - Equipment/Material Damage	IF equipment and/or material and new control house & switchgear are damaged due to congestion of the operational yard or building location	THEN additional equipment/material will need to be procured or repairs will be made and the schedule will be delayed.	Reduce	Construction methods and sequencing	4

Business Plan			
Business Plan Name & Period	Project Included in approved Business Plan?	(Over) / Under Business Plan	Project Cost relative to approved Business Plan (\$M)
NE Distribution FY20-24 Capital Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> N/A	(7.348)
NE Transmission FY20-24 Capital Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> N/A	(8.537)

If Cost > Approved

if costs > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio has been managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

Drivers

This project is required to address safety, asset condition, and reliability concerns with the Pawtucket No.1 indoor substation. This project also addresses load at risk that exceeds the distribution planning criteria; feeder loading that exceeds summer normal ratings; and loading that exceeds the rated capacity of the station bus.

Cost Summary Table

Distribution										
Project Number	C053657	Project Title	Southeast Sub (D -Sub)						Project Estimate Level	10%
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total		
Capex	2.101	4.150	3.713	0.718	0.002	0.000	0.000	10.684		
Opex	0.003	0.000	0.049	0.030	0.000	0.000	0.000	0.082		
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Total	2.104	4.150	3.762	0.748	0.002	0.000	0.000	10.766		

Southeast Sub (D-Line)										
Project Number	C053658	Project Title	Southeast Sub (D-Line)						Project Estimate Level	10%
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total		
Capex	0.330	2.100	6.270	1.107	0.002	0.000	0.000	9.809		
Opex	0.003	0.111	0.400	0.078	0.000	0.000	0.000	0.592		
Removal	0.000	0.108	0.092	0.017	0.000	0.000	0.000	0.217		
Total	0.333	2.319	6.762	1.202	0.002	0.000	0.000	10.618		

Project Number	Project Title	Pawtucket No 1 (D-Sub)						Project Estimate Level	10%
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	
Capex	0.129	0.065	0.100	0.264	0.002	0.000	0.000	0.560	
Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Removal	0.065	0.045	1.450	1.936	0.000	0.000	0.000	3.496	
Total	0.194	0.110	1.550	2.200	0.002	0.000	0.000	4.056	

Transmission

Project Number	Project Title	Southeast Sub (T-Line)						Project Estimate Level	10%
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	
Capex	0.237	0.563	0.425	0.029	0.001	0.000	0.000	1.255	
Opex	0.000	0.007	0.007	0.000	0.000	0.000	0.000	0.014	
Removal	0.000	0.006	0.030	0.000	0.000	0.000	0.000	0.036	
Total	0.237	0.576	0.462	0.029	0.001	0.000	0.000	1.305	

Project Number	Project Title	Southeast Sub (T-Sub)						Project Estimate Level	10%
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	
Capex	0.252	0.867	1.910	0.064	0.001	0.000	0.000	3.094	
Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Total	0.252	0.867	1.910	0.064	0.001	0.000	0.000	3.094	

Project Number	Project Title	Pawtucket No 1 (T-Sub)						Project Estimate Level	10%
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	
Capex	0.554	0.845	5.645	0.232	0.002	0.000	0.000	7.278	
Opex	0.003	0.005	0.078	0.004	0.000	0.000	0.000	0.090	
Removal	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	
Total	0.557	0.850	5.725	0.236	0.002	0.000	0.000	7.370	

Project Number	Project Title	Valley Sub P11 Upgrades						Project Estimate Level	10%
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	
Capex	0.142	0.180	0.630	0.010	0.000	0.000	0.000	0.962	

Opex	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.003
Removal	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.008
Total	0.142	0.180	0.633	0.018	0.000	0.000	0.000	0.973

Total Project Sanction

Capex	3.745	8.770	18.693	2.424	0.010	0.000	0.000	33.642
Opex	0.009	0.123	0.537	0.112	0.000	0.000	0.000	0.781
Removal	0.065	0.159	1.574	1.961	0.000	0.000	0.000	3.759
Total	3.819	9.052	20.804	4.497	0.010	0.000	0.000	38.182

Project Costs per Business Plan

Distribution

\$M	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total
Capex	2.560	6.250	4.400	0.350	0.000	0.000	0.000	13.560
Opex	0.006	0.111	0.087	0.006	0.000	0.000	0.000	0.210
Removal	0.065	1.608	2.616	0.033	0.000	0.000	0.000	4.322
Total Cost in Bus. Plan	2.631	7.969	7.103	0.389	0.000	0.000	0.000	18.092

Variance

\$M	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total
Capex	0.000	(0.065)	(5.683)	(1.739)	(0.006)	0.000	0.000	(7.493)
Opex	0.000	0.000	(0.362)	(0.102)	0.000	0.000	0.000	(0.464)
Removal	0.000	1.455	1.074	(1.920)	0.000	0.000	0.000	0.609
Total Variance	0.000	1.390	(4.971)	(3.761)	(0.006)	0.000	0.000	(7.348)

Project Costs per Business Plan

Transmission

\$M	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total
Capex	1.185	1.827	0.914	0.167	0.000	0.000	0.000	4.093
Opex	0.003	0.059	0.043	0.006	0.000	0.000	0.000	0.111
Removal	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001
Total Cost in Bus. Plan	1.188	1.886	0.958	0.173	0.000	0.000	0.000	4.205

Variance

\$M	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total
Capex	0.000	(0.628)	(7.696)	(0.168)	(0.004)	0.000	0.000	(8.496)
Opex	0.000	0.047	(0.045)	0.002	0.000	0.000	0.000	0.004

Removal	0.000	(0.006)	(0.031)	(0.008)	0.000	0.000	0.000	(0.045)
Total Variance	0.000	(0.587)	(7.772)	(0.174)	(0.004)	0.000	0.000	(8.537)

Cost Assumptions

The accuracy level of estimate for the project is +/-10%.

Standard material procurement process to be followed, and there are no expected delivery delays.

Net Present Value / Cost Benefit Analysis

N/A

NPV Assumptions & Calculations

N/A

Additional Impacts

N/A

Statement of Support

<i>Department</i>	<i>Individual</i>	<i>Responsibilities</i>
Project Management	Arthur, David; Migdal, Sara A.;	Endorses resources, cost estimate and schedule
Electric Project Estimation	Lutz, Sara E.;	Endorses Cost Estimate
Investment Planning	Diconza, Glen L.; McColgan, Karen A.;	Endorses relative to 5-year business plan or emergent work
Engineering and Design	Helmuth, Kevin; Larrabee, Mark A.; Swanson, Leonard G.;	Endorses scope, design, conformance with design standards
Asset Management / Planning	Ahern, Barry (US); Labarre, Alan T.;	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Resource Planning	Wyman, Anne; Phillips, Mark A.;	Endorses construction resources, cost estimate, schedule, and portfolio alignment

Reviewers	
<i>Function</i>	<i>Individual</i>
Finance	Bostic, Christina ; Byrne, Andrew ;
Regulatory	Turieto, Edward ; Artuso, Michael V. ;
Jurisdictional Delegate(s)	Easterly, Patricia ; Hill, Terron P. ;
Procurement	Chevere, Diego ;
Control Centers (CC)	Lavallee, Phillip H. ; Gallagher, Michael W. ;

Decisions

The Senior Executive Sanctioning Committee (SESC) approved this paper at a meeting held on 07/22/2019:

(a) APPROVE the investment of \$38.182M and a tolerance of +/-10% for full implementation.

(b) NOTED that Maximovich, George has the approved financial delegation

Signature Margaret M Smyth
Date 8/7/19

Margaret Smyth
US Chief Financial Officer
Chair, Senior Executive Sanctioning Committee

Appendix

N/A

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4783
In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
Responses to the Division's Fourth Set of Data Requests
Issued on September 12, 2019

R-IV-12

Request:

Referencing Attachment PCE-1, page 10: The Company indicates that the VVO and EMS work lagged and was under budget by \$0.9 million. In the future, does the Company intend to accelerate the planned VVO and EMS work or continue to correlate the budget and spend to planned substation projects?

Response:

The company does not intend to accelerate the programmatic VVO and EMS work at this time. In these specific cases, the lag was a result of conflicts with unforeseen customer-driven work at the associated substations. This programmatic work will carry over into the following year and be coordinated with the capital work plan. Note that the VVO and EMS programs include equipment that is enabling to Grid Modernization concepts, and the Company has a pending Grid Modernization Plan that may include acceleration of these types of investments. .

CONFIDENTIAL ATTACHMENT

R-IV-13

Request:

Referencing Attachment PCE-1, page 11; please provide additional details on the Aquidneck Island project change orders and soil disposal payments that contributed to the \$2.4 million overspend in FY 2019. What are the current total budget and forecasted costs for the project, and what impact will the FY 2019 overspend have on the forecasted costs? Provide the Company's most recent sanction papers for the Aquidneck Island project. Is the project scheduled for a re-sanction, and if so, what is the anticipated timing?

Response:

Please see below for the Change Order Log for payments that contributed to the Aquidneck Island project overspend in FY19. The current total FY21-FY25 budget, including prior years, is \$54M; the current sanctioned cost is \$68M; and the current total forecast to complete is \$70M. Please see Confidential Attachment DIV IV-13 for the most recent sanction papers. No re-sanction is scheduled at this time.

The Narragansett Electric Company

d/b/a National Grid

RIPUC Docket No. 4783

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019

Responses to the Division's Fourth Set of Data Requests

Issued on September 12, 2019

		Project: Newport Sub - D				
		Funding No.: C015158				
	Change Order Discription	Total Requested	Approved	Only Soil Related	FY19 - Soil Issue Est	Total Soil Issues
	Total of Requested Change Orders (PCR's)	\$2,880,475	\$2,129,309			
PCR-001	RI-DOT Permit	\$736,360.00	\$736,360.00	FY19 - 75%	\$552,270	\$736,360.00
PCR-002	REJECTED	\$275,000.00	\$0.00			
PCR-003	REJECTED	\$49,000.00	\$0.00			
PCR-004	Steel Plates	\$31,622.05	\$31,622.05			
PCR-005	REJECTED	\$1,487.00	\$0.00			
PCR-006	Police Details	\$38,562.50	\$38,562.50	FY19 - ~50%	\$19,281	\$38,562.50
PCR-007	PVC Conduit	\$1,739.00	\$1,739.00			
PCR-008	Winter Conditions	\$50,000.00	\$0.00			
PCR-009	REJECTED	\$78,000.00	\$0.00			
PCR-010	Soil Gravel import	\$241,910.00	\$241,910.00	FY19 - ~75%	\$181,433	\$241,910.00
PCR-011	Minor Construction	\$2,292.45	\$2,292.45			
PCR-012	REJECTED	\$80,289.00	\$0.00			
PCR-013	Soil Import	\$249,985.00	\$249,985.00	FY19 - ~75%	\$187,489	\$249,985.00
CN-001	Ductbank Backfill	\$117,416.25	\$117,416.25	FY19 - ~25%	\$29,354	\$117,416.25
CN-002	Ductbank Soil Disposition	\$131,810.60	\$131,810.60	FY19 - ~25%	\$32,953	\$131,810.60
CN-003	NOT USED	\$0.00	\$0.00			
CN-004	Revised Ductbank 1	\$16,537.50	\$16,537.50	FY19 - ~25%	\$4,134	\$16,537.50
CN-005	Revised Ductbank 2	\$39,006.04	\$39,006.04	FY19 - ~25%	\$9,752	\$39,006.04
CN-006	NOT USED	\$0.00	\$0.00			

The Narragansett Electric Company

d/b/a National Grid

RIPUC Docket No. 4783

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019

Responses to the Division's Fourth Set of Data Requests

Issued on September 12, 2019

Project: Newport Sub - D						
Funding No.: C015158						
	Change Order Discription	Total Requested	Approved	Only Soil Related	FY19 - Soil Issue Est	Total Soil Issues
CN-007	DMC Fittings	\$823.02	\$823.02			
CN-008	Control House Stairs	\$17,640.00	\$17,640.00	FY19 - ~25%	\$4,410	\$17,640.00
CN-009	Mobile Sub Taps	\$1,532.37	\$1,532.37			
CN-010	Structure Bolts	\$1,327.88	\$1,327.88			
CN-011	Post Insulator Bolts	\$496.41	\$496.41			
CN-012	Clean Control House	\$8,641.68	\$8,641.68			
CN-013	Cover Soil	\$1,676.64	\$1,676.64	FY19	\$1,677	\$1,676.64
CN-014	2nd Import Soil (compare slips of PCR-010 & 013)	\$71,759.05	\$71,759.05	FY19 - ~25%	\$17,940	\$71,759.05
CN-015	Relocate BS 10 x 10 Structure	\$1,183.32	\$1,183.32			
CN-016	Drill Adapter Plate	\$873.36	\$873.36			
CN-017	Relocate MOD PVC Conduit	\$1,835.80	\$1,835.80			
CN-018	Relocate Conduits for Sta Serv	\$927.62	\$927.62			
CN-019	Install AL Brackets for MOD	\$561.06	\$561.06			
CN-020	Drill & Tap Structure	\$1,181.50	\$1,181.50			
CN-021	Modify Conduit Opening on CAP Bank	\$280.53	\$280.53			
CN-022	Load Out Unsuitable Foundation Soil (PCR 09 & 12 Rewritten)	\$53,508.00	\$53,508.00	FY19	\$53,508	\$53,508.00
CN-023	Load Out Unsuitable Subgrade Excavation Spoils (9 & 12)	\$49,392.00	\$49,392.00	FY19	\$49,392	\$49,392.00
CN-024	Relocate Yard Lighting Light Switch	\$4,491.80	\$0.00			
CN-025	Install Line Taps	\$4,938.58	\$4,938.58			
CN-026	Winter Conditions	\$110,738.91				
CN-027	Mech Ledge & Rock	\$264,153.75	\$264,153.75		\$0.00	\$264,153.75
CN-028	Dedicated Spotters	\$17,913.00				
CN-029	Install Temp Power to the Control	\$1,324.52	\$1,324.52			
CN-030	Roll Phases	\$10,618.40	\$10,618.40			
CN-031	2nd Process and Load Out Uns	\$17,734.50	\$17,734.50		\$0.00	\$17,734.50
CN-032	Control House Electrical Work	\$1,324.52	\$1,324.52			
CN-033	Wiring Changes to the Control House	\$1,474.44	\$1,474.44			
CN-034	Provide Electrical Permit for SS	\$903.16	\$903.16			
CN-035	Remobilize Tools and Equipment	\$955.38	\$955.38			
CN-036	Landscaping	\$81,246.38	\$0.00			
CN-037	Hand Hole Cover	\$3,000.00	\$0.00			
CN-038	Verizon conduit	\$5,000.00	\$5,000.00		\$1,143,592	\$2,047,452
CN-039	NOT USED YET					
CN-040	NOT USED YET					

This document has been redacted for Critical Energy/Electric Infrastructure Information (CEII).



US Sanction Paper

Title:	Newport Area Transmission Reinforcements	Sanction Paper #:	USSC-14-261 v3
Project #:	C041183, C041184, C041185, CD00656	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	10/22/2018
Author:	Michael Hughes	Sponsor:	Brian Gemmell VP Asset Management & Planning
Utility Service:	Electricity T&D	Project Manager:	Michael Hughes

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of C041183, C041184, C041185 and CD00656 in the amount of \$80.859M with a tolerance of +/- 10% for the purposes of full implementation.

This sanction amount is \$80.859M broken down into:

- \$73.864M Capex*
- \$0.050M Opex*
- \$6.945M Removal*

This project has undergone a Capital Efficiency Review with the following determination:

This project is in final design and/or has secured the necessary agency approvals to proceed and is ready to be released for construction. At this stage, re-evaluation of the project design would likely result in significant delays to the project schedule and an increase in cost. This project will be evaluated for any procurement or construction efficiency opportunities upon its release for construction.

1.2 Project Summary

Transmission Planning evaluated the thermal and voltage performance of the transmission system local to Aquidneck Island in Rhode Island, which consists of the Dexter Substation (115/69 kV), Jepson Substation (69/23/13.8 kV), Navy Substation (69/13.8 kV) and Gate 2 Substation (69/23 kV), as well as the 69 kV lines 61, 62 and 63.

The April 2015 Newport Area (Aquidneck Island) Transmission Solution Study (the "Study") documented potential concerns with respect to the transmission planning standards under certain contingencies related to the 69kV at lines 61 and 62. Specifically, if the 61 or the 62 line, or certain equipment at the Dexter or Jepson Substations, were to malfunction or to be taken out of service, other equipment could overload.



US Sanction Paper

The Study identified the following thermal concerns:

- Dexter Substation: The 115/69 kV transformers overload for loss of either the 56 Mega Volt Amp (MVA) paralleled bank or the 100 MVA 115/69 kV transformers.
- 61 and 62 lines: For loss of either 69 kV line, the remaining line overloads.
- Jepson Substation: Breaker failures of the 3764 and 3765 breakers opens the 69 kV ring, and forces the flow to go through the remaining path that connects the load serving transformers and the 63 line supplying [REDACTED] and Gate 2 Substation. [REDACTED]

The contingency thermal overloads described above occur at existing peak load levels or fractions thereof. These overloads were observed on the February 2017 Aquidneck Island Reliability Project System Impact Study in support of the Proposed Plan Application (the "2017 PPA Study").

To address the reliability, asset condition and environmental issues, the recommended plan is to:

- Rebuild Jepson Substation on a National Grid owned site across the street from the existing substation designed and operated at 115 kV.
- Convert the 61 and 62 lines from 69 kV to 115 kV. Upon converting these lines to 115kV, they will become extensions of the existing 115kV lines M13 and L14.
- Remove the 115/69 kV transformation at the Dexter Substation and reconfigure the substation to maintain supply to the existing 115/13.8 kV transformer.

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C041183	T-Sub	Jepson 115kV	19.520
C041184	T-Line	Line 61/62 Conversion	33.947
C041185	T-Sub	Dexter 115kV Station	5.444
CD00656	D-Sub	Jepson Substation	21.948
Total			80.859

REDACTED VERSION



US Sanction Paper

1.4 Associated Projects

Project Number	Project Title	Estimate Amount (\$M)
C015158	NEWPORT SUBSTATION (D-SUB)	10.425
C024159	NEWPORT 69KV LINE 63 (D-LINE)	2.165
C028628	NEWPORT SUBTRANS & DIST CONVERSIO	18.926
C054052	NO AQUIDNECK RETIREMENT (D-SUB)	0.310
C054054	JEPSON SUBSTATION (D-LINE)	6.967
C058310	HARRISON SUB IMPROVEMENTS (D-SUB)	0.320
C058401	MERTON SUB IMPROVEMENTS (D-SUB)	0.330
C058404	KINGSTON SUB IMPROVEMENTS (D-SUB)	0.595
C058407	SOUTH AQUIDNECK RETIREMENT (D-SUB)	0.310
CD00649	GATE 2 SUBSTATION (D-SUB)	2.569
CD00651	BAILEY BROOK RETIREMENT (D-SUB)	0.448
CD00652	VERNON RETIREMENT (D-SUB)	0.310
Total		43.675

Note: These associated projects are part of the distribution system reinforcements on Aquidneck Island. Besides addressing the concerns on the distribution system, these projects help address the voltage concerns observed on the transmission study. These associated projects are part of a separate sanction (USSC-14-262).

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Sanction Type	Potential Investment Tolerance
1/22/18	SESC	\$51.822M	\$71.705M*	Newport Area Transmission Reinforcements	Partial
12/10/14	USSC	\$8.500M	\$39.131M	Newport Area Transmission Reinforcements	Partial

* Note: Project No. CD00656 was transferred from sanction paper USSC-14-262 into this paper when this paper was partially sanctioned on 1/22/2018, since both the transmission and distribution components of the Jepson Substation will be implemented in parallel.

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
March 2021	Project Closure Sanction

REDACTED VERSION

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
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US Sanction Paper

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
<input type="radio"/> Mandatory	Comply with applicable reliability standards such as, North American Electric Reliability Corporation (NERC) planning standards, Northeast Power Coordinating Council (NPCC) criteria, ISO-New England planning procedures and National Grid’s Transmission Planning Guide (TGP28).
<input checked="" type="radio"/> Policy- Driven	
<input type="radio"/> Justified NPV	
<input type="radio"/> Other	

1.8 Asset Management Risk Score

Asset Management Risk Score: 49

Primary Risk Score Driver: (Policy Driven Projects Only)

- Reliability
 Environment
 Health & Safety
 Not Policy Driven

1.9 Complexity Level

- High Complexity
 Medium Complexity
 Low Complexity
 N/A

Complexity Score: 32

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

- Yes
 No

REDACTED VERSION



US Sanction Paper

1.11 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan (\$)
FY19-23 NE Transmission Capital Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	11.034M
FY19-23 NE Distribution & Capital Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Over <input checked="" type="radio"/> Under <input type="radio"/> NA	1.353M

The project cost is over the existing FY19-23 NE Distribution & Transmission Capital Plan and the Potential Project Investment from the prior project partial sanction USSC-14-261 v2, dated 1/22/2018 as a result of the following variance:

- Several environmental and construction requirements (e.g., dewatering, Soil contamination, road improvements, retaining wall construction, matting, environmental control) were not fully developed during the preliminary and final engineering stages of the project. In return the planning grade estimates did not capture all the project's expected cost. The contractor cost obtained via competitive bidding process for the same scope resulted in increase of the project cost.

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the FY 19-23 NE Transmission Capital Plan portfolio has been managed and approved by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

1.13 Current Planning Horizon

\$M	Prior Yrs	Current Planning Horizon						Total
		Yr. 1 2018/19	Yr. 2 2019/20	Yr. 3 2020/21	Yr. 4 2021/22	Yr. 5 2022/23	Yr. 6 + 2023/24	
CapEx	17.761	35.906	13.106	7.091	0.000	0.000	0.000	73.864
OpEx	0.009	0.000	0.021	0.020	0.000	0.000	0.000	0.050
Removal	0.047	3.886	1.483	1.529	0.000	0.000	0.000	6.945
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	17.817	39.792	14.610	8.640	0.000	0.000	0.000	80.859

REDACTED VERSION



US Sanction Paper

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Partial Sanction	December 2014
Partial Sanction	January 2018
Engineering Design Complete - EDC	May 2018
Construction Start	May 2018
Project Sanction	October 2018
ISO Facility Ratings	March 2020
Ready for Load/Use	September 2020
Construction Complete - CC	November 2020
Project Closure Sanction	March 2021

1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	<input checked="" type="checkbox"/> Internal	<input checked="" type="checkbox"/> Contractor	
Construction/Implementation Resources to be provided	<input checked="" type="checkbox"/> Internal	<input checked="" type="checkbox"/> Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green
Availability of external resources to deliver project:	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green
Operational Impact			
Outage impact on network system:	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green
Procurement Impact			
Procurement impact on network system:	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green

REDACTED VERSION



US Sanction Paper

1.16 Key Issues (include mitigation of Red or Amber Resources)

1	Outages are restricted to the spring and fall seasons. Construction sequence and planning is critical. Numerous outages will be required on the transmission and distribution lines. Coordination of outages with other planned projects in the Southern Massachusetts and Rhode Island region will be critical to timely delivery of the project.
2	Substation and transmission line work is contracted to different construction contractors. Coordination of the construction sequences and outages will be critical in order to avoid construction down time.
3	Transmission line work over and under distribution lines and road crossings is required. A PHA process will be put in place to identify and analyze the significance of hazardous situations associated with an activity to aid management in making critical safety decisions.
4	A major public outreach effort is required for communities impacted by the transmission line, substation, and distribution line construction activities.

1.17 Climate Change

Contribution to National Grid's 2050 80% emissions reduction target:	<input checked="" type="radio"/> Neutral	<input type="radio"/> Positive	<input type="radio"/> Negative
Impact on adaptability of network for future climate change:	<input type="radio"/> Neutral	<input checked="" type="radio"/> Positive	<input type="radio"/> Negative

1.18 List References

1	Aquidneck Island Reliability Project System Impact Study, February 2017.
2	Newport Area (Aquidneck Island) Transmission Needs/Solution Study Report, April 2015. Regional Project System Identification: 1669, 1670 and 1671.
3	Asset Condition Report Addendum – Jepson Sub #37, October 2013
4	Newport Area Supply and Distribution Study, May 2007

REDACTED VERSION

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
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2 Decisions

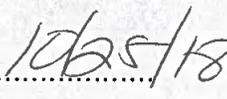
The Senior Executive Sanctioning Committee (SESC) at a meeting held on 10/22/2018

- (a) APPROVED this paper and the investment of \$80.859M and a tolerance of +/- 10%
- (b) NOTED that Michael Hughes is the Project Manager and has the approved financial delegation.

Signature.....



Date.....



Margaret Smyth

US Chief Financial Officer

Chair, Senior Executive Sanctioning Committee



US Sanction Paper

3 Sanction Paper Detail

Title:	Newport Area Transmission Reinforcements	Sanction Paper #:	USSC-14-261 v3
Project #:	C041183, C041184, C041185, CD00656	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	10/22/2018
Author:	Michael Hughes	Sponsor:	Brian Gemmell VP Asset Management & Planning
Utility Service:	Electricity T&D	Project Manager:	Michael Hughes

3.1 *Background*

The Southeastern Massachusetts and Rhode Island (SEMA-RI) Area Needs Assessment (N-1) led by ISO-New England was presented to the Planning Advisory Committee (PAC) on February 19, 2014. This ISO-New England led study identified immediate potential thermal and voltage issues in the Somerset Area including the transmission facilities between the Dexter and Bell Rock substations in Aquidneck Island.

Transmission Planning confirmed the thermal and voltage performance of the transmission system local to Aquidneck Island in Rhode Island, which consists of the Dexter Substation (115/69/13.8 kV), Jepson Substation (69/23/13.8/4.16 kV), Navy Substation (69/13.8 kV) and Gate 2 Substation (69/23 kV), as well as the 69 kV lines 61, 62 and 63. The Study documents the thermal and voltage performance of the transmission system local to Aquidneck Island.

The Study identified low voltage concerns for loss of the 115kV lines M13 or L14 that supply the Dexter Substation. The primary driver of low voltage is excessive voltage drop across the transmission system when a single line is forced to carry the entire Somerset/Bell Rock area and the Aquidneck Island load following the loss of the other line. This voltage concern is being addressed by the SEMA-RI suite of projects.

The Study identified the following thermal concerns, which were also observed in the 2017 PPA Study:

- At the Dexter Substation: The 115/69 kV transformers overload for loss of either the 56 MVA paralleled bank or the 100 MVA 115/69 kV transformers.
- 61 and 62 lines: For loss of either 69 kV line, the remaining line overloads.
- At the Jepson Substation: Breaker failures of the 3764 and 3765 breakers opens the 69 kV ring and forces the flow to go through the remaining path that connects

REDACTED VERSION



US Sanction Paper

the load serving transformers and the 63 line supplying [REDACTED] and Gate 2. [REDACTED]

The Jepson Substation is the main point of transmission supply into the Aquidneck Island distribution and consists of 69 kV, 23 kV, 13.8 kV and 4.16 kV yards. The Jepson Substation contains numerous poor asset condition issues and environmental concerns, as this substation is located entirely within the Zone A Watershed Protection Overlay.

3.2 Drivers

Based on the critical load level analysis documented on the April 2015 Newport Area (Aquidneck Island) Study, the need to resolve the thermal issues on the 69 kV lines 61 and 62, the 69 kV ring at the Jepson Substation and the 115/69 kV transformers at Dexter Substation is immediate. The 2017 PPA Study observed the thermal issues described above.

Besides the Jepson Substation being entirely within the Zone A Watershed Protection Overlay, the 69 kV, 23 kV and 4 kV equipment suffer from issues related to poor asset condition. Below is a summary of the asset condition issues at the Jepson Substation:

Jepson 69 kV Station:

- The 69 kV breakers are 1950s vintage and oil filled, with problematic air systems.
- The 69 kV structure consists of older transmission equipment with pin type insulators and an obsolete style switch for which parts are no longer available. The pin type insulators are recommended for replacement due to the failure rate history of the pin type design.
- The foundations for four oil-filled breakers would not match the dimension of the standard replacement gas circuit breaker.
- There is insufficient space in the control house for adding controls for any new 69 kV breakers, upgrading the obsolete Remote Terminal Unit (RTU) or adding breaker failure scheme for the current 69 kV ring bus.

Jepson 23 kV Station:

- Predominantly 1950s vintage equipment. All 23 kV breakers are obsolete.
- 23 kV bus is supported by pin type insulators. This design is unreliable and obsolete. The bus no longer meets current clearance and work space requirements.
- The 23 kV bus voltage is regulated by a Load Tap Changer (LTC) control scheme that often produces voltage problems and needs to be disabled and reset a few times a year. This scheme should be retired or replaced.
- Three power transformers in the yard are vintage 1950's and have no oil containment.

Jepson 4.16 kV Station:

- 1960s vintage 23/4.16 kV station with mostly original equipment.



US Sanction Paper

- Obsolete design with single set of regulators supplying both feeders
- Entire bay no longer meets current clearances to energized parts.
- No Energy Management System (EMS) and both transformer and circuit recloser testing that indicates significant equipment deterioration is occurring.

Additionally, a portion of the Jepson Substation floods in the spring. On numerous occasions, the Jepson 13.8 kV station has been in the flooded area.

Furthermore, there is load at risk served from Jepson Substation, as described below:

- For loss of the Jepson 69/13.8kV transformer, on peak approximately 22MW of load on Aquidneck Island would remain un-served until the transformer is replaced or a mobile is installed, resulting in an estimated exposure of 550MWh.
- For loss of the 69kV line section between the Jepson and [REDACTED] substation, on peak approximately 21MW of load on Aquidneck Island would remain un-served, resulting in an estimated exposure of 500MWh.

3.3 Project Description

To address the identified concerns, the recommended plan is to:

- Rebuild the Jepson Substation on a National Grid owned site across the street in Middletown, designed and operated at 115 kV. The proposed configuration is a three bay breaker and half design initially with one 115/69 kV transformer, two 115/23 kV transformers and two 115/13.8 kV transformers. The ultimate layout will allow for two future 115 kV interconnections. The existing substation will be retired and all equipment removed.
- Rebuild and convert the 61 and 62 lines from 69 kV to 115 kV. Remove double circuit tower arrangement, which will eliminate a potential single point of supply failure.
- Remove the 115/69 kV transformation at the Dexter Substation and reconfigure the 115 kV to maintain supply to the existing 115/13.8 kV transformer.

3.4 Benefits Summary

The recommended plan will address the thermal, poor asset condition and load at risk concerns. It will also move the existing Jepson Substation out of the Zone A watershed Protection Overlay.

This plan results in more robust system performance and provides additional margin for future load growth, which is superior to other alternatives.

3.5 Business and Customer Issues

The success of this project is dependent upon full implementation of the projects associated with the distribution system reinforcements on Aquidneck Island. Besides addressing the concerns on the distribution system, these projects help address the



US Sanction Paper

thermal concerns observed on the transmission study. These associated projects are part of a separate sanction (USSC-14-262).

For the Company's treatment of additional customer issues, refer to Section 4.4.

3.6 Alternatives

Alternative 1: Reinforce the Dexter Substation, Reconductor the 61/62 lines and Rebuild the Jepson Substation at 69 kV

Dexter Substation:

Replace the existing 115/69 kV 56 MVA transformers with a new 100 MVA transformer paralleled with a 56 MVA transformer. Add a new 115/69 kV 56 MVA transformer paralleled with the existing 115/69 kV 100 MVA transformer. Re-arrange the 115 kV by installing a breaker and a half with two bays initially operated with four breakers.

Jepson Substation:

Rebuild the Jepson Substation on a National Grid owned site across the street in Middletown, designed and operated at 115 kV. The proposed configuration is a three and a half breaker design, two 115/23 kV transformers and two 115/13.8 kV transformers. The ultimate layout would allow for two future transmission interconnections. The existing substation would be retired and all equipment removed.

61/62 69 kV lines:

Reconductor the 69 kV 61 and 62 lines with 795 Aluminum Conductor Steel Supported (ACSS) conductor and replace the double circuit structures with 69 kV designed structures.

The limiting N-1 contingencies with this alternative are the breaker failures that would take out one of the 115 kV lines and the parallel transformers supplying the 61 line. This alternative only provides a load growth margin of 9% due to potential voltage collapse regardless of any upgrades south of the Jepson Substation. In order for this alternative to work beyond a 9% load growth margin, the 61/62 lines would then need to be reconstructed to operate at 115 kV and the transformation at the Dexter Substation would have to be removed or a new transmission supply would have to be brought into the new Jepson Substation. This alternative does not compare favorably with the selected alternative (immediate conversion to 115kV operation), which provides a more robust supply system able to accommodate a larger amount of future load growth.

Compared to the chosen option, this alternative would require significant upgrades and additions at the Dexter Substation. This alternative moves the Jepson Substation out of the Zone A Watershed Protection Overlay, and it addresses the identified thermal issues similar to chosen plan, but it will not work beyond a load growth margin of 9%. Therefore, this option is not recommended.



US Sanction Paper

Alternative 2: Non-Wires Alternative

An evaluation was performed for a Non-Wires Alternative (NWA) that would involve adding sufficient demand-side resources (energy efficiency, demand response, and distributed generation) at strategic locations on Aquidneck Island to defer or eliminate the need for the Project.

The feasibility of this approach was assessed consistent with the criteria set forth in Section 2.1.D of the System Reliability Procurement Standards (SRP Standards), adopted by the Rhode Island Public Utilities Commission (RIPUC) on June 10, 2014.

Given that proposed upgrade of the Jepson Substation is driven by asset condition issues, this upgrade will fail criterion 1 of the SRP Standards. In addition, as a result of the possible thermal overloads at the Jepson Substation 69 kV ring bus, which cannot be addressed through load reductions less than 20 percent of the relevant peak load in the area (criterion 3 of the SRP Standards), the Company concluded that there is no NWA for the Jepson Substation portion of the Project.

The Company identified load reductions that would be required on Aquidneck Island to address the possible thermal overloads driving the need to upgrade the 61 and 62 lines. In making these calculations, the Company assumed the conductor clearance limitations on the 61 and 62 lines would be removed. Based on the load levels analyzed as part of the Study, the Company determined the following:

- In 2014, 23 MW of load reductions at the Gate II and [REDACTED] Substations would be needed to address the possible N-1 contingency thermal overloads on the 61 and 62 lines. Peak load for this area is approximately 63 MW. The required load reduction therefore is approximately 36% of the relevant peak load.
- In 2022, 24 MW of load reductions at the Gate II, [REDACTED] and Newport substations would be needed to address the potential N-1 contingency thermal overloads on the 61 and 62 Lines. Peak load for this area was projected to be approximately 75 MW. The required load reduction is therefore approximately 32% of the relevant peak load.

A NWA for the 61 and 62 Line Upgrades clearly would fail criterion 3 of the SRP Standards. In addition, the construction start for the 61 and 62 Line Upgrades is less than 36 months called for in criterion (4) of the SRP Standards. Therefore, the Company concluded that an NWA for this portion of the project would not be feasible.

3.7 Safety, Environmental and Project Planning Issues

The Company will develop a health and safety plan and follow all National Grid safety and environmental rules.



US Sanction Paper

Safety Issues:

- Outages will be taken to allow for work to be performed. However, work must be performed in proximity to live equipment.
- A thorough safety brief shall be conducted and emphasized via daily tailboard meetings. Proper personal protective equipment (PPE) shall be worn at all times.
- Grounding and tagging all isolation points will be performed to ensure equipment is de-energized before work can begin. Safety observers will be used as appropriate.
- Transmission line work over and under distribution lines and road crossings is required. A PHA process will be put in place to identify and analyze the significance of a hazardous situation associated with an activity to aid management in making critical safety decisions.

Environmental Issues:

- In-situ soil pre-characterization will be performed prior to removal or disposal of any soil excavated during construction. Several environmental and construction requirements (e.g., dewatering, Soil contamination, road improvements, retaining wall construction, matting, environmental control) were not fully developed during the preliminary and final engineering stages of the project. In return the planning grade estimates did not capture all the project's expected cost. The contractor cost obtained via competitive bidding process for the same scope resulted in increase of the project cost. Also, contingent has been added for soil removal in the existing Jepson substation previously thought to be less significant.

Project Planning Issues:

- Outages are restricted to the spring and fall seasons. Construction sequence and planning is critical. Numerous outages will be required on the transmission and distribution system. Coordination of outages with other planned projects in the Southern Massachusetts and Rhode Island region will be critical to timely delivery of the project.
- Substation and transmission line work is contracted to different construction contractors. Coordination of the construction sequences and outages will be critical in order to avoid construction down time.
- A major public outreach effort is required for communities impacted by the transmission line, substation, and distribution line construction activities



US Sanction Paper

3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	If National Grid cancels an outage that was included in the contractors schedule then National Grid is responsible for any schedule impact and any schedule recovery costs directly attributable to the cancelled Outage (only if the outage was cancelled by National Grid and not by others)	3	3	4	9	12	Avoid	Schedule Outages during the Fall and Spring as far from peak demand seasons as possible- i.e. avoid scheduling on the shoulders of Spring and Fall seasons. Hold regular coordination meetings with other projects in the area (i.e. SEMA RI project). Request missed outage contingency plans from finalist contractors during Q&A – redistribution of work through flexible/contingency scheduling to use available time and resources effectively.	N/A	Implement missed outage contingency plan as agreed with the contractor during the RFP event
2	Both Dexter and Jepsen substations may have building and/or soil contaminants. Risks include unforeseen types or levels of contamination that would result in: a) greater re-mediation expense than budgeted; b) impacts to the EPC construction schedule; c) additional construction labor to work around contaminants; and/or assist with segregation of contaminants; d) need for additional Hazmat Training for contractor personnel; e) possible stand-by time for EPC Contractor if crews are unable to access portions or all of work-site; f) possible furlough of crews with de-mobilization and re-mobilization to allow contaminants to be removed.	3	4	2	12	6	Accept	National Grid will test the soils and/or any material suspected to be containing hazardous material. Advise contractors of the potential hazardous material risks and ask for adaptive scheduling that will allow more flexibility in crew assignments while the approved environmental management company is removing contaminants.	N/A	If contaminated materials are found, National Grid will coordinate the abatement, transportation and disposal of hazardous waste in a timely manner so that it does not impact the contractors schedule. If the contamination is more than estimated, National Grid may also be responsible for additional effort on the contractors part to a) work around contaminants and b) cease work and possibly demolish until contaminants are removed.
3	Delays due to transmission line cutovers into the Jepsen Sub. National Grid's Transmission Line Services (TLS) will rebuild and upgrade the existing 69kV Lines 61 & 62 into 115kV lines.	1	3	4			Avoid	Schedule re-occurring project meeting status between TLS and substation contractor to assess project resources and status	N/A	N/A
4	Relocation of unforeseen utilities such as electric, gas, or water lines on the each of the project sites.	3	3	1	9		Accept	The contractor scope of work includes detailed surveying of all work sites that require excavating. The purpose of the survey is to discover any unforeseen subsurface conflicts prior to final engineering	N/A	If evidence of a conflict/manmade obstruction does exist for which a no cost (in-scope) engineering design or work around solution cannot be developed, then National Grid expects the contractor to provide a one-time lump-sum adjustment (documented as an itemized fixed price change-order) to remove or relocate the identified conflict(s)/manmade obstruction(s)

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3.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration To Acquire Permit	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
RIHPHC (RI Historic Preservation Office & Tribal Historic Preservation Consultation under Section 106 of the National Historic Preservation Act)	Required	3 months	Complete	01/2016
RI Department of Environmental Management (RIDEM) Freshwater Wetlands Permit	Required	6 months	Complete	05/2017
RI Pollutant Discharge Elimination System (RIPDES) - Storm Water Discharge Associated with Construction Activities	Required	6 months	Complete	05/2017
Water Quality Certification Under Section 401 of the Clean Water Act	Required	6 months	Complete	05/2017
Army Corp of Engineers (ACOE) Section 404 Permit	Required	12 months	Complete	05/2017
RI Energy Facility Siting Board (EFSB) License	Required	12 months	Complete	06/2017
Local Planning &	Required	12 months	Complete	06/2017

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In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
Responses to the Division's Fourth Set of Data Requests



US Sanction Paper

Zoning Boards Approval – Special Variances				
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3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

C041183 is 69% Pool Transmission Facility (PTF), C041184 is 100% PTF and C041185 is 40% PTF. CD00656 is a Distribution project.

Investment recovery will be through standard rate recovery mechanisms approved by appropriate regulatory agencies.

3.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$12.221M. This is indicative only. Recovery is through the following: Regional Service (RNS) of \$6.936M; Local Network Service (LNS) of \$1.337M; and distribution rates of \$3.948M, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3.10.3 CIAC / Reimbursement

N/A

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US Sanction Paper

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate Level (%)	Spend (\$M)	Prior Yrs	Current Planning Horizon						Total
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
C041183	Jepson 115kV	Est Lvl (e.g. +/- 10%)	CapEx	8.553	6.631	3.150	2.285	0.000	0.000	0.000	18.619
			OpEx	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.008
			Removal	0.014	0.003	0.251	0.625	0.000	0.000	0.000	0.893
			Total	6.575	6.634	3.401	2.910	0.000	0.000	0.000	19.520
C041184	Line 61/62 Conversion	Est Lvl (e.g. +/- 10%)	CapEx	5.773	19.720	3.152	0.665	0.000	0.000	0.000	29.310
			OpEx	0.000	0.000	0.021	0.020	0.000	0.000	0.000	0.041
			Removal	0.000	3.713	0.712	0.171	0.000	0.000	0.000	4.596
			Total	5.773	23.433	3.885	0.856	0.000	0.000	0.000	33.947
C041185	Dexter 115kV Station	Est Lvl (e.g. +/- 10%)	CapEx	2.169	0.714	0.965	0.734	0.000	0.000	0.000	4.582
			OpEx	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001
			Removal	0.032	0.170	0.401	0.258	0.000	0.000	0.000	0.861
			Total	2.202	0.884	1.366	0.992	0.000	0.000	0.000	5.444
CD00656	Jepson Substation	Est Lvl (e.g. +/- 10%)	CapEx	3.268	8.841	5.839	3.407	0.000	0.000	0.000	21.353
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.001	0.000	0.119	0.475	0.000	0.000	0.000	0.595
			Total	3.267	8.841	5.958	3.882	0.000	0.000	0.000	21.948
Total Project Sanction			CapEx	17.761	35.906	13.106	7.091	0.000	0.000	0.000	73.864
			OpEx	0.009	0.000	0.021	0.020	0.000	0.000	0.000	0.050
			Removal	0.047	3.886	1.483	1.529	0.000	0.000	0.000	6.945
			Total	17.817	39.792	14.610	8.640	0.000	0.000	0.000	80.859

Note that Project No. CD00656 was transferred from sanction paper USSC-14-262 into this paper when this paper was partially sanctioned on 1/22/2018 since the distribution component of the Jepson Substation will be implemented in parallel with the transmission component (Project No. C041183).

It is expected that the plant will be capitalized at the ready for load date, unless otherwise specified.

3.11.2 Project Budget Summary Table

Project Costs Per Business Plan – Transmission

\$M	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
CapEx	14.495	21.696	5.913	2.786	0.000	0.000	0.000	44.890
OpEx	0.009	0.372	0.074	0.023	0.000	0.000	0.000	0.478
Removal	0.046	1.279	0.637	0.547	0.000	0.000	0.000	2.509
Total Cost in Bus. Plan	14.550	23.347	6.624	3.356	0.000	0.000	0.000	47.877



US Sanction Paper

Variance - Transmission (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2018/19	Yr. 2 2019/20	Yr. 3 2020/21	Yr. 4 2021/22	Yr. 5 2022/23	Yr. 6 + 2023/24	
\$M								
CapEx	0.000	(5.369)	(1.375)	(0.918)	0.000	0.000	0.000	(7.662)
OpEx	0.000	0.372	0.074	0.023	0.000	0.000	0.000	0.469
Removal	0.000	(2.607)	(0.727)	(0.507)	0.000	0.000	0.000	(3.841)
Total Cost in Bus. Plan	0.000	(7.604)	(2.028)	(1.402)	0.000	0.000	0.000	(11.034)

Project Costs Per Business Plan – Distribution

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2018/19	Yr. 2 2019/20	Yr. 3 2020/21	Yr. 4 2021/22	Yr. 5 2022/23	Yr. 6 + 2023/24	
\$M								
CapEx	3.266	8.800	9.627	1.104	0.000	0.000	0.000	22.797
OpEx	0.000	0.000	0.000	0.251	0.000	0.000	0.000	0.251
Removal	0.001	0.000	0.000	0.251	0.000	0.000	0.000	0.252
Total Cost in Bus. Plan	3.267	8.800	9.627	1.606	0.000	0.000	0.000	23.300

Variance - Distribution (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2018/19	Yr. 2 2019/20	Yr. 3 2020/21	Yr. 4 2021/22	Yr. 5 2022/23	Yr. 6 + 2023/24	
\$M								
CapEx	0.000	(0.041)	3.788	(2.303)	0.000	0.000	0.000	1.444
OpEx	0.000	0.000	0.000	0.251	0.000	0.000	0.000	0.251
Removal	0.000	0.000	(0.119)	(0.224)	0.000	0.000	0.000	(0.343)
Total Cost in Bus. Plan	0.000	(0.041)	3.669	(2.276)	0.000	0.000	0.000	1.352

3.11.3 Cost Assumptions

The costs presented in this sanction paper are based on the following assumptions:

- C041183 – Cost is based on the Project Grade Estimate developed on 7/17/2018.
- C041184 – Cost is based on the Project Grade Estimate developed on 9/18/2018.
- C041185 – Cost is based on the Project Grade Estimate developed on 7/17/2018.
- CD00656 – Cost is based on the Project Grade Estimate developed on 7/17/2018.

The accuracy level of estimate for each project is identified in table 3.11.1.

3.11.4 Net Present Value / Cost Benefit Analysis

This is not a NPV project.



US Sanction Paper

3.11.4.1 PV Summary Table

N/A

3.11.4.2 NPV Assumptions and Calculations

N/A

3.11.5 Additional Impacts

No additional impacts have been identified at this time.

3.12 Statements of Support

3.12.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planning	Glen DiConza Karen McColgan	Endorses relative to 5-year business plan or emergent work
Resource Planning	Mark Phillips	Endorses construction resources, cost estimate, schedule, and portfolio alignment
Asset Management / Planning	Brian Hayduk Al Labarre	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Engineering and Design	Mark Larrabee Natasha Deschene Leonard G. Swanson	Endorses scope, design, conformance with design standards
Project Management	Dave Arthur Sara Migdal	Endorses resources, cost estimate, schedule
Electric Project Estimation	John Duffy	Endorses Cost Estimate



US Sanction Paper

3.12.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Felicia Midkiff Andrew Byrne
Regulatory	Ed Turieo Michael Artuso
Jurisdictional Delegate(s)	Patricia Easterly Terron Hill
Procurement	Diego Chevere
Control Centers (CC)	Michael Gallagher Philip Lavalle

4 Appendices

4.1 Sanction Request Breakdown by Project

N/A

4.2 Other Appendices

N/A

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

National Grid has hired a consultant to develop and implement a comprehensive public outreach plan for all of proposed projects on Aquidneck Island. This outreach effort is part of a comprehensive and proactive public outreach process to establish and maintain communications with stakeholders (e.g., project abutters, residents, businesses, federal, state and local officials, and community groups).

This process will include opportunities for public education and communication regarding the need for the project, the permitting and siting processes, the detailed construction plans, the dissemination of construction updates and outreach prior to and during construction, and follow-up outreach after project completion. The process is designed to engage the community in a two-way dialogue, facilitate transparency throughout the project, foster public participation, and solicit feedback from stakeholders.

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nationalgrid		
Long: US Sanction Paper		
Title:	Aquidneck Island - Distribution Projects	Sanction Paper #: USSC-14-262 v4
Project #:	C015158, C024159, C028628, C054054, CD00649	Sanction Type: Sanction
Operating Company:	The Narragansett Electric Company	Date of Request: 8/26/2019
Author:	Hughes, Michael	Sponsor(s): Sedewitz, Carol A. VP Electric Asset Mgmt & Planning
Utility Service:	Electricity T&D	Project Manager: Hughes, Michael

Executive Summary

This paper requests Sanction of C015158, C024159, C028628, C054054, CD00649 in the amount of \$55.477M with a tolerance of +/-10% for the purposes of full implementation.

This sanction amount is \$55.477M broken down into:
\$47.819M Capex
\$2.290M Opex
\$5.368M Removal

With a CIAC/Reimbursement of \$0.000M
With a Salvage Value of \$0.000M

This project has been evaluated for capital efficiencies, which are reflected in sanction amount. The project will continue to be evaluated for any procurement or construction efficiency opportunities upon its release for construction.

Project Summary

This paper encompasses work at Newport Substation, associated distribution line reconductoring and conversions, Line 63 Reconfiguration, Jepson Substation Distribution Line reconfigurations. Additional upgrades are required to several area distribution lines to support the Aquidneck Island Reliability project. These upgrades are part of the overall Aquidneck Island Reliability Project (AIRP) which include additional transmission system improvements and retirements to several area substations and will resolve reliability concerns in southern Middletown and the Newport, RI area.

Background

The Newport Study Area encompasses the City of Newport and the towns of Middletown, Jamestown and Portsmouth (including Prudence Island). The area has approximately 34,000 customers with a peak load of 146MW. Aquidneck Island has most of the load and peaks at 135MW, Jamestown peaks at 10MW and Prudence Island at 1MW.

The area is supplied by two (2) 115kV lines (L14 & M13) which terminate on the northern half of Aquidneck Island at Dexter substation. From Dexter substation, two (2) 69 kV lines (Lines 61 & 62) continue south to supply Jepson substation. From Jepson substation, a single 69kV line (Line 63) continues south to supply the US Naval Base (Navy 1 substation) and Gate 2 Substation.

REDACTED VERSION

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
Responses to the Division's Fourth Set of Data Requests
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A single 115/13.8kV transformer at Dexter substation supplies the distribution load on the northern section of Aquidneck Island and a single 69/13.8kV transformer at Jepson supplies the middle section of Aquidneck Island. The remainder of the load is supplied by five (5) 23kV lines sourced from Jepson and Gate 2 substations which supply a 4.16kV distribution system with approximately 70MW of load. Twelve 23/4.16kV substations, ten located in the southern half of Aquidneck Island and two in Jamestown, supply this 4.16kV system.

Interruptions to the Newport electrical system resulting in significant customer outages occurred in the summer of 2003. One of the action items proposed by the Company to the Rhode Island Public Utilities Commission (RI PUC) was to conduct a planning study to identify and resolve electrical related issues in the area.

This area study was published in May 2007 and titled "The Newport Area Supply and Distribution Study". The Study identified an immediate need to build a new substation in the City of Newport to address both normal and contingency overloads. The study recommended construction of a new substation consisting of a single transformer supplying four (4) 13.8kV feeders. The new station was to be sourced from Line 63, a radial 69kV supply line that supplies the [REDACTED] and Gate 2 substations.

Construction of a new substation was contingent on the Company acquiring a parcel of land in Newport for this substation. The Company encountered significant challenges in acquiring a suitable land parcel which has impacted the in-service date of this substation. To address critical loading concerns in the City of Newport, the 2008 Annual Plan recommended accelerating some of the distribution construction identified in the 2007 study and recommended redistributing the area load on the supply and distribution systems to optimize all available capacity. All of these recommended investments are complete.

In 2011, the Company purchased a parcel of land in the City of Newport suitable for a new substation. The Company successfully worked with the city to amend the zoning ordinance to allow a substation to be built via a special permit. The substation site was encumbered by a lease that was released by the tenant in 2014. The substation construction started in the fall 2018 with an in-service date of summer 2019.

Transmission Planning has completed a review of the Aquidneck Island transmission supply system. This review identified various n-1 thermal overloads and voltage issues throughout Aquidneck Island. The review identified a need to upgrade the 69kV lines from Dexter to Jepson substation to 115kV and the need to rebuild Jepson substation as an 115kV station. The review also identified various asset condition, safety, and environmental concerns with Jepson substation.

Jepson substation consists of a 69kV station, a 23kV station, a 13.8kV station, and a 4.16kV station. The station is located within the 100 year floodplain and directly adjacent to Sisson Pond and entirely within Zone A Watershed Protection Overlay. The station will be rebuilt on Company owned land in Middletown and outside the 100 year floodplain and the Zone A Watershed Protection Overlay. The existing station will be retired and all equipment removed.

The new 115kV station in Middletown will be part of a separate transmission sanction paper, which will include the upgrades of the 69kV lines to 115kV and modifications to Dexter substation. The new 115/23kV station and the new 115/13.8kV station is part of the sanction for the Distribution Line Project. The existing 23/4.16kV station will be retired and load converted to the 13.8kV system. This is the most economical approach as opposed to building a new 23/4.16kV station in Middletown.

Project Descriptions

To address reliability and asset condition issues, National Grid plans to:

- Rebuild Jepson substation at 115 kV on a National Grid owned site. The proposed configuration is a 3 bay breaker and half design initially with one 115/69 kV transformers, two 115/23 kV transformers and two 115/13.8 kV transformers. The ultimate layout would allow for two future 115 kV interconnections.
- Retire and remove the existing Jepson substation.
- Build a new 69/13.8kV substation in Newport on a parcel of land recently purchased for this purpose.

REDACTED VERSION

- The substation will consist of a single transformer supplying four (4) 13.8kV feeders. A short 69kV tap from the existing Line 63 is required to supply this station.
- Retire the 4.16kV load at Gate II substation and upgrade the 23kV relays.

Summary of Benefits

The recommended plan is in-line with commitments made by the Company to state regulators. The plan is part of a comprehensive solution for Aquidneck Island and addresses all asset condition, safety, environmental, thermal, and reliability concerns at the least cost.

The plan introduces new 13.8kV capacity in the heart of the existing Newport 4.16kV system sourced from the 69kV supply system. No load will be left un-served for loss of a transformer or supply line resulting in a very reliable supply to the City of Newport and southern Middletown.

The plan provides capacity to supply load growth on Aquidneck Island well beyond the study horizon period at relatively low cost. Spare capacity will exist at Dexter, Jepson and Newport substations to supply future load growth.

The plan eliminates substation equipment in need of replacement or upgrades; eliminates the need to upgrade manhole and ductline infrastructure to reinforce the 23kV supply system; and eliminates the need for a second 69kV line into Newport.

Business and Customer Issues

The project follows up on action items proposed by the Company to the RIPUC to identify and resolve electrical related issues in the area as a result of interruptions to the Newport electrical system that resulted in significant customer outages in previous years. Failure to execute this project may impact commitment made by the Company to state regulators.

Alternatives

Number	Title
1	Construct a new 69kV underground transmission line from the new 115kV substation in Middletown to the new substation in Newport. A comprehensive routing analysis was completed for this supply line and this analysis concluded the line would have to be built underground on city streets.
2	Construct a new 115/13.8kV and a new 115/23kV substation in Middletown (Jepson Substation) on the site of the proposed 115kV station. The 115/13.8kV station would consist of a single transformer supplying metal-clad switchgear with (4) 13.8kV feeder positions. The 115/23kV station would consist of two (2) transformers supplying a metal-clad switchgear with (3) 23kV supply lines.
3	Construct a new 69/13.8kV substation in Newport on a parcel of land acquired for this purpose. The station would consist of two (2) transformers supplying a metal-clad switchgear with (8) 13.8kV feeder positions with five feeders being initially installed. The 115/23kV station would consist of two (2) transformers supplying a metal-clad switchgear with (3) 23kV supply lines.

This alternative would retire North Aquidneck, South Aquidneck, Bailey Brook, and Vernon substations to relieve the highly loaded 23kV supply system and is part of a comprehensive solution to address asset condition, environmental, thermal, and reliability concerns at least cost. However upgrading the 23kV supply system is not an economical approach because most of the infrastructure consists of small paper and lead cable installed in 3-inch ductline. The small ductline is not suitable to house the required larger solid dielectric cables. Thus, upgrading this infrastructure is not recommended due to the significant cost impact.

The costs of alternatives are calculated during the options evaluation stage. Once an approach is selected, costs of alternatives are not updated or re-estimated.

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Related Projects, Scoring and Budget

Summary of Projects

<i>Project Number</i>	<i>Project Type (Elec only)</i>	<i>Project Title</i>	<i>Estimate Amount(\$M)</i>
C015158	D-Sub	Newport Sub	15.058
C024159	D-Line	Newport 69kV Line 63	1.761
C028628	D-Line	Newport SubTrans & Dist	29.038
C054054	D-Sub	Jepson Sub	7.154
CD00649	D-Sub	Gate 2 Substation	2.466
Total:			55.477

Associated Projects

<i>Project Number</i>	<i>Project Title</i>	<i>Estimate Amount (\$M)</i>
C041183	Jepson 115kV Substation (T-Sub)	19.520
C041184	Line 61 / 62 Conversion (T-Line)	33.947
C041185	Dexter 115kV Substation (T-Sub)	5.444
CD00656	Jepson Substation	21.948
C054052	N Aquidneck Retirement	0.330
C058310	Harrison Sub Improvement	0.326
C058401	Merton Sub Improvement	0.387
C058404	Kingston Sub Improvements	0.595
C058407	S Aquidneck Retirement	0.342
CD00651	Bailey Brook Retirement	0.463
CD00652	Vernon Retirement	0.302
		83.604

Prior Sanctioning History

<i>Date</i>	<i>Governance Body</i>	<i>Sanctioned Amount</i>	<i>Potential Project Investment</i>	<i>Sanction Type</i>	<i>Sanction Paper</i>	<i>Potential Investment Tolerance</i>
11/26/2018	USSC	31.174M	49.361M	Partial Sanction	USSC-14-262	+/-25%
2/10/2016	USSC	13.937M	55.827M	Partial Sanction	USSC-14-262	-25% / +50%
12/10/2014	USSC	10.000M	53.586M	Partial Sanction	USSC-14-262	+/-25%
11/9/2011	USSC	15.000M	42.000M	Partial Sanction	USSC-14-262	-25% / +50%
12/3/2008	DCIG	15.500M	15.50M	Strategy		+/-25%
4/2/2008	DCIG	3.500M	12.30M	Strategy		+/-25%
10/11/2005		1.000M	N/A	Strategy		10%

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Electronic
DoA

There are various cost drivers included the following:

Scope changes included increase in cost for limited hours that street work could be performed after the award of contract. This limited hours from the estimated 10 hours per day to six hours per day. Changes to field conditions included the discovery of unusable soil after excavation back on the substation site and the street work. Also the discovery of contaminated soil present on site resulted in changes associated with appropriate disposal and handling efforts. During the execution of distribution line Work Requests some scope (due to field conditions) was not initially identified, which increased the Storms estimates from the original amount.

As this project developed and various partial sanctions were brought forward, changes to the potential project investment amount were identified. When the partial sanction was brought forward in February 2016 with a potential investment amount of \$55.827M, the paper included a potential investment of \$15.567M for the CD00656 project at Jepson Substation. When the next partial sanction paper was submitted in November 2018, it removed CD00656 from USSC-14-262 and shifted it to associated paper USSC-14-261. This was done to try and organize transmission projects and distribution projects in to separate papers under the Aquidneck Island Reliability Project portfolio. This resulted in a reduction to the total investment amount with an overall estimate of \$49.361M under USSC-14-262. The submittal of the sanction for full implementation in August 2019 showed a final adjustment to the overall investment amount, increasing it to \$55.477M. This investment amount included additional costs associated with more mature distribution line designs/estimates from STORMS, increased costs associated with additional construction risks identified by the team and actual contractor costs, including change orders identified for the cost drivers outlined above.

Key Milestones

<i>Milestone</i>	<i>Date (Month / Year)</i>
Partial Sanction	November, 2011
Partial Sanction	December, 2014
Partial Sanction	February, 2016
Engineering Design Complete - EDC	May, 2018
Construction Start	September, 2018
Partial Sanction	November, 2018
Project Sanction	August, 2019
Construction Complete / Ready for Load - Newport...	August, 2019
Construction Complete - CC - D-Line Circuits	October, 2021
Gate D - Approval to Progress to Closeout	March, 2022
Gate E - Approval to Close Project	July, 2022
Project Closure Sanction	October, 2022

Next Planned Sanction

<i>Date (Month/Year)</i>	<i>Purpose of Sanction Review</i>
October, 2022	Closure

Category

<i>Category</i>	<i>Reference to Mandate, Policy, NPV, or Other</i>
<input type="radio"/> Mandatory	National Grid USA Internal Strategy Document
<input checked="" type="radio"/> Policy-Driven	Distribution Planning Criteria Strategy Issue 1 –

REDACTED VERSION

- Justified NPV
 Other

February 2011

Asset Management Risk Score: 41

PRIMARY RISK SCORE DRIVER

- Reliability Environment Health & Safety Not Policy Driven

Complexity Level: 33

- High Complexity Medium Complexity Low Complexity N/A

Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project: Yes No

Current Planning Horizon

Distribution

\$M	Prior Yrs	Current Planning Horizon						Total
		Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	
CapEx	24.909	11.537	9.654	2.819	0.000	0.000	0.000	48.919
OpEx	1.100	0.305	0.550	0.259	0.000	0.000	0.000	2.214
Removal	2.534	0.608	0.793	0.409	0.000	0.000	0.000	4.344
Total	28.543	12.450	10.997	3.487	0.000	0.000	0.000	55.477

Capex	24.909	11.537	9.654	2.819	0.000	0.000	0.000	48.919
Opex	1.100	0.305	0.550	0.259	0.000	0.000	0.000	2.214
Removal	2.534	0.608	0.793	0.409	0.000	0.000	0.000	4.344
Total	28.543	12.450	10.997	3.487	0.000	0.000	0.000	55.477

Resources, Operations, & Procurement

RESOURCE SOURCING

Engineering & design Resources to be provided	<input checked="" type="checkbox"/> Internal	<input checked="" type="checkbox"/> Contractor
Construction/Implementation Resources to be provided	<input checked="" type="checkbox"/> Internal	<input checked="" type="checkbox"/> Contractor

RESOURCE DELIVERY

Availability of internal resources to delivery project:	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green
Availability of external resources to delivery project:	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green

OPERATIONAL IMPACT

Outage impact on network system	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green
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PROCUREMENT IMPACT

Procurement impact on	<input type="radio"/> Red	<input type="radio"/> Amber	<input checked="" type="radio"/> Green
-----------------------	---------------------------	-----------------------------	--

REDACTED VERSION

network system:

Key Issues

- 1 A major public outreach effort is ongoing for communities impacted by the substation construction and distribution line construction and conversion work.
- 2 Coordination with RI Department of Transportation (RIDOT) is ongoing to review compliance with the Americans with Disabilities Act (ADA) for new pole sets or pole replacements.
- 3 A traffic mitigation plan is needed for the distribution line construction and the proposed conversion work.

Climate Change

- Contribution to National Grid's 2050 80% emissions reduction target: Neutral Positive Negative
- Impact on adaptability of network for future climate change: Neutral Positive Negative

List References

N/A

Safety, Environmental and Project Planning Issues

Project Planning Voltage conversions are required to upgrade the distribution system from 4.16kV to 13.8kV in Newport and Middletown. Outages are required to energize the converted areas at 13.8kV. These conversions and outages may have to occur during off hours or winter months to avoid conflicts with the City of Newport's tourist season.

Permitting

<i>Permit Name</i>	<i>Probability Required</i>	<i>Duration to Acquire Permit</i>	<i>Status</i>	<i>Estimated Completion Date</i>
RIDEM	Certain	6 Months	Complete	June, 2017
Newport Special Use Permit	Certain	7 Months	Complete	February, 2018
EFSB Permit - Jepson & Line 61/62	Certain	12 to 18 Months	Complete	March, 2017
Road opening Permit	Certain	3 Months	Complete	August, 2018
Building Permit	Certain	4 Months	Complete	September, 2018

Investment Recovery and Customer Impact

Investment Recovery

Investment recovery will be through standard rate recovery mechanisms approved by appropriate regulatory agencies.

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Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$8.842M.

Execution Risk Appraisal

Risk Breakdown Structure Category	Qualitative Assessment / Risk Response Strategy				Risk Score	
	Risk ID + Title	IF Statement	THEN Statement	Risk Response Strategy		
3. Engineering	R1 - Limited Outage availability for Line 63 Construction	If outages can not be obtained as needed	Then construction will be delayed.	Reduce	Outages will be scheduled one year in advance and an outage coordination consultant will be brought onto project team. Schedule construction to finish during off	0
11. Construction	R2 - Construction delays due to weather or damage from major storms	If National Grid is listed as the provider for certain equipment or materials for the project, and it is delivered late or defective, beyond the mutually agreed delivery date in the project schedule,	then National Grid is responsible for any schedule impact	Accept	Create slack in the schedule.	6
2. Public Local Government	R3 - Limited opportunities for distribution system outages for cutovers during construction	As outage needs are identified they will be planned well in advance	Then outages can be managed by an outside consultant and worked into the overall plan of construction.	Reduce	Work with Engineering to determine best options.	9

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In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
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Attachment DIV IV-13
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11. Construction	R4 - Construction delays due to other utilities not transferring lines with in the project schedule.	If Construction delays due to other utilities not transferring lines with in the project schedule.	Planning well in advance to avoid conflicts.	Avoid	Coordinate with Verizon and Design.	12
11. Construction	R5 - General public opposition to the project and damage to property during construction.	If during planning stage there is opposition or during construction unavoidable damage is caused,	Then remediation will be implemented. A community relations consultant will be hired to help mitigate.	Reduce	Coordinate with Public Relations consultant (RDW) to inform public of progress and plans.	12
3. Engineering	R6 - FAA may require certain mitigation measures for construction near Newport Airport.	Submit requirements of each pole to be installed early	Obtain approval and adjust as needed.	Accept	Submit pole info as each pole is designed early in the design process.	0
11. Construction	R7 - Design of the distribution and subtransmission work is on well travelled roadways	Develop Traffic control plans as needed then implement approved plans	0	Accept	Develop traffic control plan that is acceptable to DOT and implement.	0
3. Engineering	R8 - Poles appear to approach private property	Budget and time to be allocated to obtain the proper approvals.	Then implement design as needed.	Accept	Budget and time to be allocated to obtain proper rights and easements as required.	0
11. Construction	R9 - Steel Pole installation at [REDACTED]	Early coordination with the [REDACTED] will be needed.	Then implement design and construction to accommodate the [REDACTED]	Accept	Early coordination with the Navy to mitigate issues.	0
	R10 - Approval	Early coordination	Then implement design and		Early coordination	

REDACTED VERSION

11. Construction	from [REDACTED] for work at [REDACTED]	with the [REDACTED] will be needed.	construction to accommodate the [REDACTED]	Accept	with the Navy to mitigate issues.	25
11. Construction	R11 - Limited Construction windows for work in Newport and Middleton	Early coordination with the towns will be needed.	Then implement design and construction to accommodate the towns.	Accept	Coordination with construction and schedule traffic management plan as needed in advance of construction activities.	8

Business Plan			
Business Plan Name & Period	Project Included in approved Business Plan?	(Over) / Under Business Plan	Project Cost relative to approved Business Plan (\$M)
FY20-24 NE Distribution Capital Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> N/A	(3.183)

If Cost > Approved

if costs > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio has been managed and approved by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

Drivers

The primary driver of this project is reliability. Aquidneck Island is supplied by a highly utilized supply and distribution system. It is increasingly challenging to supply load in southern Middletown and in the City of Newport. The Jepson 13.8kV system has been utilized to provide relief to the 23kV supply system and the 4.16kV distribution system. However, this 13.8kV system has been extended to its limits.

The 23kV supply system is a mixture of overhead and underground construction in Middletown and predominantly underground construction in Newport. The underground system consists mostly of paper and lead cable installed in 3-inch ducts. The 3-inch ducts are not suitable to house required solid dielectric cables, making upgrades to the 23kV supply system challenging and costly.

For loss of the Dexter 115/13.8kV transformer on peak approximately 22MW of load on Aquidneck Island would remain un-served until the transformer is replaced or a mobile is installed resulting in an estimated exposure of 540MWh.

For loss of the Jepson 69/13.8kV transformer on peak approximately 22MW of load on Aquidneck Island would remain un-served until the transformer is replaced or a mobile is installed resulting in an estimated exposure of 550MWh.

For loss of the 69kV line section between Jepson and the [REDACTED] substation on peak approximately 21MW of load on Aquidneck Island would remain un-served resulting in an estimated exposure of 500MWh.

A number of 23/4.16kV stations in the area have asset condition, safety, environmental, and thermal concerns that need to be addressed. The recommendation is to retire these stations. This recommendation is part of a comprehensive solution developed for Aquidneck Island to address all concerns at least cost.

REDACTED VERSION

Cost Summary Table

Distribution									
Project Number	Project Title							Project Estimate Level	+/- 10%
C015158	Newport Sub								
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	
Capex	9.384	5.138	0.000	0.000	0.000	0.000	0.000	14.522	
Opex	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.019	
Removal	0.364	0.153	0.000	0.000	0.000	0.000	0.000	0.517	
Total	9.767	5.291	0.000	0.000	0.000	0.000	0.000	15.058	
C024159	Newport 69kV Line 63								
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	
Capex	1.158	0.390	0.128	0.000	0.000	0.000	0.000	1.676	
Opex	0.012	0.002	0.000	0.000	0.000	0.000	0.000	0.014	
Removal	0.031	0.008	0.032	0.000	0.000	0.000	0.000	0.071	
Total	1.201	0.400	0.160	0.000	0.000	0.000	0.000	1.761	
C028628	Newport SubTrans & Dist								
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	
Capex	12.013	3.672	5.843	2.345	0.000	0.000	0.000	23.873	
Opex	1.017	0.302	0.493	0.200	0.000	0.000	0.000	2.012	
Removal	1.657	0.442	0.704	0.350	0.000	0.000	0.000	3.153	
Total	14.687	4.416	7.040	2.895	0.000	0.000	0.000	29.038	
C054054	Jepson Sub								
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	
Capex	0.376	1.883	3.683	0.474	0.000	0.000	0.000	6.416	
Opex	0.028	0.001	0.057	0.059	0.000	0.000	0.000	0.145	
Removal	0.476	0.001	0.057	0.059	0.000	0.000	0.000	0.593	
Total	0.880	1.885	3.797	0.592	0.000	0.000	0.000	7.154	
CD00649	Gate 2 Substation								
Spend	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total	

REDACTED VERSION

Capex	1.978	0.454	0.000	0.000	0.000	0.000	0.000	2.432
Opex	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.024
Removal	0.006	0.004	0.000	0.000	0.000	0.000	0.000	0.010
Total	2.008	0.458	0.000	0.000	0.000	0.000	0.000	2.466

Total Project Sanction

Capex	24.909	11.537	9.654	2.819	0.000	0.000	0.000	48.919
Opex	1.100	0.305	0.550	0.259	0.000	0.000	0.000	2.214
Removal	2.534	0.608	0.793	0.409	0.000	0.000	0.000	4.344
Total	28.543	12.450	10.997	3.487	0.000	0.000	0.000	55.477

Project Costs per Business Plan

Distribution

\$M	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total
Capex	24.909	14.055	7.160	0.000	0.000	0.000	0.000	46.124
Opex	1.100	0.559	0.329	0.000	0.000	0.000	0.000	1.988
Removal	2.534	0.923	0.725	0.000	0.000	0.000	0.000	4.182
Total Cost in Bus. Plan	28.543	15.537	8.214	0.000	0.000	0.000	0.000	52.294

Variance

\$M	Prior Yrs	Yr 1 2020	Yr 2 2021	Yr 3 2022	Yr 4 2023	Yr 5 2024	Yr 6 2025	Total
Capex	0.000	2.518	(2.494)	(2.819)	0.000	0.000	0.000	(2.795)
Opex	0.000	0.254	(0.221)	(0.259)	0.000	0.000	0.000	(0.226)
Removal	0.000	0.315	(0.068)	(0.409)	0.000	0.000	0.000	(0.162)
Total Variance	0.000	3.087	(2.783)	(3.487)	0.000	0.000	0.000	(3.183)

Cost Assumptions

Costs are from Project cost estimates and work request estimates.

Net Present Value / Cost Benefit Analysis

N/A

NPV Assumptions & Calculations

N/A

Additional Impacts

Some cost impacts are associated with unplanned contaminated soil removal and unanticipated unusable soil

REDACTED VERSION

as back fill for the distribution street trenches. Some additional cost impacts are from scope changes and additional costs are from unanticipated field conditions encountered during construction.

Statement of Support		
Department	Individual	Responsibilities
Project Management	Arthur, David; Migdal, Sara A.;	Endorses resources, cost estimate and schedule
Electric Project Estimation	Lutz, Sara E.;	Endorses Cost Estimate
Engineering and Design	Hellmuth, Kevin; Larrabee, Mark A.;	Endorses scope, design, conformance with design standards
Investment Planning	Diconza, Glen L.;	Endorses relative to 5-year business plan or emergent work
Resource Planning	Phillips, Mark A.; Wyman, Anne;	Endorses construction resources, cost estimate, schedule, and portfolio alignment
Asset Management / Planning	Labarre, Alan T.;	Endorses scope, estimate, and schedule with company's goals, strategies, and objectives.

Reviewers	
Function	Individual
Finance	Bostic, Christina ;
Regulatory	Azarcon, Carolyn ;
Jurisdictional Delegate(s)	Easterly, Patricia ;
Procurement	Chevere, Diego ;
Control Centers (CC)	Gallagher, Michael W. ;

REDACTED VERSION

In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
Responses to the Division's Fourth Set of Data Requests

Decisions

The Senior Executive Sanctioning Committee (SESC) approved this paper at a meeting held on 08/26/2019:

(a) APPROVE the investment of \$55.477M and a tolerance of +/-10% for full implementation.

(b) NOTED that Hughes, Michael has the approved financial delegation

Signature



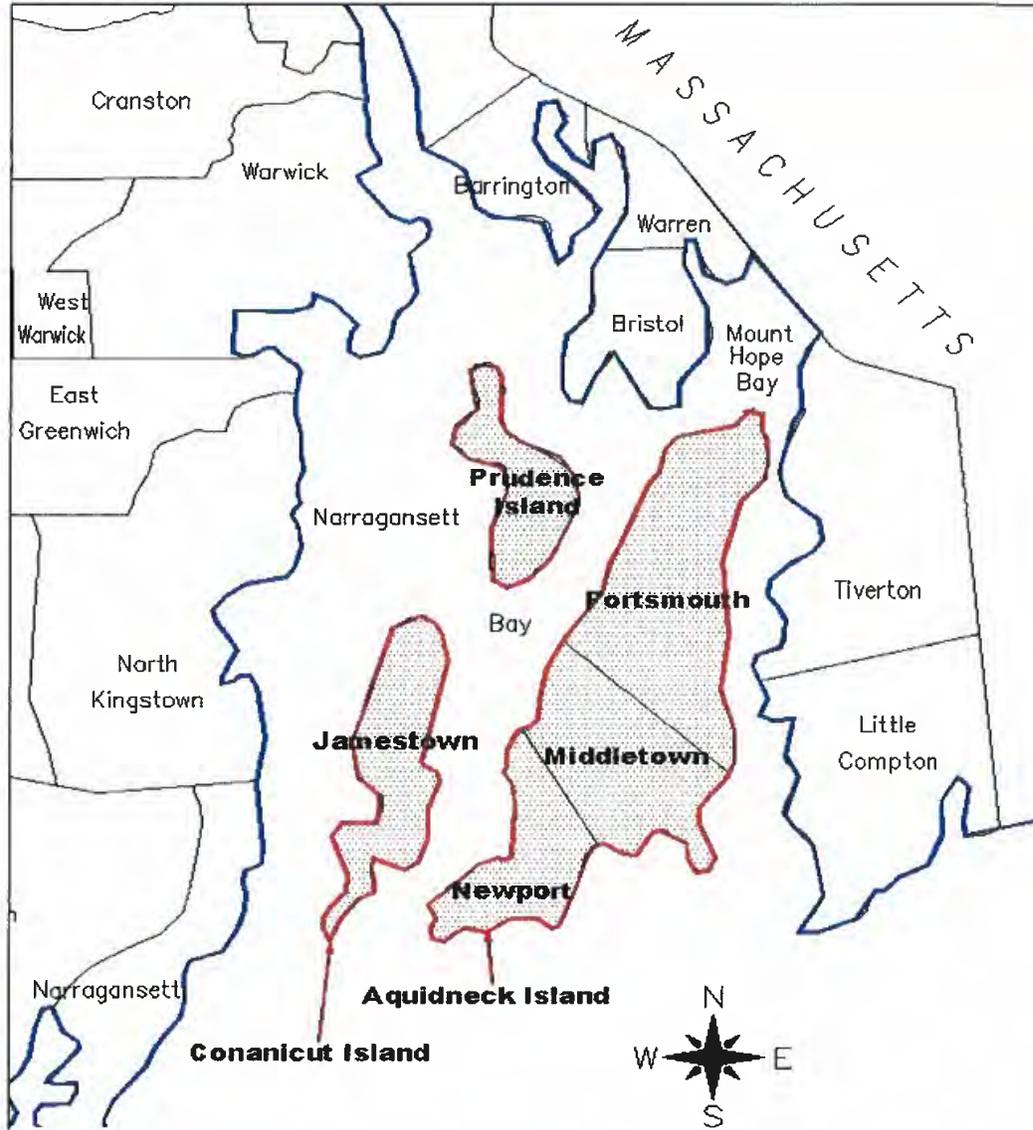
Date

9/4/19

Margaret Smyth
US Chief Financial Officer
Chair, Senior Executive Sanctioning Committee

REDACTED VERSION

Appendix



The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4783
In Re: Electric Infrastructure, Safety, and Reliability Plan FY2019
Responses to the Division's Fourth Set of Data Requests
Issued on September 12, 2019

R-IV-14

Request:

Referencing Attachment PCE-1, page 13; provide Table 9 - FY 2019 Project Variance Report in executable format.

Response:

Please see attachment DIV IV-14 for Table 9 - FY 2019 Project Variance Report in executable format. Please note that the table total for the variance column is \$1,143 million higher than Table 9 in PCE-1, page 13. The formula for that column was updated to include the variance from the Franklin Square Breaker project, which was missing from the version used for Table 9.