

PUC 1-16 (Electric)

Request:

Please provide the capital authorization and closing reports for all projects begun or finished since January 1, 2013 of \$250,000 or more in magnitude.

Response:

The Company has provided the information requested in three separate attachments based on the types of projects used during the time period specified:

- 1) **Attachment 1-16-1 (Electric) – Specific Projects:** Specific Projects are used for capital work of a defined scope and are closed once the work is completed. Projects are authorized for the expected total cost to complete the work and re-authorized for any unexpected changes in cost which may occur.
- 2) **Attachment 1-16-2 (Electric) – Blanket Projects:** The Company utilizes perennial blanket projects to initiate, monitor, and report on relatively smaller, routine work under \$100,000 in value. The blanket projects are set-up for each budget classification (New Business, Public Requirements, Damage/Failure, etc) and the amount of funding approved each year is based on historic costing trends, input from local Operations, and a forecasted impact of inflationary and economic conditions on costs. All Blanket projects are approved within one USSC Sanction Paper annually and the approval amount is reviewed/reset each fiscal year.
- 3) **Attachment 1-16-3 (Electric) – Program Projects:** Program projects are similar to Blanket Projects but are more narrow in their focus. While Blanket Projects are set up at the Budget Classification level, a program is more narrowly defined for a certain type of work within a budget classification. Examples include the Inspection & Maintenance Program (Asset Replacement), Major Storms (Damage/Failure), Overloaded Line Transformers (Load Relief), etc. Programs Projects remain open until the program is completed and are budgeted and approved annually. The budget is based on many factors including the program's goals, priority, resource and material availability, etc.

Project #	Project Description	Project Type	Page Reference
C005414	Farnum Pike Sub_115 kV Dist Assets Total	Distribution Substation	Page 5 of 1643
C015158	Newport Substation (D-Sub) Total	Distribution Substation	Page 48 of 1643
C020297	Sac AB Repl Prog Phase 7 NEC DxT Total	Distribution Substation	Page 80 of 1643
C023852	Inst Ductline Governor St. Prov. Total	Distribution Line	Page 92 of 1643
C024175	Chase Hill Sub (D_Line) Total	Distribution Line	Page 107 of 1643
C024176	Chase Hill Sub (D-Sub) Total	Distribution Substation	Page 141 of 1643
C024179	Coventry MITS (Dist Sub) Total	Distribution Substation	Page 175 of 1643
C028628	Newport SubTrans & Dist Conversion Total	Distribution Line	Page 185 of 1643
C028851	Recon. 38F5 and 2227 Greenville Ave Total	Distribution Line	Page 217 of 1643
C028884	Install Johnston 18F10 Feeder Total	Distribution Line	Page 223 of 1643
C028920	New London Ave (D-Sub) Total	Distribution Substation	Page 233 of 1643
C028921	New London Ave (D-Line) Total	Distribution Line	Page 261 of 1643
C028932	Recon. 0.5 Miles Segment of 2232 Total	Distribution Line	Page 289 of 1643
C032258	ACNW Vlt47 Full Rebuild Prov Total	Distribution Line	Page 293 of 1643
C033535	Johnston Sub 12.47 kV Expansion Total	Distribution Substation	Page 304 of 1643
C034002	Johnston Sub 12kV Expansion Getawa. Total	Distribution Line	Page 314 of 1643
C035087	DOTR-Apponaug Circulator Imprv Warw Total	Distribution Line	Page 324 of 1643
C036072	Johnston #18 Substation Expansion Total	Distribution Substation	Page 335 of 1643
C036093	Elmwood#7Replace 23KV Groun Bank Total	Distribution Substation	Page 345 of 1643
C036230	Langworthy Substation (D-Sub) Total	Distribution Substation	Page 353 of 1643
C036397	Clarkson - new 13F10 feeder (line) Total	Distribution Line	Page 363 of 1643
C036450	83F2 Load Relief - New Fdr (Dline) Total	Distribution Line	Page 372 of 1643
C036516	Kilvert St 87 - New Fdr (DLine) Total	Distribution Line	Page 378 of 1643
C036522	Kilvert St 87 - Install TB#2 Total	Distribution Substation	Page 390 of 1643
C043085	D/F Sockanosset #2 TRF Total	Distribution Substation	Page 409 of 1643
C044972	LN13_Paving and sewer Total	Facilities/IT/Telcom	Page 418 of 1643
C045657	DOTR-Repl Bridges No.475 & 476 E.P. Total	Distribution Line	Page 422 of 1643
C045680	MELR13_Replace windows Total	Facilities/IT/Telcom	Page 428 of 1643
C046352	Volt Var Dline RI Pilot Project Total	Distribution Line	Page 443 of 1643
C046386	BITS Wakefield Sub Upgrades (D-Sub) Total	Distribution Substation	Page 467 of 1643
C046397	Fdr 1109A - Install Cable Dorrance Total	Distribution Line	Page 495 of 1643
C046398	Memorial Blvd Easton's Beach inst d Total	Distribution Line	Page 499 of 1643
C046399	Fdr 1103 Inst Cable So Main St Prov Total	Distribution Line	Page 508 of 1643
C046400	Capital Ctr Fdrs - Elim T-body join Total	Distribution Line	Page 514 of 1643
C046405	Fdr 1113 Inst Cable Fountain St Pro Total	Distribution Line	Page 523 of 1643
C046406	Fdr 1109B Inst Cable Pine St & west Total	Distribution Line	Page 529 of 1643
C046506	Tunk Hill Road, Scituate RI, Storm Total	Distribution Line	Page 535 of 1643
C046697	Hope Substation Flood Restoration Total	Distribution Substation	Page 544 of 1643
C046831	CLARKE 65J12 Feeder Upgrade (D-Sub) Total	Distribution Substation	Page 548 of 1643
C046832	CLARKE St Feeder Upgrades (D-Line) Total	Distribution Line	Page 557 of 1643
C047377	IRURD Wethersfield Commons Total	Distribution Line	Page 566 of 1643
C047396	IRURD Silver Maple Drive Total	Distribution Line	Page 577 of 1643
C047397	IRURD Cedarhurst. Total	Distribution Line	Page 583 of 1643
C047422	IRURD Maplewood Total	Distribution Line	Page 589 of 1643
C047495	DG SVC OCI Solar RI-233 Total	Distribution Line	Page 600 of 1643

Project #	Project Description	Project Type	Page Reference
C048596	Kents Corner - Replace VRs Total	Distribution Substation	Page 633 of 1643
C048687	LIN13_ Renovate Lincoln Ops Center Total	Facilities/IT/Telcom	Page 639 of 1643
C048717	DOTR-EMain/WMain Int Recon Total	Distribution Line	Page 657 of 1643
C049140	Randall St Bridge Ductline. Prov Total	Distribution Line	Page 663 of 1643
C049681	Clarkson - EMS Expansion Total	Distribution Substation	Page 669 of 1643
C049682	Warwick 52 - EMS Expansion Total	Distribution Substation	Page 675 of 1643
C049726	UG Fdrs 1141-1143 Hurr Barrier Prov Total	Distribution Line	Page 681 of 1643
C049910	Southeast Sub MC Retirement (DLine) Total	Distribution Line	Page 687 of 1643
C049981	Nsnvle 127W41 New Customer Load Total	Distribution Line	Page 703 of 1643
C050006	Hyde Ave MC Retirement (D-Line) Total	Distribution Line	Page 712 of 1643
C050017	Daggett Ave MC Retirement (D-Line) Total	Distribution Line	Page 726 of 1643
C050699	Hopkins Hill #63 - EMS Expansion Total	Distribution Substation	Page 735 of 1643
C051202	13F1 Elim T-Body Joints Prov Total	Distribution Line	Page 741 of 1643
C051203	LNG Plant Svc Terminal Rd Prv DLine Total	Distribution Line	Page 745 of 1643
C051204	LNG Plant Svc Terminal Rd Prv DSub Total	Distribution Substation	Page 759 of 1643
C051212	South St repl indoor subst D-SUB Total	Distribution Substation	Page 773 of 1643
C051213	South St repl indoor subst D-LINE Total	Distribution Line	Page 804 of 1643
C051385	Central Falls Sub Relief Total	Distribution Line	Page 836 of 1643
C051496	Toray Plastics (12.5MW GT) Total	Distribution Substation	Page 847 of 1643
C051625	South Street Transformer Spare. Total	Distribution Substation	Page 853 of 1643
C051824	Lafayette Sub Transformer Replaceme Total	Distribution Substation	Page 859 of 1643
C052686	Prov RI Survey/Repl UG sec. cables Total	Distribution Line	Page 874 of 1643
C052964	IRURD Rollingwood Total	Distribution Line	Page 878 of 1643
C053111	Volt Var - IT/IS Total	Facilities/IT/Telcom	Page 890 of 1643
C053266	NW Vlt 122 Kinsley Bldg, Prov. Total	Distribution Line	Page 914 of 1643
C053268	Pawtucket No 1 Bus Sect 73 Relief Total	Distribution Line	Page 920 of 1643
C053646	Quonset Sub Expansion (D-Sub) Total	Distribution Substation	Page 931 of 1643
C053647	Quonset Sub Expansion (D-Line) Total	Distribution Line	Page 949 of 1643
C053964	Nasonville TRF LTC Damage/failure. Total	Distribution Substation	Page 967 of 1643
C054005	SHARPE BUILDING ASSC-Foundry Bld 4 Total	Distribution Line	Page 973 of 1643
C054012	MELR15_ Renovations PHASE 1 Total	Facilities/IT/Telcom	Page 979 of 1643
C054323	Franklin Square Breaker Replacement Total	Distribution Substation	Page 993 of 1643
C054666	MELR15_Light Stores Roof Replacemen Total	Facilities/IT/Telcom	Page 999 of 1643
C054788	ValleySub 102 NERC CIP v3.25 Total	Distribution Substation	Page 1005 of 1643
C054909	Warwick Mall Trf 2 Failure Total	Distribution Substation	Page 1011 of 1643
C054929	Fox Pl, Providence, RI Total	Distribution Line	Page 1015 of 1643
C055268	AMGEN 35 kV-Second Feeder Service Total	Distribution Line	Page 1021 of 1643
C055357	RI UG Cable Repl Program - Fdr 1111 Total	Distribution Line	Page 1043 of 1643
C055359	RI UG Cable Repl Program - Fdr 79F1 Total	Distribution Line	Page 1052 of 1643
C055367	RI UG Cable Repl Program Fdr 54K21 Total	Distribution Line	Page 1056 of 1643
C055369	RI UG Cable Repl Program Fdr 54K23 Total	Distribution Line	Page 1065 of 1643
C057169	RI Streetlighting & Controls Pilot Total	Distribution Line	Page 1069 of 1643
C058179	General Dynamics, N Kingstown RI Total	Distribution Line	Page 1075 of 1643
C058287	IRURD Ferncliffe Farms URD Total	Distribution Line	Page 1081 of 1643
C059539	MELR15_ Renovations PHASE 2 Total	Facilities/IT/Telcom	Page 1092 of 1643

Project #	Project Description	Project Type	Page Reference
C059579	Fdr 3324 Install Cable Transf Leads Total	Distribution Substation	Page 1102 of 1643
C059882	Flood Contingency Plan NECO - D Total	Distribution Substation	Page 1108 of 1643
C061711	MDT16_Facility Purchase Total	Facilities/IT/Telcom	Page 1124 of 1643
C061986	Moses Brown School, Providence RI Total	Distribution Line	Page 1136 of 1643
C063246	Franklin Sq Fire Escape Replacement Total	Distribution Substation	Page 1142 of 1643
C063546	MELR16_Renovations PHASE 3 Total	Facilities/IT/Telcom	Page 1148 of 1643
C064266	Clarkson St New Feeder 13F10 Total	Distribution Substation	Page 1157 of 1643
C065470	Recloser Communication Upgrade - RI Total	Distribution Line	Page 1163 of 1643
C068686	Franklin Sq Breaker Replacements Total	Distribution Substation	Page 1173 of 1643
C069711	Franklin Square Protection Scheme Total	Distribution Substation	Page 1190 of 1643
C070026	New Svc Bs Eagle St Providence RI Total	Distribution Line	Page 1196 of 1643
C070246	IRURD Immokolee Dr, Portsmouth Total	Distribution Line	Page 1202 of 1643
C070466	Valley #102 22T Replacement D/F Total	Distribution Substation	Page 1206 of 1643
C072027	INVP 4055 - RI Renewable Energy Total	Facilities/IT/Telcom	Page 1219 of 1643
C072689	350 Eddy St, Providence Total	Distribution Line	Page 1236 of 1643
C075445	RI Royal Disconnect Replacement Total	Distribution Substation	Page 1242 of 1643
C075860	Geneva Sub Equipment Replacement Total	Distribution Substation	Page 1246 of 1643
C076923	RI VVO/CVR Feeder Licenses Total	Facilities/IT/Telcom	Page 1251 of 1643
C077042	LINC17_Backup Control Total	Facilities/IT/Telcom	Page 1268 of 1643
CD00002	Miriam Hospital Second Feeder Servi Total	Distribution Line	Page 1280 of 1643
CD00135	I-195 Contract 14 - Providence Total	Distribution Line	Page 1289 of 1643
CD00518	Spare Transformer - Peacedale & 8 o Total	Distribution Substation	Page 1303 of 1643
CD00526	EMS Add-Peacedale 59 RI Total	Distribution Substation	Page 1307 of 1643
CD00528	EMS Expansion - Natick 29 Substatio Total	Distribution Substation	Page 1313 of 1643
CD00529	EMS Expansion - Hospital Sub 146 Total	Distribution Substation	Page 1319 of 1643
CD00530	EMS Expansion - Elmwood Outdoor 7 Total	Distribution Substation	Page 1325 of 1643
CD00531	EMS Expansion - Division Street 61 Total	Distribution Substation	Page 1331 of 1643
CD00533	EMS Expansion - Lincoln Ave 72 Total	Distribution Substation	Page 1337 of 1643
CD00534	EMS Expansion - Old Baptist 46 Total	Distribution Substation	Page 1346 of 1643
CD00641	Retire Pawtuxet Substation (D-Line) Total	Distribution Line	Page 1352 of 1643
CD00648	Eldred Sub Asset Replacement (D-Sub Total	Distribution Substation	Page 1358 of 1643
CD00649	Gate 2 Substation (D-Sub) Total	Distribution Substation	Page 1367 of 1643
CD00659	Eldred Sub Asset Replacement(D-Lin Total	Distribution Line	Page 1399 of 1643
CD00686	IRURD Carriage Drive Total	Distribution Line	Page 1408 of 1643
CD00696	Mobile Sub - Replace MSID#9734 Total	Distribution Substation	Page 1414 of 1643
CD00722	New Shun Pike Substation - 23kV Lin Total	Distribution Line	Page 1422 of 1643
CD00723	New Shun Pike Substation-23kV Sub Total	Distribution Substation	Page 1438 of 1643
CD00766	I-195 Contract 15 - Providence Total	Distribution Line	Page 1454 of 1643
CD00824	Radio Improvement Project. Total	Facilities/IT/Telcom	Page 1468 of 1643
CD00827	IRURD South Rd Est So. Kingstown Total	Distribution Line	Page 1477 of 1643
CD00916	Wood River - EMS Expansion Total	Distribution Substation	Page 1483 of 1643
CD00937	IRURD Village Green Rehab Total	Distribution Line	Page 1489 of 1643
CD00972	New Highland Drive Substation - DSu Total	Distribution Substation	Page 1498 of 1643
CD00978	New Highland Drive Substation - DLi Total	Distribution Line	Page 1521 of 1643
CD00997	ACNW Vault 34 Reconstruction Prov Total	Distribution Line	Page 1544 of 1643

Project #	Project Description	Project Type	Page Reference
CD01093	KENTS CORNER transformer contingenc Total	Distribution Line	Page 1550 of 1643
CD01097	Warwick Mall Substation Flood Resto Total	Distribution Substation	Page 1556 of 1643
CD01101	Kent County 2nd Transformer (D-Sub) Total	Distribution Substation	Page 1564 of 1643
CD01102	Hunt River Substation Retirement Total	Distribution Substation	Page 1592 of 1643
CD01194	Repl Padmt Swgr mult locns 79F1-13F Total	Distribution Line	Page 1620 of 1643
CD01242	Pontiac Substation Flood Restoratio Total	Distribution Substation	Page 1626 of 1643
CD01243	Pontiac Substation Flood Restoratio Total	Distribution Line	Page 1635 of 1643

C003693

Woonsocket Sub New 115/13 kV Sub

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPlan Help Calc Print Win

Funding Project Estimates - Summary C003693 Current Total Authorized Amount: \$5,10...

Title Woonsocket Sub New 115/13 kV Sub
Project Number C003693

Budget Version Default (active)

Revision
Revision Status Approved
Revision No. 28
Est Start Date 04/01/2004
Est Complete Date 01/01/2013
Est In Srvc Date 11/30/2012
Capital \$4,965,000.00
Expense \$55,000.00
Jobbing \$0.00
Retirement \$0.00
Removal \$80,000.00
Total (excl. Rets.) \$5,100,000.00
Credits \$0.00
Net \$5,100,000.00

Revision Info Other Updates

Revision 28 of 28 < < > >
[Find Revision](#) Send for Approval

☐ Show 'Budget Only' Revisions

Spending Estimates:
Grid Estimates
Forecast
Summarize from W/O
Copy Estimate

Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates

Edit:
New Revision
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Update
Update With Actuals
Import Estimates

Other:
Revision Comments
Released Dollars
Substitution
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Record 1 of 1 < < > >
Audits

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: C003693 **USSC #:** USSC0408P31R1
Revision: 28 **Budget Version:** Default
Project Title: Woonsocket Sub New 115/13 kV Sub
Project Description: 03857 Woonsocket Sub New 115/13 kV Sub

Project Status: Closed
Responsible Person: MAXIMOVICH, GEOR **Initiator:** PowerBatch,
Spending Rationale: Asset Condition **Funding Type:** P Dist by Transmission Sub RI
Budget Class: Asset Replacement
Capital by Category:
Program Code:
Project Risk Score: 41 **Project Complexity Score:** 29

Project Schedule / Expenditures

Revision Status: Approved
Est Start Date: 4/1/2004 **Est Complete Date:** 1/1/2013
Est In-Service Date: 11/30/2012
TTD Actuals: \$5,248,878 **As Of:** 10/2/2017

Cost Breakdown	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>
	<u>\$4,965,000</u>	<u>\$55,000</u>	<u>\$80,000</u>	<u>\$5,100,000</u>	<u>\$0</u>

Justification / Risk Identification:

Woonsocket substation # 26 is located in North Smithfield RI. Transmission Planning issued in 2007 a 10-year area study report for transmission system in Rhode Island and National Grid's footprint in neighboring Southeastern Massachusetts (SEMA) that recommended a new 115 kV breaker in an existing bay at Woonsocket substation to accommodate a low profile distribution substation. The 2009 Distribution Annual Plan confirmed the need of Woonsocket substation expansion and feeders addition.

Project Scope:

03857 Woonsocket Sub New 115/13 kV Sub. The project involves the addition at Woonsocket # 26 substation of a 115kV transmission tap, a 115kV circuit breaker, a 115 kV circuit switcher, a 115/13.8 kV power transformer, a 13.8 kV metal-clad switchgear with four feeder positions, a metal enclosed capacitor bank and getaway ducts and manhole system for four new 13.8 kV feeders. The main driver for this project is asset replacement, increased reliability, and load growth.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>5/8/2013 10:32:12</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

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

US Sanction Paper

nationalgrid

Title:	Woonsocket Substation #26 – Install new 115/13.8 kV distribution substation and four feeders	Sanction Paper #:	USSC0408P31R1
Project #:	C03488, C03693, C24279, C15200	Sanction Type:	Re-Sanction
Operating Company:	The Narragansett Electric Company	Date of Request:	12/14/11
Author:	Scott Sobolewski / George Maximovich	Sponsor:	Chris Root
Utility Service:	Electricity T&D		

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests the re-sanction of Project #'s C03488, C03693, C24279 and C15200 in the amount of \$10.630M and a tolerance of +/-10% to continue with construction to completion and closeout activities.

The re-sanction amount is \$10.630M broken down into:

\$10.210M Capex
\$ 0.183M Opex
\$ 0.237M Removal

Note the originally requested sanction amount of \$9.400M and a tolerance of +/-10% was approved for \$4.400M in June 2009 for DxD projects and \$5.000M in February 2010 for TxT and DxT projects. The project is approximately 79% complete and \$8.390M has been spent to date. This paper is requesting approval for additional \$1.230M for a re-sanction approval of \$10.630M to allow completion and close out of this project.

1.2 Brief Description:

The project involves the addition at Woonsocket # 26 substation of a 115kV transmission tap, a 115kV circuit breaker, a 115 kV circuit switcher, a 115/13.8 kV power transformer, a 13.8 kV metal-clad switchgear with four feeder positions, a metal enclosed capacitor bank and getaway ducts and manhole system for four new 13.8 kV feeders. The main driver for this project is asset replacement, increased reliability, and load growth.

Woonsocket substation # 26 is located in North Smithfield RI. Transmission Planning issued in 2007 a 10-year area study report for transmission system in Rhode Island and National Grid's footprint in neighboring Southeastern Massachusetts (SEMA) that recommended a new 115 kV breaker in an existing bay at Woonsocket substation to

US Sanction Paper

accommodate a low profile distribution substation. The 2009 Distribution Annual Plan confirmed the need of Woonsocket substation expansion and feeders addition.

These new feeders will have the capacity and feeder configuration to provide strong feeder ties with Riverside 108W61 and 108W62. In addition, upon completion of this project, the temporary transformer currently in use at West Farnum will be removed and transferred back to the system transformer pool. Finally, the load relief provided from this project will also provide load relief to Nasonville 127 Substation and allow for the extension of a second feeder to Pascoag Municipality.

This paper requests a re-sanction due to additional scope as the project progressed during the final engineering and construction phase and an initially low construction estimate based on preliminary engineering documentation. This is detailed further in the Key Variances section of the paper.

1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount (\$M's)
C03488	115 kV Tap Woonsocket Sub New 115/13.8 kV	0.580
C03693	Woonsocket Sub New 115/13 kV Sub	5.100
C24279	Woonsocket Sub New 13 kV Sub/gear	3.200
C15200	Woonsocket Substation #26 – Install Four New Distribution Feeders	1.750
Total		10.630

1.4 Associated Projects:

Project Number	Project Title	Company	Estimate Amount (\$)
Total			\$



US Sanction Paper

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
February 16, 2010	AMIC	\$5.000M	Woonsocket Substation Reinforcements to Accommodate a New 115/13.8kV Distribution Substation	Sanction
June 10, 2009	DCIG	\$4.400M	Woonsocket Substation #26 – Install new 115/13.8 kV distribution substation and four feeders.	Sanction
April 2, 2008	DCIG	\$0.158M	Install a New 115/13.8 kV Distribution Substation and four feeders in Woonsocket Substation yard, RI	Strategy
May 22, 2007	AMIC	\$2.700M	Strategy to Reinforce Greater Rhode Island Transmission System (Greater Rhode Island Transmission Study)	Strategy

Over / Under Expenditure Analysis - C03488

Summary Analysis (M's)	Capex	Opex	Removal	Total
Latest approval	\$0.404	\$0.028	\$0.068	\$0.500
Re-Sanction Amount	\$0.480	\$0.028	\$0.072	\$0.580
Change*	\$0.076	0	\$0.004	\$0.080

Over / Under Expenditure Analysis – C03693

Summary Analysis (M's)	Capex	Opex	Removal	Total
Latest approval	\$4.365	\$0.055	\$0.080	\$4.500
Re-Sanction Amount	\$4.965	\$0.055	\$0.080	\$5.100
Change*	\$0.600	\$0.000	\$0.000	\$0.600

US Sanction Paper



Over / Under Expenditure Analysis – C24279

Summary Analysis (M's)	Capex	Opex	Removal	Total
Latest approval	\$2.870	\$0.030	\$0.000	\$2.900
Re-Sanction Amount	\$3.165	\$0.035	\$0.000	\$3.200
Change*	\$0.295	\$0.005	\$0.000	\$0.300

Over / Under Expenditure Analysis – C15200

Summary Analysis (M's)	Capex	Opex	Removal	Total
Latest approval	\$1.290	\$0.030	\$0.180	\$1.500
Re-Sanction Amount	\$1.600	\$0.065	\$0.085	\$1.750
Change*	\$0.310	\$0.035	\$(0.095)	\$0.250

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
November 2012	Project Closure

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
<input type="checkbox"/> Mandatory	Distribution Planning Criteria Asset Replacement
<input checked="" type="checkbox"/> Policy-Driven	
<input type="checkbox"/> Justified NPV	

1.8 Asset Management Risk Score

C03488, C03693, C24279 & C15200

Asset Management Risk Score: 41

Primary Risk Score Driver: (Policy Driven Projects Only)

☒ Reliability ☐ Environment ☐ Health & Safety

1.9 Complexity Level: (if applicable)

☒ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: 29

US Sanction Paper



1.10 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan (\$)
Dist- Current 5 year Spending Plan FY12-16 Budget	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.283M
Trans- Current 5 year Spending Plan FY12-16 Budget	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Over <input checked="" type="checkbox"/> Under	\$0.682M

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

N/A

1.12 Distribution Current Planning Horizon:

Company Name	Current planning horizon							
\$M	Prior YR'S	Yr 1 11/12	Yr 2 12/13	Yr 3 13/14	Yr 4 14/15	Yr 5 15/16	Yr 7 +	Total
Proposed Capex Investment	4.090	4.864	0.776					9.730
Proposed Opex Investment	0.026	0.108	0.021					0.155
Proposed Removal Investment	0.001	0.145	0.019					0.165
CIAC / Reimbursement								0.000
Total	\$4.117	\$5.117	\$0.816	\$0.000	\$0.000	\$0.000	\$0.000	\$10.050

US Sanction Paper



1.13 Transmission Current Planning Horizon:

Company Name	Current planning horizon							
\$M	Prior YR'S	Yr 1 11/12	Yr 2 12/13	Yr 3 13/14	Yr 4 14/15	Yr 5 15/16	Yr 7 +	Total
Proposed Capex Investment	0.140	0.335	0.005					0.480
Proposed Opex Investment	0.001	0.027						0.028
Proposed Removal Investment		0.072						0.072
CIAC / Reimbursement								0.000
Total	\$0.141	\$0.434	\$0.005	\$0.000	\$0.000	\$0.000	\$0.000	\$0.580

1.14 Resources:

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="checkbox"/> Red	<input type="checkbox"/> Amber	<input checked="" type="checkbox"/> Green
Availability of external resources to deliver project:	<input type="checkbox"/> Red	<input type="checkbox"/> Amber	<input checked="" type="checkbox"/> Green
Operational Impact			
Outage impact on network system:	<input type="checkbox"/> Red	<input type="checkbox"/> Amber	<input checked="" type="checkbox"/> Green
Procurement impact on network system:	<input type="checkbox"/> Red	<input type="checkbox"/> Amber	<input checked="" type="checkbox"/> Green

1.15 Key Issues (include mitigation of Red or Amber Resources):

1	A detailed outage plan was prepared and construction activities are coordinated with the construction and outage sequence of other projects in this area.
2	

US Sanction Paper



1.16 Key Milestones:

Milestone	Target Date: (Month/Year)
Construction Start	June 2011
Project Resanction	December 2011
Construction Complete	May 2012
Submit Facility Rating to ISO	November 2011
Ready for Load - RFL	June 2012
Project Closure Report	November 2012

1.17 Climate Change:

Are financial incentives (e.g. carbon credits) available?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Contribution to National Grid's 2050 80% emissions reduction target:	<input checked="" type="checkbox"/> Neutral	<input type="checkbox"/> Positive <input type="checkbox"/> Negative
Impact on adaptability of network for future climate change:	<input checked="" type="checkbox"/> Neutral	<input type="checkbox"/> Positive <input type="checkbox"/> Negative

1.18 List References:

1	2009 Distribution Annual Plan (2009- 2014)
2	2007 The Greater Rhode Island Transmission Planning Study
3	2004 "Replacement of Temporary West Farnum Distribution Supply Transformer" – Part 2 of the North Blackstone Valley Area Supply Study. By: John Fritz and Frank Carro

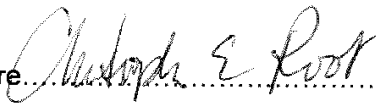
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2 Recommendations:

The **Sanctioning Authority** USSC is invited to:

- (a) APPROVE the investment of \$10.630M and a tolerance of +/- 10%
- (b) NOTE that **Scott Sobolewski** is the Distribution Line Project Manager and **George Maximovich** is the Substation Project Manager and have the approved financial delegation.

Signature.......... Date.....1/9/12.....
Project Sponsor: Christopher E. Root, Senior Vice President Network Strategy

3 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on December 14, 2011

Signature.......... Date.....1/16/12.....
Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper



4 Sanction Paper Detail

Title:	Woonsocket Substation #26 – Install new 115/13.8 kV distribution substation and four feeders	Sanction Paper #:	USSC0408P31R1
Project #:	C03488, C03693, C24279, C15200	Sanction Type:	Re-Sanction
Operating Company:	The Narragansett Electric Company	Date of Request:	12/14/11
Author:	Scott Sobolewski / George Maximovich	Sponsor:	Chris Root
Utility Service:	Electricity T&D		

4.1 Background

The 345/115/13.8 kV transformer at West Farnum substation, North Smithfield, RI failed in November of 2001. A temporary 115/13.8 kV transformer was installed to supply the two distribution feeders at West Farnum. Upon completion of the proposed project the temporary transformer at West Farnum will be removed and transferred back to the system spare transformer pool.

In November of 2006 the power transformer at Riverside substation in the same general area failed. The existing 42 MVA transformer was replaced with a 33 MVA system spare. The reduced capacity has resulted in decreased area reliability during certain area contingencies.

In 2007 Transmission Planning issued a 10-year area study report for transmission system in Rhode Island and National Grid's footprint in neighboring Southeastern Massachusetts (SEMA) that recommended a new 115 kV breaker in an existing bay at Woonsocket substation to accommodate a low profile distribution substation.

In 2007 the Town of Pascoag requested an increase in the capacity to their facility in Burrillville. This will require a second distribution feeder to supply their projected load. The recommended plan involves installation of a new 115/13.8 kV Distribution substation within the existing Woonsocket #26 substation fence. This plan will improve asset replacement, reliability, and load growth conditions.

The originally requested sanction amount of \$9.400M and a tolerance of +/-10% was approved for \$4.400M in June 2009 for DxD projects and \$5.000M in February 2010 for TxT and DxT projects. The project is approximately 79% complete and \$8.390M has been spent to date.

4.2 Drivers

The main drivers for these projects are asset replacement, increased reliability, and load growth.

These projects will provide load relief to Riverside, Nasonville, and Staples Substations. In addition, the new feeders from Woonsocket Substation will permit the removal of all 15kV load from the West Farnum Substation. Once the load is removed from the West Farnum Substation the 15kV temporary transformer and associated equipment can be

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taken out of service and removed. The removal of the transformer is necessary for the progression of the RI NEEWS project.

The Town of Pascoag is served by the Nasonville 127W43. The loading on this feeder exceeded 100% in 2010. In order to serve the Town's growing load and address the 127W43 loading an additional feeder is required. Upon completion of the Woonsocket substation and associated feeder, load will be transferred from the Nasonville 127W42 feeder to Woonsocket 26W41 and 26W47 feeders. The reduced loading on the 127W42 feeder will allow this feeder to be built in a westerly direction along the 127W43 for two miles. At this point the Nasonville 127W41 can be transferred to the 127W42 to provide a second feeder to the Town of Pascoag.

This re-sanction is requested for the following reasons:

C03488 – Key Variations

The estimate of \$0.500M was approved in February of 2010 for a 115 kV Tap to provide supply to a new 115/13.8kV substation. The project has spent approximately \$0.480M to date on engineering, permitting, construction, equipment and materials. The project resanction is requested for the following reasons:

- A design change from the original design of wood poles to a new design based on steel poles was executed in order to comply with Substation Engineering Standards due to site location. The design, material and construction variance was \$0.050M.
- A low labor construction estimate on civil and removal activities was estimated which resulted in a variance off \$0.030M

The total project cost variance was \$0.080M.

Detail Analysis (M's)	Over/Under Expenditure?	Amount
Latest approval		\$0.500M
Key variation 1 – Design change from original design of wood poles to steel poles	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.050M
Key variation 2 – Low construction estimate on civil and removal activities	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.030M

C03693 – Key Variations

The estimate of \$4.500M was approved in February of 2010 to install a 115kV circuit breaker, circuit switcher and 40 MVA transformer as part of a new 115/13.8kV distribution substation. The project has spent approximately \$4.600M to date on engineering, permitting, construction, equipment and materials. The project resanction is requested for the following reasons:

- Removal of foundations and conduits found during site preparation and initial excavations. Available drawings used for detail design and construction estimates indicated that foundations and conduits from previous installation were removed. The total cost variance was \$0.030M.

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- Additional fill and grade was required for stability purposes on foundations close to wetland area based on soil site conditions. The material and construction cost variance was \$0.100M.
- Updated grounding analysis and safety calculations of touch and step voltages determined the need of additional grounding conductor, connectors and ground rods in the 115kV yard. The material and construction cost variance was \$0.120M.
- A low labor construction estimate on civil and primary works was identified. The original construction estimate was based in preliminary engineering documentation. The total cost variance was approximately \$0.350M.

The total project cost variance was \$0.600M.

Detail Analysis (M's)	Over/Under Expenditure?	Amount
Latest approval		\$4.500M
Key variation 1 - Removal of foundations and conduits found during site preparation & excavations - material and labor cost	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.030M
Key variation 2 – Additional fill and grade for stability purpose in foundations – material and labor cost	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.100M
Key variation 3 - Additional grounding conductor, connectors, and ground rods - material and labor cost	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.120M
Key variation 4 – Low Construction Estimate variance	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.350M

C24279 – Key Variations

The estimate of \$2.900M was approved in June of 2009 to install a 13.8 kV metal-clad switchgear with four feeder positions and a metal enclosed 7.2 MVAR capacitor bank. The project has spent approximately \$2.510M to date on engineering, permitting, construction, equipment and materials. The project resanction is requested for the following reasons:

- Removal of foundations and conduits found during site preparation and initial excavations. Available drawings used for detail design and construction estimates indicated that foundations and conduits from previous installation were removed. The total cost variance was \$0.020M.
- Updated grounding analysis and safety calculations of touch and step voltages determined the need of additional grounding conductor, connectors and ground rods in the 13.8kV yard. The material and construction cost variance was \$0.065M.
- Material cost variance based material market price and storage cost of 13.8 kV metal-clad switchgear for nine months. The total cost variance was \$0.180M
- A low labor construction estimate on civil and primary works was identified. The original construction estimate was based in preliminary engineering documentation. The total cost variance was approximately \$0.035M.

The total project cost variance was \$0.300M.

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Detail Analysis (M's)	Over/Under Expenditure?	Amount
Latest approval		\$2.900M
Key variation 1 - Removal of foundations and conduits found during site preparation & excavations - material and labor cost	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.020M
Key variation 2 – Additional grounding conductor, connectors, and ground rods –material and labor cost	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.065M
Key variation 3 – Material market price and storage cost of 13.8 kV metal-clad switchgear	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.180M
Key variation 4 - Low Construction Estimate variance	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.035M

C15200 – Key Variations

The estimate of \$1.500M was approved in June of 2009 for the distribution portion of this project, C15200. The project has spent approximately \$0.800M to date on engineering, permitting, construction, equipment and materials, and project management. The following key variations resulted in the need for a project re-sanction for C15200:

1) In August of 2011 an updated civil construction estimate was provided for the installation of the new feeder getaway manhole and duct system. The initial civil estimate provided did not include National Grid Labor Adders and repaving of the Woonsocket Substation driveway. The new civil construction estimate increased by \$0.360M.

2) In March of 2011 a Project Change Request was received from Distribution Planning to increase the scope of the project. This PCR was provided to engineering for a detailed design and estimate to include the following:

- Remove 4 existing reclosers and Install 6 new reclosers.
- Install one 1200kVAR cap bank, one 900kVAR cap bank and one 200 kVAR capacitor.
- Change phasing at three separate locations.
- Install three fault indicators.
- Install two load breaks.
- Reconductor 300ft of 1/0 Al cable with 477 kcmil Al cable.
- Perform switching as indicated by Distribution Planning.

The additional work is estimated to cost \$0.340M.

3) In August of 2011 the STORMS design estimate was reviewed by the Project Team for accuracy. It was determined that the estimate included unnecessary labor factors that increased the estimate considerably. These labor factors were corrected in STORMS. The resulting adjustment to the STORMS estimate reduced the construction cost estimate by \$0.450M.

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This paper is requesting an additional \$0.250M to complete the distribution portion of this project. The following table indicates the key variations that account for the difference between the original sanction amount of \$1.500M and the requested re-sanction amount of \$1.750M.

Detail Analysis (M's)	Over/Under Expenditure?	Amount
Latest approval		\$1.500M
Key Variation 1 – Low construction estimate for civil estimate	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.360M
Key variation 2 – A Project Change Request issued by Planning	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.340M
Key Variation 3 – Adjustment to STORMS estimate.	<input type="checkbox"/> Over <input checked="" type="checkbox"/> Under	\$0.450M

4.3 Project Description

4.1 Transmission Project C03488

Install a 115kV transmission tap originating within the existing Woonsocket facility to provide supply to a new 115/13.8kV substation. To facilitate the 115kV tap installation portions of two transmission lines Q143S and V148 will be relocated.

4.2 DxT Project C03693

Install a 115kV circuit breaker, a 115 kV circuit switcher and a 115/13.8 kV [REDACTED] transformer as part of a new 115/13.8kV distribution substation.

4.3 Distribution substation project C24279

The project involves the installation of new foundations, a 13.8 kV metal-clad switchgear with four feeder positions and a metal enclosed 7.2 MVAR capacitor bank. The metal-clad switchgear will supply four 13.8 kV feeders.

4.4 Distribution line project C15200

This project establishes four new distribution feeders at the new Woonsocket #26 substation. The underground work consists of the installation of approximately

- 650 feet of 9-way duct,
- 250 feet of 4-way duct,
- 150 feet of 2-way duct,
- three 4-way manholes,
- +/- 2400 circuit feet of 3-1C 1000 kcmil Cu EPR 15 kV underground cable and miscellaneous underground equipment. (see 5.2.4 for copper justification)

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The overhead work involves the installation of

- 23 poles,
- two 15 kV loadbreak switches,
- four sets of three 600A disconnect switches,
- +/- 3500 circuit feet of 3-477 kcmil Al spacer cable,
- +/- 800 circuit feet of 3-477 kcmil Al bare primary and miscellaneous overhead equipment
- Install 6 new SCADA controlled reclosers

This project will remove

- 23 poles,
- one 15 kV airbreak switch,
- +/- 800 circuit feet of 3-336.4 kcmil Al bare primary,
- +/- 1100 feet of 1-1/0 Al bare primary and miscellaneous overhead equipment.

4.4 Benefits Summary

N/A

4.5 Business Issues

The Woonsocket #26 substation project is in the five year plan. Installation of the proposed substation will increase the area reliability and support the projected load growth. The investment on this project is not tied to any other initiative nor is it applicable to any costs sharing projects.

4.6 Options Analysis

Complete Recommended Option

Connect a new distribution substation at Woonsocket by adding a 115kV circuit breaker in the existing 115 kV yard and create a tap position and construct an overhead tap (See Strategy Paper SG069, approved June 2007). The proposed overhead tap was chosen over underground option as most cost effective and environmentally friendly. In addition, the presence of the stream running through the construction site would make permitting and construction of an alternative underground tap more difficult and expensive. The recommended option is approximately 79% complete and \$8.390M has been spent to date. The cost for the remainder of the projects is approximately \$2.240M for completion and close out of this recommended option.

Alternative 2 – Defer the project

This is a reliability-driven project and delaying the in service date would not allow the Company to support the forecasted load growth and reliability improvement.

Alternative 3 – Do Nothing Option

This is not considered a valid option since it does not meet distribution loading forecast in the area and does not address reliability improvement.

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4.7 Safety, Environmental and Project Planning Issues

This project is constructed within the boundaries of the existing Woonsocket #26 substation. The existing facilities remain energized throughout the construction effort. National Grid safety procedures and best work practices are employed. The substation site is currently secured with a fence and new construction will be done entirely within the existing fence perimeter.

The upgrades at the 115kV yard and the new 115kV transmission tap require transmission line outages. A detailed outage plan was prepared and construction activities are coordinated with the construction and outage sequence of other projects in this area.

Installation of the new distribution substation requires no outages.

RI DEM notification for soil disturbing work, wetlands permitting (Request for Preliminary Determination) and a building permit was required. A request for Preliminary Determination was submitted for review to RI DEM, Wetlands Division and a building permit was submitted for review to the Building Inspector of the Town of North Smithfield, RI. The permitting process is completed.

4.8 Execution Risk Appraisal

Number	Status (Active, Dormant, Retired)	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact			Score		Strategy	Risk Owner	Comments/Actions
						Cost	Schedule		Cost	Schedule			
1	Active	Construction	Increased man-hours necessary for dewatering site. Site is abutted by Wetlands	Excessive Rainfall	3	1	1		3	3	Accept	Construction Supervisor	
2	Active	Construction	Unforeseen existing underground conditions require changes to the drawings or route of the ductbank	Unforeseen structures encountered	3	1	1		3	3	Accept	Construction Supervisor	
3	Active	Environmental	Contaminated Soils Encountered	Small or discoloration of soil noted	1	2	2		2	2	Accept	Construction Supervisor	No AUL's linked to property
4	Active	Outage Planning and Availability	Transmission Line Outage coordination with other projects on this area	Construction execution delays	2	2	2		4	4	Mitigate	Construction Supervisor	

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4.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Freshwater wetlands permit from RIDEM	Certain	2 Months	Complete	
Building Permit	Certain	1 Month	Complete	

Permitting Summary

- 1) A freshwater wetlands permit from RIDEM pursuant to R.I.G.L. Sec. 2-1-18 et seq. for alteration of freshwater wetlands. The RIDEM issued an Insignificant Alteration Permit for the Project on October 21, 2009 (Permit No. 09-0206) (attached as Attachment E). Please note that this permit also constitutes the authorization from the U.S. Army Corps of Engineers (ACOE) under section 404 of the Clean Water Act for the work proposed. The Project qualifies as a Category 2 activity under the Rhode Island Programmatic General Permit (General Permit No. NAE-2006-2711).
- 2) The Town of North Smithfield Building Department issued an insignificant determination on December 1, 2009 with regard to the Erosion and Sediment Control Permit – Determination of Applicability that was submitted by Vanasse Hangen Brustlin, Inc. on November 3, 2009.

4.10 Investment Recovery

4.10.1 Investment Recovery and Regulatory Implications

The proposed project addresses capacity related reliability concerns in the area. In addition the proposed project supports the company's regulatory requirements to serve electric wholesale related projected load.

4.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$2,126,000. This is indicative only. The actual revenue requirement will differ, 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.

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4.11 Financial Impact to National Grid

4.11.1 Transmission and DxT Cost Summary Table

Project #	Project Description	Project Estimate Level	\$M	Current Planning Horizon							Total
				Prior YR Spending	YR1 11/12	YR2 12/13	YR3 13/14	YR4 14/15	YR5 15/16	YR6+	
C03488	Woonsocket #26	+/- 10%	Capex	0.140	0.335	0.005					0.480
	Sub New 115/13.8kV		Opex	0.001	0.027						0.028
			Removal	0.000	0.072						0.072
			Total	0.141	0.434	0.005	0.000	0.000	0.000	0.000	0.580
C03693	Woonsocket #26	+/- 10%	Capex	2.371	2.294	0.300					4.965
	New 115/13kV Sub		Opex	0.009	0.041	0.005					0.055
			Removal	0.000	0.075	0.005					0.080
			Total	2.380	2.410	0.310	0.000	0.000	0.000	0.000	5.100
Total Proposed Sanction											
			Capex	2.511	2.629	0.305	0.000	0.000	0.000	0.000	5.445
			Opex	0.010	0.068	0.005	0.000	0.000	0.000	0.000	0.083
			Removal	0.000	0.147	0.005	0.000	0.000	0.000	0.000	0.152
			Total	2.521	2.844	0.315	0.000	0.000	0.000	0.000	5.680
				\$2.521	\$2.844	\$0.315	\$0.000	\$0.000	\$0.000	\$0.000	\$5.680

4.11.2 Project Budget Summary Table

Project Costs per Business Plan				Prior Year Spending*	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6+	Total
Capex				2.511	3.000	0.500	0.000	0.000	0.000	0.000	6.011
Opex				0.010	0.084	0.009	0.000	0.000	0.000	0.000	0.103
Removal				0.000	0.224	0.024	0.000	0.000	0.000	0.000	0.248
Total Cost in B Plan				2.521	3.308	0.533	0.000	0.000	0.000	0.000	\$6.362

* P/Y Actuals

Variance (Business Plan-Project Estimate)				Prior Year Spending	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6+	Total
Capex				0.000	0.371	0.195	0.000	0.000	0.000	0.000	0.566
Opex				0.000	0.016	0.004	0.000	0.000	0.000	0.000	0.020
Removal				0.000	0.077	0.019	0.000	0.000	0.000	0.000	0.096
Total Variance				0.000	0.464	0.218	0.000	0.000	0.000	0.000	\$0.682

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Distribution Cost Summary Table

Project #	Project Description	Project Estimate Level	\$M	Current Planning Horizon							Total
				Prior YR Spending	YR1 11/12	YR2 12/13	YR3 13/14	YR4 14/15	YR5 15/16	YR6+	
C24279	Woonsocket #26	+/- 10%	Capex	1.675	1.270	0.220					3.165
	New 13.8kV		Opex	0.017	0.017	0.001					0.035
	S/gear		Removal	0.000	0.000	0.000					0.000
			Total	1.692	1.287	0.221	0.000	0.000	0.000	0.000	3.200
C15200	Woonsocket #26	+/- 10%	Capex	0.044	1.300	0.256					1.600
	Install four 13.8kV		Opex	0.000	0.050	0.015					0.065
	feeders		Removal	0.001	0.070	0.014					0.085
			Total	0.045	1.420	0.285	0.000	0.000	0.000	0.000	1.750
Total Proposed Sanction											
			Capex	1.719	2.570	0.476	0.000	0.000	0.000	0.000	4.765
			Opex	0.017	0.067	0.016	0.000	0.000	0.000	0.000	0.100
			Removal	0.001	0.070	0.014	0.000	0.000	0.000	0.000	0.085
			Total	1.737	2.707	0.506	0.000	0.000	0.000	0.000	4.950
				\$1.737	\$2.707	\$0.506	\$0.000	\$0.000	\$0.000	\$0.000	\$4.950

4.11.2 Project Budget Summary Table

Project Costs per Business Plan				Prior Year Spending*	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6+	Total
Capex				1.719	2.205	0.300	0.000	0.000	0.000	0.000	4.224
Opex				0.017	0.159	0.009	0.000	0.000	0.000	0.000	0.185
Removal				0.001	0.233	0.024	0.000	0.000	0.000	0.000	0.258
Total Cost in B Plan				1.737	2.597	0.333	0.000	0.000	0.000	0.000	\$4.667

* P/Y Actuals

Variance (Business Plan-Project Estimate)				Prior Year Spending	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6+	Total
Capex				0.000	(0.365)	(0.176)	0.000	0.000	0.000	0.000	(0.541)
Opex				0.000	0.092	(0.007)	0.000	0.000	0.000	0.000	0.085
Removal				0.000	0.163	0.010	0.000	0.000	0.000	0.000	0.173
Total Variance				0.000	(0.110)	(0.173)	0.000	0.000	0.000	0.000	(\$0.283)

4.11.3 Cost Assumptions

The overall substation, transmission and distribution line projects estimate of \$10.630M is a project grade estimate (-10% to +10%).

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

Standard material and equipment procurement process is to be performed in parallel with Final Design.



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4.11.4 Net Present Value / Cost Benefit Analysis

Not financially driven.

4.11.5 Additional Impacts

None

4.12 Statements of Support

4.12.1 Supporters

Role	Name	Responsibilities
Investment Planning	Ray Morey	Endorses relative to 5-year business plan or emergent work
Project Management	Daniel Glenning	Endorses Cost, Scope, Schedule, and Quality and support of all stakeholders
Project Management	Prabhjot Anand	Endorses Cost, Scope, Schedule, and Quality and support of all stakeholders
Resource Planning	Mark Phillips	Resource Planning Transmission/Substations
Resource Planning	Jim Patterson Jr	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Electric Transmission Planning	Carol Sedewitz	Transmission Planning
Transmission Engineering	Mark Browne	Transmission Engineering
Transmission Asset Owner	Peter Altenburger	Asset Management Transmission
Distribution Asset Owner	Rob Sheridan	Asset Management Distribution
Substation Engineering and Design	John Gavin	Substations
Protection and Telecommunications	Len Swanson	Protection and Telecommunications
Engineering/Design	Bob Brawley	Endorses scope, design, conformance with design standards
Construction	Fred Raymond	In-House Construction
Transmission Control Center	Will Houston	New England Control Center

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4.12.2 Reviewers

Reviewer List	Name
Finance	Stephen Nigloschy
Regulatory	Peter Zschokke
Procurement	Art Curran
Jurisdictional Delegates	Jennifer Grimsley

5 Appendices

5.1 Project Cost Breakdown

Project Cost Breakdown					
Cost Category	<u>I</u> <u>C03488</u> <u>\$M</u>	<u>DxT</u> <u>C03693</u> <u>\$M</u>	<u>D</u> <u>C24279</u> <u>\$M</u>	<u>D</u> <u>C15200</u> <u>\$M</u>	Description of Cost Category
Material					
Labor					
Other					
Transportation					
Reimbursement					
Labor Adders					
Contractor					
AFUDC					
Salvage					
Removal					
O&M					
Retirement					
Total:	0.580	5.100	3.200	1.750	

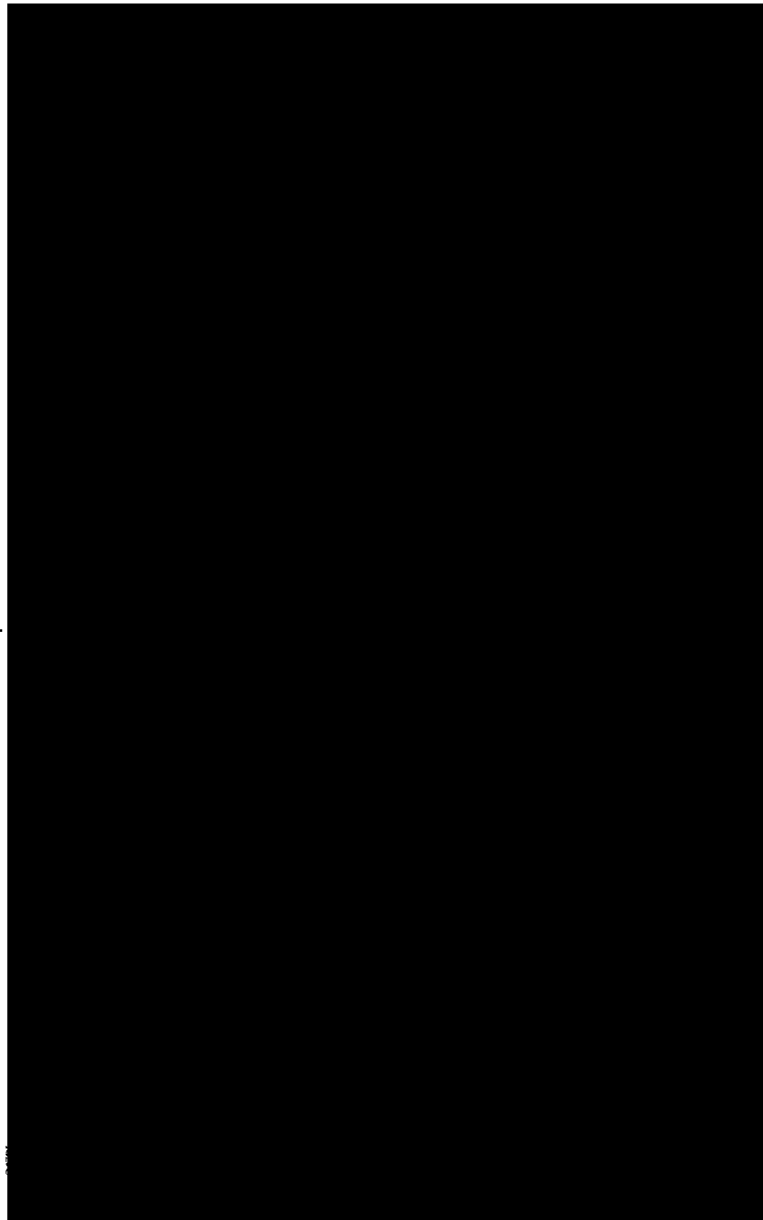
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5.2 Other Appendices

5.3 5.2.1 Woonsocket Substation #26 - One Line Diagram

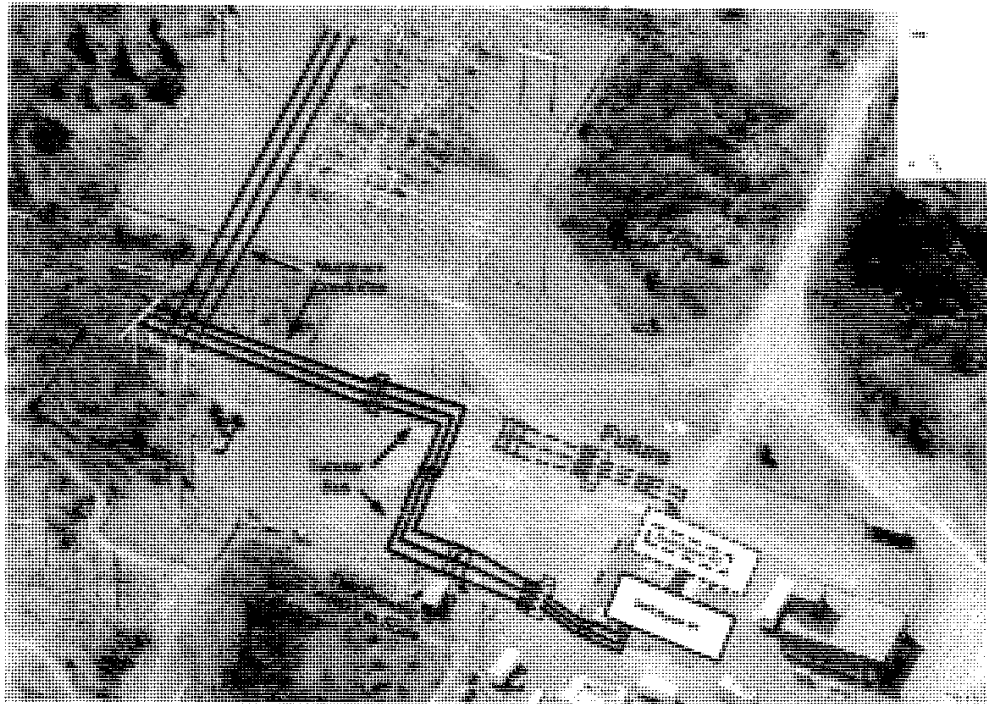
Woonsocket #26
Proposed One-line for new 115-13.8 kV



US Sanction Paper



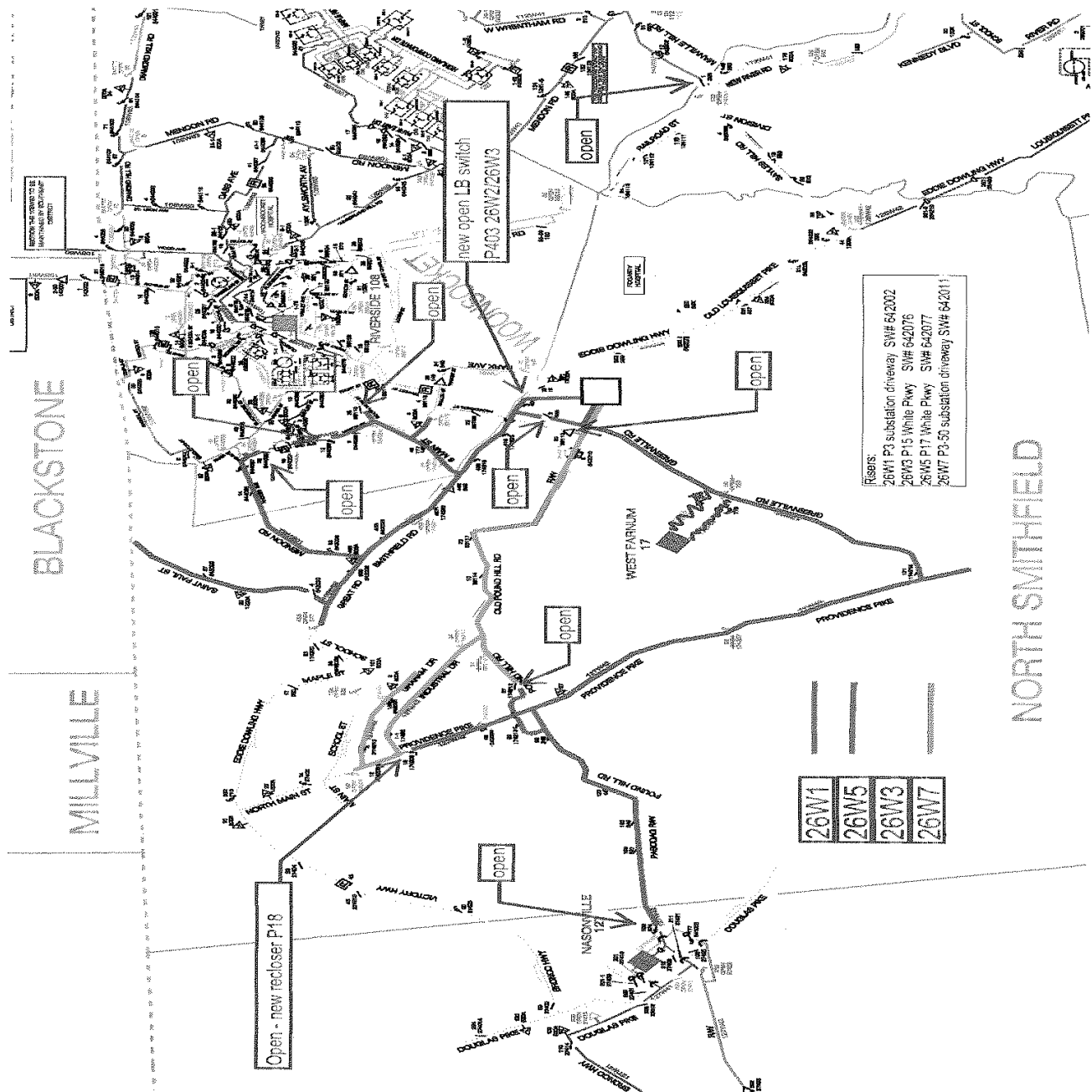
5.2.2 Proposed Layout of 115kV Tap and New Distribution Substation



US Sanction Paper

nationalgrid

5.2.3 Woonsocket 26W1, 26W3, 26W5, and 26W7 Feeders



US Sanction Paper



5.4 5.2.4 Project Change Request

Project Change Request

Project Identification

Date: 3/17/11

Project Name: Woonsocket Sub – 4 Dist Fdrs

Project Funding Number: C15200 **Change Number:** _____

Work Order Number: WR#5642331, WR#5612308, WR#5612058, WR#5567170

Project Manager: Scott Sobolewski

5.4.1 Change Request Information

- ☐ Category 1 - Configuration Change
- ☐ Category 2 - Minor Change
- ☒ Category 3 - Major Change
- ☐ Category 4 - FY Spend or Target Change

Request Date: 3/17/2011

Requested By: Joel A Rivera **Department:** Distribution Planning

Description of Change:

Changes include distribution line work that is needed to support the feeder arrangements for the new Woonsocket Substation and to facilitate a construction sequence in support of the NEWS project.

Scope Impact: What is being changed, added replaced or deleted?

Remove 4 existing reclosers and Install 6 new reclosers.
Install one 1200kVAR cap bank, one 900kVAR cap bank and one 200 kVAR capacitor.
Change phasing at three separate locations.
Install three fault indicators.
Install two load breaks.
Reconductor 300ft of 1/O Al with 477 Al
Perform switching as indicated by Distribution Planning.

Schedule Impact: What are the schedule impacts?

This scope change will add approximately 1,030 hours to the schedule. This work will be executed once the overhead work for the new feeders is complete. There should be no impact to the ready for load date, as currently we are scheduled to be complete with the new feeder overhead work by September 2011.

Is the ready for load date impacted? No

What is the impact?

If YES; RFL Date changed to _____

US Sanction Paper



Quality Impact: What is the quality or testing impacts?
N/A

Project Change Request Continued

Cost Impact: What are the estimated costs to the project?

Description	Man hours	Cost	Cost Adders or Burdens	Total Cost
Engineering Labor	50			
Construction Labor	870.5			
Operations Labor (testing and commissioning)	100			
Material Cost				
Consultant or Contractor Cost				
Other Cost				
Total Cost				\$339,020

Impacts Delegation of Authority (DOA)? Yes ☒ No ☐

Change Request Cause Codes

- ☐ A) Inaccurate existing drawings
- ☐ B) Design Error
- ☐ C) Material Substitution
- ☐ D) Installer preference, install ability/maintain ability issue
- ☐ E) Working clearance issue, field interference
- ☒ F) Scope Change
- ☐ G) Safety Issue
- ☐ H) Other (Please Explain) _____

US Sanction Paper



Project Change Request Continued

<u>Acceptance Information</u>
Accepting Name: <u>Rob Sheridan</u>
Role: <u>Sponsor</u>
Action: Approve: <input checked="" type="checkbox"/> Reject: <input type="checkbox"/>
Accepting Comments: <u>Indicated that this scope change supported the scope and schedule of the NEWS project.</u>
Accepting Signature: <u>Robert D. Sheridan</u>
Date: <u>7/28/2011</u>

<u>Approver Information</u>
Project Manager Signature: <u>Scott Sobolewski</u>
Date: _____
Project Sponsor Signature: _____
Date: _____
Change Review Committee Signature: _____
Date: _____

Need to go to Change Review Committee? Yes ☐ No ☐

C005414

Farnum Pike Sub_115 kV Dist Assets

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C005414</u>	USSC #:
Revision: <u>8</u>	Budget Version: <u>Default</u>
Project Title: <u>Farnum Pike Sub 115 kV Dist Assets</u>	
Project Description: 03245 Farnum Pike Sub_115 kV Dist Assets	

Project Status: <u>Closed</u>	
Responsible Person: <u>PARENTEAU, STEVE</u>	Initiator: <u>Szymanowski, Slawon</u>
Spending Rationale: <u>System Capacity & Performance</u>	Funding Type: <u>P Dist by Transmission Sub RI</u>
Budget Class: <u>Load Relief</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>49</u>	Project Complexity Score: <u>15</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>											
Est Start Date: <u>9/1/2004</u>	Est Complete Date: <u>6/30/2009</u>										
Est In-Service Date: <u>12/1/2008</u>											
TTD Actuals: <u>\$3,201,087</u>	As Of: <u>10/2/2017</u>										
Cost Breakdown	<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;"><u>Capital</u></td> <td style="text-align: center;"><u>Expense</u></td> <td style="text-align: center;"><u>Removal</u></td> <td style="text-align: center;"><u>Total</u></td> <td style="text-align: center;"><u>Credits</u></td> </tr> <tr> <td style="text-align: center;"><u>\$3,065,000</u></td> <td style="text-align: center;"><u>\$85,000</u></td> <td style="text-align: center;"><u>\$130,000</u></td> <td style="text-align: center;"><u>\$3,280,000</u></td> <td style="text-align: center;"><u>\$0</u></td> </tr> </table>	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>	<u>\$3,065,000</u>	<u>\$85,000</u>	<u>\$130,000</u>	<u>\$3,280,000</u>	<u>\$0</u>
<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>							
<u>\$3,065,000</u>	<u>\$85,000</u>	<u>\$130,000</u>	<u>\$3,280,000</u>	<u>\$0</u>							

Justification / Risk Identification:

<Enter data here>

Project Scope:

<Enter data here>

Project Alternatives Considered:

<Enter data here>

Additional Notes:

<Enter data here>

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>1/10/2007 00:00:00</u>	Approver	<u>poisso</u>	<u>SAP Default Approver</u>
Line 2:	Date	<u>1/15/2007 00:00:00</u>	Approver	<u>Sheridan, Robert D</u>	<u>SAP Default Approver</u>
Line 3:	Date	<u>1/16/2007 00:00:00</u>	Approver	<u>Root, Christopher</u>	<u>SAP Default Approver</u>
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C005414 Current Total Authorized Amount: \$3,28...

Title **Farnum Pike Sub_115 kV Dist Assets**

Project Number **C005414**

Budget Version Default (inactive)

Revision

Revision Status **Approved**

Revision No. **8**

Est Start Date **09/01/2004**

Est Complete Date **06/30/2009**

Est In Srv Date **12/01/2008**

Capital **\$3,065,000.00**

Expense **\$85,000.00**

Jobbing **\$0.00**

Retirement **\$0.00**

Removal **\$130,000.00**

Total (excl. Rets.) **\$3,280,000.00**

Credits **\$0.00**

Net **\$3,280,000.00**

Revision Info **Other Updates**

Revision 8 of 21

[Find Revision](#)

☐ Show 'Budget Only' Revisions

Spending Estimates:

Property Estimates:

Edit:

Other:

Record **1** of 1

This document has been redacted for Critical
Energy Infrastructure Information.

NG USA Confidential

December 22, 2004

NATIONAL GRID USA
Northeast Transmission

APPLICATION BY THE NARRAGANSETT ELECTRIC COMPANY (TNECo)
TO INSTALL: TWO 115-13.2 KV , 33/44/55 MVA, 3-PHASE LTC TRANSFORMERS,
TWO CIRCUIT SWITCHERS, NEW CONTROL HOUSE, AND
NEW 115 KV TAP TO T-172N LINE FOR THE FARNUM PIKE # 23 SUBSTATION

Substation Project: E05415 05414
Transmission Project: E05415 05414

Line
Business Sponsor: Marc F. Mahoney
(Paper by)

Substation Project Engineer: Stanley F. Urbanowski
Transmission Project Engineer: Gerald Pepi (Vanderweil)

Summary

This paper proposes the expenditure of \$3,280,000 to purchase and install two (2) new 33/44/55 MVA, 115-13.2 kV, three-phase LTC transformers , two (2) new 115 kV circuit switchers, new control/switchgear building, new relay/control panels, and associated equipment at the Farnum Pike #23 Substation, Smithfield, RI. The existing transformers, one 115 kV airbreak switch, control building, and control/relay panels will be removed. Expansion of the existing Farnum Pike substation fenced area is required to provide space for installation a new transformer and distribution facilities while maintaining the existing substation to supply the four (4) existing distribution feeders Since the expansion area is restricted due to a gas pipeline that borders the substation on three sides, indoor metal-clad switchgear will be used for the new distribution portion of the substation. The space requirement for the metal-clad switchgear is significantly less than a comparable low profile installation. Several (TNECo) distribution projects are also associated with this sanction paper.

2. A transmission project for a new 115 kV tap line to the T-172N Line is also included in this sanction paper. The vertical drops from the existing tap to the T-172N Line will be disconnected and the existing tap line, dead-end structures, and air break switch will remain for connecting a mobile substation to either the S-171N or the T-172N Line.
3. The proposed substation will provide additional supply needed in order to alleviate load growth and limited capacity of the existing substations in the area. The Smithfield area of Rhode Island has been experiencing the load growth at the rate of 4.5% per annum for last five years. At this load level the distribution system in the area is exposed to contingencies which violate the distribution design criteria.
4. The proposed Transmission and Distribution expenditures are included in the current business plan for FY2005 and FY2006.

5. The in-service date for the new T-172N tap line, new T2 transformer and two new distribution feeders is October 1, 2005. Replacement of the existing T1 transformer and cut-over of the existing four feeders will be completed by June 30, 2006.

Background

6. This project was initiated by Delivery Network Planning (DNP) of the Narragansett Electric Company. The plan to supply the area is detailed in the *Smithfield Area Study 115 kV Supply and Eastern 23 kV Distribution Supply Areas* by John W. Williams issued in May 2004. Working with DNP, Network Planning and Development has reviewed the proposed changes with consideration of future needs of the transmission system in the area. The recommended plan has no adverse impact on the New England Transmission System, is fully supported by the transmission infrastructure, and is consistent with the long term expansion of the transmission system (the analyses is described in the *System Impact Study for the Smithfield Supply Area Modifications* by Slawomir Szymanowski issued in July 2004). A Strategy Paper “Smithfield, RI Area Supply Project” was developed by Slawomir Szymanowski. The paper was presented and noted by Northeast Transmission on June 29, 2004
7. The installation of two new 115kV circuit switchers and retirement of the two existing sacrificial air breaks at the Farnum Pike Substation agrees with Strategic Guideline “NTB SG001” issued by Northeast Transmission to replace all 115 kV sacrificial air break switches. The two existing sacrificial air break switches at the Farnum Pike Substation were listed to be replaced in February 2008.

Project Description

8. Purchase and install two (2) new 33/44/55 MVA, 115-13.2 kV, three-phase LTC transformers, two (2) new 115 kV circuit switchers, new switchgear/control building, new relay/control panels, and associated equipment at the Farnum Pike #23 Substation, Smithfield, RI. Remove two existing transformers, sacrificial air break switches, control house, and other equipment associated with existing station.
9. Install an intermediate 2-pole guyed wood structure into T-172N main line. Install a 2-pole guyed wood tap structure on the main line R/W. Install one short span of conductors to substation and tap existing T-172N line to supply the new T2 transformer. Remove vertical taps between existing main and tap lines T-172N.

Business Issues

10. The new transformers and transmission taps, along with their associated 115 kV switches will improve the area reliability and operability by:
 - Increasing Farnum Pike’s transformer capacity thus offloading the existing transformers in the area, and
 - Limiting construction time by replacing air break switches while building new substation.

11. A new supply source in the Smithfield area is critical to serve load in a reliable manner. Without this additional supply source, the distribution system will be exposed to contingencies that will overload feeders above the limits outlined in the National Grid Distribution Design Criteria as soon as 2005.
12. The proposed improvements are in response to a customer request by The Narragansett Electric Company. At the point of connection, the proposed improvements meet the customer reliability needs and have no adverse impact on the New England Transmission System.

Network Asset Management Review

13. The recommended project meets the requirements as set forth in the *Smithfield Area Study 115 kV Supply and Eastern 23 kV Distribution Supply Areas*, dated May 2004.
14. Transmission Network Assets to be installed at the Farnum Pike Substation include:

Two new 33/44/55 MVA, 115-13.2 kV, 3Ø, LTC Transformers
Two (2) new 115 kV circuit switchers, and
New control/switchgear building
New Relay & Control Panels.
New 115 kV tap to T-172N Line

Safety Appraisal

15. Care will be taken to ensure worker safety by following generally accepted work practices. Specifically, the importance of maintaining appropriate working clearances from, and the performance of a non-reclosing assessment of nearby energized lines will be emphasized in the construction documents issued to Transmission Line Services or contractors.

Environmental and Permitting Issues

16. All substation work is expected to take place adjacent to the existing fence and appears to be well outside of protected buffer zones.
17. The new T-172N Line tap to Farnum Pike Substation will be entirely on the existing right-of-way. No new permits are expected in the course of this project.
18. None of the sites are likely to include any locations where hazardous materials may be found buried in the ground.
19. No environmental issues are expected to be encountered during this project.

Commercial Factors

20. The new facilities at Farnum Pike Substation are 100% Non-PTF.

Narragansett Electric Company

Recovery of Narragansett's assets are subject to the FERC-approved Integrated Facilities Arrangement (IFA) between Narragansett and NEP. There are two components of the IFA that stem from historical agreements carried forward through mergers of EUA, NEES and National Grid. Recovery differs based upon the assets as follows:

Former NEES/Narragansett Electric Facilities:

Narragansett Electric's return on and return of capital investment is fixed for facilities that fall under this category. Therefore, there is no incremental recovery for any new capital investment (PTF or Non-PTF).

Currently, Operation and maintenance expenses are recovered monthly based upon actual charges. All other expenses are fixed as part of the Integrated Facilities Agreement. Any increase in those components is currently not recoverable unless we file a revised IFA.

NEP recovers its charges under the Narragansett IFA by passing the costs through the NEPOOL OATT or NEP's Tariff No. 9, dependent upon whether facilities are PTF or Non-PTF.

Financial Implications

21. Estimated TNECo expenditures are as follows:

TNECO Projects (Requesting Sanction Approval)

Co.#	Company	Project	Item	Capital	O&M	Removal	Total
49	TNECo	C05414	Transmission Substation costs.	\$3,000,000	\$75,000	\$125,000	\$3,200,000
49	TNECo	C05414	Transmission Line costs.	\$65,000	\$10,000	\$5,000	\$80,000
			Total	\$3,065,000	\$85,000	\$130,000	\$3,280,000

Associated TNECo Distribution projects:

Co. #	Company	Project	Item	Capital	O&M	Removal	Total
49	TNECo	C04539	Distribution Substation costs	\$1,800,000	\$75,000	\$125,000	\$2,000,000
49	TNECo		Distribution Line costs	\$1,200,000	\$75,000	\$25,000	\$1,300,000

Estimated Expenditures by year are as follows:

	FY2005	FY2006	FY2007	Total
TNECo Capital	\$100,000	\$2,700,000	\$265,000	\$3,065,000
TNECo O&M	0	\$65,000	\$20,000	\$85,000
TNECo Removal	0	\$70,000	\$60,000	\$130,000
Total	\$100,000	\$2,835,000	\$345,000	\$3,280,000

Estimated Expenditure Breakdown by year are as follows:

Item	FY2005	FY2006	FY2007	Estimated Transmission Costs
Material	0	\$1,635,000	\$200,000	\$1,835,000
Labor	\$55,000	\$470,000	\$35,000	\$560,000
Other	0	\$200,000	0	\$200,000
Transportation	0	\$35,000	\$15,000	\$50,000
Reimbursement	0	0	0	0
Labor Adders	\$45,000	\$400,000	\$30,000	\$475,000
Contractors	0	\$40,000	0	\$40,000
AFUDC	0	\$40,000	\$80,000	\$120,000
	0	0	0	0
Total	\$100,000	\$2,820,000	\$360,000	\$3,280,000

22. The estimated project cost is \$3,280,000 with an allowable variance of +/-5%.
23. Proposed expenditures are included in current business plan for FY2005 and FY2006.
24. There may be congestion costs associated with taking the T-172N line out of service to install the new tap to the Farnum Pike substation and taking the S-171N line out of service to replace the existing transformer and air break switch. All efforts will be made to schedule the S-171N and T-172N line work to minimize the likelihood of congestion costs.

Project Risk Appraisal

25. The ability to obtain the necessary permits and scheduled line outages could delay project completion.
26. During construction, every effort will be made to reduce the risk of unplanned customer outages through coordination with Systems Operation and the Ocean State Division.

Other Approvals and Conditions

27. NEPOOL Section 18.4 approval is required for this project.

Statements of Support

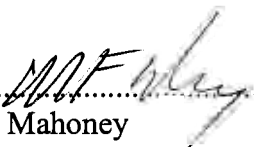
28. The following functions support this proposal

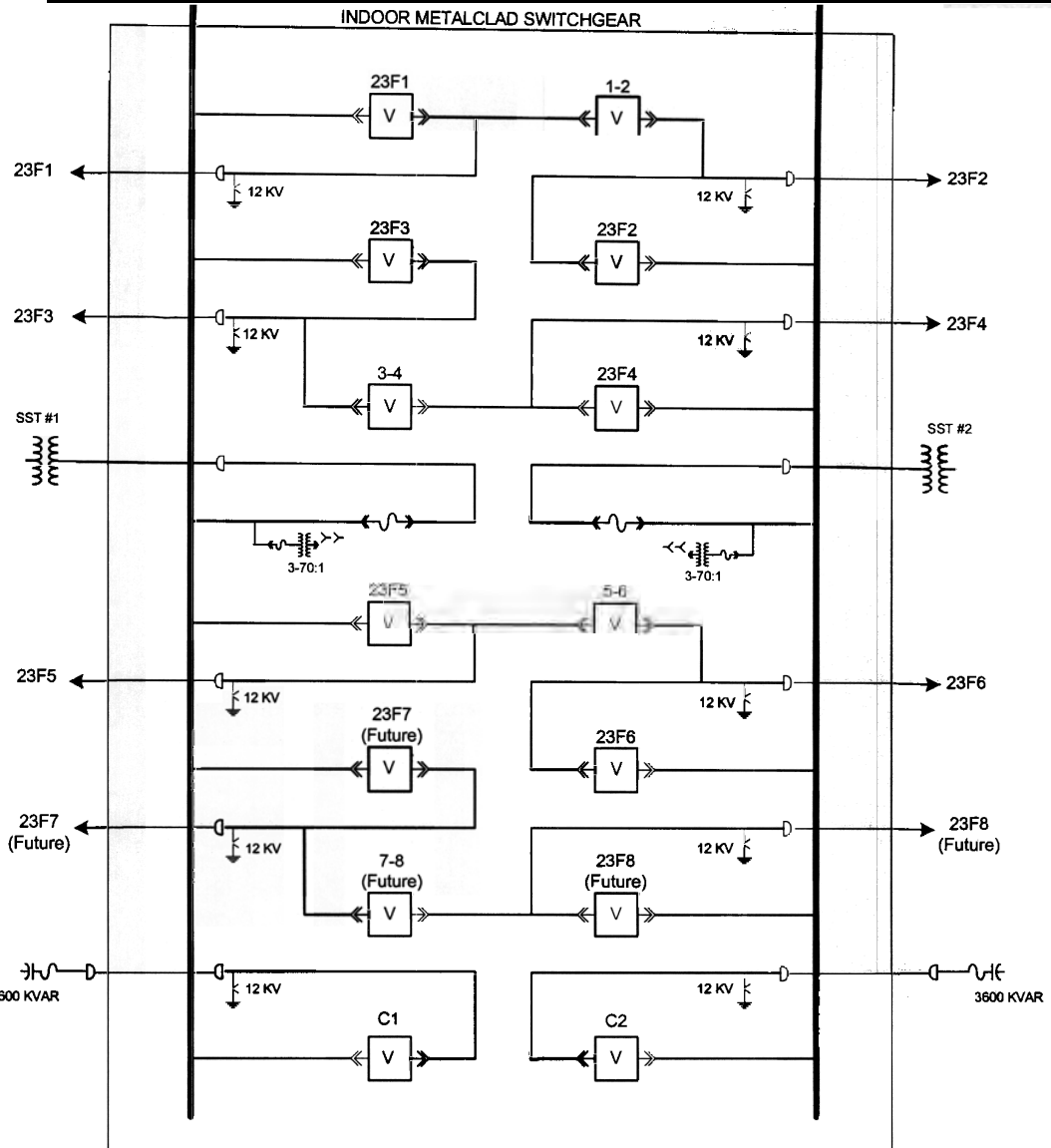
Transmission Asset Strategy
Transmission Commercial Services
Transmission Finance
Network Planning and Development
System Planning and Engineering
Substation Engineering Services
VP and Chief Engineer
Protection, Telecommunications & Meter Engineering
Ocean State Division Operations

Recommendation

29. National Grid USA Management is invited to approve a total New England Power Company expenditure of \$3,280,000 for the purposes stated above.

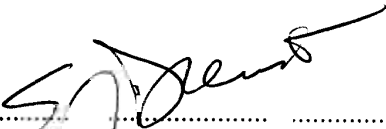
Sponsors' Signature

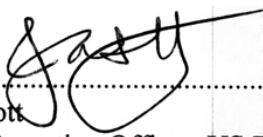
Signed..........Date.....1/9/05.....
Marc F. Mahoney
Vice President, Transmission Network Asset Management



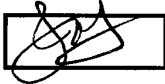
Decision of the Sanctioning Authority

30. Signing below will indicate approval of this recommendation

Signed..........Date.....1/6/05
Edward J. Dienst
Sr. Vice President, New England Operations

Signed..........Date.....1/12/05
Jeff Scott
Chief Operating Officer, US Transmission Business

Initial



In addition, the approver also delegates authority to enter into subsequent commitments with external parties as necessary to carry out the project. This additional authority is granted at the discretion of the approver by initialing in the box. Total dollars committed is limited to \$3,444,000 which consists of the project estimated cost plus accuracy threshold and is included in the sanction paper.

C015158

Newport Substation (D-Sub)

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C015158</u>	USSC #: <u>USSC-14-262 v2</u>
Revision: <u>7</u>	Budget Version: <u>Default</u>
Project Title: <u>Newport Substation (D-Sub)</u>	
Project Description: Construct Newport Substation. This project is for the metal-clad switchgear and cap banks.	

Project Status: <u>open</u>	
Responsible Person: <u>FIKU, ENDRIT</u>	Initiator: <u>Reis, Nicholas</u>
Spending Rationale: <u>System Capacity & Performance</u>	Funding Type: <u>P Electric Distribution Sub RI</u>
Budget Class: <u>Load Relief</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>41</u>	Project Complexity Score: <u>33</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>											
Est Start Date: <u>4/1/2007</u>	Est Complete Date: <u>9/30/2023</u>										
Est In-Service Date: <u>9/30/2022</u>											
TTD Actuals: <u>\$1,692,339</u>	As Of: <u>10/2/2017</u>										
Cost Breakdown	<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;"><u>Capital</u></th> <th style="text-align: left;"><u>Expense</u></th> <th style="text-align: left;"><u>Removal</u></th> <th style="text-align: left;"><u>Total</u></th> <th style="text-align: left;"><u>Credits</u></th> </tr> <tr> <td><u>\$1,000,000</u></td> <td><u>\$0</u></td> <td><u>\$0</u></td> <td><u>\$1,000,000</u></td> <td><u>\$0</u></td> </tr> </table>	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>	<u>\$1,000,000</u>	<u>\$0</u>	<u>\$0</u>	<u>\$1,000,000</u>	<u>\$0</u>
<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>							
<u>\$1,000,000</u>	<u>\$0</u>	<u>\$0</u>	<u>\$1,000,000</u>	<u>\$0</u>							

Justification / Risk Identification:

Refer to attached documents for project justification and risk identification.

Project Scope:

Build a new 69/13.8kV substation in Newport consisting of 2-40MVA LTC transformers supplying metal-clad switchgear each with 4-feeders and a 2-stage 7.2MVAR capacitor bank. This project is for the metal-clad switchgear and cap banks.

Refer to attached Conceptual Engineering Report for scope of this work.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Several Projects see DOA Allocation attached below

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>3/4/2016 13:18:55</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost + 10%*****

REDACTED - CEII Information has been Redacted

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4770
Attachment PUC 1-16-1 part 1 of 2
Page 51 of 889

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C015158 Current Total Authorized Amount: \$1,00...

Title **Newport Substation (D-Sub)**

Project Number **C015158**

Budget Version Default (active)

Revision **v2**

Revision Status **Approved**

Revision No. **7**

Est Start Date **04/01/2007**

Est Complete Date **09/30/2023**

Est In Srvc Date **09/30/2022**

Capital **\$1,000,000.00**

Expense **\$0.00**

Jobbing **\$0.00**

Retirement **\$0.00**

Removal **\$0.00**

Total (excl. Rets.) **\$1,000,000.00**

Credits **\$0.00**

Net **\$1,000,000.00**

Revision Info **Other Updates**

Revision **7** of **7** **< > >I**

Find Revision **Send for Approval**

☐ Show 'Budget Only' Revisions

Spending Estimates:

Grid Estimates

Forecast

Summarize from W/O

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Edit:

New Revision

Delete Revision

Update

Update With Actuals

Import Estimates

Version Compare

Property Estimates:

Unit Estimates

Create As Built

Delete Used Estimates

Other:

Revision Comments

Released Dollars

Substitution

Slide

Close

Record **1** of **1** **< > >I**

Audits

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



US Sanction Paper

Title:	Aquidneck Island	Sanction Paper #:	USSC-14-262 V2
Project #:	C028628, CD00649, C015158, C054054, C024159, CD00649, CD00651, CD00652, C058401, C058310, C058404, C054052, C058407	Sanction Type:	Partial Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	02/10/16
Author:	Ayo Osimboni	Sponsor:	John Gavin Vice President Electric Asset Management
Utility Service:	Electricity T&D	Project Manager:	Ayo Osimboni

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction in the amount of \$13.937M with a tolerance of $\pm 10\%$ for full implementation of work on Gate 2 Feeder 38W2 and conversion of feeder 122J6, which are part of the distribution work associated with funding # C028628 also work associated with funding # CD00649, Gate 2 Substation D-Sub all of which are part of the Aquidneck Island Reliability Project. This sanction amount will provide funding for the construction activities.

The sanction amount of \$13.937M is broken down into:

\$ 12.623M Capex
\$ 0.423M Opex
\$ 0.891M Removal

NOTE the potential investment of \$55.827M and a tolerance of -25% +50% contingent upon submittal and approval of a Project Sanction paper following completion of all engineering activities.

1.2 Project Summary

Build a 69/13.8kV feeder at Gate 2 substation in the City of Newport to provide short-term relief to the City prior to the construction of the new Newport substation and also begin the upgrade of the distribution lines, Gate 2 Feeder 38W2 and Conversion of Feeder 122J6 which are part of the overall distribution line upgrade for the Aquidneck Island Reliability project.



US Sanction Paper

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C028628	D-Line	Newport SubTran & Dist	17.024
CD00649	D-Sub	Gate 2 Substation	1.890
C024159	D-Line	Newport 69kV line 63	1.411
C054054	D-Line	Jepson Sub	6.631
C015158	D-Sub	Newport Sub	10.557
C054052	D-Sub	N. Aquidneck Retirement	0.332
C058310	D-Sub	Harrison Sub Improvement	0.326
C058401	D-Sub	Merton Sub Improvements	0.387
C058404	D-Sub	Kingston Sub Improvements	0.595
C058407	D-Sub	S. Aquidneck Retirements	0.342
CD00651	D-Sub	Bailey Brook Retirement	0.463
CD00652	D-Sub	Vernon Retirement	0.302
CD00656	D-Sub	Jepson Substation	15.567
Total			55.827

1.4 Associated Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C041183	T-Sub	Jepson 115kV Station (T-Sub)	\$13.20
C041184	T-Line	Line 61/62 Conversion (T-Line)	\$22.70
C041185	T-Sub	Dexter 115kV Station (T-Sub)	\$3.90
Total			\$39.80

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
12/10/2014	USSC	\$10.000M	\$53.585M	Aquidneck Island	Partial Sanction	+/-25%
11/09/2011	USSC	\$15.000M	\$42.00M	Aquidneck Island	Partial	-25% +50%
12/03/2008	DCIG	\$15.500M	\$15.50M	Substation Installation Project	Sanction	+/- 25%
04/02/2008	DCIG	\$3.500M	\$12.30M	Newport Substation Installation	Strategy	+/- 25%
10/11/2005	Power Plant	\$1.000M	N.A.	Newport Land Purchase	Strategy	N.A.



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1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
June 2017	Project Sanction (Distribution Line Work)

1.7 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	National Grid USA Internal Strategy Document Distribution Planning Criteria Strategy Issue 1 – February 2011

1.8 Asset Management Risk Score

Asset Management Risk Score: 41

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: 33

1.10 Process Hazard Assessment

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

☐ Yes
 ☒ No



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 (\$)
FY17-2021 New England Distribution Electric capital Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	9.774M

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

Inclusion of dollars in future plans and approval by Rhode Island PUC through the annual ISR Approval process will be required.

1.13 Current Planning Horizon

\$M	Prior Yrs	Current Planning Horizon						Total
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
		2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	
CapEx	3.971	3.676	5.247	15.705	11.978	5.523	0.000	46.100
OpEx	0.063	0.277	0.381	1.161	1.911	0.524	0.000	4.317
Removal	0.060	0.583	0.774	1.819	1.650	0.524	0.000	5.410
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	4.094	4.536	6.402	18.685	15.539	6.571	0.000	55.827

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Partial Sanction for Dline Project	February 2016
Construction Complete - Gate 2 Feeder	March 2016
Ready for Load - Gate 2 Feeder	June 2016
EFSB Decision - 115kV Reinforcements	March 2017
Engineering Design Complete 4kV Station Upgrades	June 2017
Construction Start – 4kV Station Upgrades	June 2017
Engineering Design Complete Newport Substation	March 2018

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Milestone	Target Date: (Month/Year)
Construction Start - Newport Substation	April 2018
Engineering Design Complete Jepson Substation	August 2018
Construction Start – Jepson Substation	September 2018
Construction Complete - Newport Substation	September. 2019
Construction Start – 4kV Station Retirements	December 2019
Ready for Load - Newport Substation	December 2019
Construction Complete – 4kV Station Upgrades	March 2020
Construction Complete – Jepson Substation	March 2020
Ready for Load - Jepson Substation	November 2020
Engineering Design Complete Station Retirements	September 2022
Project Closure Report	September 2023

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

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

1	State and local permits are required to build Newport substation and the distribution line work.
2	The ER report was filled with the Energy Facility Siting Board (EFSB) on



US Sanction Paper

	December 30 th 2015 for the proposed Jepson substation and 61/62 line upgrade.
3	Navy approval to build the 13.8kV feeder at Gate 2 substation has been received but we still need their approval to build the 69kV tap to proposed Newport substation.
4	A major public outreach effort is ongoing for communities impacted by the substation construction and distribution line construction and conversion work.
5	Coordination with RIDOT is ongoing to review compliance with the Americans with Disabilities Act (ADA) for new pole sets or pole replacements.
6	A traffic mitigation plan is needed for the distribution line construction and the proposed conversion work.

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 checked="" type="radio"/> Neutral	<input type="radio"/> Positive	<input type="radio"/> Negative

1.18 List References

1	Distribution Planning Criteria Strategy, Issue 1, February 2011
2	Conceptual Engineering Report, Newport Mall Substation, 7/20/11
3	Conceptual Engineering Report, Gate 2 Substation, 7/21/11
4	Conceptual Engineering Report, Jepson Substation, 7/22/11
5	Conceptual Engineering Report, Bailey Brook Substation, 7/25/11
6	Conceptual Engineering Report, Vernon Substation, 7/25/11
7	Newport Area Supply and Distribution Study, May 2007
8	Jepson Equipment Condition Assessment, February 2005

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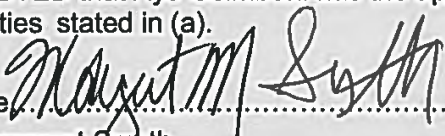

2 Decisions

The Senior Executive Sanctioning Committee Committee (SESC) at a meeting held on 02/22/16:

(a) APPROVED the investment of \$13.937M and a tolerance of +/- 10% for construction activities associated with building the 69/13.8kV feeder at Gate 2 substation and begin the distribution upgrade of Gate 2 feeder 38W2 and 122J6 which are all part of Aquidneck Island Reliability Project.

(b) NOTED the potential distribution investment \$55.827M to and a tolerance of - 25% +50%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

(c) NOTED that Ayo Osimboni has the approved financial delegation to undertake the activities stated in (a).

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

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3 Sanction Paper Detail

Title:	Aquidneck Island	Sanction Paper #:	USSC-14-262 V2
Project #:	C028628, CD00649, C015158, C054054, C024159, CD00649, CD00651, CD00652, C058401, C058310, C058404, C054052, C058407	Sanction Type:	Partial Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	02/10/16
Author:	Ayo Osimboni	Sponsor:	John Gauvin Vice President Electric Asset Management
Utility Service:	Electricity T&D	Project Manager:	Ayo Osimboni

3.1 Background

The Newport Study Area encompasses the City of Newport and the towns of Portsmouth, Middletown, Jamestown and Prudence Island. Figure 1 shows a geographic map of the study area. 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. Figure 2 shows a one-line of the existing transmission system.

A single 115/13.8kV transformer at Dexter 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 the 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. Figure 3 shows a one-line of the existing sub-transmission system and Figure 4 shows the approximate geographic areas supplied by the distribution system.



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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 Utility 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 US Navy 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 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 is projected to start in the spring 2018 with an in-service date of fall 2019.

Transmission Planning has recently 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 transmission sanction paper along with 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.



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3.2 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 Navy 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 which 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.

In the summer of 2003, interruptions to the electrical system in Newport resulted in significant customer outages. One of the action items proposed by the Company to the Rhode Island Public Utility Commission was to conduct a planning study to identify and resolve electrical related issues in the area.

3.3 Project Description

Install a 69/13.8kV feeder at Gate 2 substation in the City of Newport with a recommended in-service date of March 2016. This feeder addresses near-term thermal concerns in Newport until a new substation is built to provide the required long-term relief. All the work associated with this feeder is in-line with the long-term plan for the area resulting in no out of line expenditures.

Build a new 69/13.8kV substation in Newport on a parcel of land recently purchased for this purpose. The substation will consist of a single transformer supplying four (4) 13.8kV feeders. A short 69kV tap is required to supply this station. A one-line of the proposed station is shown on Figure 5.

Build a new substation in Middletown (Jepson Substation) on company owned land. The substation will consist of two (2) 115/13.8kV transformers supplying six (6) feeders and



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two (2) 115/23kV transformers supplying three (3) supply lines. A new 115kV station will also be built on this site to replace the existing Jepson 69kV substation. This 115kV station will be sanctioned separately as part of transmission reinforcements required on Aquidneck Island. A one-line of the proposed 115/23kV station is shown on Figure 6. A one-line of the proposed 115/13.8kV station is shown on Figure 7.

The 23kV supply system on Aquidneck Island needs relief. The most economical approach is to retire a number of 23/4.16kV stations and to convert the load to the 13.8kV system. This approach addresses asset condition, safety, environmental, thermal, and reliability concerns with these assets at least cost. This approach is part of a comprehensive solution that eliminates the need to install a new 69kV line to Newport (a \$32M investment). This approach retires four 23/4.16kV stations which include:

- Vernon substation is a metal-clad station built in 1949. It has two transformers, TR231 installed in 1949 and TR232 installed in 1963. The metal-clad switchgear is obsolete and needs to be replaced to address safety & reliability concerns. Station breakers are obsolete and the TR231 needs to be replaced due to poor condition. The estimated cost to rebuild this station is \$4.90M. The retirement of this station eliminates this \$4.9M investment.
- Bailey Brook was built in 1941 on a small site with no room for expansion. It is located within local wetlands and adjacent to a brook that is the source of island water supply. Rebuilding the station outside the floodplain is not an economical approach because station is located in downtown Middletown and in a congested area. Locating and permitting a new site is not practical or economical. There is no economic or reliability benefit to keeping this station.
- South Aquidneck is a metal-clad station located within the flood plain. It has a single LTC transformer supplying 3-feeders. The station breakers are obsolete along with the station insulators and arresters. The estimated cost to address these concerns is \$0.80M. However, this station cannot be offloaded due to lack of feeder ties and because the site is too small to install a mobile transformer. The LTC is an arcing in oil design which requires a higher level of maintenance.
- North Aquidneck is a metal-clad station with a single transformer supplying 3-feeders. The station has non-standard breakers and limited EMS. The LTC is an arcing in oil design which requires a higher level of maintenance. Station has similar offloading challenges to South Aquidneck making station maintenance very challenging.

The retirement of these 4.16kV station increases the reliability on the 13.8kV distribution system with increased feeder ties. The conversion of the 4.16kV load to 13.8kV also reduces line losses by approximately 90%. A one-line of the proposed station retirements is shown on Figure 8.



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3.4 Benefits Summary

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.

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.

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.

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.

3.5 Business and Customer Issues

The project follows up on action items proposed by the Company to the Rhode Island Public Utility Commission to identify and resolve electrical related issues in the area as a result of interruptions to the Newport electrical system resulting in significant customer outages that occurred in the summer of 2003. Failure to execute this project may impact commitment made by the Company to state regulators.

3.6 Alternatives

Alternative 1: New 69kV Line to Newport and substation additions (\$82.85M)

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.

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 metal-clad switchgear with (3) 23kV supply lines.

Construct a new 69/13.8kV substation in Newport on a parcel of land recently acquired for this purpose. The station would consist of two (2) transformers supplying metal-clad switchgear with (8) 13.8kV feeder positions with five feeders being initially installed.

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The 115/23kV station would consist of two (2) transformers supplying 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. Upgrading the 23kV supply system is not an economical approach since 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. Upgrading this infrastructure is not recommended due to the significant cost impact.

The estimated cost of this plan is \$82.85M, or \$29.00M higher than the preferred plan. This plan has similar reliability benefits to the preferred plan. However, there is no economic or reliability benefit to implement this plan over the preferred plan.

Alternative 2: Non-Wires Alternative

The recommended plan is part of a comprehensive solution to address asset condition, safety, reliability, and environmental concerns on Aquidneck Island. The need for these investments is immediate. Due to the immediate need for these investment and because many concerns are related to asset condition and environmental issues, a non-wires solution is not applicable. New supply and distribution capacity is the only reasonable alternative to address the identified concerns.

3.7 Safety, Environmental and Project Planning Issues

A filing to the Rhode Island Energy Facility Siting Board ("EFSB") is required to build the proposed new 115kV substation in Middletown and to upgrade the 69kV lines (Line 61 and Line 62) to 115kV. The ER report was filed on December 23rd 2015 with the board.

An Environmental Report is required to support the application to the EFSB for construction of jurisdictional facilities. The Environmental Report was prepared in accordance with the EFSB Rules to provide information on the potential environmental impacts of the electric transmission system improvements proposed by National Grid.

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.



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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Risk Owner	Comments/Actions
			Cost	Schedule	Cost	Schedule			
1	Drawn out EFSB approval of Jepson substation relocation.	3	3	5	9		Mitigate	Project Manager/RDW	Meet with abutters during stakeholder outreach process to discuss mitigative measures.
2	Limited opportunities for outage for Line 63 Loop construction.	3	1	3		9	Mitigate	Project Manager	Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. Schedule construction to finish during off peak period.
3	Construction delays due to poor weather or damage from major storms.	2	3	3	6	6	Accept	Project Manager	Create some slack within the schedule
4	Limited opportunities for outage for Newport Substation connection to Line 63.	3	1	3		9	Mitigate	Project Manager	Gate 2 has a breaker position that may be used to prevent the need for or an outage. Working with the engineering team to decide best options to eliminate the need for an outage.
5	Drawn out EFSB approval of Line 61/62 conversions.	3	1	5			Mitigate	Legal/RDW/PM	Public outreach consultant (RDW) has been brought onto the project team.
6	Limited opportunities for Line 61/62 outages for construction cutovers.	4	1	3		12	Mitigate	Project Manager/Construction Supervisor	Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. Construction will be scheduled so that cutovers will be performed during off peak periods.
7	Limited opportunities for Jepson Substation construction cutovers.	3	1	3		9	Mitigate	Project Manager	Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team.
8	Limited opportunities for distribution system outages for cutovers during construction.	5	1	5	5		Mitigate	Project Manager	An outage coordination consultant will be brought onto the project team.
9	Change in ADA clearance requirement from 3' to 4' during design/construction	2	2	2			Avoid	Project Manager/Legal	Obtain construction permits from DOT early prior to possible change in ADA regulations.
10	Construction delays due to other utilities not transferring their lines within the project schedule.	4	1	3		12	Avoid	Project Manager/Construction Supervisor	Coordinate construction plan with Verizon during constructability review process. Coordination during design has started and will be maintained through project.
11	General public opposition to the project.	3	2	4	6	12	Mitigate	RDW/PM/Outreach Group	Public outreach consultant (RDW) has been brought onto the project team. Project information (facts sheets/talking points) for all projects on Aquidneck Island to be developed.
12	Negative impacts to wetlands contained on Jepson substation parcel during construction/relocation.	2	2	2			Mitigate	VHB/Substation Engineering/Construction Supervisor	VHB has delineated all wetlands and will ID construction mitigation requirements. Design will account for minimizing wetlands impacts. Construction activities will need to follow SESC measures.
13	FAA may require certain mitigative measures for construction near Newport Airport.	3	2	1	6		Accept	Distribution Design	Submit required documentation for each pole to be installed early in the design process.
14	Majority of the distribution and subtransmission work is on well traveled roadways.	5	3	1		5	Accept	Distribution Line Construction/Contractor	Develop traffic control and detour plans for the project and perform extensive coordination with the DOT and cities/towns.
15	Numerous poles appear to be encroaching on private property and easements/rights are believed to not have been obtained.	4	1	1			Accept	Real Estate/PM	Budget and time to be allocated to obtain proper rights/easements as required.
16	Approval to install 2 additional steel poles within the existing easement with US Navy along Line 63 involves extensive coordination and takes a significant amount of time to get the necessary approvals.	5	1	5	5		Accept	Real Estate/PM	Early coordination with the navy has begun and will continue so as to mitigate the issue prior to commencement of construction.
17	Approval from US Navy for Gate 2 substation work is required from base commander. Construction work at the substation is schedule to begin in mid 2015	5	1	5	5		Accept	Real Estate/PM	Early coordination with the Navy has begun in order to mitigate this issue.
18	Limited construction windows for work in Middletown and Newport.	4	2	5	8		Accept	Project Manager	Extensive coordination of all construction activities and schedule, traffic management plan, detour plans etc will be necessary in advance of any construction work.



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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
RIDEM Permit	Likely	6 months	Not Applied For	TBD
Newport - Special Use Permit	Certain	7 months	Not Applied For	10/31/17
EFSB Permit Approval – Jepson substation and 61/62 line Upgrade	Likely	12 to 18 months	In-progress	03/31/17
Road Opening Permit	Certain	3 months	Not Applied For	TBD
Building Permit	Certain	4 months	Not Applied For	TBD

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Investment recovery will be through standard rate recovery mechanisms approved by the appropriate 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 \$9.247M. This is indicative only. The actual revenue requirement will differ, 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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3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table: Distribution Project

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 +	
					2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	
C028626	Newport SubTran & Dist	Est Lvl (e.g +/- 25%)	CapEx	0.752	2.022	3.620	3.620	3.620	0.000	0.000	13.634
			OpEx	0.011	0.213	0.272	0.272	0.453	0.000	0.000	1.221
			Removal	0.022	0.426	0.634	0.634	0.453	0.000	0.000	2.169
			Total	0.785	2.661	4.526	4.526	4.526	0.000	0.000	17.024
CD00649	Gate 2 Substation	Est Lvl (e.g +/- 25%)	CapEx	1.804	0.000	0.000	0.000	0.000	0.000	0.000	1.804
			OpEx	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.051
			Removal	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.035
			Total	1.890	0.000	0.000	0.000	0.000	0.000	0.000	1.890
C024159	Newport 69kV line 63	Est Lvl (e.g +/- 25%)	CapEx	0.156	0.093	0.108	0.855	0.000	0.000	0.000	1.212
			OpEx	0.000	0.000	0.007	0.052	0.000	0.000	0.000	0.059
			Removal	0.000	0.000	0.016	0.124	0.000	0.000	0.000	0.140
			Total	0.156	0.093	0.131	1.031	0.000	0.000	0.000	1.411
C054054	Jepson Sub	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.320	0.078	2.580	1.940	1.523	0.000	6.441
			OpEx	0.000	0.000	0.001	0.040	0.030	0.024	0.000	0.095
			Removal	0.000	0.000	0.001	0.040	0.030	0.024	0.000	0.095
			Total	0.000	0.320	0.080	2.660	2.000	1.571	0.000	6.631
C015158	Newport Sub	Est Lvl (e.g +/- 25%)	CapEx	1.124	1.028	1.153	3.943	1.944	0.000	0.000	9.192
			OpEx	0.001	0.044	0.050	0.170	0.840	0.000	0.000	1.105
			Removal	0.000	0.033	0.037	0.127	0.063	0.000	0.000	0.260
			Total	1.125	1.105	1.240	4.240	2.847	0.000	0.000	10.557
C054052	N. Aquidneck Retirement	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.032	0.010	0.110	0.180	0.000	0.000	0.332
			Total	0.000	0.032	0.010	0.110	0.180	0.000	0.000	0.332
C058310	Harrison Sub Improvement	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.023	0.151	0.100	0.000	0.000	0.274
			OpEx	0.000	0.000	0.012	0.025	0.015	0.000	0.000	0.052
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.000	0.035	0.176	0.115	0.000	0.000	0.326
C058401	Merton Sub Improvements	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.052	0.023	0.155	0.104	0.000	0.000	0.334
			OpEx	0.000	0.000	0.012	0.025	0.016	0.000	0.000	0.053
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.052	0.035	0.180	0.120	0.000	0.000	0.387
C058404	Kingston Sub Improvements	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.114	0.212	0.162	0.000	0.000	0.488
			OpEx	0.000	0.000	0.011	0.053	0.043	0.000	0.000	0.107
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.000	0.125	0.265	0.205	0.000	0.000	0.595
C058407	S. Aquidneck Retirements	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.032	0.020	0.110	0.180	0.000	0.000	0.342
			Total	0.000	0.032	0.020	0.110	0.180	0.000	0.000	0.342
CD00651	Bailey Brook Retirement	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.003	0.040	0.040	0.150	0.230	0.000	0.000	0.463
			Total	0.003	0.040	0.040	0.150	0.230	0.000	0.000	0.463
CD00652	Vernon Retirement	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.023	0.109	0.108	0.000	0.000	0.240
			OpEx	0.000	0.000	0.003	0.014	0.014	0.000	0.000	0.031
			Removal	0.000	0.000	0.003	0.014	0.014	0.000	0.000	0.031
			Total	0.000	0.000	0.029	0.137	0.136	0.000	0.000	0.302
CD00656	Jepson Substation	Est Lvl (e.g +/- 10%)	CapEx	0.135	0.161	0.105	4.080	4.000	4.000	0.000	12.481
			OpEx	0.000	0.020	0.013	0.510	0.500	0.500	0.000	1.543
			Removal	0.000	0.020	0.013	0.510	0.500	0.500	0.000	1.543
			Total	0.135	0.201	0.131	5.100	5.000	5.000	0.000	15.567
Total Project Sanction			CapEx	3.971	3.676	5.247	15.705	11.978	5.523	0.000	46.100
			OpEx	0.063	0.277	0.381	1.161	1.911	0.524	0.000	4.317
			Removal	0.060	0.583	0.774	1.819	1.650	0.524	0.000	5.410
			Total	4.094	4.536	6.402	18.685	15.539	6.571	0.000	55.827



US Sanction Paper

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	
\$M								
CapEx	3.971	2.882	7.225	16.687	11.600	1.200	0.000	43.565
OpEx	0.063	0.190	0.426	1.088	0.783	0.036	0.000	2.586
Removal	0.060	0.361	0.544	1.499	1.508	0.024	0.000	3.996
Total Cost in Bus. Plan	4.094	3.433	8.195	19.274	13.891	1.260	0.000	50.147

Variance (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	
\$M								
CapEx	0.000	(0.794)	1.978	0.982	(0.378)	(4.323)	0.000	(2.535)
OpEx	0.000	(0.087)	0.045	(0.073)	(1.128)	(0.488)	0.000	(1.731)
Removal	0.000	(0.222)	(0.230)	(0.320)	(0.142)	(0.500)	0.000	(1.414)
Total Cost in Bus. Plan	0.000	(1.103)	1.793	0.589	(1.648)	(5.311)	0.000	(5.680)

3.11.3 Cost Assumptions

Substation estimates were obtained from Conceptual Engineering Reports prepared by substation engineering. Conceptual Grade Estimates have been developed with only the conceptual understanding of the project. The estimates have been prepared using historical cost data or data from similar projects with an accuracy of -25% to +50%.

The estimate for the 69kV transmission line was obtained from Routing Analysis Report prepared by transmission line engineering and consultants to the company. This Conceptual Engineering Estimate has been developed with only the conceptual understanding of the project. The estimates have been prepared using historical cost data or data from similar projects with an accuracy of -25% to +50%.

The overall distribution line work estimate was developed utilizing generic construction costs. Minimal field work has been performed to assess the actual condition of the assets or the number of poles and transformers needing replacement associated with the conversion from 4kV to 13kV. This is an Investment Grade Estimate with a level of accuracy ranging from -50% to +200%.for

The estimates for the distribution work to be completed under funding C028628 and CD00649 are based on STORMS estimate.

3.11.4 Net Present Value / Cost Benefit Analysis

N/A



US Sanction Paper

3.11.5 Additional Impacts

N/A

3.12 Statements of Support

None

3.12.1 Supporters

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

Role	Individual	Responsibilities
Investment Planning	Glen DiConza	Endorses relative to distribution 5-year business plan or emergent work
Resource Planning	Anne Wyman	Endorses D-Line resources, cost estimate, schedule and portfolio alignment
Resource Planning	Mark Phillips	Endorses substation resources, cost estimate, schedule and portfolio alignment
Asset Management/ Planning	Kasia Kulbacka	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Asset Management/ Planning	Alan Labarre	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Engineering / Design	Suzan Martuscello	Endorses substation scope, design, conformance with design standards
Engineering / Design	Mark Browne	Endorses sub-transmission line scope, design, conformance with design standards
Engineering / Design	Len Swanson	Endorses substation scope, design, conformance with design standards
Project Management	Andrew Schneller	Endorses Resources, cost estimate, schedule

3.12.2 Reviewers

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

Function	Individual
Finance	Keith Fowler / Phillip Horowitz
Regulatory	Peter Zschokke
Jurisdictional Delegates	Jim Patterson
Procurement	Art Curran
Control Center	Michael Gallagher
Control Center	Will Houston



US Sanction Paper

4 Appendices

4.1 Sanction Request Breakdown by Project

\$M	C028628	CD00649	C024159	C054054	C015158	C054052	C058310	CD00656	CD00652	CD058404	C058407	C058401	CD00651	Total
CapEx	5.623	2.200	0.200	0.800	1.000		0.050	2.100		0.600		0.050		12.623
OpEx	0.423													0.423
Removal	0.647	0.044				0.050			0.050		0.050		0.050	0.891
Total	6.693	2.244	0.200	0.800	1.000	0.050	0.050	2.100	0.050	0.600	0.050	0.050	0.050	13.937

4.2 Other Appendices

N/A

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

A Customer Outreach is ongoing as part of the Energy Facilities Siting Board (EFSB) Filing process. The company has hired a consultant to develop a comprehensive public outreach plan for all of proposed projects on Aquidneck Island.

This outreach effort will be 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 will be designed to engage the community in a two-way dialogue, facilitate transparency throughout the Project, foster public participation, and solicit feedback from stakeholders.

US Sanction Paper

nationalgrid

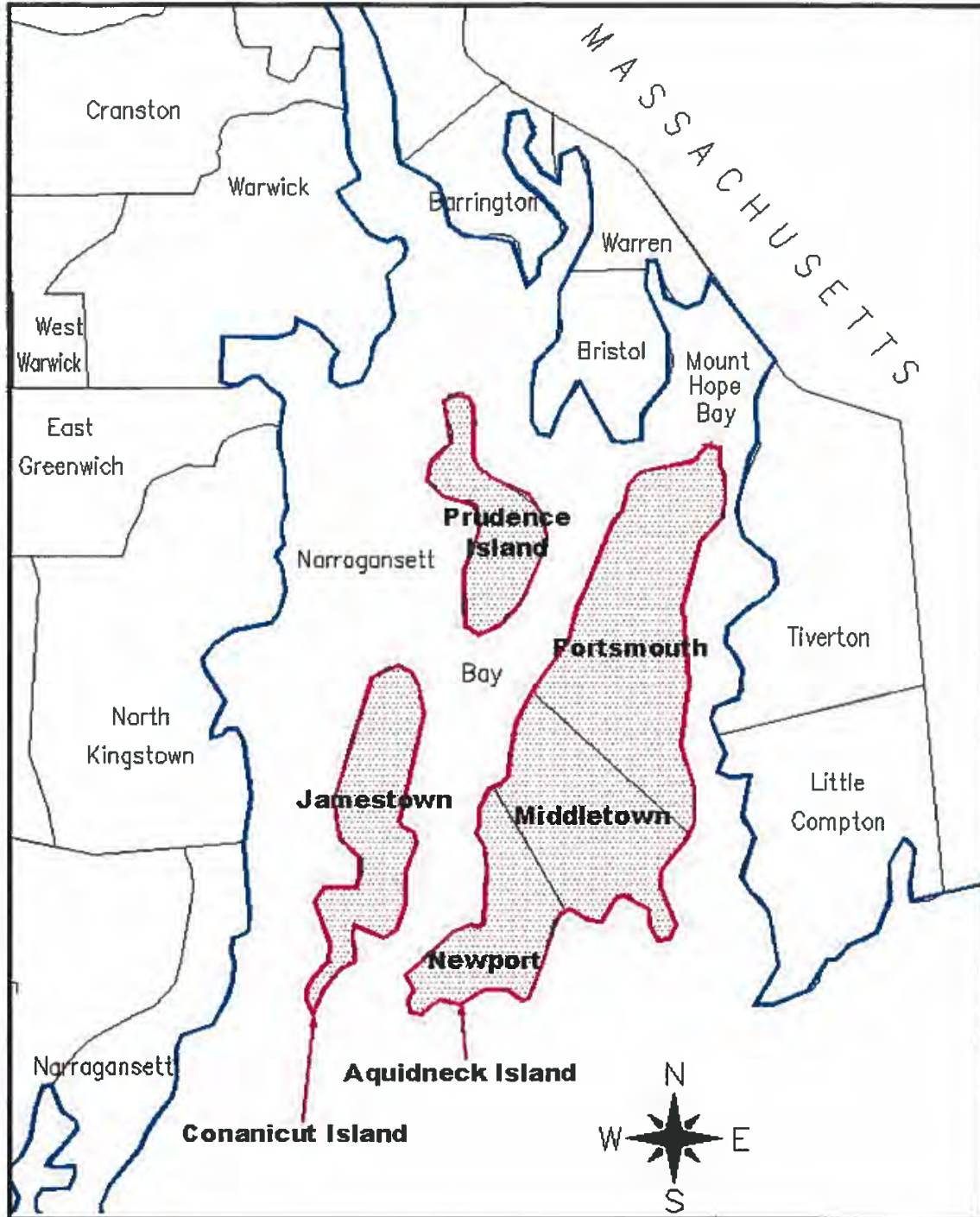
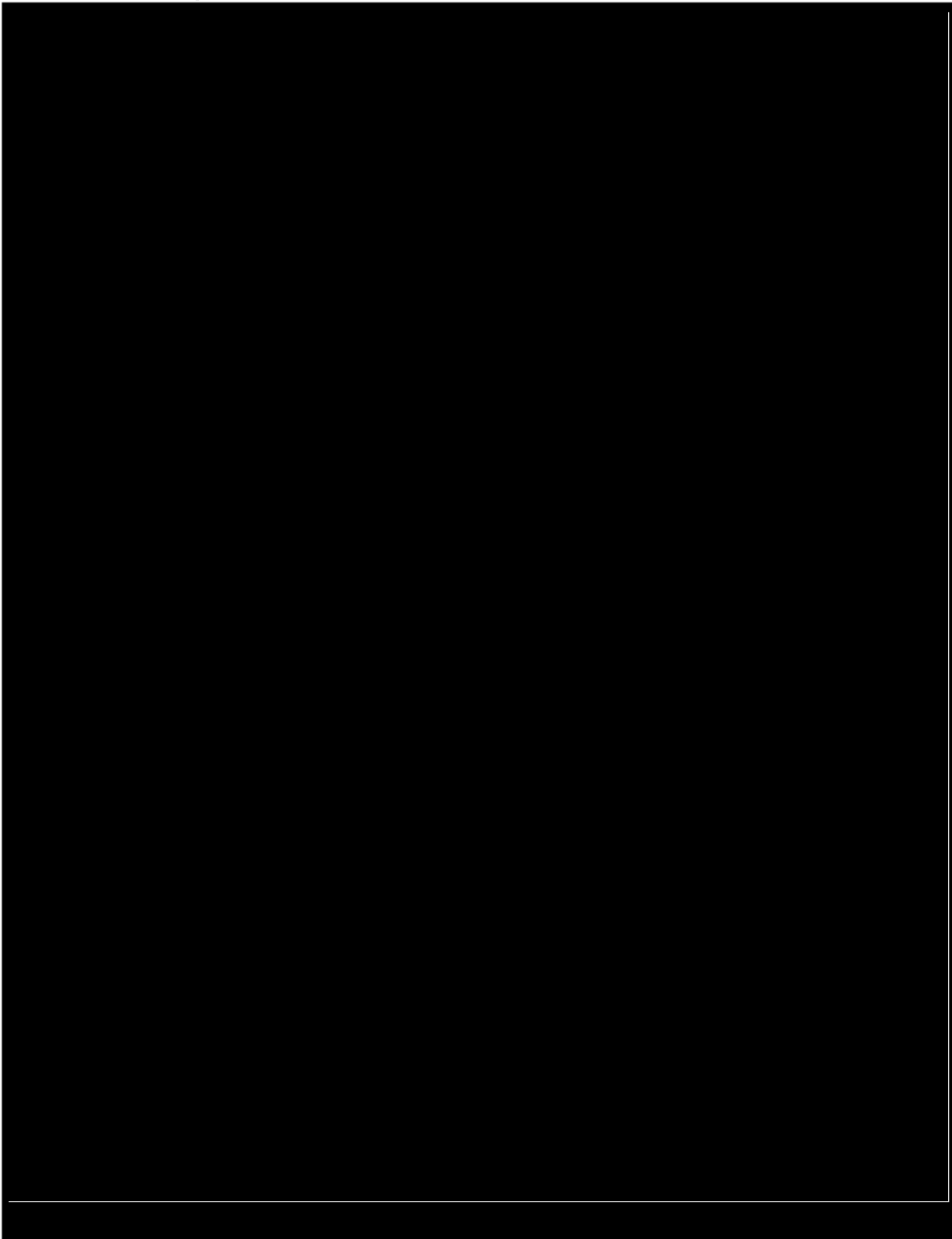


FIGURE 1 – GEOGRAPHIC AREA MAP

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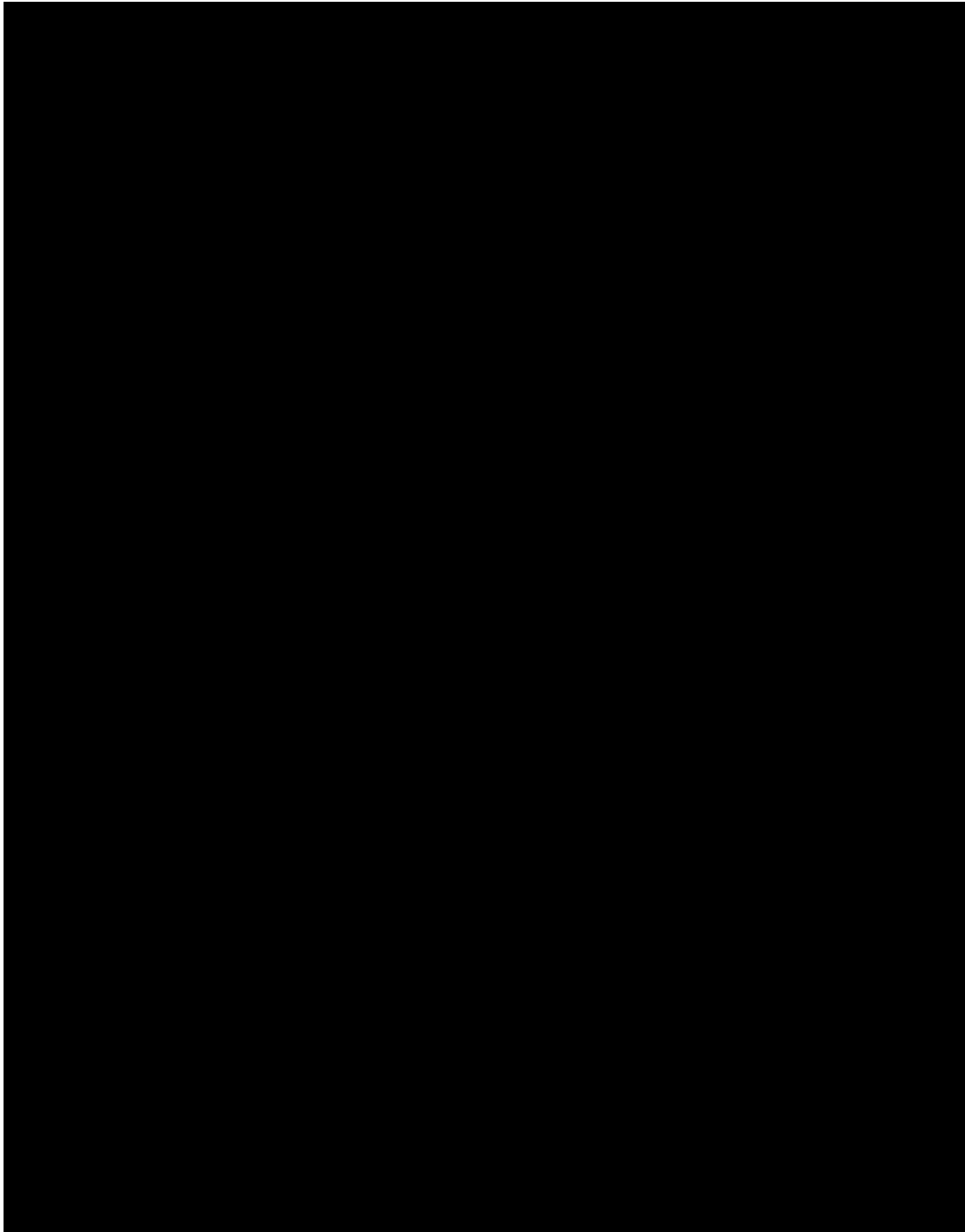


FIGURE 3 – EXISTING SUB-TRANSMISSION SYSTEM ONE-LINE DIAGRAM

US Sanction Paper

nationalgrid

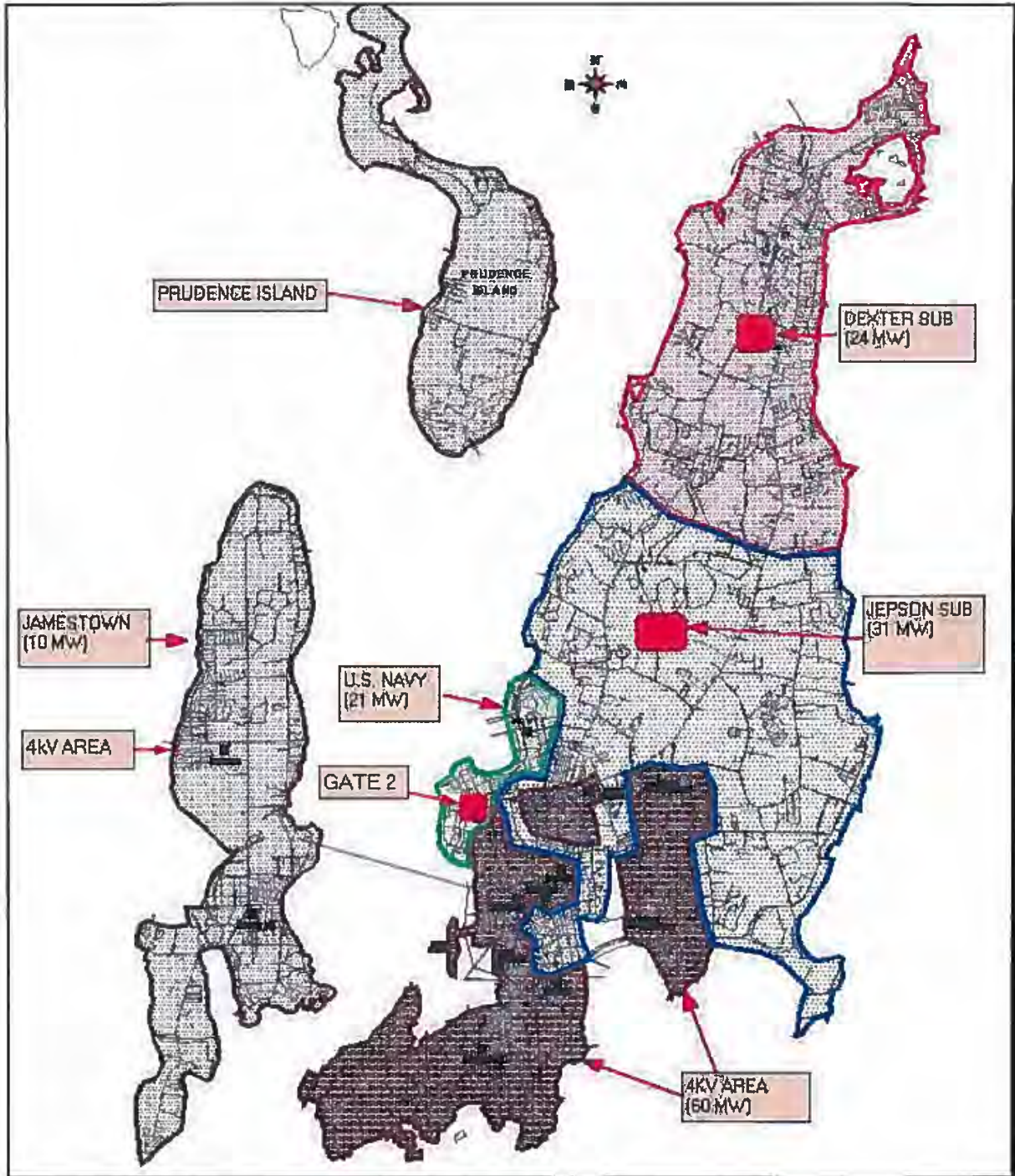


FIGURE 4 – GEOGRAPHIC MAP OF EXISTING DISTRIBUTION

US Sanction Paper

nationalgrid

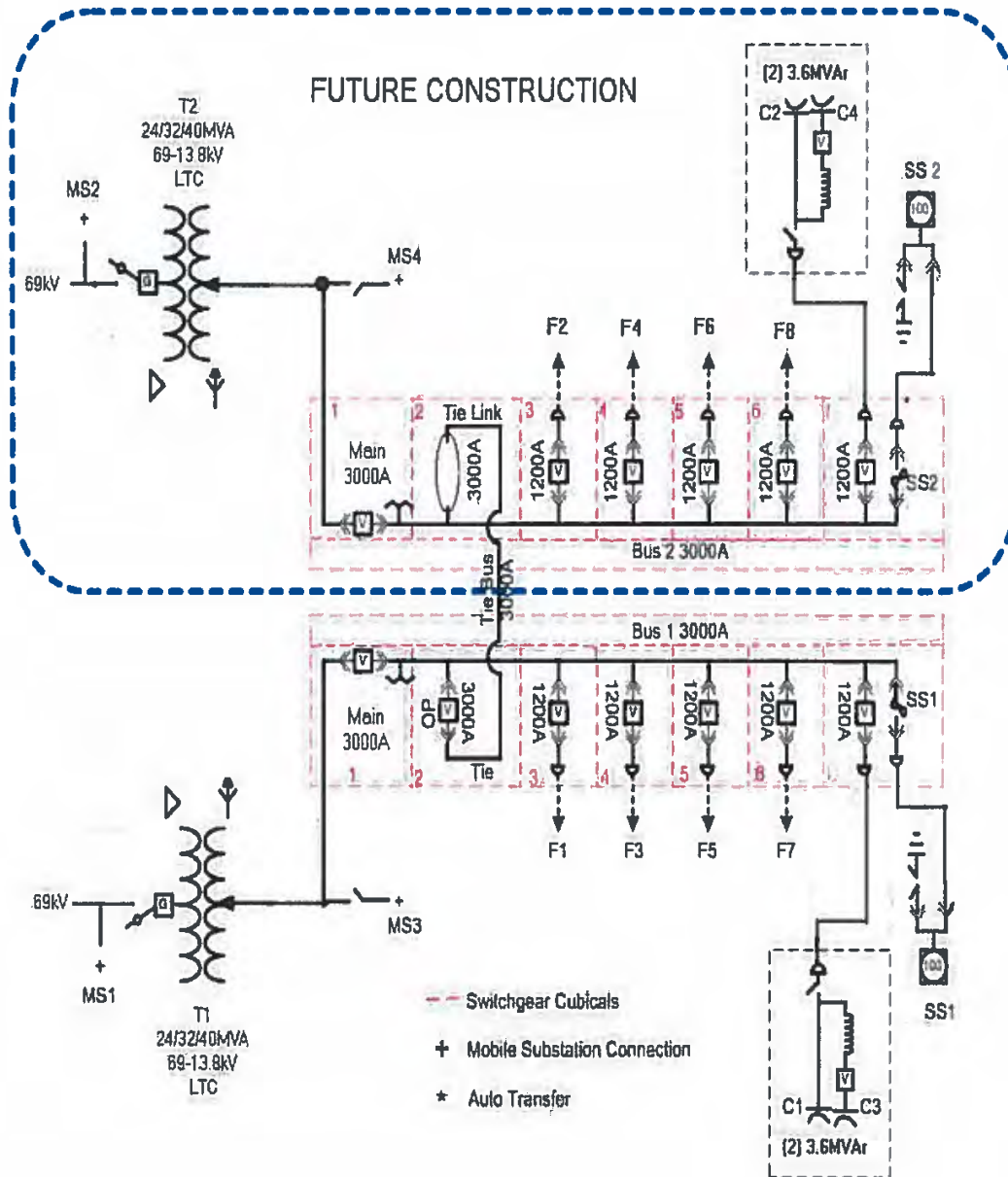


FIGURE 5 – NEWPORT 69/13.8kV SUBSTATION PROPOSED ONE-LINE

US Sanction Paper

nationalgrid

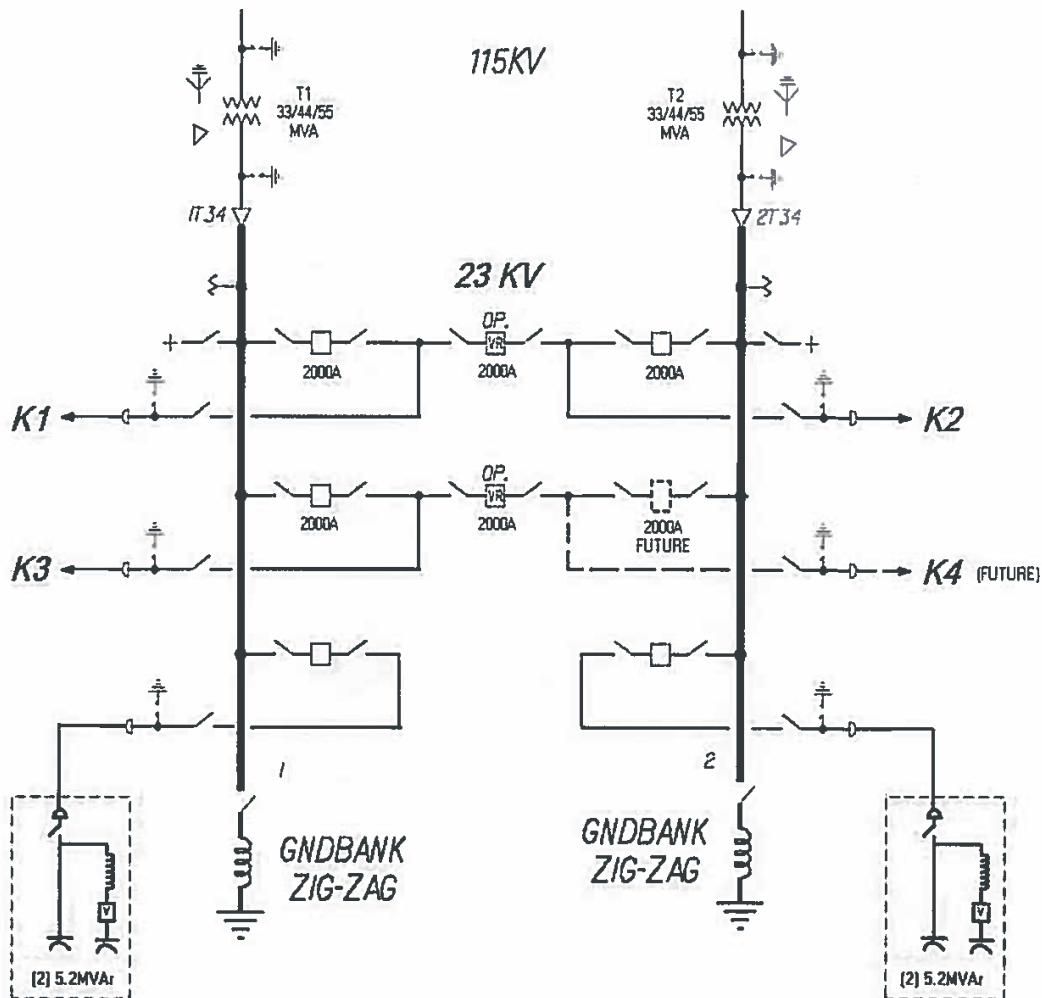


FIGURE 6 – MIDDLETOWN 115/23kV SUBSTATION PROPOSED ONE-LINE

US Sanction Paper

nationalgrid

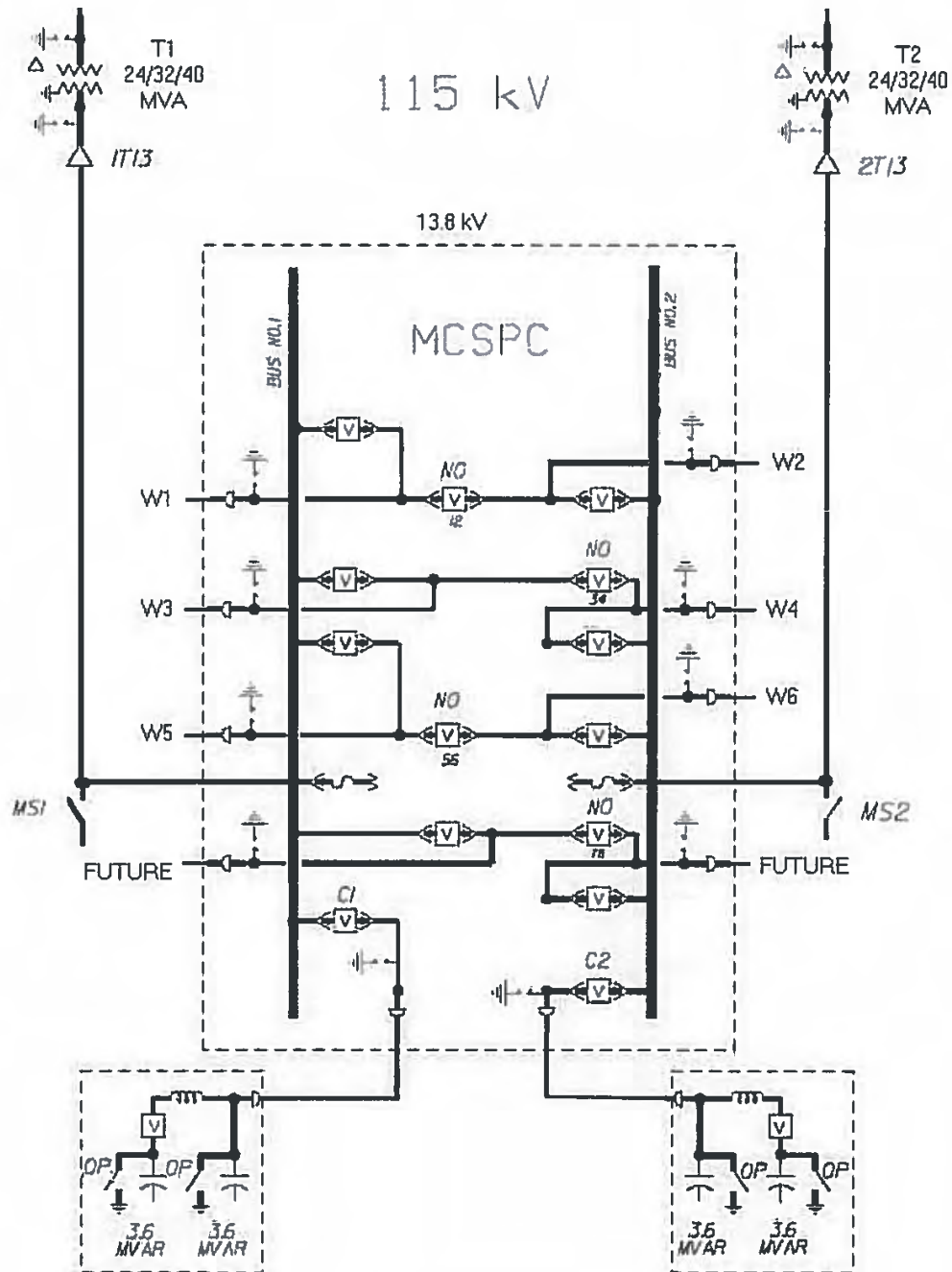


FIG 7 – MIDDLETOWN 115/13.8kV SUBSTATION PROPOSED ONE-LINE

US Sanction Paper

nationalgrid

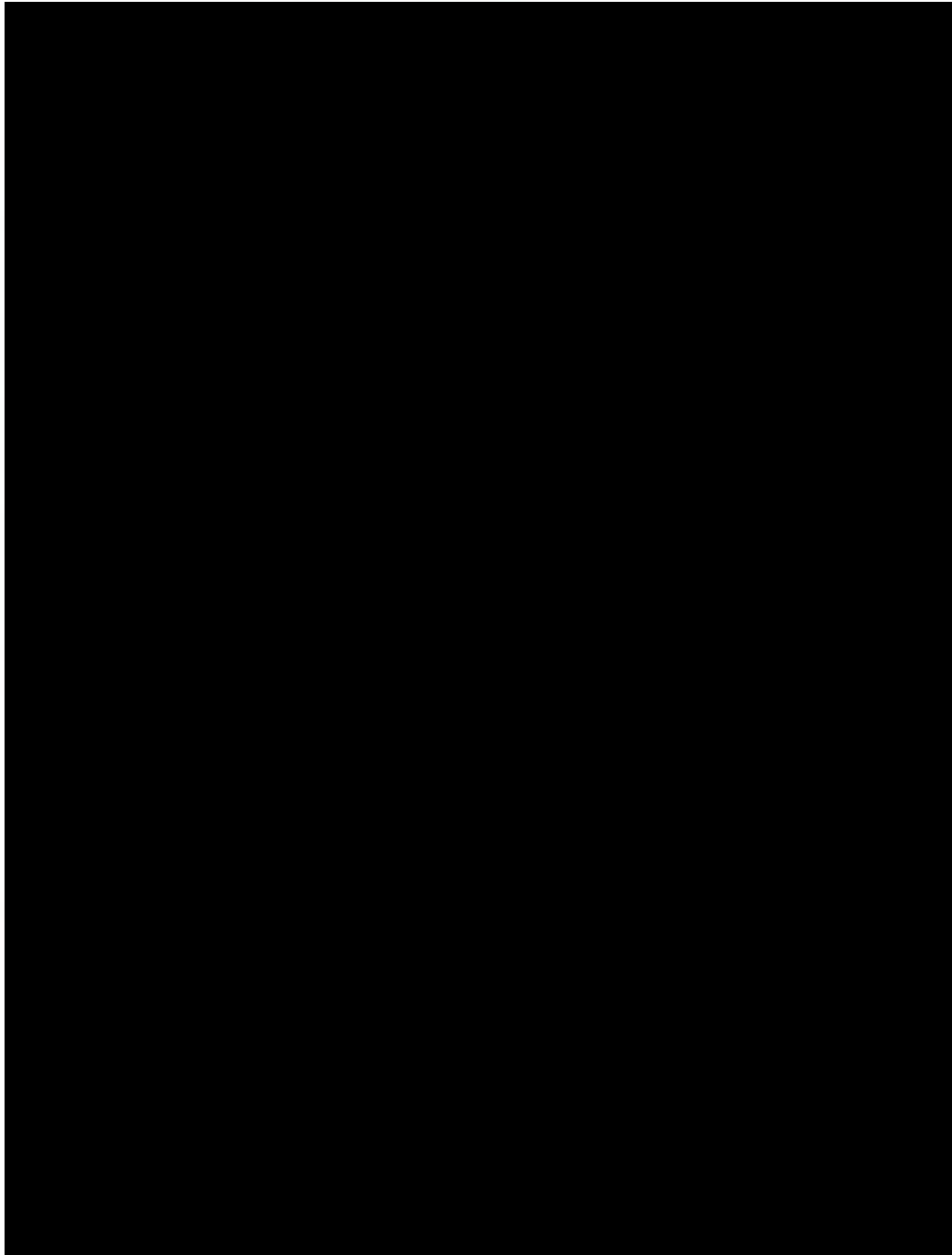


FIGURE 8 – PROPOSED STATION RETIREMENTS

US Sanction Paper

nationalgrid

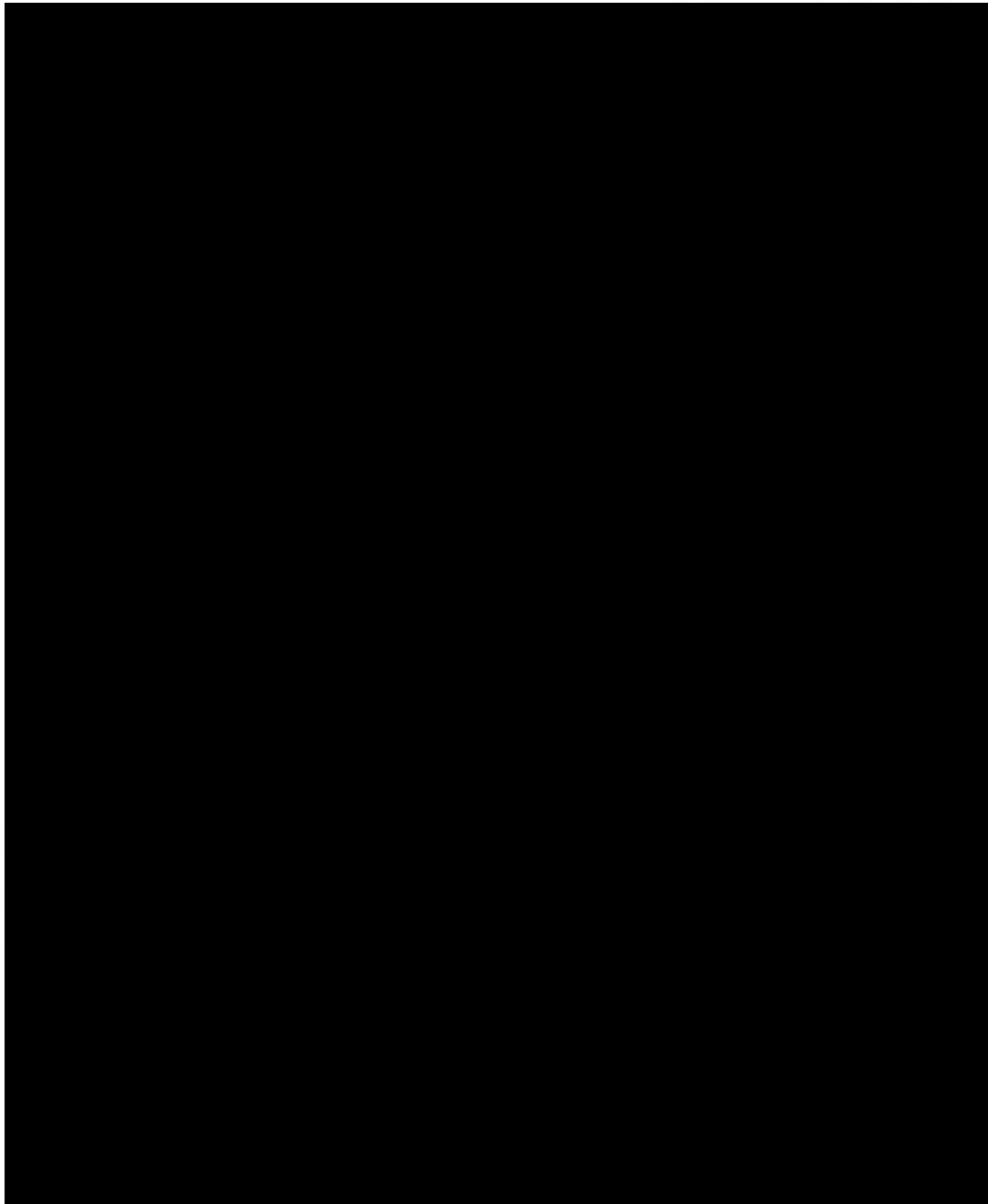


FIG 9 – PROPOSED SUBTRANSMISSION SYSTEM ONE-LINE

C020297

Sac AB Repl Phase 7 NEC

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C020297</u>	USSC #: <u>USSC-14-082</u>
Revision: <u>13</u>	Budget Version: <u>Default</u>
Project Title: <u>Sac AB Repl Prog Phase 7 NEC DxT</u>	
Project Description: 03740 Sac AB Repl Prog Phase 7 NEC DxT	

Project Status: <u>Closed</u>	
Responsible Person: <u>KELLY, MICHAEL</u>	Initiator: <u>McGrath, James M</u>
Spending Rationale: <u>Asset Condition</u>	Funding Type: <u>P Dist by Transmission Sub RI</u>
Budget Class: <u>Asset Replacement</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>49</u>	Project Complexity Score: <u>15</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>													
Est Start Date: <u>1/1/2007</u>	Est Complete Date: <u>8/31/2014</u>												
Est In-Service Date: <u>8/31/2014</u>													
TTD Actuals: <u>\$1,017,988</u>	As Of: <u>10/2/2017</u>												
<table border="0" style="width: 100%;"> <tr> <td style="width: 15%;">Cost Breakdown</td> <td style="width: 15%;"><u>Capital</u></td> <td style="width: 15%;"><u>Expense</u></td> <td style="width: 15%;"><u>Removal</u></td> <td style="width: 15%;"><u>Total</u></td> <td style="width: 15%;"><u>Credits</u></td> </tr> <tr> <td></td> <td><u>\$955,000</u></td> <td><u>\$83,000</u></td> <td><u>\$89,000</u></td> <td><u>\$1,127,000</u></td> <td><u>\$0</u></td> </tr> </table>		Cost Breakdown	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>		<u>\$955,000</u>	<u>\$83,000</u>	<u>\$89,000</u>	<u>\$1,127,000</u>	<u>\$0</u>
Cost Breakdown	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>								
	<u>\$955,000</u>	<u>\$83,000</u>	<u>\$89,000</u>	<u>\$1,127,000</u>	<u>\$0</u>								

Justification / Risk Identification:

03740 Sac AB Repl Prog Phase 7 NEC DxT

Project Scope:

03740 Sac AB Repl Prog Phase 7 NEC DxT

Project Alternatives Considered:

<Enter data here>

Additional Notes:

<Enter data here>

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>4/28/2014 11:02:48</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C020297 Current Total Authorized Amount: \$1,12...

Title

Project Number

Budget Version

Revision

Revision Status

Revision No.

Est Start Date

Est Complete Date

Est In Srvc Date

Capital

Expense

Jobbing

Retirement

Removal

Total (excl. Rets.)

Credits

Net

Revision Info

Revision

[Find Revision](#)

☐ Show 'Budget Only' Revisions

Spending Estimates:

Edit:

Property Estimates:

Other:

Record of 1

This document has been reviewed for Critical
Energy Infrastructure Information (CEII).



Short Form Sanction Paper

Title:	Sacrificial Airbreak Replacement at Wood River & West Cranston	Sanction Paper #:	USSC-14-082
Project #:	C020297	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	April 1 st , 2014
Author:	Michael Kelly	Sponsor:	Cheri Warren
Utility Service:	Electricity T&D	Project Manager:	Michael Kelly / Mark Phillips

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of *Project Funding Number C020297* in the amount **\$1.127M** with a tolerance of +/- 10% for the purposes of procurement of materials, removal of existing Sacrificial Air-breaks, installation of new Circuit Switchers, reinforcement of supporting lattice structures, testing & commissioning as well as closeout procedures for this project, covering work at both the West Cranston & Wood River substations.

This sanction amount is \$1.127M broken down into:

*\$0.955M Capex
\$0.083M Opex
\$0.089M Removal*

1.2 Project Summary

The Project will include the replacement of the 172T2 & 171T1 Sacrificial Air-breaks at the West Cranston substation as well as the 10T115 & 20T115 Sacrificial Air-breaks at the Wood River Substation in addition to all structural modifications required for the new Circuit Switchers.



Short Form Sanction Paper

2 Project Detail

2.1 Background

Sacrificial Air-break schemes were historically applied for the protection of substation power transformers. However, when subjected to a fault condition, the slow clearing time of sacrificial air-breaks has been shown to be a cause of reduced reliability and damage to substation equipment.

2.2 Drivers

The driver for this work has been identified as Reliability in the Northeast Transmission Sacrificial Air-breaks Strategy Paper, SG 001.

In 1992 a study was commissioned by New England Electric System (NEES) concluded that the inherent slow clearing time of Sacrificial Air-breaks is the primary cause of extensive damage due to a substation fault. The excessive clearing time of 2.5 to 3 seconds to clear such a fault often results in extensive damage to equipment in the local vicinity as well as the possible destruction of the switch itself.

By comparison, Circuit Switchers which replace the Sacrificial Air-breaks, clear a fault in less than 0.1 seconds in addition to numerous other benefits such as being easier to maintain, safer to operate, and possessing the ability to be controlled remotely.

Difficulties with standard operation and maintenance of Sacrificial Air-breaks have been an issue for some time. Infrared review of the devices provides evidence of thermally weak "hot spots" on the equipment.

2.3 Project Description

The new Circuit Switchers are being provided as part of the Sacrificial Air-break Replacement Program which is considered non-mandatory/policy driven.

This project provides for the replacement of the 171T1 and 172T2 Sacrificial Air-breaks at the West Cranston substation as well as the 10T115 & 20T115 Sacrificial Air-breaks at the Wood River Substation with Circuit Switchers. New primary bus will be installed to interconnect the Circuit Switchers with the 115 kV incoming lines and the transformers. The existing structures supporting the Sacrificial Air-break switches will be reinforced for the new Circuit Switchers.



Short Form Sanction Paper

2.4 Benefits

Installation of the new Circuit Switchers to replace existing Sacrificial Air-breaks will significantly decrease fault clearing time which will limit potential damage to associated substation equipment. Benefits include increased reliability and safety.

2.5 Business & Customer Issues

Detailed plans are being developed to minimize any disruption to customers & transmission lines. The installation of modern Circuit Switchers in replacement of problematic Sacrificial Air-breaks will lead to improved reliability performance providing our customers with improved service. Planned replacement also offers the lowest lifetime cost approach for customers.

2.6 Alternatives

Alternative 1: Do Nothing

This option would have no initial cost however there will be indirect costs associated with increased maintenance levels. This option would involve no proactive replacement of equipment, only replacing when failure occurs. All Air-breaks should be replaced before the onset of significantly reduced reliability. This option is unacceptable because:

- Leaving degraded Air-breaks in service puts the company and customers at risk of long-term interruptions of the transmission system.
- Failures of this equipment have the potential to cause extensive damage to other equipment as well as serious injuries to our employees.

2.7 Investment Recovery

2.7.1 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$1.146M. This is indicative only. The actual revenue requirement will differ, 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.



Short Form Sanction Paper

3 Related Projects, Scoring, Budgets

3.1 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C020297	Distribution Substation	West Cranston	0.599
C020297	Distribution Substation	Wood River	0.528
Total			1.127

3.2 Associated Projects

Not Applicable, no associated projects.

3.3 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
03/1992	Transmission	-	Transformer Protection SAC AB Study 1992.	-
02/2004	Transmission	-	SG001 Sacrificial Air-breaks Strategy Paper	-
01/2007	Transmission	\$0.100M	Electronic DoA	Partial
08/2012	USSC	\$0.375M	Rhode Island Sacrificial Air- breaks Replacement	Partial
09/2012	USSC	\$0.280M	Sacrificial Air-breaks Replacement-W.Cranston	Partial

3.4 Category

Category	Reference to Mandate, Policy, or NPV Assumptions
<input type="radio"/> Mandatory <input checked="" type="radio"/> Policy- Driven <input type="radio"/> Justified NPV	This project is consistent with National Grid's goal of complying with NERC & NPCC reliability criteria and improving reliability for the benefit of our customers.



Short Form Sanction Paper

3.5 Asset Management Risk Score

Asset Management Risk Score: 49

Primary Risk Score Driver: (Policy Driven Projects Only)

☒ Reliability ☐ Environment ☐ Health & Safety ☐ Not Policy Driven

3.6 Complexity Level

☐ High Complexity ☐ Medium Complexity ☒ Low Complexity ☐ N/A

Complexity Score: 15

4 Financial

4.1 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan (\$)
FY 2015-2019 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"/> NA	\$1.042 M

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

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

4.2 CIAC / Reimbursement

		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
\$M	Prior Yrs	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Total
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000



Short Form Sanction Paper

4.3 Cost Summary Table

					Current Planning Horizon (\$M)						
Project Number	Project Title	Project Estimate Level (%)	Spend	Prior Yrs	Yr. 1	Yr. 2	Yr.3	Yr. 4	Yr. 5	Yr. 6 +	
					2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Total
C020297	West Cranston	+/- 10%	CapEx	0.230	0.325	-	-	-	-	-	0.555
			OpEx	0.015	0.005	-	-	-	-	0.020	
			Removal	-	0.024	-	-	-	-	0.024	
			Total	0.245	0.354	-	-	-	-	0.599	
C020297	Wood River	+/- 10%	CapEx	0.400	-	-	-	-	-	-	0.400
			OpEx	0.063	-	-	-	-	-	0.063	
			Removal	0.065	-	-	-	-	-	0.065	
			Total	0.528	-	-	-	-	-	0.528	
Total Project Sanction			CapEx	0.630	0.325	-	-	-	-	-	0.955
			OpEx	0.078	0.005	-	-	-	-	0.083	
			Removal	0.065	0.024	-	-	-	-	0.089	
			Total	0.773	0.354	-	-	-	-	1.127	

4.4 Project Budget Summary Table

Project Costs Per Business Plan

Project Costs per Business Plan

\$M	Prior Yrs (Actual)	Current Planning Horizon (\$M)						Total
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
CapEx	0.630	0.081	0.000	0.000	0.000	0.000	0.000	0.711
OpEx	0.078	0.003	0.000	0.000	0.000	0.000	0.000	0.081
Removal	0.065	0.002	0.000	0.000	0.000	0.000	0.000	0.067
Total Cost in Bus. Plan	0.773	0.086	0.000	0.000	0.000	0.000	0.000	0.859

Variance (Business Plan-Project Estimate)

\$M	Prior Yrs (Actual)	Current Planning Horizon (\$M)						Total
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
CapEx	0.000	(0.244)	0.000	0.000	0.000	0.000	0.000	(0.244)
OpEx	0.000	(0.003)	0.000	0.000	0.000	0.000	0.000	(0.003)
Removal	0.000	(0.022)	0.000	0.000	0.000	0.000	0.000	(0.022)
Total Cost in Bus. Plan	0.000	(0.269)	0.000	0.000	0.000	0.000	0.000	(0.269)



Short Form Sanction Paper

5 Key Milestones

Milestones	Target Date: (Month/Year)
Project Sanction	04/2014
Construction Start	04/2014
Construction Complete	05/2014
Ready For Load	05/2014
Project Closure	08/2014

6 Statements of Support

6.1.1 Supporters

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

Role	Name	Responsibilities
Investment Planner	Glen DiConza	Endorses relative to 5-year business plan or emergent work
Resource Planning	Mark Phillips	Endorses resources, cost estimate, schedule, and Portfolio Alignment
Asset Management / Planning	Alan Labarre	Endorses scope, estimate, and schedule with the company's goals, strategies and objectives
Engineering and Design	John Gavin	Endorses scope, design, conformance with design standards
Project Management	Sonny Anand	Endorses resources, cost estimate, schedule

6.1.2 Reviewers

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

Reviewer List	Name
Finance	Keith Fowler
Regulatory	Gideon N. Katsh
Jurisdictional Delegates	Jennifer L. Grimsley
Jurisdictional Delegates	Nibil Hitti
Procurement	Art Curran
Control Centers (CC)	Michael Gallagher

Short Form Sanction Paper

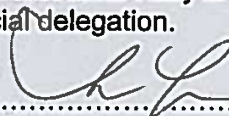
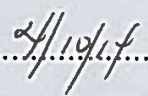


7 Decisions

I:

(a) APPROVE this paper and the investment of \$1.127M and a tolerance of +/-10%

(b) NOTE that Mike Kelly is the Project Manager and Mark Phillips has the approved financial delegation.

Signature..........Date..........

Executive Sponsor – Marie Jordan
Senior Vice President
Network Strategy

C023852

Inst Ductline Governor St. Prov.

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C023852</u>	USSC #: <u>USSC-13-239-DCIG0109P</u>
Revision: <u>6</u>	Budget Version: <u>Default</u>
Project Title: <u>Inst Ductline Governor St. Prov.</u>	
Project Description: <u>Install 2800' of 12-way manhole and duct system.</u>	

Project Status: <u>open</u>	
Responsible Person: <u>PHILLIPS, DANIELLE</u>	Initiator: <u>Castro, Kathy</u>
Spending Rationale: <u>Asset Condition</u>	Funding Type: <u>P Electric Distribution Line RI</u>
Budget Class: <u>Asset Replacement</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>30</u>	Project Complexity Score: <u>21</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>											
Est Start Date: <u>4/1/2008</u>	Est Complete Date: <u>4/30/2014</u>										
Est In-Service Date: <u>2/28/2014</u>											
TTD Actuals: <u>\$1,532,781</u>	As Of: <u>10/2/2017</u>										
Cost Breakdown	<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;"><u>Capital</u></th> <th style="text-align: left;"><u>Expense</u></th> <th style="text-align: left;"><u>Removal</u></th> <th style="text-align: left;"><u>Total</u></th> <th style="text-align: left;"><u>Credits</u></th> </tr> <tr> <td><u>\$1,571,000</u></td> <td><u>\$82,000</u></td> <td><u>\$0</u></td> <td><u>\$1,653,000</u></td> <td><u>\$0</u></td> </tr> </table>	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>	<u>\$1,571,000</u>	<u>\$82,000</u>	<u>\$0</u>	<u>\$1,653,000</u>	<u>\$0</u>
<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>							
<u>\$1,571,000</u>	<u>\$82,000</u>	<u>\$0</u>	<u>\$1,653,000</u>	<u>\$0</u>							

Justification / Risk Identification:

CL 7/7/08 changed project name from "Ives St" to "Governor St," changed scope and est. A new duct/manhole system is being constructed on Governor St in Providence. The new system will provide a route to bypass an existing ductline on nearby Ives St which is unusable due to blistered fiber ducts. The Ives St ductline is a critical corridor for 23 kV supply to 2 substations in Providence's East Side and for 11 kV primary-metered service to Brown University. This project covers expenditures necessary to install the MH/duct system required for proactive replacement of 4070's VLF cable & existing paper insulated lead covered cable on Ives St, and to respectively develop a route to

Project Scope:

Install 2800' of 12-way manhole and duct system.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

<Enter data here>

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>9/3/2013 09:10:48</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C023852 Current Total Authorized Amount: \$1,65...

Title Inst Ductline Governor St. Prov.

Project Number C023852

Budget Version Default (active)

Revision

Revision Status Approved

Revision No. 6

Est Start Date 04/01/2008

Est Complete Date 04/30/2014

Est In Srvc Date 02/28/2014

Capital \$1,571,000.00

Expense \$82,000.00

Jobbing \$0.00

Retirement \$0.00

Removal \$0.00

Total (excl. Rets.) \$1,653,000.00

Credits \$0.00

Net \$1,653,000.00

Spending Estimates:

Grid Estimates

Forecast

Summarize from W/O

Copy Estimate

Property Estimates:

Unit Estimates

Create As Built

Delete Used Estimates

Edit:

New Revision

Delete Revision

Update

Update With Actuals

Import Estimates

Other:

Revision Comments

Released Dollars

Substitution

Slide

Version Compare

Close

Revision Info Other Updates

Revision 6 of 6 < > << >>

Find Revision Send for Approval

☐ Show 'Budget Only' Revisions

Record 1 of 1 < > << >>

Audits

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Short Form Sanction Paper



Title:	Install Ductline – Governor St., Providence	Sanction Paper #:	USSC-13-239
Project #:	C23852	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	08/20/2013
Author:	Danielle Phillips	Sponsor:	Cheryl A. Warren
Utility Service:	Electricity T&D	Project Manager:	Danielle Phillips

1 Executive Summary

1.1 Sanctioning Summary

This paper requests sanction of C23852 in the amount \$1.653M with a tolerance of +/- 10% to proceed with construction activities.

This sanction amount is \$1.653M broken down into:

\$1.570M Capex
\$0.083M Opex
\$0.000M Removal

2 Project Detail

2.1 Project Description, Justification, Customer Issues, Drivers and Benefits

Project Description:

The portion of feeder 1152B on Ives and Manning Streets which consists of 1970's XLPE cable is a candidate for inclusion early in the underground cable replacement program. However, the existing ductline in this area consists of concrete-encased 4" fiber ducts installed in the 1960's. The ducts are severely blistered, making them unusable in their present condition.

This project will install the ducts necessary for future elimination of 1970's XLPE on feeder 1152B, will provide spare ducts for use in the event of cable failures, and will allow for future replacement of aging PILC cable. A new ductline route will allow for future replacement of aging PILC cable. A new ductline route will be developed to bypass the Ives Street ductline, as shown the Appendix.

Background:



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An existing ductline on Ives and Manning Streets in Providence, Rhode Island, consists of 4" fiber ducts encased in concrete. The ducts are severely blistered with no usable spare ducts. As shown in Figure 1, the ductline contains two 23kV circuits that supply the East Side of Providence, four 11kV circuits that supply primary metered service to Brown University, two 4kV circuits, and fiber optic cable. Supplying Brown University are feeders 1152B, which in this area is early 1970's cross-linked polyethylene (XLPE) cable; 1153 which is paper-insulated lead-covered (PILC) cable approximately 40 years of age; 1151 which is PILC approximately 20 years of age; and 1126 which is ethylene-propylene rubber (EPR) approximately 4 years of age. The 23 kV supply circuits consists of feeders 2248 and 24 which supply 4 kV substation East George Street. Both feeders are PILC cable in this area and are approximately 40 years of age. Feeder 2248 continues to Rochambeau Avenue substation, which is also supplied by feeder 1110 from Admiral Street.

The most recent attempt to use this ductline was in 2004 when feeder 1126 was installed to Brown University. At that time, one duct for feeder 1126 was made usable by a specialized reaming and cutting process to remove fiber blisters. Because of PCB contamination in the Ives Street manholes, it was not cost-effective to continue the reaming process to create additional usable spare ducts. The presence of PCB's required that the large volume of process water generated by the reaming process be disposed of as PCV waste, which is very costly.

In the event of in-service failure of any one of the feeders in this ductline, emergency duct construction would be required. Such emergency construction would only address an immediate issue (cable failure repairs), and would not provide long-term benefit. A proactive long-term approach to address the unusable ductlines on Ives and Manning Streets is desirable so that ducts are available for use in the event of in-service failure, and for future underground cable asset replacement projects.

Drivers:

The company is undertaking a program to proactively replace underground distribution cable. National Grid Internal Strategy Document "Primary Underground Cable" – Initial Strategy, dated January 2008, sets forth a strategy to eliminate all primary underground cable more than 60 years old from the system within fifteen years. The strategy is intended to provide for a sustainable system going forward. In moving toward a sustainable system, a concerted effort is also being made to eliminate cross-linked polyethylene (XLPE) cables manufactured in the 1970's. This particular vintage XLPE cable insulation is targeted for elimination based on historical performance.

Existing duct and manhole system are used for the underground cable replacements where suitable facilities exist. In some cases, duct construction is required where existing facilities are unsuitable due to duct size, manhole size or physical constraints, or lack of usable ducts. National Grid Internal Strategy Document "Distribution Ducts and Conduit" – Issue 2, dated September 2008, sets forth a strategy to repair and/or



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replace failed conduit systems upon evaluation of alternatives and when justified by short and long-term needs.

Ductlines on Ives and Manning Streets are a critical underground corridor for 11kV cables that supply Brown University, and 23kV cables that supply East George Street and Rochambeau Avenue substations. A suitable alternative route to these locations does not exist, and large-scale repair or additions to the existing ductline is neither practicable nor cost-effective because of the number of circuits involved and physical constraints. The Company's strategies for primary underground cable and distribution ducts support implementation of a proactive plan to install the underground facilities necessary for future cable replacement programs in this area, while limiting risk in the event of in-services failures.

Benefits:

There are not direct financial benefits arising from this project. However, replacing the existing ductline will provide a more reliable and sustainable system for the customers.

Business Issues:

Although this project installs ductline and is consistent with the Company's distribution duct strategy, it is being incorporated into the Company's underground cable replacement initiative because it installs the facilities necessary for future cable replacements, both early in the program (1152B-1970's XLPE) and in future years (1153, 2248, 24 – aged PILC cable).

The project proactively addresses the lack of usable spare ducts on Ives and Manning Streets. This underground corridor is critical for supply to Brown University and to the East Side area of Providence.

Safety, Environmental and Project Planning Issues:

One of the manholes on Manning Street has tested positive for PCB-contamination and proper measures are in place for remediation of the PCB-contamination.

Dewatering, if required during duct and manhole construction, will be in accordance with existing Narragansett Bay Commission Permits, and "best management practices" will be implemented as necessary for management of excavation materials and spoil.

The City of Providence is considering enactment of a new ordinance which would apply for construction in the public way in an area including multiple properties, such as a street or multiple streets. The ordinance would require a 60 day review period by the Department of Planning and Development and City Council prior to obtaining road opening permit.



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2.1.1 Alternatives:

Alternative 1: Recommended Option

This project will install the ducts necessary for future elimination of 1970's XLPE on feeder 1152B, will provide spare ducts for use in the event of cable failures, and will allow for future replacement of aging PILC cable. A new ductline route will be allowed for future replacement of aging PILC cable. A new ductline route will be developed to bypass the Ives Street ductline, as shown in the Appendix.

Alternative 2: do nothing option.

A "do-nothing" alternative is not recommended because of the risk incurred by the potential for in-service failures. The Ives Street ductline contains all feeders that supply 11kV primary metered service to Brown University and 23kV supply to all of 4 kV substations East George Street and half of 4 kV substations Rochambeau Avenue. In-service failure on Ives or Manning Streets would require long-term emergency loading on the equipment remaining in service. This would result in loss-of-life on the cables remaining in service and, for feeders 2248 and 24, the 11 kV – 23 kV step-up transformers at South Street substation. Such emergency loading would be necessary until duct construction was completed and the failed cable replaced, or until other provisions were made. Use of 4 kV feeders ties to pick up load would be limited since most ties are to feeders also supply from East George and Rochambeau Substations. Use of "roll-on generation" would most likely encounter local opposition since both East George and Rochambeau substations are located in densely-built residential areas. Should one of the cables to Brown University fail during higher load periods, Brown University may be required to shed load for an extended period of time.

Adding ducts to the existing Ives Street ductline is not considered feasible. Because of manhole congestion and physical limitations, the maximum number of ducts that can be added is insufficient to replace all cable targeted for asset replacement as well as provide spare ducts for use in the event of future failures.

2.2 Investment Recovery

The Company franchise to distribute electricity obligates the Company to have the necessary facilities to provide reliable electric service. The proposed investment installs the infrastructure necessary for future proactive replacement of aged and deteriorated underground cable to maintain reliable service and avoid in-service failures. The project fully supports the objective of the Company's Primary Underground Cable Strategy, which seeks to provide for a sustainable system going forward, and the strategy's regulatory/reputation benefit which is risk avoidance for damage to reputation and subsequent regulatory intervention.



Short Form Sanction Paper

2.2.1 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately \$0.314M. This is indicative only. The actual revenue requirement will differ 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 Related Projects, Scoring, Budgets

3.1 Summary of Projects:

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C23852	D-Line	Install Ductline – Governor St., Providence	\$ 1.653
Total			\$ 1.653

3.2 Associated Projects:

Project Number	Project Title	Estimate Amount
9000120317	Gas Main Relay - Governor St., Providence	\$ 656,732.00
Total		\$ 656,732.00

3.3 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
01/14/2009	USSC	\$0.100M	Install Ductline – Governor St., Providence	Preliminary Works Sanction



Short Form Sanction Paper

3.4 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
<input type="radio"/> Mandatory <input checked="" type="radio"/> Policy- Driven <input type="radio"/> Justified NPV	The investment is classified as policy-driven. The Company is undertaking an asset replacement program for underground cable to proactively replace aging and deteriorated cable and avoid in-service failures. Such replacements cannot be done on Ives and Manning Streets in Providence without additions to the duct/manhole system.

3.5 Asset Management Risk Score

Asset Management Risk Score: 30

Primary Risk Score Driver: (Policy Driven Projects Only)

☒ Reliability
 ☐ Environment
 ☐ Health & Safety
 ☐ Not Policy Driven

3.6 Complexity Level:

☐ High Complexity
 ☐ Medium Complexity
 ☒ Low Complexity
 ☐ N/A

Complexity Score: 18

4 Financial

4.1 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan (\$)
NE Distribution and Sub-Transmission	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	\$1.512M



Short Form Sanction Paper

FY14 - FY18 Business Plan			
------------------------------	--	--	--

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

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

4.2 CIAC / Reimbursement

N/A.

4.3 Cost Summary Table

					Current Planning Horizon (\$M)						
Project Number	Project Title	Project Estimate	Spend	Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6+	Total
					2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	
C2882	Install Outline—Governor St., Providence	4	CapEx	0011	1.510	0.080	-	-	-	-	1.571
			OpEx	-	0.082	-	-	-	-	0.082	
			Renewal	-	-	-	-	-	-	-	
			Total	0011	1.592	0.080	-	-	-	1.663	
Total Project Sanction			CapEx	0011	1.510	0.080	-	-	-	-	1.571
			OpEx	-	0.082	-	-	-	-	-	0.082
			Renewal	-	-	-	-	-	-	-	-
			Total	0011	1.592	0.080	-	-	-	1.663	



Short Form Sanction Paper

4.4 Project Budget Summary Table

Project Costs per Business Plan

	Prior Yrs (Actual)	Current Planning Horizon (\$M)						Total
		Yr. 1 2013/14	Yr. 2 2014/15	Yr. 3 2015/16	Yr. 4 2016/17	Yr. 5 2017/18	Yr. 6 + 2018/19	
CapEx	\$ 0.010	\$ 0.100	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 0.110
OpEx	\$ -	\$ 0.015	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 0.015
Removal	\$ -	\$ 0.015	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 0.015
Total Cost in Bus. Plan	\$ 0.010	\$ 0.130	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 0.140

Variance (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon (\$M)						Total
		Yr. 1 2013/14	Yr. 2 2014/15	Yr. 3 2015/16	Yr. 4 2016/17	Yr. 5 2017/18	Yr. 6 + 2018/19	
CapEx	\$ (0.001)	\$ (1.410)	\$ (0.050)	\$ -	\$ -	\$ -	\$ -	\$ (1.461)
OpEx	\$ -	\$ (0.067)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (0.067)
Removal	\$ -	\$ 0.015	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 0.015
Total Cost in Bus. Plan	\$ (0.001)	\$ (1.462)	\$ (0.050)	\$ -	\$ -	\$ -	\$ -	\$ (1.513)

5 Key Milestones:

Milestone	Target Date: (Month/Year)
Preliminary Engineering Complete	09/2009
Full Spend Sanction Request Complete	08/2013
Construction Start Date	09/2013
Project Completion	02/2014
Project Closure	04/2014

6 Statements of Support

6.1.1 Supporters

Role	Name	Responsibilities
Investment Planner	Glen DiConza	Endorses relative to 5-year business plan or emergent work
Resource Planning	Jim Patterson	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Engineering and Design	Robert D. Sheridan	Endorses scope, design, conformance with design standards
Project Management	Timothy Moore	Endorses Resources, cost estimate, schedule

Short Form Sanction Paper



6.1.2 Reviewers

Reviewers read the paper for content / language and recommends edits if necessary.

Reviewer List	Name
Finance	Keith Fowler
Regulatory	Gideon N. Katsh
Jurisdictional Delegates	Jennifer L. Grimsley
Procurement	Art Curran

Short Form Sanction Paper



7. Decisions:

I:

- (a) APPROVE this paper and the investment of \$1.653M and a tolerance of +/-10%
- (b) NOTE that Danielle Phillips is the Project Manager and has the approved financial delegation.

Signature.....

A handwritten signature in blue ink, appearing to be "MJ" or similar initials.

Date.....

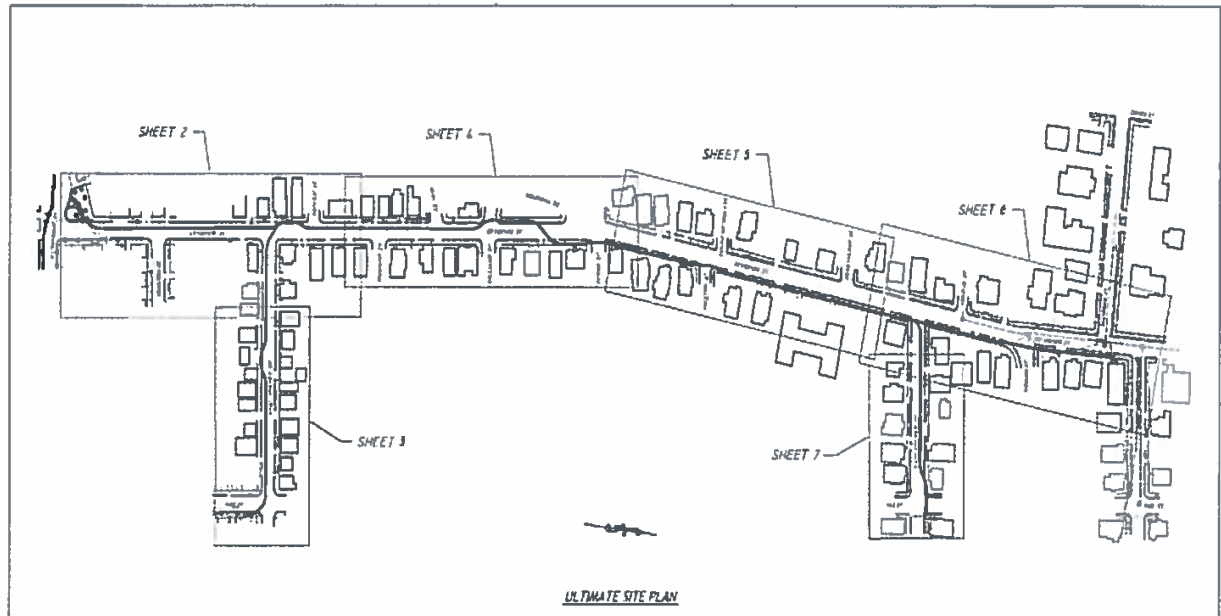
8/21/13

Marie Jordan
Senior Vice President
Network Strategy

Short Form Sanction Paper



8. Other Appendices:



C024175

Chase Hill Sub (D_Line)

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C024175</u>	USSC #: <u>USSC0408P36v7/AMICPW</u>
Revision: <u>11</u>	Budget Version: <u>Default</u>
Project Title: <u>Chase Hill Sub (D Line)</u>	
Project Description: Distribution line work associated with a new 115:12.47 kV substation in Hopkinton, RI	

Project Status: <u>open</u>	
Responsible Person: <u>BOYLE, RICHARD</u>	Initiator: <u>Vaz, Jack P</u>
Spending Rationale: <u>System Capacity & Performance</u>	Funding Type: <u>P Electric Distribution Line RI</u>
Budget Class: <u>Load Relief</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>36</u>	Project Complexity Score: <u>25</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>	
Est Start Date: <u>4/1/2008</u>	Est Complete Date: <u>6/30/2019</u>
Est In-Service Date: <u>3/31/2019</u>	
TTD Actuals: <u>\$4,582,824</u>	As Of: <u>10/2/2017</u>

Cost Breakdown	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>
	<u>\$7,602,000</u>	<u>\$0</u>	<u>\$0</u>	<u>\$7,602,000</u>	<u>\$0</u>

Justification / Risk Identification:

Loading on four feeders and one transformer in the South County West area is projected to exceed SN capability and peak contingency loading on the two Westerly transformers and the Wood River T10 transformer is projected at 140% of SE capability. To address normal and contingency loading concerns in this area, the 2007 Annual Plan identified the need for a new substation in Hopkinton.

Project Scope:

Three new distribution feeders will be installed from the proposed substation with provision for a fourth feeder, when and if needed. The new feeders would primarily tie into and relieve the existing single feeder from the Ashaway Substation and other area feeders supplied out of Westerly substation. All load served by the new 115kV supplied Hopkinton substation would result in transfers from and relief of the area 34.5kV distribution supply system. Project #C24175 is expected to require the installation of 132 poles and approximately 5 circuit miles of 477 kcmil Al mainline conductors (estimated capacity).

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>12/21/2015 19:07:52</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C024175 Current Total Authorized Amount: \$7,602,000

Title Chase Hill Sub (D_Line)
Project Number C024175

Budget Version Default [active]
Revision v7
Revision Status Approved
Revision No. 11
Est Start Date 04/01/2008
Est Complete Date 06/30/2019
Est In Srvc Date 03/31/2019
Capital \$7,602,000.00
Expense \$0.00
Jobbing \$0.00
Retirement \$0.00
Removal \$0.00
Total (excl. Rets.) \$7,602,000.00
Credits \$0.00
Net \$7,602,000.00

Revision Info Other Updates

Revision 11 of 11
[Find Revision](#)
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Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate

Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates

Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates

Other:
Revision Comments
Released Dollars
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Record 1 of 1
Audits

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

D+T

US Sanction Paper

nationalgrid

Title:	Chase Hill Substation #155	Sanction Paper #:	USSC0408P36v7 AMIC PWS0930v6
Project #:	C024175, C024176, C030165, C030166, C034102, C036233, C036234	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	12/15/15
Author:	Michael Rook/Robert Schneller	Sponsor:	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	Project Manager:	Michael Rook

1 Executive Summary

1.1 Sanctioning Summary

This paper requests a sanction of C024175, C024176, C030165, C030166, C034102, C036233, and C036234 in the amount \$22.315M with a tolerance of +/-10% for the purposes of full implementation of the project.

This sanction amount is \$22.315M broken down into:

\$21.005M Capex

\$0.307M Opex

\$1.003M Removal

1.2 Project Summary

Facility loading and outage exposure concerns led to the initial development of this project which has distribution and transmission (both PTF and non-PTF) components. The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-feeder positions, and a 7.2 MVar 2-stage station capacitor bank in the town of Hopkinton, R.I. Four positions will be utilized immediately and the other will be used to facilitate future expansion. The station will be directly tapped from the 115 kV Line 1870S with four (4) new distribution feeders initially and will require the retirement/removal of the Ashaway and Hope Valley Substations.



US Sanction Paper

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C024175	D-Line	Chase Hill Substation	7.602
C024176	D-Sub	Chase Hill Substation	11.033
C030165	T-Line	Chase Hill Substation	1.415
C030166	T-Sub	Chase Hill Substation	1.815
C034102	D-Sub	Ashaway Retire	0.200
C036233	D-Sub	Hope Valley Retire	0.220
C036234	D-Line	Hope Valley Retire	0.030
Total			22.315

1.4 Associated Projects

Project Number	Project Title	Estimate Amount (\$M)
C036230	Langworthy Substation (D-Sub)	1.870
C036232	Langworthy Substation (D-Line)	0.128
Total		1.998

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
6/10/15	USSC0408P36v6 AMIC PWS0930v5	\$8.610M	\$19.717M	Chase Hill Substation #155	Partial Sanction	+/-10%
5-13-14	USSC0408P36v5 AMIC PWS0930v4	\$6.035M	\$19.72M	Chase Hill Substation #155	Partial Sanction	+/-10%
12/11/13	USSC0408P36v4 AMIC PWS0930v3	\$4.035M	\$29.07M	Chase Hill Substation Project	Partial Sanction	+/-10%
8/8/12	USSC0408P36v3 AMIC PWS0930v2	\$2.350M	\$23.216M	Hopkinton Substation Project		+/-25%
10/12/11	USSC1011PS407	\$1.300M	\$13.022M	Westerly Substation Flood Restoration	Partial Sanction	+/-25%



US Sanction Paper

1/4/09	AMIC PWS0939	\$0.350M	NA	New 115/13.2 Substation in Hopkinton, RI	PWS Re-Strategy	+/-10%
1/11/09	DCIG #0408P36	\$0.960M	\$9.019M	Hopkinton New Substation Installation	RE-Strategy	+/-10%
9/08	AMIC #SG103	\$0.133M	NA	Preliminary Engineering for New 115 kV Substation in Hopkinton, RI	Preliminary Works Sanction	+/-10%
9/08	AMIG #SG104	\$0.133	\$3.22M	Strategy to Build a 115 kV Substation in Hopkinton, RI	Strategy Paper	+/-10%
4/10/08	DCIG #0405P35	\$0.250M	NA	Hopkinton New Substation Installation	Strategy Paper	NA

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
6/19	Closure Paper



US Sanction Paper

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
<input type="radio"/> Mandatory	The construction of this substation relieves the load and improves reliability issues in the Hopkinton area.
<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: 36

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: 25

1.10 Process Hazard Assessment

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

☐ Yes ☒ No



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 (\$)
NE Dist. FY'16 – FY'20 Approved Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	\$4.855M
NE Transmission FY'16 – FY'20 Business Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	\$1.098M

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

1.13 Current Planning Horizon

\$M	Prior Yrs.	Current Planning Horizon						Total
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
		2015/16	2016/17	2017/18	2018/2019	2019/2020	0	
CapEx	3.197	3.110	10.910	2.282	2.281	0.020	0.000	21.800
OpEx	0.000	0.000	0.018	0.000	0.000	0.150	0.000	0.168
Removal	0.000	0.000	0.047	0.000	0.000	0.300	0.000	0.347
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.197	3.110	10.975	2.282	2.281	0.470	0.000	22.315

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start of Construction	September, 2015
Project Sanction	December, 2015
Station Construction Complete	September, 2016
Ready for Load	December, 2016
Complete D-Line Construction	September, 2018
Removal/Retirements of Hope Valley & Ashaway Substations	March, 2019
Project Closure	June, 2019

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1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	<input checked="" type="checkbox"/> Internal	<input 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

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

1	Receipt of Building Permit
2	Winter Weather Conditions
3	

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 checked="" type="radio"/> Neutral	<input type="radio"/> Positive	<input type="radio"/> Negative

US Sanction Paper



1.18 List References

1	Engineering Report – New Hopkinton Substation, Jan. 2008
2	Transmission Planning Study – Proposed Hopkinton Substation, Sept. 2008
3	Westerly Substation Flood Restoration – Sanction Paper
4	Technical Scope Document for Substations – Chase Hill #155, 7/31/13
5	Technical Scope Document 115 kV Line 1870S/1814 Loop for Chase Hill
6	Project Change Request DOC #PR.09.04.00A
7	Project Data Sheet (PDS) #815-10, 3-30-15

US Sanction Paper

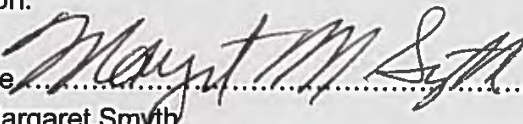
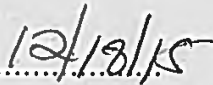


2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on 12/9/15:

(a) APPROVED this paper and the investment of \$22.315M and a tolerance of +/-10%

(b) NOTED that Michael Rook and Robert Schneller have the approved financial delegation.

Signature..........Date.....
Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee

US Sanction Paper



3 Sanction Paper Detail

Title:	Chase Hill Substation #155	Sanction Paper #:	USSC0408P36v7 AMIC PWS0930v6
Project #:	C024175, C024176, C030165, C030166, C034102, C036233, C036234	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	12/15/15
Author:	Michael Rook/Robert Schneller	Sponsor:	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	Project Manager:	Michael Rook

3.1 Background

The South County West (SCW) area encompasses the Rhode Island towns of Charlestown, Hopkinton, Richmond, Westerly and a section of South Kingstown. The SCW area has approximately 31,000 customers with a peak load of approximately 95MW. Six (6) substations supply the SCW area and combined supply twelve 12kV feeders and three 35kV lines. The 115kV system supplies a 35kV substation and a 12kV substation; the 35kV system supplies four 12kV substations. See attached one line diagrams for additional details.

The Hopkinton Substation Project originally comprised of Funding Projects C24175, C24176, C30165, C30166, C33050 and C34102 was funded with an approved DOA of \$1.310M. This original project included a new 115-12.47kV substation in the town of Hopkinton, RI, directly tapped from the 115 kV Line 1870S on a parcel owned in fee by The Narragansett Electric Company (NEC). A single 115-12.47 kV, 24/32/40 MVA LTC transformer, a 7.2 MVar 2-stage station capacitor bank at distribution voltage level, four (4) new distribution feeders were included as well as the retirement/removal of the Ashaway Substation.

Early investigations of the fee owned property for substation siting determined it to be zoned "residential" which would not permit substation construction. A zoning amendment petition submitted by NEC was subsequently denied and the Town of Hopkinton passed a new and more restrictive zoning ordinance for substations. NEC appealed to the RI PUC requesting an over-ride of the towns zoning ordinance. After several joint public meetings between the own, PUC and NG, the PUC issued an order requesting NG to investigate alternative town sites compliant with the new zoning ordinance. NG evaluated 20 potential zoning qualified sites, each of which had development issues from the town and/or NG perspectives. During this search, NG identified a parcel on Ashaway Rd. as a suitable substation site and although zoned

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residential was acceptable to the Town. A Town vote confirmed this approval and the two parties entered into a formal agreement.

During this siting effort a severe rainstorm/flood on March 30, 2010 resulted in the failure of the Westerly Substation in R.I. and a study of the effort was advanced. The study results indicated that in order to resolve the failure at Westerly Substation, the Hopkinton Substation would be fully built out (doubling its size), the Westerly Substation retired, and major improvements implemented at the Langworthy Substation in Westerly, R.I. A partial sanction for Hopkinton Substation Project was approved on 8/8/12 increasing the DOA funding from \$1.300M to \$2.350M to reflect this scope change and the substation given the formal name of "Chase Hill Substation #155".

On 12/11/13 a partial sanction was approved increasing the DOA from \$2.350M to \$4.035M for the advancement of the final design, wetland permit preparation, initiation of long lead equipment purchases and preliminary construction. Recently, a "Project Change Request" (Doc. #PR.09.04.00A) issued on 3/12/14 removed the Westerly work scope component from Chase Hill due to the distance to the load center which is reflected in this paper by \$9.3M cost reduction.

On 6/10/15 a partial sanction request of \$2.575M added to the previously approved \$6.035M brings the total DOA to \$8.610M with a tolerance of +/-10% for the overall Chase Hill #155 Substation Project. This request provided for the completion of design engineering, permitting, procurement of long lead equipment and preliminary construction activities.

3.2 Drivers

The construction of this substation relieves the load and improves reliability issues in the Hopkinton area. Chase Hill Substation will provide relief to the heavily loaded 35kV sub-transmission system and support the long term load growth in the area.

The South County West (SCW) area encompasses the Rhode Island Towns of Charlestown, Hopkinton, Richmond, Westerly and a section of South Kingstown. Six (6) substations supply the SCW area. Combined, these substations supply twelve 12kV feeders and three 35kV lines. The 115kV system supplies a 35kV substation and a 12kV substation; the 35kV system supplies four 12kV substations. See attached one line diagrams for additional details.

3.3 Project Description

The proposed Chase Hill Substation consists of constructing a new metal-clad substation on a newly acquired site on Ashaway Rd. in Hopkinton, R.I. The 115kV transmission circuit (1870S) Right-of-Way crosses through this property.



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The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-distribution feeder positions, and 7.2 MVAR 2-stage station capacitor bank in the town of Hopkinton, R.I. The station directly tapped from the 115 kV Line 1870S will initially have four (4) distribution feeders to relieve the heavily loaded Ashaway Substation feeder and other area feeders, the other four feeder positions will be used to facilitate future expansion. Refer to Figure 4.2.4 for a Station One-Line Diagram.

With the energization of the Chase Hill Substation, the Ashaway and Hope Valley substations are no longer needed. The load will be transferred to the new Chase Hill Substation and they will be retired and dismantled.

3.4 Benefits Summary

The recommended alternative relieves the load and improves reliability issues in the Hopkinton area. The Chase Hill Substation will provide relief to the heavily loaded 35kV sub-transmission system and support long-term load growth. In addition, this recommendation will benefit customer reliability by converting the area from "Phasing Group 3" to "Phasing Group 2" which will facilitate feeder ties with the rest of the system in southern Rhode Island.

3.5 Business and Customer Issues

There are no significant business issues beyond what has been described elsewhere.

3.6 Alternatives

The recommended Option: Develop the Chase Hill Substation to meet the current and future loads of the Hopkinton area.

In 2008, a new substation project in Hopkinton, RI was approved by both AMIC and DCIG. The purpose of the project is to provide load relief to the heavily loaded local 34.5 kV sub-transmission system and allowed for the retirement of Ashaway Substation. The options considered at that time other than the recommended alternative provide herein would either defer the project or reinforce and expand the existing 34.5kV and 12.47kV distribution systems. This expansion would further require replacement of the Wood River transformers and upgrading the supply lines a much more costly alternative resulting in the selection of the Hopkinton project.

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3.7 Safety, Environmental and Project Planning Issues

A formal and detailed Cutover Plan will be developed for the interconnection of the existing and newly installed feeders. This Plan will be developed during the Final Engineering and Design Phase.

Other required consents would include:

- Town Building Permit

There are environmental impacts associated with the construction of the substation. Specifically, a small stream crossing is required to accommodate the substation access road. To bridge this stream and minimize environmental impacts a pre-cast open bottom culvert is proposed to be installed. A vegetated buffer will be created between the substation and the nearby wetlands by planting native shrubs. This buffer will be extended in the final design to accommodate the Town's concerns to reduce the visual impact. Also, "Low Impact Development" techniques will be used to manage and improve the quality of the rain water runoff from the station's access driveway.

In addition, a noise study was conducted to determine the transformer to be specified for purchase so that the noise impact at the nearest abutter's residence is in an acceptable range. Finally, a Phase 1 Archeological Study was performed and approved. The report concluded that proposed substation in the area surveyed will have no effect on any significant cultural resources. However, during the site archeological survey, representatives of the Narragansett Indian Tribe Historical Preservation Office (NITHPO) observed a number of stone groupings within the central parcel area. These stone groupings have been identified and working in concert with the NITHPO, the substation facilities are laid out to avoid any interference with them.

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3.8 *Execution Risk Appraisal*



US Sanction Paper

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	Obtaining the required scheduled outage	2	2	2			Accept	Develop plan and increase communication between as scheduled outage approaches.	Construction delays may result from outage postponement.	Continue frequent communication until outage work is concluded.
2	Obtaining the proper distribution line easement rights or ability to enact existing rights.	3	1	2	6		Mitigate	Identify dedicated individual to address potential property issues immediately after Distribution Line design is completed.	Unable to acquire proper easements.	Circle back to design to determine potential alternate routes.
3	Material/equipment damaged during substation construction extending schedule.	1	2	2			Mitigate	Require contractor to provide site security and be responsible for potential damage.	Vandalism occurs.	Enhance security measures and expedite replacement of materials and/or equipment.
4	Weather conditions requiring cancellation of construction work for one or more days.	3	2	1			Mitigate	Work with contractor to find an acceptable solution based on longer work day hours or weekends	Weather predictability	Retain flexibility in work hours
5	Long Eared Bat added to Endangered List	1	1	1			Mitigate	Work with Fish & Wildlife to define work parameters.	Yearly Restrictions	Strictly adhere to agency guidelines
6	Design based on incorrect as-buils, maps, t-sheets or other records	2	2	1			Mitigate	Provide multiple document reviews.	Correcting constructed facilities	Revise review procedure

Total Risk \$: \$1M
Total Risk Wks: 8



US Sanction Paper

3.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration To Acquire Permit	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Building Permit	Certain	1 mo.	Need Initiated	1/16

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

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 \$3.944M. This is indicative only. The actual revenue requirement will be recovered through Regional Network Service (RNS) rate base.

3.10.3 CIAC / Reimbursement - N/A



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 +	
					2015/16	2016/17	2017/18	2018/2019	2019/2020	0	
C024175	Chase Hill Substation	+/-10%	CapEx	0.357	0.400	2.282	2.282	2.281	0.000	0.000	7.602
			OpEx	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	
			Total	0.357	0.400	2.282	2.282	2.281	0.000	0.000	7.602
C024176	Chase Hill Substation	+/-10%	CapEx	2.062	2.600	6.351	0.000	0.000	0.020	0.000	11.033
			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	2.062	2.600	6.351	0.000	0.000	0.020	0.000	11.033
C030165	Chase Hill Substation	+/-10%	CapEx	0.379	0.100	0.671	0.000	0.000	0.000	0.000	1.350
			OpEx	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.018
			Removal	0.000	0.000	0.047	0.000	0.000	0.000	0.000	0.047
			Total	0.379	0.100	0.936	0.000	0.000	0.000	0.000	1.415
C030166	Chase Hill Substation	+/-10%	CapEx	0.399	0.010	1.406	0.000	0.000	0.000	0.000	1.815
			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	0.399	0.010	1.406	0.000	0.000	0.000	0.000	1.815
C034102	Ashaway Retire	+/-10%	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.070	0.000	0.070
			Removal	0.000	0.000	0.000	0.000	0.000	0.130	0.000	0.130
			Total	0.000	0.000	0.000	0.000	0.000	0.200	0.000	0.200
C036233	Hope Valley Retire	+/-10%	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.070	0.000	0.070
			Removal	0.000	0.000	0.000	0.000	0.000	0.150	0.000	0.150
			Total	0.000	0.000	0.000	0.000	0.000	0.220	0.000	0.220
C036234	Hope Valley Retire	+/-10%	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.010
			Removal	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.020
			Total	0.000	0.000	0.000	0.000	0.000	0.030	0.000	0.030
Total Project Sanction			CapEx	3.197	3.110	10.910	2.282	2.281	0.020	0.000	21.800
			OpEx	0.000	0.000	0.018	0.000	0.000	0.150	0.000	0.168
			Removal	0.000	0.000	0.047	0.000	0.000	0.300	0.000	0.347
			Total	3.197	3.110	10.975	2.282	2.281	0.470	0.000	22.315



US Sanction Paper

3.11.2 Project Budget Summary Table

Distribution Project Costs per Business Plan

		Current Planning Horizon						
		Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +
	\$M	(Actual)	2015/16	2016/17	2017/18	2018/2019	2019/2020	0
CapEx		4.173	5.522	5.800	0.000	0.000	0.000	0.000
OpEx		0.000	0.428	0.412	0.000	0.000	0.000	0.000
Removal		0.537	0.544	0.044	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan		4.710	6.494	6.256	0.000	0.000	0.000	0.000
								Total
								15.495
								0.840
								1.125
								17.460

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
		Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +
	\$M	(Actual)	2015/16	2016/17	2017/18	2018/2019	2019/2020	0
CapEx		0.976	2.412	(5.110)	(2.282)	(2.281)	(0.020)	0.000
OpEx		0.000	0.428	0.394	0.000	0.000	(0.150)	0.000
Removal		0.537	0.544	(0.003)	0.000	0.000	(0.300)	0.000
Total Cost in Bus. Plan		1.513	3.384	(4.719)	(2.282)	(2.281)	(0.470)	0.000
								Total
								(6.305)
								0.672
								0.778
								(4.855)

Transmission Project Costs per Business Plan

		Current Planning Horizon						
		Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +
	\$M	(Actual)	2015/16	2016/17	2017/18	2018/2019	2019/2020	0
CapEx		1.751	0.734	0.620	0.000	0.000	0.000	0.000
OpEx		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
Total Cost in Bus. Plan		1.751	0.734	0.620	0.000	0.000	0.000	0.000
								Total
								3.105
								0.000
								0.000
								3.105

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
		Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +
	\$M	(Actual)	2015/16	2016/17	2017/18	2018/2019	2019/2020	0
CapEx		0.000	0.624	(1.657)	0.000	0.000		0.000
OpEx		0.000	0.000	(0.018)	0.000	0.000	0.000	0.000
Removal		0.000	0.000	(0.047)	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan		0.000	0.624	(1.722)	0.000	0.000	0.000	0.000
								Total
								(1.033)
								(0.018)
								(0.047)
								(1.098)



US Sanction Paper

3.11.3 Cost Assumptions

3.11.4 Net Present Value / Cost Benefit Analysis – Not Financially Driven

3.11.4.1 NPV Summary Table

Economic measures		5yr	10yr	20yr	Comment
NPV	@ Discount rate				
IRR					
MIRR					
Simple Payback in Years					
Total O&M					
Total Capital Investment					
Total Savings					

3.11.4.2 NPV Assumptions and Calculations

3.11.5 Additional Impacts - There are no additional impacts to be considered.

3.12 Statements of Support

3.12.1 Supporters

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

Area	Individual	Responsibility
Transmission NE	Michelle Park	Endorses relative to 5-year business plan or emergent work.
Dist. NE	Glen Diconza	Endorses relative to 5-year business plan or emergent work.
Distribution - New England	Anne Wyman	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Trans. Line & Substation - New England	Mark Phillips	Endorses Resources, cost estimate, schedule, and Portfolio Alignment

US Sanction Paper



Transmission Planning Projects	Kasia Kubacka	Endorses scope, design, conformance with design standards
Substations	Susan Martuscello	Endorses scope, design, conformance with design standards
Transmission & Sub-T Line	Mark Browne	Endorses scope, design, conformance with design standards
Protection & Telecom	Leonard Swanson	Endorses scope, design, conformance with design standards
Dist. Line and Sub. and Sub.-T Planning	Alan Labarre	Endorses scope, design, conformance with design standards
T&D Line NE	Andrew Schneller	Endorses resource, cost estimate and schedule

3.12.2 Reviewers

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

Function	Individual
Finance	Keith Fowler and Phillip Horowitz
Regulatory	Peter Zschokke
Jurisdictional Delegate	Carol Sedewitz
Jurisdictional Delegate	Jim Patterson
Procurement	Art Curran
New England Regional CC	Michael Gallagher
NE Transmission Regional CC	Will Houston

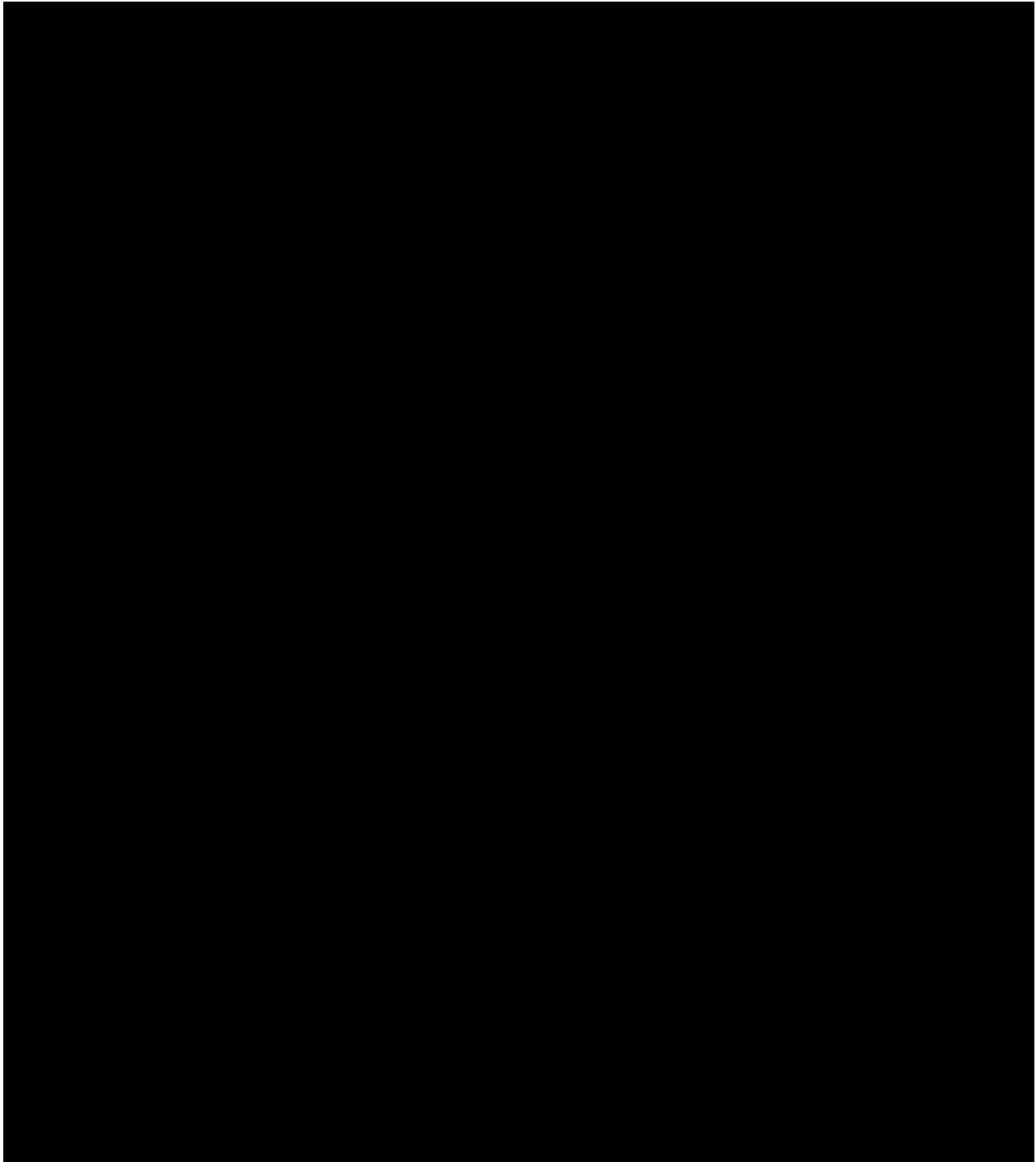
4 Appendices

4.1 Sanction Request Breakdown by Project - NA

US Sanction Paper



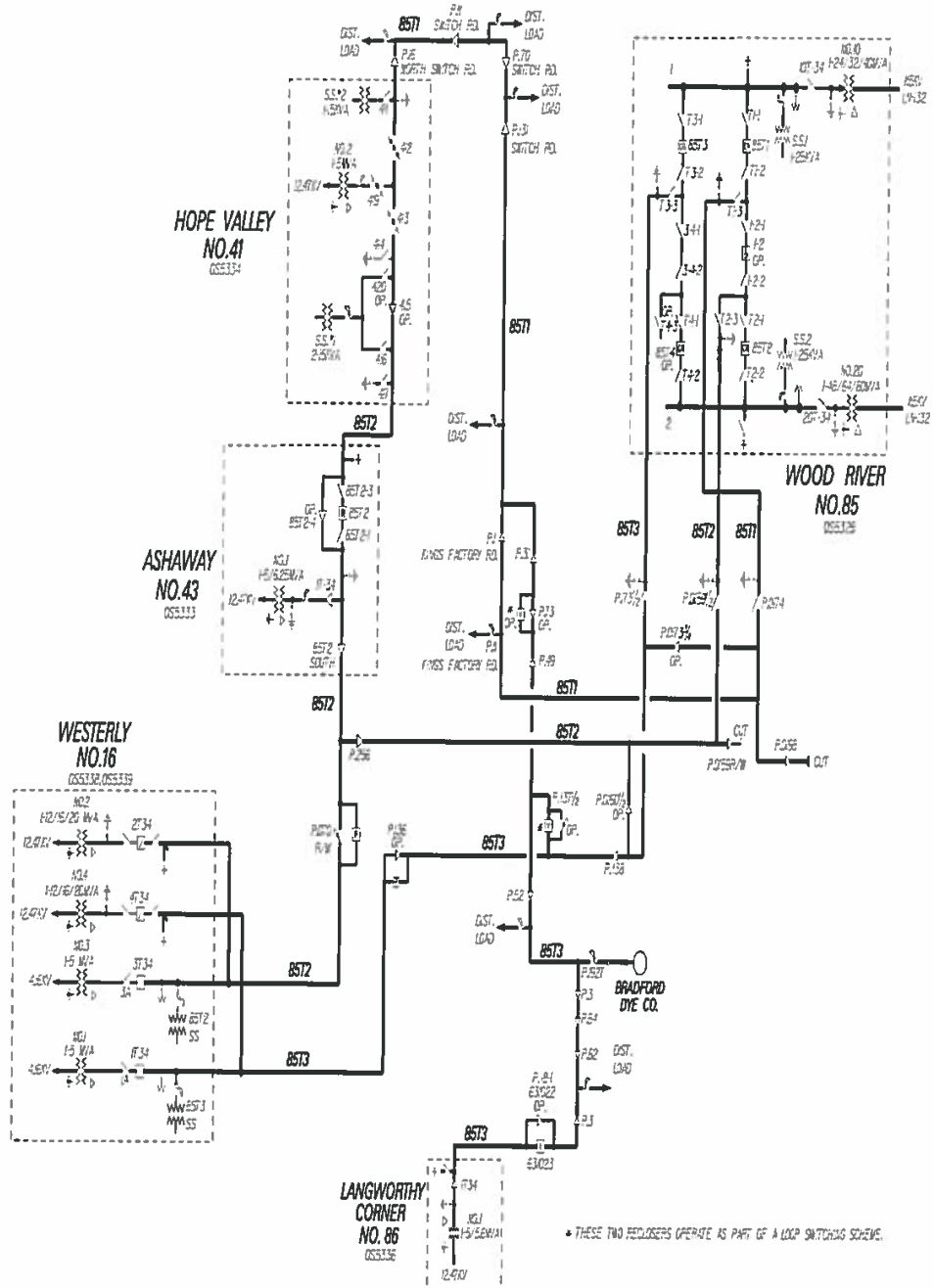
4.2 Other Appendices



US Sanction Paper



4.2.2 One Line Diagram: 34.5kV Lines 85T1, 85T2, & 5T3



34.5KV LINES 85T1, 85T2 & 85T3
OCEAN STATE DIVISION

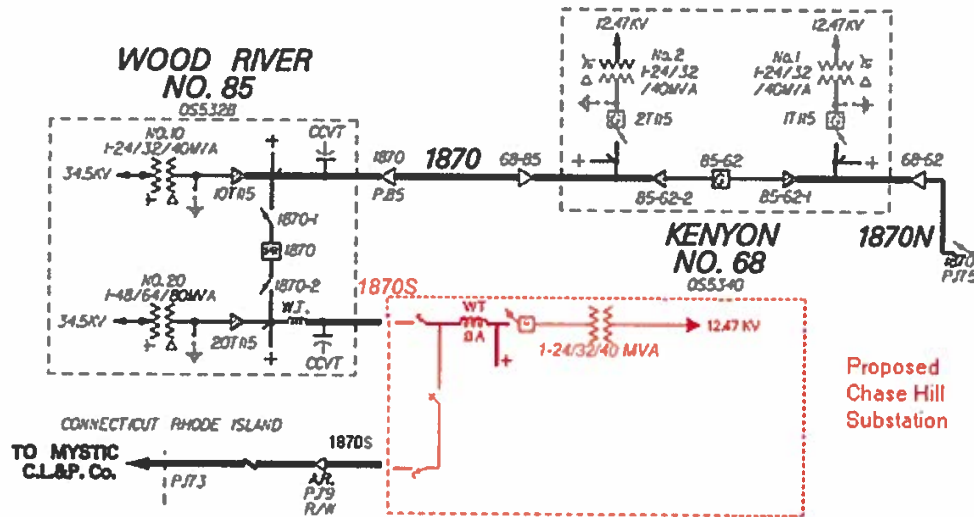
LND-3401

#0108

US Sanction Paper

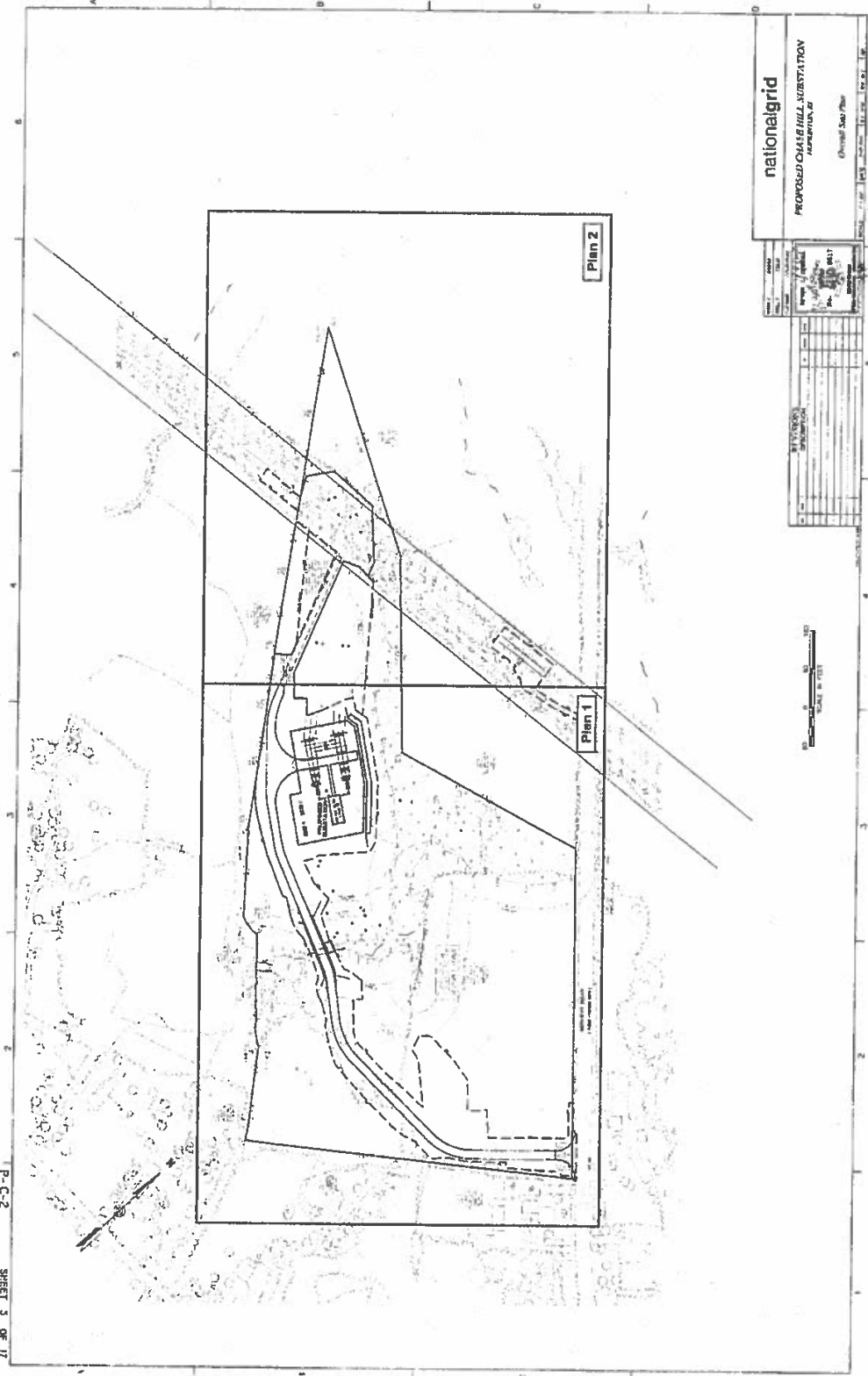


4.2.3 One Line Diagram with Chase Hill (Hope Valley & Ashaway Retirements):



nationalgrid

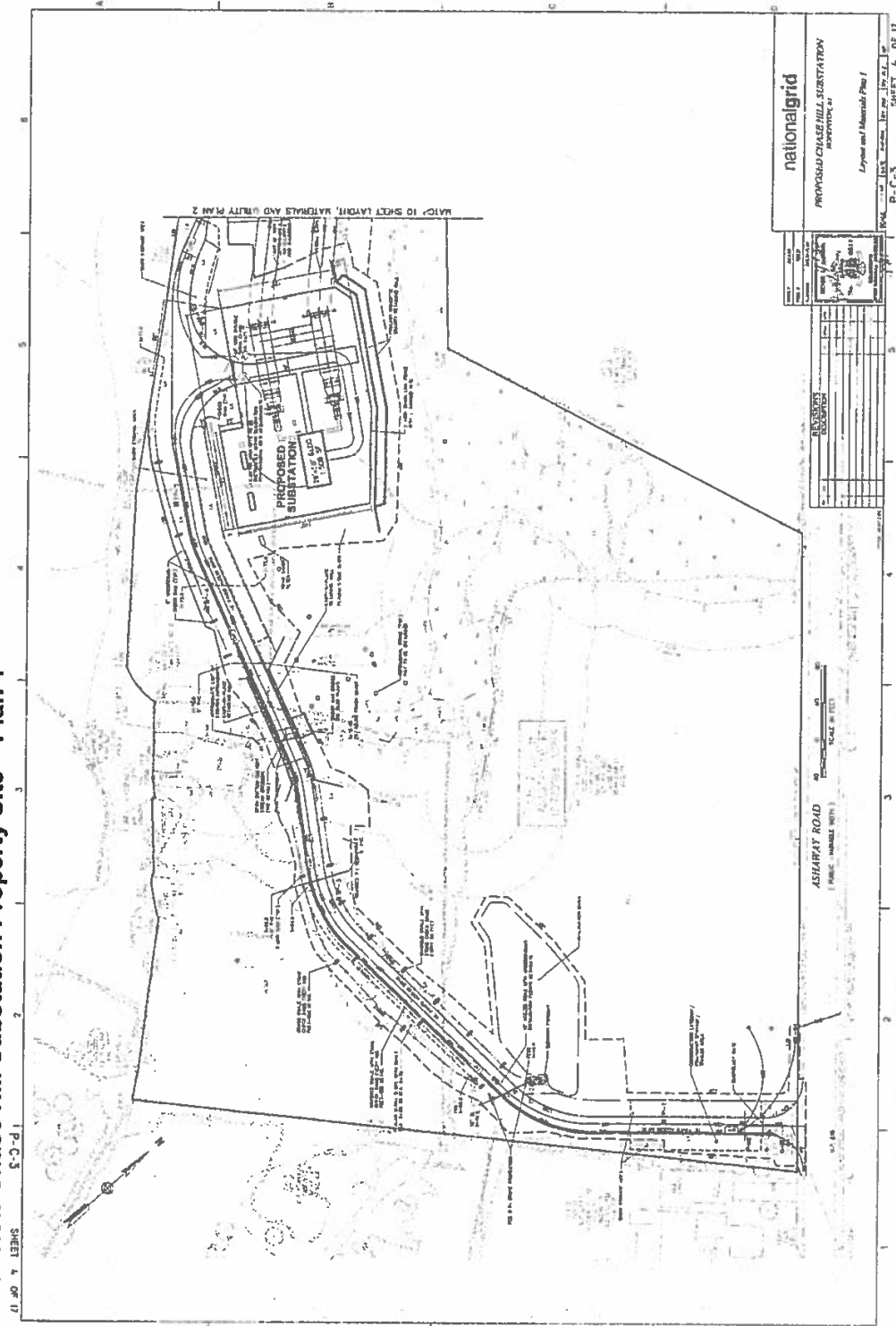
4.2.5 New Chase Hill Substation Property Site (Plan1 & 2)



nationalgrid

US Sanction Paper

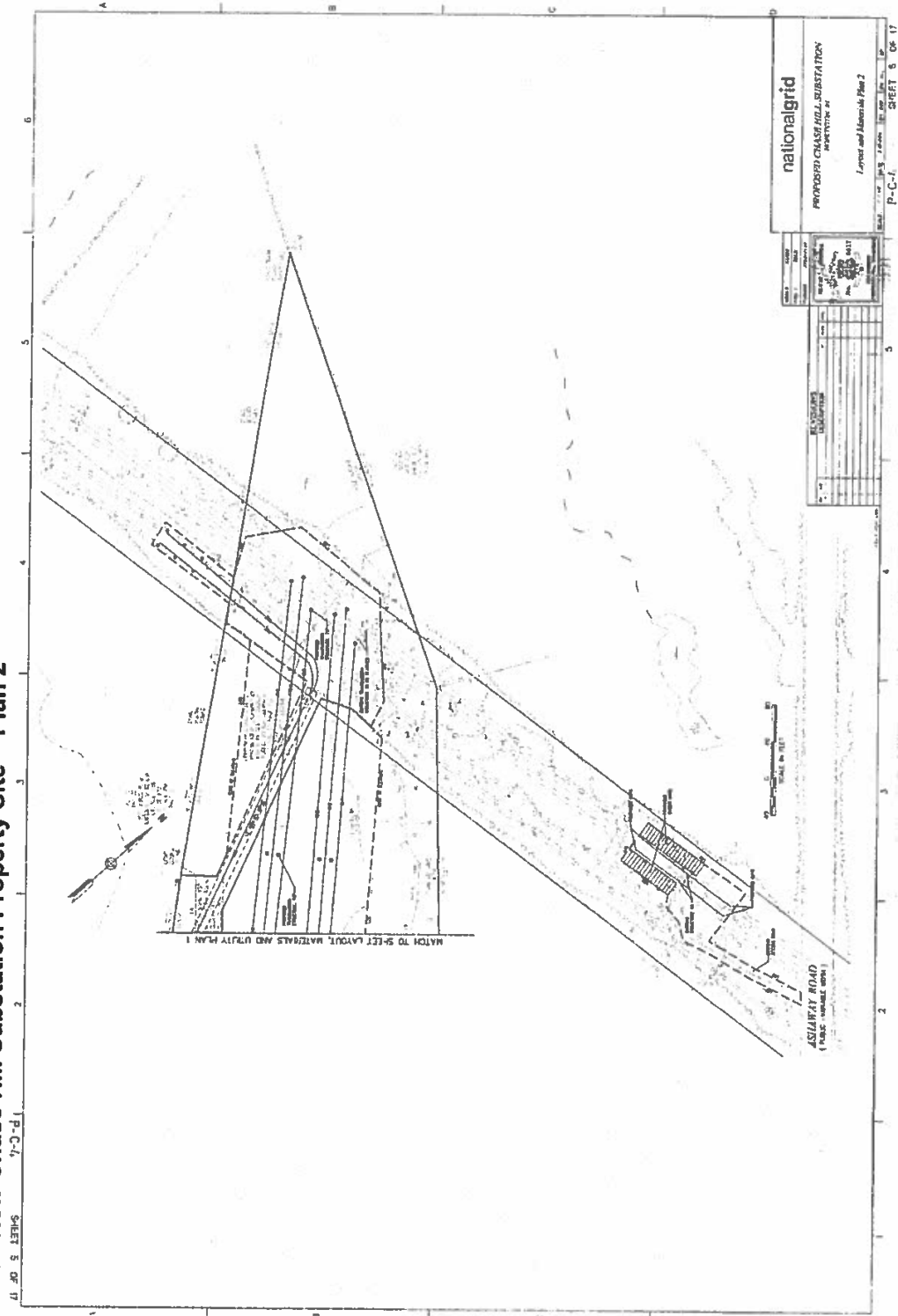
4.2.6 New Chase Hill Substation Property Site – Plan 1



nationalgrid

US Sanction Paper

4.2.7 New Chase Hill Substation Property Site – Plan 2



US Sanction Paper



4.3 *NPV Summary - Not Applicable*

4.4 *Customer Outreach Plan*

A customer outreach effort was conducted on a limited scope prior to the Hopkinton Town meeting principally for the abutters of the proposed site of the substation. Project Status meetings with Town officials have been conducted monthly from construction start and will continue through the end of the Project.

D+T

US Sanction Paper



Title:	Chase Hill Substation #155	Sanction Paper #:	USSC0408P36v7 AMIC PWS0930v6
Project #:	C024175, C024176, C030165, C030166, C034102, C036233, C036234	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	12/15/15
Author:	Michael Rook/Robert Schneller	Sponsor:	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	Project Manager:	Michael Rook

1 Executive Summary

1.1 Sanctioning Summary

This paper requests a sanction of C024175, C024176, C030165, C030166, C034102, C036233, and C036234 in the amount \$22.315M with a tolerance of +/-10% for the purposes of full implementation of the project.

This sanction amount is \$22.315M broken down into:

*\$21.005M Capex
\$0.307M Opex
\$1.003M Removal*

1.2 Project Summary

Facility loading and outage exposure concerns led to the initial development of this project which has distribution and transmission (both PTF and non-PTF) components. The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-feeder positions, and a 7.2 MVAR 2-stage station capacitor bank in the town of Hopkinton, R.I. Four positions will be utilized immediately and the other will be used to facilitate future expansion. The station will be directly tapped from the 115 kV Line 1870S with four (4) new distribution feeders initially and will require the retirement/removal of the Ashaway and Hope Valley Substations.



US Sanction Paper

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C024175	D-Line	Chase Hill Substation	7.602
C024176	D-Sub	Chase Hill Substation	11.033
C030165	T-Line	Chase Hill Substation	1.415
C030166	T-Sub	Chase Hill Substation	1.815
C034102	D-Sub	Ashaway Retire	0.200
C036233	D-Sub	Hope Valley Retire	0.220
C036234	D-Line	Hope Valley Retire	0.030
Total			22.315

1.4 Associated Projects

Project Number	Project Title	Estimate Amount (\$M)
C036230	Langworthy Substation (D-Sub)	1.870
C036232	Langworthy Substation (D-Line)	0.128
Total		1.998

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
6/10/15	USSC0408P36v6 AMIC PWS0930v5	\$8.610M	\$19.717M	Chase Hill Substation #155	Partial Sanction	+/-10%
5-13-14	USSC0408P36v5 AMIC PWS0930v4	\$6.035M	\$19.72M	Chase Hill Substation #155	Partial Sanction	+/-10%
12/11/13	USSC0408P36v4 AMIC PWS0930v3	\$4.035M	\$29.07M	Chase Hill Substation Project	Partial Sanction	+/-10%
8/8/12	USSC0408P36v3 AMIC PWS0930v2	\$2.350M	\$23.216M	Hopkinton Substation Project		+/-25%
10/12/11	USSC1011PS407	\$1.300M	\$13.022M	Westerly Substation Flood Restoration	Partial Sanction	+/-25%

US Sanction Paper



2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on 12/9/15:

(a) APPROVED this paper and the investment of \$22.315M and a tolerance of +/-10%

(b) NOTED that Michael Rook and Robert Schneller have the approved financial delegation.

Signature Margaret M Smyth Date 12/18/15

Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee

C024176

Chase Hill Sub (D-Sub)

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C024176</u>	USSC #: <u>USSC0408P36v7/AMICPW</u>
Revision: <u>11</u>	Budget Version: <u>Default</u>
Project Title: <u>Chase Hill Sub (D-Sub)</u>	
Project Description: New Hopkinton substation with 1-40MVA LTC transformer and 3-feeders.	

Project Status: <u>open</u>	
Responsible Person: <u>BOYLE, RICHARD</u>	Initiator: <u>Vaz, Jack P</u>
Spending Rationale: <u>System Capacity & Performance</u>	Funding Type: <u>P Electric Distribution Sub RI</u>
Budget Class: <u>Load Relief</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>36</u>	Project Complexity Score: <u>25</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>											
Est Start Date: <u>4/1/2008</u>	Est Complete Date: <u>6/30/2019</u>										
Est In-Service Date: <u>3/31/2019</u>											
TTD Actuals: <u>\$10,385,955</u>	As Of: <u>10/2/2017</u>										
Cost Breakdown	<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;"><u>Capital</u></th> <th style="text-align: left;"><u>Expense</u></th> <th style="text-align: left;"><u>Removal</u></th> <th style="text-align: left;"><u>Total</u></th> <th style="text-align: left;"><u>Credits</u></th> </tr> <tr> <td><u>\$11,033,000</u></td> <td><u>\$0</u></td> <td><u>\$0</u></td> <td><u>\$11,033,000</u></td> <td><u>\$0</u></td> </tr> </table>	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>	<u>\$11,033,000</u>	<u>\$0</u>	<u>\$0</u>	<u>\$11,033,000</u>	<u>\$0</u>
<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>							
<u>\$11,033,000</u>	<u>\$0</u>	<u>\$0</u>	<u>\$11,033,000</u>	<u>\$0</u>							

Justification / Risk Identification:

Loading on four feeders and one transformer in the South County West area is projected to exceed SN capability and peak contingency loading on the two Westerly transformers and the Wood River T10 transformer is projected at 140% of SE capability. To address normal and contingency loading concerns in this area, the 2007 Annual Plan identified the need for a new substation in Hopkinton.

Project Scope:

Permit, engineer and design a new 115-13.2kV substation on NGRID owned land off 115kV right of way in Hopkinton, RI. The substation equipment will consist of:

- A 115kV circuit switcher,
- A 115 13.2kV 24/32/40 MVA LTC transformer,
- A 5 feeders position metal clad switchgear, breakers, and

Project Alternatives Considered:

<Enter data here>

Additional Notes:

PPM 3303 \$710K; PPM3304 \$1.235M; PPM11971 \$10K; PPM 11972 \$10K; PPM 11975 \$10K; PPM 3714 \$10K;
(Trans C30165 \$130K; C30166 \$235K)

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>12/21/2015 19:09:36</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C024176 Current Total Authorized Amount: \$11,0...

Title Chase Hill Sub (D-Sub)
Project Number C024176

Budget Version Default (active)
Revision v7
Revision Status Approved
Revision No. 11
Est Start Date 04/01/2008
Est Complete Date 06/30/2019
Est In Srvc Date 03/31/2019
Capital \$11,033,000.00
Expense \$0.00
Jobbing \$0.00
Retirement \$0.00
Removal \$0.00
Total (excl. Rets.) \$11,033,000.00
Credits \$0.00
Net \$11,033,000.00

Revision Info Other Updates

Revision 11 of 11
[Find Revision](#)
☐ Show 'Budget Only' Revisions

Spending Estimates:
Grid Estimates
Forecast
Summarize from WO
Copy Estimate

Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates

Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates

Other:
Revision Comments
Released Dollars
Substitution
Slide

Version Compare

Record 1 of 1

Audits

Close

Send for Approval

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

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US Sanction Paper

Title:	Chase Hill Substation #155	Sanction Paper #:	USSC0408P36v7 AMIC PWS0930v6
Project #:	C024175, C024176, C030165, C030166, C034102, C036233, C036234	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	12/15/15
Author:	Michael Rook/Robert Schneller	Sponsor:	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	Project Manager:	Michael Rook

1 Executive Summary

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This paper requests a sanction of C024175, C024176, C030165, C030166, C034102, C036233, and C036234 in the amount \$22.315M with a tolerance of +/-10% for the purposes of full implementation of the project.

This sanction amount is \$22.315M broken down into:

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\$0.307M Opex

\$1.003M Removal

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US Sanction Paper

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8/8/12	USSC0408P36v3 AMIC PWS0930v2	\$2.350M	\$23.216M	Hopkinton Substation Project		+/-25%
10/12/11	USSC1011PS407	\$1.300M	\$13.022M	Westerly Substation Flood Restoration	Partial Sanction	+/-25%



US Sanction Paper

1/4/09	AMIC PWS0939	\$0.350M	NA	New 115/13.2 Substation in Hopkinton, RI	PWS Re-Strategy	+/-10%
1/11/09	DCIG #0408P36	\$0.960M	\$9.019M	Hopkinton New Substation Installation	RE-Strategy	+/-10%
9/08	AMIC #SG103	\$0.133M	NA	Preliminary Engineering for New 115 kV Substation in Hopkinton, RI	Preliminary Works Sanction	+/-10%
9/08	AMIG #SG104	\$0.133	\$3.22M	Strategy to Build a 115 kV Substation in Hopkinton, RI	Strategy Paper	+/-10%
4/10/08	DCIG #0405P35	\$0.250M	NA	Hopkinton New Substation Installation	Strategy Paper	NA

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
6/19	Closure Paper



US Sanction Paper

1.7 Category

Category	Reference to Mandate, Policy, NPV, or Other
<input type="radio"/> Mandatory	The construction of this substation relieves the load and improves reliability issues in the Hopkinton area.
<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: 36

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: 25

1.10 Process Hazard Assessment

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

☐ Yes ☒ No



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 (\$)
NE Dist. FY'16 – FY'20 Approved Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	\$4.855M
NE Transmission FY'16 – FY'20 Business Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	\$1.098M

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

1.13 Current Planning Horizon

\$M	Prior Yrs.	Current Planning Horizon						Total
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
		2015/16	2016/17	2017/18	2018/2019	2019/2020	0	
CapEx	3.197	3.110	10.910	2.282	2.281	0.020	0.000	21.800
OpEx	0.000	0.000	0.018	0.000	0.000	0.150	0.000	0.168
Removal	0.000	0.000	0.047	0.000	0.000	0.300	0.000	0.347
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.197	3.110	10.975	2.282	2.281	0.470	0.000	22.315

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start of Construction	September, 2015
Project Sanction	December, 2015
Station Construction Complete	September, 2016
Ready for Load	December, 2016
Complete D-Line Construction	September, 2018
Removal/Retirements of Hope Valley & Ashaway Substations	March, 2019
Project Closure	June, 2019

US Sanction Paper



1.15 Resources, Operations and Procurement

Resource Sourcing			
Engineering & Design Resources to be provided	<input checked="" type="checkbox"/> Internal	<input 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

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

1	Receipt of Building Permit
2	Winter Weather Conditions
3	

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 checked="" type="radio"/> Neutral	<input type="radio"/> Positive	<input type="radio"/> Negative

US Sanction Paper



1.18 List References

1	Engineering Report – New Hopkinton Substation, Jan. 2008
2	Transmission Planning Study – Proposed Hopkinton Substation, Sept. 2008
3	Westerly Substation Flood Restoration – Sanction Paper
4	Technical Scope Document for Substations – Chase Hill #155, 7/31/13
5	Technical Scope Document 115 kV Line 1870S/1814 Loop for Chase Hill
6	Project Change Request DOC #PR.09.04.00A
7	Project Data Sheet (PDS) #815-10, 3-30-15

US Sanction Paper

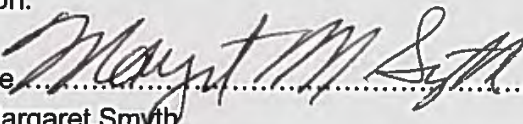
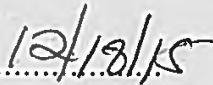


2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on 12/9/15:

(a) APPROVED this paper and the investment of \$22.315M and a tolerance of +/-10%

(b) NOTED that Michael Rook and Robert Schneller have the approved financial delegation.

Signature..........Date.....
Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee

US Sanction Paper



3 Sanction Paper Detail

Title:	Chase Hill Substation #155	Sanction Paper #:	USSC0408P36v7 AMIC PWS0930v6
Project #:	C024175, C024176, C030165, C030166, C034102, C036233, C036234	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	12/15/15
Author:	Michael Rook/Robert Schneller	Sponsor:	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	Project Manager:	Michael Rook

3.1 Background

The South County West (SCW) area encompasses the Rhode Island towns of Charlestown, Hopkinton, Richmond, Westerly and a section of South Kingstown. The SCW area has approximately 31,000 customers with a peak load of approximately 95MW. Six (6) substations supply the SCW area and combined supply twelve 12kV feeders and three 35kV lines. The 115kV system supplies a 35kV substation and a 12kV substation; the 35kV system supplies four 12kV substations. See attached one line diagrams for additional details.

The Hopkinton Substation Project originally comprised of Funding Projects C24175, C24176, C30165, C30166, C33050 and C34102 was funded with an approved DOA of \$1.310M. This original project included a new 115-12.47kV substation in the town of Hopkinton, RI, directly tapped from the 115 kV Line 1870S on a parcel owned in fee by The Narragansett Electric Company (NEC). A single 115-12.47 kV, 24/32/40 MVA LTC transformer, a 7.2 MVar 2-stage station capacitor bank at distribution voltage level, four (4) new distribution feeders were included as well as the retirement/removal of the Ashaway Substation.

Early investigations of the fee owned property for substation siting determined it to be zoned "residential" which would not permit substation construction. A zoning amendment petition submitted by NEC was subsequently denied and the Town of Hopkinton passed a new and more restrictive zoning ordinance for substations. NEC appealed to the RI PUC requesting an over-ride of the towns zoning ordinance. After several joint public meetings between the own, PUC and NG, the PUC issued an order requesting NG to investigate alternative town sites compliant with the new zoning ordinance. NG evaluated 20 potential zoning qualified sites, each of which had development issues from the town and/or NG perspectives. During this search, NG identified a parcel on Ashaway Rd. as a suitable substation site and although zoned

US Sanction Paper



residential was acceptable to the Town. A Town vote confirmed this approval and the two parties entered into a formal agreement.

During this siting effort a severe rainstorm/flood on March 30, 2010 resulted in the failure of the Westerly Substation in R.I. and a study of the effort was advanced. The study results indicated that in order to resolve the failure at Westerly Substation, the Hopkinton Substation would be fully built out (doubling its size), the Westerly Substation retired, and major improvements implemented at the Langworthy Substation in Westerly, R.I. A partial sanction for Hopkinton Substation Project was approved on 8/8/12 increasing the DOA funding from \$1.300M to \$2.350M to reflect this scope change and the substation given the formal name of "Chase Hill Substation #155".

On 12/11/13 a partial sanction was approved increasing the DOA from \$2.350M to \$4.035M for the advancement of the final design, wetland permit preparation, initiation of long lead equipment purchases and preliminary construction. Recently, a "Project Change Request" (Doc. #PR.09.04.00A) issued on 3/12/14 removed the Westerly work scope component from Chase Hill due to the distance to the load center which is reflected in this paper by \$9.3M cost reduction.

On 6/10/15 a partial sanction request of \$2.575M added to the previously approved \$6.035M brings the total DOA to \$8.610M with a tolerance of +/-10% for the overall Chase Hill #155 Substation Project. This request provided for the completion of design engineering, permitting, procurement of long lead equipment and preliminary construction activities.

3.2 Drivers

The construction of this substation relieves the load and improves reliability issues in the Hopkinton area. Chase Hill Substation will provide relief to the heavily loaded 35kV sub-transmission system and support the long term load growth in the area.

The South County West (SCW) area encompasses the Rhode Island Towns of Charlestown, Hopkinton, Richmond, Westerly and a section of South Kingstown. Six (6) substations supply the SCW area. Combined, these substations supply twelve 12kV feeders and three 35kV lines. The 115kV system supplies a 35kV substation and a 12kV substation; the 35kV system supplies four 12kV substations. See attached one line diagrams for additional details.

3.3 Project Description

The proposed Chase Hill Substation consists of constructing a new metal-clad substation on a newly acquired site on Ashaway Rd. in Hopkinton, R.I. The 115kV transmission circuit (1870S) Right-of-Way crosses through this property.



US Sanction Paper

The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-distribution feeder positions, and 7.2 MVAR 2-stage station capacitor bank in the town of Hopkinton, R.I. The station directly tapped from the 115 kV Line 1870S will initially have four (4) distribution feeders to relieve the heavily loaded Ashaway Substation feeder and other area feeders, the other four feeder positions will be used to facilitate future expansion. Refer to Figure 4.2.4 for a Station One-Line Diagram.

With the energization of the Chase Hill Substation, the Ashaway and Hope Valley substations are no longer needed. The load will be transferred to the new Chase Hill Substation and they will be retired and dismantled.

3.4 Benefits Summary

The recommended alternative relieves the load and improves reliability issues in the Hopkinton area. The Chase Hill Substation will provide relief to the heavily loaded 35kV sub-transmission system and support long-term load growth. In addition, this recommendation will benefit customer reliability by converting the area from "Phasing Group 3" to "Phasing Group 2" which will facilitate feeder ties with the rest of the system in southern Rhode Island.

3.5 Business and Customer Issues

There are no significant business issues beyond what has been described elsewhere.

3.6 Alternatives

The recommended Option: Develop the Chase Hill Substation to meet the current and future loads of the Hopkinton area.

In 2008, a new substation project in Hopkinton, RI was approved by both AMIC and DCIG. The purpose of the project is to provide load relief to the heavily loaded local 34.5 kV sub-transmission system and allowed for the retirement of Ashaway Substation. The options considered at that time other than the recommended alternative provide herein would either defer the project or reinforce and expand the existing 34.5kV and 12.47kV distribution systems. This expansion would further require replacement of the Wood River transformers and upgrading the supply lines a much more costly alternative resulting in the selection of the Hopkinton project.

US Sanction Paper



3.7 Safety, Environmental and Project Planning Issues

A formal and detailed Cutover Plan will be developed for the interconnection of the existing and newly installed feeders. This Plan will be developed during the Final Engineering and Design Phase.

Other required consents would include:

- Town Building Permit

There are environmental impacts associated with the construction of the substation. Specifically, a small stream crossing is required to accommodate the substation access road. To bridge this stream and minimize environmental impacts a pre-cast open bottom culvert is proposed to be installed. A vegetated buffer will be created between the substation and the nearby wetlands by planting native shrubs. This buffer will be extended in the final design to accommodate the Town's concerns to reduce the visual impact. Also, "Low Impact Development" techniques will be used to manage and improve the quality of the rain water runoff from the station's access driveway.

In addition, a noise study was conducted to determine the transformer to be specified for purchase so that the noise impact at the nearest abutter's residence is in an acceptable range. Finally, a Phase 1 Archeological Study was performed and approved. The report concluded that proposed substation in the area surveyed will have no effect on any significant cultural resources. However, during the site archeological survey, representatives of the Narragansett Indian Tribe Historical Preservation Office (NITHPO) observed a number of stone groupings within the central parcel area. These stone groupings have been identified and working in concert with the NITHPO, the substation facilities are laid out to avoid any interference with them.

US Sanction Paper



3.8 *Execution Risk Appraisal*

US Sanction Paper



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	Obtaining the required scheduled outage	2	2	2			Accept	Develop plan and increase communication between as scheduled outage approaches.	Construction delays may result from outage postponement.	Continue frequent communication until outage work is concluded.
2	Obtaining the proper distribution line easement rights or ability to enact existing rights.	3	1	2	6		Mitigate	Identify dedicated individual to address potential property issues immediately after Distribution Line design is completed.	Unable to acquire proper easements.	Circle back to design to determine potential alternate routes.
3	Material/equipment damaged during substation construction extending schedule.	1	2	2			Mitigate	Require contractor to provide site security and be responsible for potential damage.	Vandalism occurs.	Enhance security measures and expedite replacement of materials and/or equipment.
4	Weather conditions requiring cancellation of construction work for one or more days.	3	2	1			Mitigate	Work with contractor to find an acceptable solution based on longer work day hours or weekends	Weather predictability	Retain flexibility in work hours
5	Long Eared Bat added to Endangered List	1	1	1			Mitigate	Work with Fish & Wildlife to define work parameters.	Yearly Restrictions	Strictly adhere to agency guidelines
6	Design based on incorrect as-buils, maps, t-sheets or other records	2	2	1			Mitigate	Provide multiple document reviews.	Correcting constructed facilities	Revise review procedure

Total Risk \$: \$1M
Total Risk Wks: 8



US Sanction Paper

3.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration To Acquire Permit	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Building Permit	Certain	1 mo.	Need Initiated	1/16

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

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 \$3.944M. This is indicative only. The actual revenue requirement will be recovered through Regional Network Service (RNS) rate base.

3.10.3 CIAC / Reimbursement - N/A



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 +	
					2015/16	2016/17	2017/18	2018/2019	2019/2020	0	
C024175	Chase Hill Substation	+/-10%	CapEx	0.357	0.400	2.282	2.282	2.281	0.000	0.000	7.602
			OpEx	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	
			Total	0.357	0.400	2.282	2.282	2.281	0.000	0.000	7.602
C024176	Chase Hill Substation	+/-10%	CapEx	2.062	2.600	6.351	0.000	0.000	0.020	0.000	11.033
			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	2.062	2.600	6.351	0.000	0.000	0.020	0.000	11.033
C030165	Chase Hill Substation	+/-10%	CapEx	0.379	0.100	0.671	0.000	0.000	0.000	0.000	1.350
			OpEx	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.018
			Removal	0.000	0.000	0.047	0.000	0.000	0.000	0.000	0.047
			Total	0.379	0.100	0.936	0.000	0.000	0.000	0.000	1.415
C030166	Chase Hill Substation	+/-10%	CapEx	0.399	0.010	1.406	0.000	0.000	0.000	0.000	1.815
			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	0.399	0.010	1.406	0.000	0.000	0.000	0.000	1.815
C034102	Ashaway Retire	+/-10%	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.070	0.000	0.070
			Removal	0.000	0.000	0.000	0.000	0.000	0.130	0.000	0.130
			Total	0.000	0.000	0.000	0.000	0.000	0.200	0.000	0.200
C036233	Hope Valley Retire	+/-10%	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.070	0.000	0.070
			Removal	0.000	0.000	0.000	0.000	0.000	0.150	0.000	0.150
			Total	0.000	0.000	0.000	0.000	0.000	0.220	0.000	0.220
C036234	Hope Valley Retire	+/-10%	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.010
			Removal	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.020
			Total	0.000	0.000	0.000	0.000	0.000	0.030	0.000	0.030
Total Project Sanction			CapEx	3.197	3.110	10.910	2.282	2.281	0.020	0.000	21.800
			OpEx	0.000	0.000	0.018	0.000	0.000	0.150	0.000	0.168
			Removal	0.000	0.000	0.047	0.000	0.000	0.300	0.000	0.347
			Total	3.197	3.110	10.975	2.282	2.281	0.470	0.000	22.315



US Sanction Paper

3.11.2 Project Budget Summary Table

Distribution Project Costs per Business Plan

		Current Planning Horizon						
		Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +
	\$M	(Actual)	2015/16	2016/17	2017/18	2018/2019	2019/2020	0
CapEx		4.173	5.522	5.800	0.000	0.000	0.000	0.000
OpEx		0.000	0.428	0.412	0.000	0.000	0.000	0.000
Removal		0.537	0.544	0.044	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan		4.710	6.494	6.256	0.000	0.000	0.000	0.000
								Total
								15.495
								0.840
								1.125
								17.460

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
		Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +
	\$M	(Actual)	2015/16	2016/17	2017/18	2018/2019	2019/2020	0
CapEx		0.976	2.412	(5.110)	(2.282)	(2.281)	(0.020)	0.000
OpEx		0.000	0.428	0.394	0.000	0.000	(0.150)	0.000
Removal		0.537	0.544	(0.003)	0.000	0.000	(0.300)	0.000
Total Cost in Bus. Plan		1.513	3.384	(4.719)	(2.282)	(2.281)	(0.470)	0.000
								Total
								(6.305)
								0.672
								0.778
								(4.855)

Transmission Project Costs per Business Plan

		Current Planning Horizon						
		Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +
	\$M	(Actual)	2015/16	2016/17	2017/18	2018/2019	2019/2020	0
CapEx		1.751	0.734	0.620	0.000	0.000	0.000	0.000
OpEx		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
Total Cost in Bus. Plan		1.751	0.734	0.620	0.000	0.000	0.000	0.000
								Total
								3.105
								0.000
								0.000
								3.105

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
		Prior Yrs	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +
	\$M	(Actual)	2015/16	2016/17	2017/18	2018/2019	2019/2020	0
CapEx		0.000	0.624	(1.657)	0.000	0.000		0.000
OpEx		0.000	0.000	(0.018)	0.000	0.000	0.000	0.000
Removal		0.000	0.000	(0.047)	0.000	0.000	0.000	0.000
Total Cost in Bus. Plan		0.000	0.624	(1.722)	0.000	0.000	0.000	0.000
								Total
								(1.033)
								(0.018)
								(0.047)
								(1.098)



US Sanction Paper

3.11.3 Cost Assumptions

3.11.4 Net Present Value / Cost Benefit Analysis – Not Financially Driven

3.11.4.1 NPV Summary Table

Economic measures		5yr	10yr	20yr	Comment
NPV	@ Discount rate				
IRR					
MIRR					
Simple Payback in Years					
Total O&M					
Total Capital Investment					
Total Savings					

3.11.4.2 NPV Assumptions and Calculations

3.11.5 Additional Impacts - There are no additional impacts to be considered.

3.12 Statements of Support

3.12.1 Supporters

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

Area	Individual	Responsibility
Transmission NE	Michelle Park	Endorses relative to 5-year business plan or emergent work.
Dist. NE	Glen Diconza	Endorses relative to 5-year business plan or emergent work.
Distribution - New England	Anne Wyman	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Trans. Line & Substation - New England	Mark Phillips	Endorses Resources, cost estimate, schedule, and Portfolio Alignment



US Sanction Paper

Transmission Planning Projects	Kasia Kubacka	Endorses scope, design, conformance with design standards
Substations	Susan Martuscello	Endorses scope, design, conformance with design standards
Transmission & Sub-T Line	Mark Browne	Endorses scope, design, conformance with design standards
Protection & Telecom	Leonard Swanson	Endorses scope, design, conformance with design standards
Dist. Line and Sub. and Sub.-T Planning	Alan Labarre	Endorses scope, design, conformance with design standards
T&D Line NE	Andrew Schneller	Endorses resource, cost estimate and schedule

3.12.2 Reviewers

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

Function	Individual
Finance	Keith Fowler and Phillip Horowitz
Regulatory	Peter Zschokke
Jurisdictional Delegate	Carol Sedewitz
Jurisdictional Delegate	Jim Patterson
Procurement	Art Curran
New England Regional CC	Michael Gallagher
NE Transmission Regional CC	Will Houston

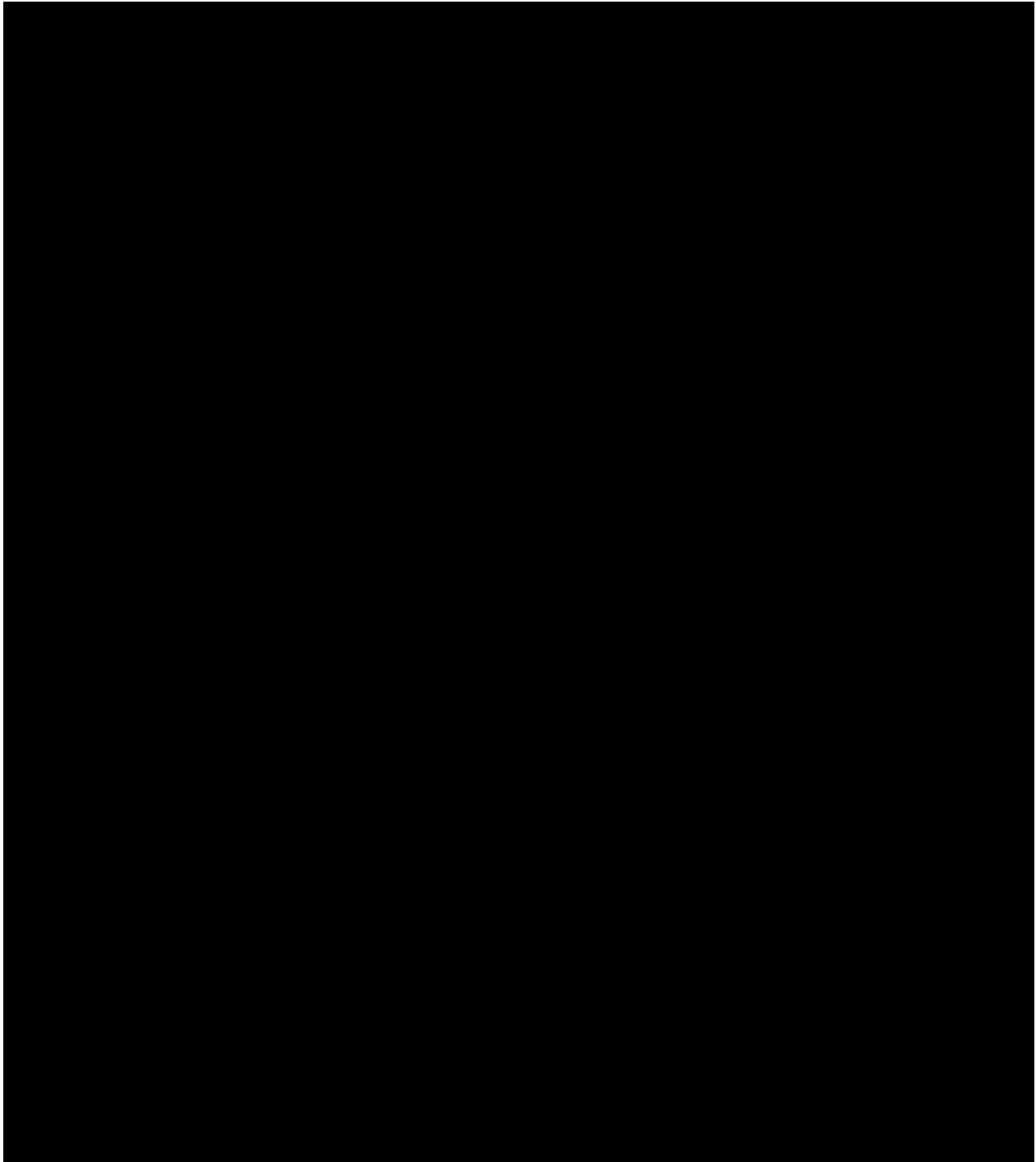
4 Appendices

4.1 Sanction Request Breakdown by Project - NA

US Sanction Paper



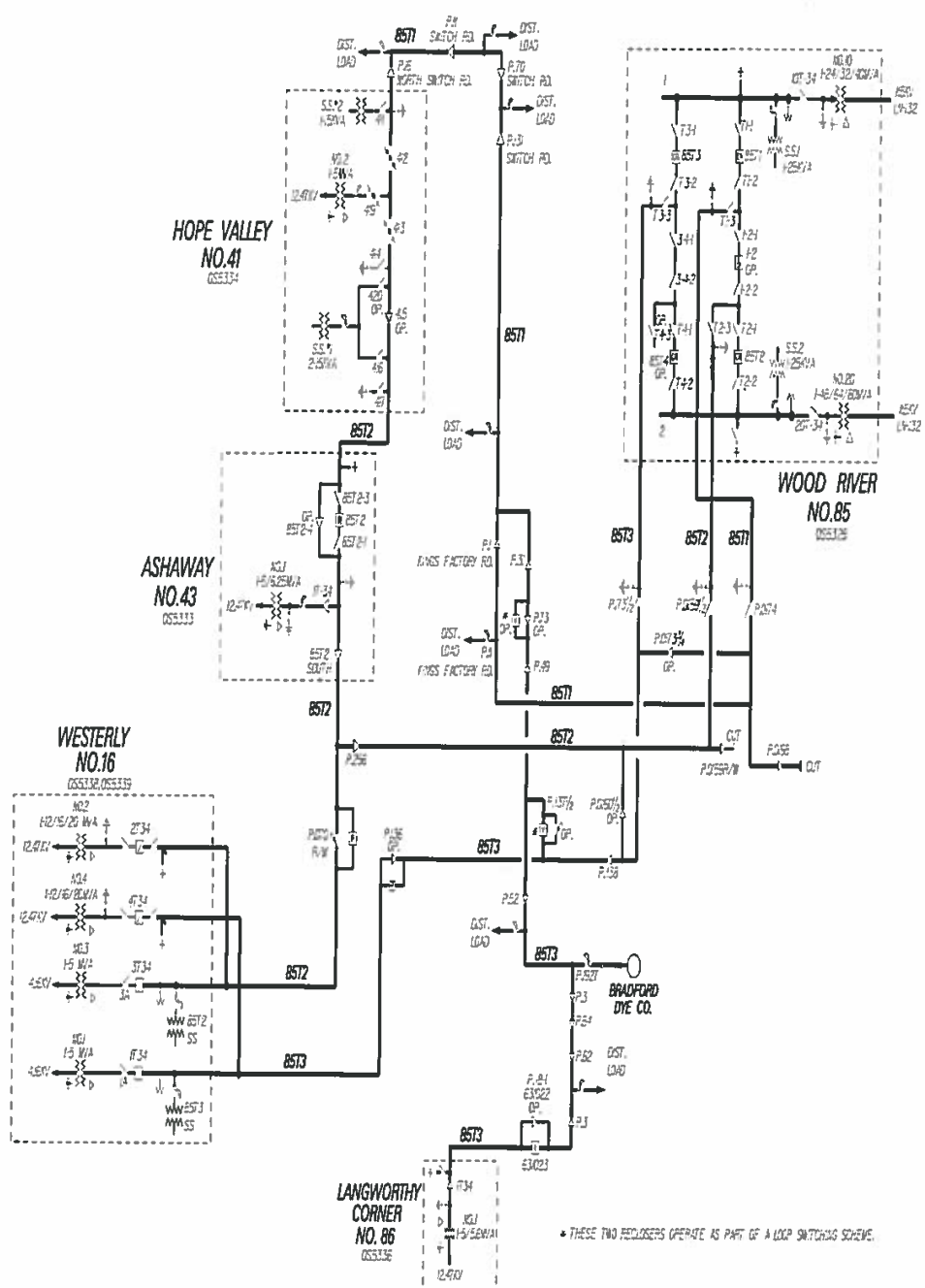
4.2 Other Appendices



US Sanction Paper



4.2.2 One Line Diagram: 34.5kV Lines 85T1, 85T2, & 5T3



34.5KV LINES 85T1, 85T2 & 85T3
OCEAN STATE DIVISION

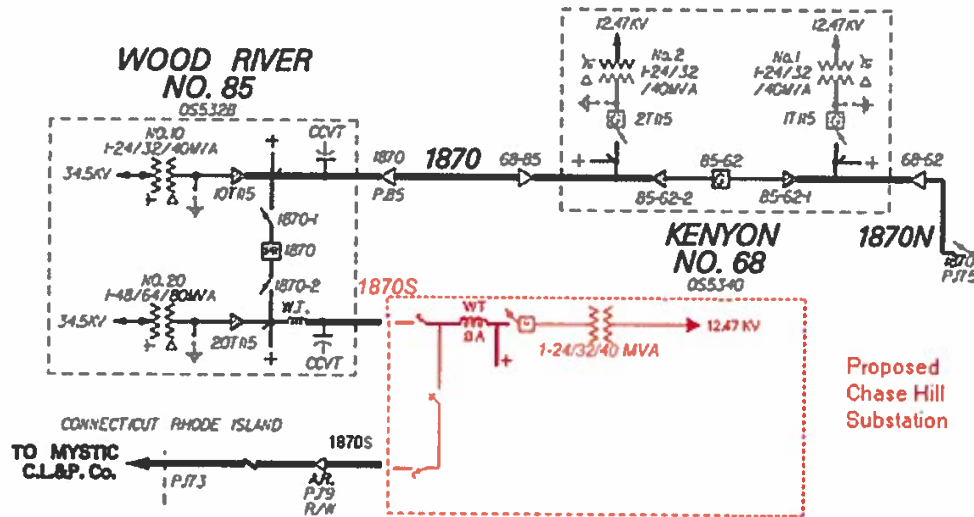
LND-3401

#0108

US Sanction Paper

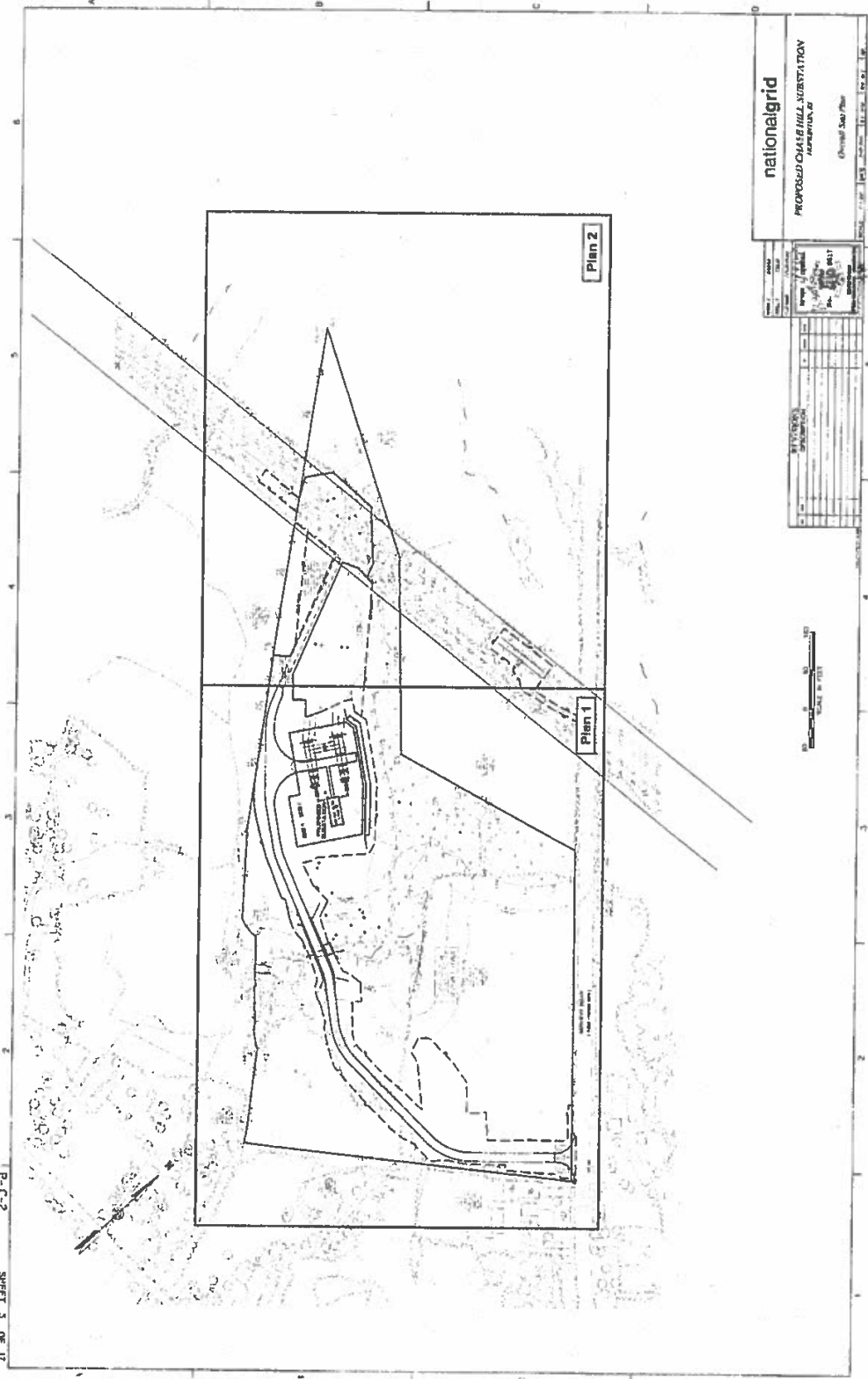


4.2.3 One Line Diagram with Chase Hill (Hope Valley & Ashaway Retirements):



nationalgrid

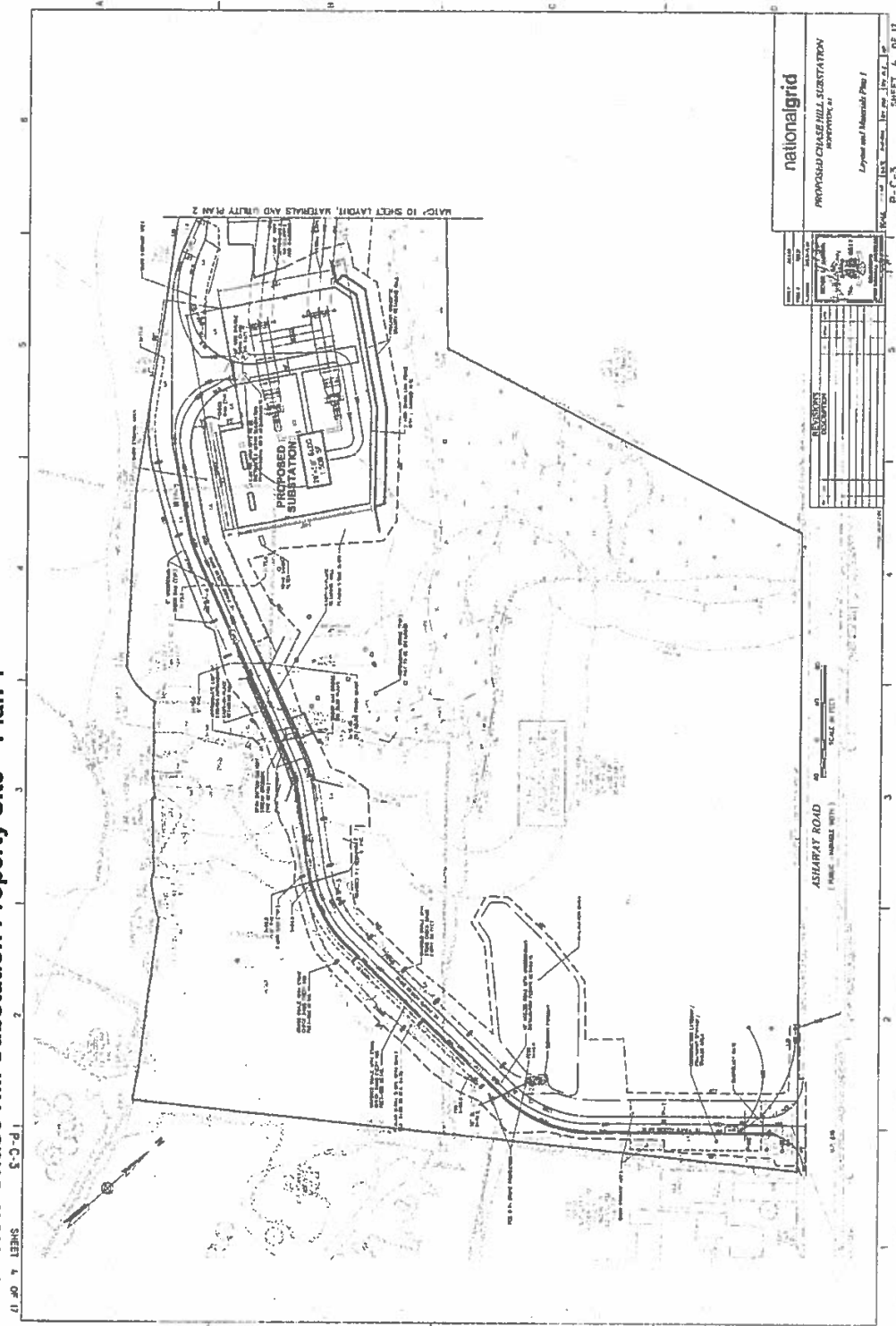
4.2.5 New Chase Hill Substation Property Site (Plan1 & 2)



nationalgrid

US Sanction Paper

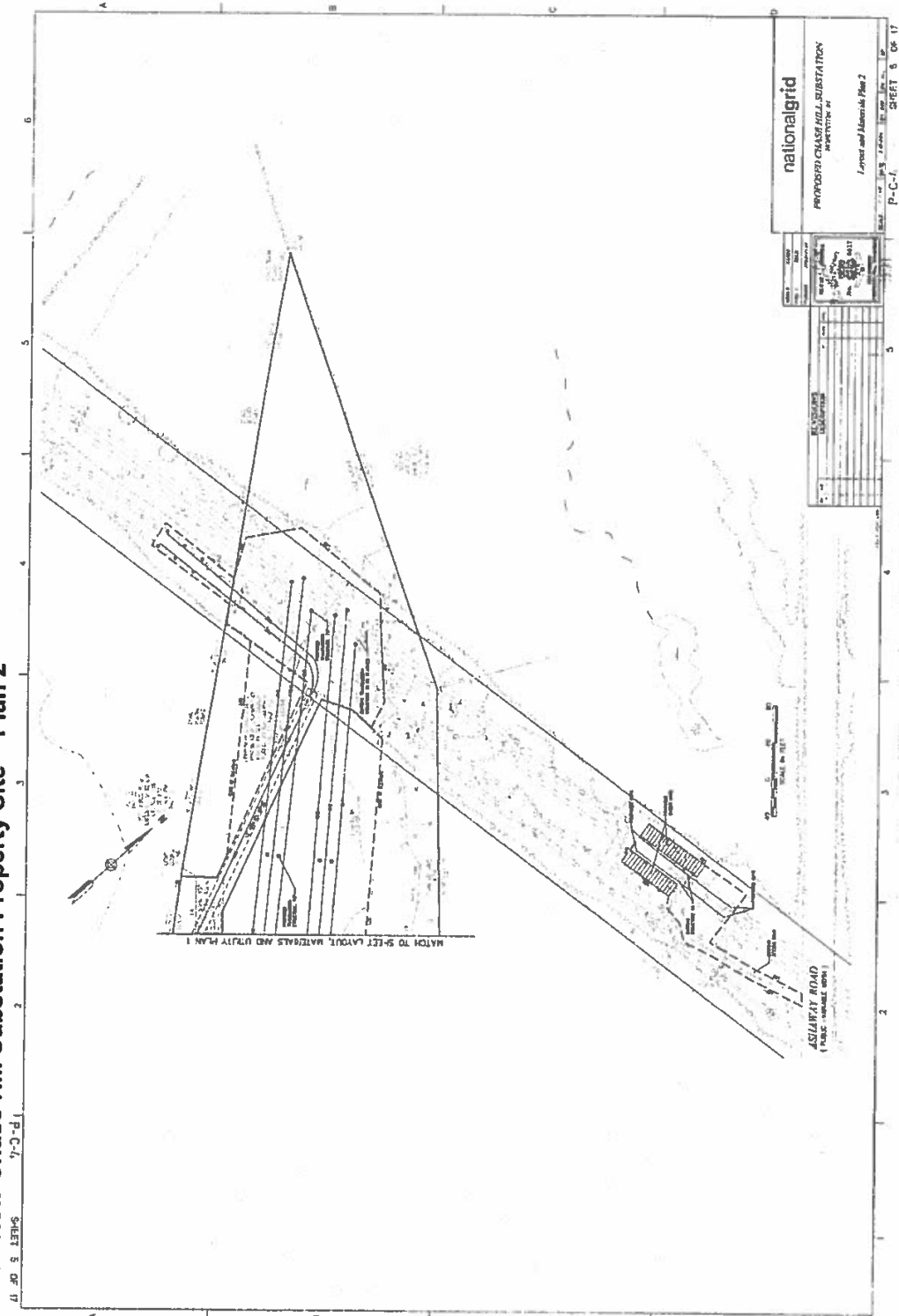
4.2.6 New Chase Hill Substation Property Site -- Plan 1



nationalgrid

US Sanction Paper

4.2.7 New Chase Hill Substation Property Site – Plan 2



US Sanction Paper



4.3 *NPV Summary - Not Applicable*

4.4 *Customer Outreach Plan*

A customer outreach effort was conducted on a limited scope prior to the Hopkinton Town meeting principally for the abutters of the proposed site of the substation. Project Status meetings with Town officials have been conducted monthly from construction start and will continue through the end of the Project.

D+T

US Sanction Paper



Title:	Chase Hill Substation #155	Sanction Paper #:	USSC0408P36v7 AMIC PWS0930v6
Project #:	C024175, C024176, C030165, C030166, C034102, C036233, C036234	Sanction Type:	Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	12/15/15
Author:	Michael Rook/Robert Schneller	Sponsor:	John Gavin, VP Asset Management
Utility Service:	Electricity T&D	Project Manager:	Michael Rook

1 Executive Summary

1.1 Sanctioning Summary

This paper requests a sanction of C024175, C024176, C030165, C030166, C034102, C036233, and C036234 in the amount \$22.315M with a tolerance of +/-10% for the purposes of full implementation of the project.

This sanction amount is \$22.315M broken down into:

*\$21.005M Capex
\$0.307M Opex
\$1.003M Removal*

1.2 Project Summary

Facility loading and outage exposure concerns led to the initial development of this project which has distribution and transmission (both PTF and non-PTF) components. The project includes a new substation with one 115-12.47 kV, 24/32/40 MVA LTC transformer and associated circuit switcher, a breaker-and-a-half metal clad substation with 8-feeder positions, and a 7.2 MVAR 2-stage station capacitor bank in the town of Hopkinton, R.I. Four positions will be utilized immediately and the other will be used to facilitate future expansion. The station will be directly tapped from the 115 kV Line 1870S with four (4) new distribution feeders initially and will require the retirement/removal of the Ashaway and Hope Valley Substations.



US Sanction Paper

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C024175	D-Line	Chase Hill Substation	7.602
C024176	D-Sub	Chase Hill Substation	11.033
C030165	T-Line	Chase Hill Substation	1.415
C030166	T-Sub	Chase Hill Substation	1.815
C034102	D-Sub	Ashaway Retire	0.200
C036233	D-Sub	Hope Valley Retire	0.220
C036234	D-Line	Hope Valley Retire	0.030
Total			22.315

1.4 Associated Projects

Project Number	Project Title	Estimate Amount (\$M)
C036230	Langworthy Substation (D-Sub)	1.870
C036232	Langworthy Substation (D-Line)	0.128
Total		1.998

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
6/10/15	USSC0408P36v6 AMIC PWS0930v5	\$8.610M	\$19.717M	Chase Hill Substation #155	Partial Sanction	+/-10%
5-13-14	USSC0408P36v5 AMIC PWS0930v4	\$6.035M	\$19.72M	Chase Hill Substation #155	Partial Sanction	+/-10%
12/11/13	USSC0408P36v4 AMIC PWS0930v3	\$4.035M	\$29.07M	Chase Hill Substation Project	Partial Sanction	+/-10%
8/8/12	USSC0408P36v3 AMIC PWS0930v2	\$2.350M	\$23.216M	Hopkinton Substation Project		+/-25%
10/12/11	USSC1011PS407	\$1.300M	\$13.022M	Westerly Substation Flood Restoration	Partial Sanction	+/-25%

US Sanction Paper



2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on 12/9/15:

(a) APPROVED this paper and the investment of \$22.315M and a tolerance of +/-10%

(b) NOTED that Michael Rook and Robert Schneller have the approved financial delegation.

Signature Margaret M Smyth Date 12/18/15

Margaret Smyth
US Chief Financial Officer
Chair, US Sanctioning Committee

C024179

Coventry MITS (Dist Sub)

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C024179</u>	USSC #: <u>USSC0408P37C</u>
Revision: <u>7</u>	Budget Version: <u>Default</u>
Project Title: <u>Coventry MITS (Dist Sub)</u>	
Project Description: Install a modular feeder on Tiogue Ave in Coventry utilizing a Modular Integrated Transportable Substation (MITS) design.	

Project Status: <u>Closed</u>	
Responsible Person: <u>ROOK, MICHAEL</u>	Initiator: <u>Vaz, Jack P</u>
Spending Rationale: <u>System Capacity & Performance</u>	Funding Type: <u>P Electric Distribution Sub RI</u>
Budget Class: <u>Load Relief</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>41</u>	Project Complexity Score: <u>15</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>											
Est Start Date: <u>4/1/2008</u>	Est Complete Date: <u>3/31/2013</u>										
Est In-Service Date: <u>6/1/2009</u>											
TTD Actuals: <u>\$2,153,037</u>	As Of: <u>10/2/2017</u>										
Cost Breakdown	<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;"><u>Capital</u></th> <th style="text-align: left;"><u>Expense</u></th> <th style="text-align: left;"><u>Removal</u></th> <th style="text-align: left;"><u>Total</u></th> <th style="text-align: left;"><u>Credits</u></th> </tr> <tr> <td><u>\$2,154,000</u></td> <td><u>\$0</u></td> <td><u>\$0</u></td> <td><u>\$2,154,000</u></td> <td><u>\$0</u></td> </tr> </table>	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>	<u>\$2,154,000</u>	<u>\$0</u>	<u>\$0</u>	<u>\$2,154,000</u>	<u>\$0</u>
<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>							
<u>\$2,154,000</u>	<u>\$0</u>	<u>\$0</u>	<u>\$2,154,000</u>	<u>\$0</u>							

Justification / Risk Identification:

In the Central Rhode Island West Area, the 2007 Annual Plan identified projected 2009 loading on 8-feeders, 4-transformers & 1-supply line to exceed SN ratings. Additionally, the plan identified loading on 2228, 2230 & 2232 distribution supply lines to exceed SE capability for loss of any one line. These 3-lines supply a number of stations in the Central Rhode Island West area and operate in a closed looped system.

To address projected transformer, feeder and distribution supply line overloads in the Central Rhode Island West

Project Scope:

This project is being routed for approval to accept preliminary engineering charges only. The total estimated cost of this project is \$1.8M and we currently expect the project to have an in-service date of 6/1/09. Once a project grade estimate is developed, the project will be submitted for re-approval for the total estimated cost.

Project Alternatives Considered:

Additional Notes:

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>5/24/2016 13:11:08</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPPlan Help Calc Print Win

Funding Project Estimates - Summary C024179 Current Total Authorized Amount: \$2,15...

Title

Project Number

Budget Version

Revision

Revision Status

Revision No.

Est Start Date

Est Complete Date

Est In Srvc Date

Capital

Expense

Jobbing

Retirement

Removal

Total (excl. Rets.)

Credits

Net

Revision Info

Revision

[Find Revision](#)

☐ Show 'Budget Only' Revisions

Spending Estimates:

Edit:

Property Estimates:

Other:

Record of 1

D



USSC Closure Paper

Title:	Tiogue #100 MITS Project	Sanction Paper #:	USSC0408PS37C
Project #:	C024179, C024180	Sanction Type:	Closure
Operating Company:	The Narragansett Electric Company	Date of Request:	5-17-16
Author:	Michael Rook/Robert Schneller	Sponsor:	Carol Sedewitz, Acting Vice President, Electric Asset Management
Utility Service:	Electricity T&D	Project Manager:	Michael Rook/ Robert Schneller

1 Executive Summary

This paper is presented to close the Tiogue #100 MITS Project. The total spend was \$2.942M. The latest sanctioned amount for this project was \$3.745M.

The final spend amount is \$2.942M broken down into:

\$2.942M Capex

\$0.000 Opex

\$0.000 Removal

2 Project Summary

This project has been successful in addressing the reliability concerns in the Central Rhode Island West (CRIW) area. The substation consists of a Mobile Integrated Transportable Substation (MITS) supplied from an existing 34.5kV supply line situated on a parcel was purchased by National Grid in 2009 at 990 Tiogue Ave in Coventry, R.I. The project construction completed in October 2014 and commissioned in February 2015 is comprised of one 34.5/12.47 kV, 7.5/9.375 MVA transformer, three 7620V, 548A voltage regulators, and one 15 kV 600A recloser.

The Tiogue distribution line work consisted of extending the 34.5kV supply line #3309 from the Kent County Substation #22 tapped at pole #93 approximately 0.4 miles on Tiogue Ave. from Hopkins Hill Rd. to the substation site. A pole top recloser was installed during the substation construction work to complete the distribution line work on pole #93 providing primary protection to this tapped 34.5kV line and backup protection for the MITS. A feeder getaway was installed and the distribution feeders in the area reconfigured to create a new 12.47kV feeder.

USSC Closure Paper



3 Over/Under Expenditure Analysis

3.1 Summary Tables

Actual Spending (\$M)			
Project #	Description		Total Spend
C024179	Tiogue #100 MITS -- Substation	Capex	2.153
		Opex	0.000
		Removal	0.000
		Total	2.154
Project #	Description		Total Spend
C024180	Tiogue #100 MITS - Distribution Line	Capex	0.788
		Opex	0.000
		Removal	0.000
		Total	0.788
Total		Capex	2.936
		Opex	0.000
		Removal	0.000
		Total	2.942

Project Sanction Summary Table			
Project Sanction Approval (\$M)			Total Spend
		Capex	3.745
		Opex	0.000
		Removal	0.000
		Total Cost	3.745
Sanction Variance (\$M)			Total Spend
		Capex	0.804
		Opex	0.000
		Removal	0.000
		Total Variance	0.803

USSC Closure Paper



3.2 Analysis

The Project successfully met the objective of addressing the reliability concerns in CRIW area while underspending the Sanction amount by \$0.803M. The source of all underspend was within the substation component principally comprised from savings derived from the negotiated site purchase price and a reduced amount of site contamination from the original estimate.

The project initially carried an estimated real estate purchase price of \$2.0M. Fortunately, a parcel adequately sized came to the market only 0.4 miles from the 34.5kV supply line. The final negotiated purchase price of the parcel was \$1.595M, approximately \$400k less than expected.

Based on the historic use of the parcel (public works garage) a limited soil sampling program was conducted during the due diligence period of the purchase. This program identified petroleum present on the site. A conservative cost to remediate this contamination was developed. The actual cost to remediate the site under ran the original estimate making up most of the balance of the total under run.

All of the close out activities have been completed.

4 Improvements / Lessons Learned

A best practice typically performed whenever a project requires soil disturbance is implementation of a sampling program. It is encouraged is to conduct this program as early as permissible and as detailed as possible as it will provide valuable information to cost out and schedule the project.

Another best practice for future substation siting is the proper utilization of a MITS based on the site environment. The Tiogue MITS is sited in a mixed use area of both commercial and high density residential housing. The MITS's general design enclosing equipment in secure cabinets coupled with the underground supply/feeder lines all surrounded by the standard NG fencing provided a high degree of comfort to Town officials and the general public. This comfort translated to a smooth and timely approval of all permits.



USSC Closure Paper

5 Closeout Activities

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	<input checked="" type="radio"/> Yes <input type="radio"/> N/A
All relevant costs have been charged to project	<input checked="" type="radio"/> Yes <input type="radio"/> N/A
All work orders and funding projects have been closed	<input checked="" type="radio"/> Yes <input type="radio"/> N/A
All unused materials have been returned	<input checked="" type="radio"/> Yes <input type="radio"/> N/A
All as-builts have been completed	<input checked="" type="radio"/> Yes <input type="radio"/> N/A
All lessons learned have been entered appropriately into the lesson learned database	<input checked="" type="radio"/> Yes <input type="radio"/> N/A

6 Statements of Support

6.1 Supporters

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

Department	Individual	Responsibilities
Investment Planning	Glen DiConza	Endores relative to 5-year business plan or emergent work
Resource Planning	Mark Phillips	Endores construction resources, cost estimate, schedule, and portfolio alignment
Asset Management/Planning	Alan Labarre	Endores scope, estimate and schedule with the company's goals, strategies, and objectives
Engineering & Design	Susan Martuscello	Endores scope, design, conformance with design standards
Project Management	Robert Schneller	Endores resources, cost estimate, and schedule
Electric Project Estimation	Jamie Simonds	Endores Cost Estimate

USSC Closure Paper



6.2 Reviewers

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



Function	Individual
Finance	Patricia Easterly
Regulatory	Peter Zschokke
Jurisdictional Delegate	Jim Patterson
Procurement	Art Curran
Control Center	Michael Gallagher

USSC Closure Paper



7 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on May 17, 2016.

Signature..........Date..........
Christopher Kelly
Acting Senior Vice President
Electric Process & Engineering

C028628

Newport SubTrans & Dist Conversion

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C028628</u>	USSC #: <u>USSC-14-262 v2</u>
Revision: <u>7</u>	Budget Version: <u>Default</u>
Project Title: <u>Newport SubTrans & Dist Conversion</u>	
Project Description: This project is to upgrade the 37K33 feeder from Jepson to the planned Newport Substation, and for conversions/upgrades of the 13.8kV and 4kV systems in Newport.	

Project Status: <u>open</u>	
Responsible Person: <u>FIKU, ENDRIT</u>	Initiator: <u>Vaz, Jack P</u>
Spending Rationale: <u>System Capacity & Performance</u>	Funding Type: <u>P Electric Distribution Line RI</u>
Budget Class: <u>Load Relief</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>41</u>	Project Complexity Score: <u>33</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>											
Est Start Date: <u>5/1/2008</u>	Est Complete Date: <u>9/30/2023</u>										
Est In-Service Date: <u>9/30/2022</u>											
TTD Actuals: <u>\$3,507,643</u>	As Of: <u>10/2/2017</u>										
Cost Breakdown	<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;"><u>Capital</u></th> <th style="text-align: left;"><u>Expense</u></th> <th style="text-align: left;"><u>Removal</u></th> <th style="text-align: left;"><u>Total</u></th> <th style="text-align: left;"><u>Credits</u></th> </tr> <tr> <td><u>\$5,623,000</u></td> <td><u>\$423,000</u></td> <td><u>\$647,000</u></td> <td><u>\$6,693,000</u></td> <td><u>\$0</u></td> </tr> </table>	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>	<u>\$5,623,000</u>	<u>\$423,000</u>	<u>\$647,000</u>	<u>\$6,693,000</u>	<u>\$0</u>
<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>							
<u>\$5,623,000</u>	<u>\$423,000</u>	<u>\$647,000</u>	<u>\$6,693,000</u>	<u>\$0</u>							

Justification / Risk Identification:

Refer to attached documents for project justification.

Project Scope:

Install 5-13kV feeders at the proposed Newport Substation and reconfigure the area distribution system. Refer to attached document for scope of this work.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

DOA Allocation Attached

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>3/4/2016 13:18:59</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028628 Current Total Authorized Amount: \$6,69...

Title: **Newport SubTrans & Dist Conversion**

Project Number: **C028628**

Budget Version Default (active)

Revision: **v2**

Revision Status: **Approved**

Revision No.: **7**

Est Start Date: **05/01/2008**

Est Complete Date: **09/30/2023**

Est In Srvc Date: **09/30/2022**

Capital: **\$5,623,000.00**

Expense: **\$423,000.00**

Jobbing: **\$0.00**

Retirement: **\$0.00**

Removal: **\$647,000.00**

Total (excl. Rets.): **\$6,693,000.00**

Credits: **\$0.00**

Net: **\$6,693,000.00**

Revision Info: **Other Updates**

Revision: **7 of 7** **< >**

[Find Revision](#) **Send for Approval**

☐ Show 'Budget Only' Revisions

Spending Estimates:

Grid Estimates

Forecast

Summarize from W/O

Copy Estimate

Property Estimates:

Unit Estimates

Create As Built

Delete Used Estimates

Edit:

New Revision

Delete Revision

Update

Update With Actuals

Import Estimates

Other:

Revision Comments

Released Dollars

Substitution

Slide

Version Compare

Close

Record 1 of 1 **< >**

Audits



US Sanction Paper

Title:	Aquidneck Island	Sanction Paper #:	USSC-14-262 V2
Project #:	C028628, CD00649, C015158, C054054, C024159, CD00649, CD00651, CD00652, C058401, C058310, C058404, C054052, C058407	Sanction Type:	Partial Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	02/10/16
Author:	Ayo Osimboni	Sponsor:	John Gavin Vice President Electric Asset Management
Utility Service:	Electricity T&D	Project Manager:	Ayo Osimboni

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction in the amount of \$13.937M with a tolerance of $\pm 10\%$ for full implementation of work on Gate 2 Feeder 38W2 and conversion of feeder 122J6, which are part of the distribution work associated with funding # C028628 also work associated with funding # CD00649, Gate 2 Substation D-Sub all of which are part of the Aquidneck Island Reliability Project. This sanction amount will provide funding for the construction activities.

The sanction amount of \$13.937M is broken down into:

\$ 12.623M	Capex
\$ 0.423M	Opex
\$ 0.891M	Removal

NOTE the potential investment of \$55.827M and a tolerance of -25% +50% contingent upon submittal and approval of a Project Sanction paper following completion of all engineering activities.

1.2 Project Summary

Build a 69/13.8kV feeder at Gate 2 substation in the City of Newport to provide short-term relief to the City prior to the construction of the new Newport substation and also begin the upgrade of the distribution lines, Gate 2 Feeder 38W2 and Conversion of Feeder 122J6 which are part of the overall distribution line upgrade for the Aquidneck Island Reliability project.



US Sanction Paper

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C028628	D-Line	Newport SubTran & Dist	17.024
CD00649	D-Sub	Gate 2 Substation	1.890
C024159	D-Line	Newport 69kV line 63	1.411
C054054	D-Line	Jepson Sub	6.631
C015158	D-Sub	Newport Sub	10.557
C054052	D-Sub	N. Aquidneck Retirement	0.332
C058310	D-Sub	Harrison Sub Improvement	0.326
C058401	D-Sub	Merton Sub Improvements	0.387
C058404	D-Sub	Kingston Sub Improvements	0.595
C058407	D-Sub	S. Aquidneck Retirements	0.342
CD00651	D-Sub	Bailey Brook Retirement	0.463
CD00652	D-Sub	Vernon Retirement	0.302
CD00656	D-Sub	Jepson Substation	15.567
Total			55.827

1.4 Associated Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C041183	T-Sub	Jepson 115kV Station (T-Sub)	\$13.20
C041184	T-Line	Line 61/62 Conversion (T-Line)	\$22.70
C041185	T-Sub	Dexter 115kV Station (T-Sub)	\$3.90
Total			\$39.80

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Tolerance
12/10/2014	USSC	\$10.000M	\$53.585M	Aquidneck Island	Partial Sanction	+/-25%
11/09/2011	USSC	\$15.000M	\$42.00M	Aquidneck Island	Partial	-25% +50%
12/03/2008	DCIG	\$15.500M	\$15.50M	Substation Installation Project	Sanction	+/- 25%
04/02/2008	DCIG	\$3.500M	\$12.30M	Newport Substation Installation	Strategy	+/- 25%
10/11/2005	Power Plant	\$1.000M	N.A.	Newport Land Purchase	Strategy	N.A.



US Sanction Paper

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
June 2017	Project Sanction (Distribution Line Work)

1.7 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	National Grid USA Internal Strategy Document Distribution Planning Criteria Strategy Issue 1 – February 2011

1.8 Asset Management Risk Score

Asset Management Risk Score: 41

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: 33

1.10 Process Hazard Assessment

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

☐ Yes
 ☒ No



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 (\$)
FY17-2021 New England Distribution Electric capital Plan	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	9.774M

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

Inclusion of dollars in future plans and approval by Rhode Island PUC through the annual ISR Approval process will be required.

1.13 Current Planning Horizon

\$M	Prior Yrs	Current Planning Horizon						Total
		Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6 +	
		2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	
CapEx	3.971	3.676	5.247	15.705	11.978	5.523	0.000	46.100
OpEx	0.063	0.277	0.381	1.161	1.911	0.524	0.000	4.317
Removal	0.060	0.583	0.774	1.819	1.650	0.524	0.000	5.410
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	4.094	4.536	6.402	18.685	15.539	6.571	0.000	55.827

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Partial Sanction for Dline Project	February 2016
Construction Complete - Gate 2 Feeder	March 2016
Ready for Load - Gate 2 Feeder	June 2016
EFSB Decision - 115kV Reinforcements	March 2017
Engineering Design Complete 4kV Station Upgrades	June 2017
Construction Start – 4kV Station Upgrades	June 2017
Engineering Design Complete Newport Substation	March 2018

US Sanction Paper



Milestone	Target Date: (Month/Year)
Construction Start - Newport Substation	April 2018
Engineering Design Complete Jepson Substation	August 2018
Construction Start – Jepson Substation	September 2018
Construction Complete - Newport Substation	September, 2019
Construction Start – 4kV Station Retirements	December 2019
Ready for Load - Newport Substation	December 2019
Construction Complete – 4kV Station Upgrades	March 2020
Construction Complete – Jepson Substation	March 2020
Ready for Load - Jepson Substation	November 2020
Engineering Design Complete Station Retirements	September 2022
Project Closure Report	September 2023

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

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

1	State and local permits are required to build Newport substation and the distribution line work.
2	The ER report was filled with the Energy Facility Siting Board (EFSB) on



US Sanction Paper

	December 30 th 2015 for the proposed Jepson substation and 61/62 line upgrade.
3	Navy approval to build the 13.8kV feeder at Gate 2 substation has been received but we still need their approval to build the 69kV tap to proposed Newport substation.
4	A major public outreach effort is ongoing for communities impacted by the substation construction and distribution line construction and conversion work.
5	Coordination with RIDOT is ongoing to review compliance with the Americans with Disabilities Act (ADA) for new pole sets or pole replacements.
6	A traffic mitigation plan is needed for the distribution line construction and the proposed conversion work.

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 checked="" type="radio"/> Neutral	<input type="radio"/> Positive	<input type="radio"/> Negative

1.18 List References

1	Distribution Planning Criteria Strategy, Issue 1, February 2011
2	Conceptual Engineering Report, Newport Mall Substation, 7/20/11
3	Conceptual Engineering Report, Gate 2 Substation, 7/21/11
4	Conceptual Engineering Report, Jepson Substation, 7/22/11
5	Conceptual Engineering Report, Bailey Brook Substation, 7/25/11
6	Conceptual Engineering Report, Vernon Substation, 7/25/11
7	Newport Area Supply and Distribution Study, May 2007
8	Jepson Equipment Condition Assessment, February 2005

US Sanction Paper



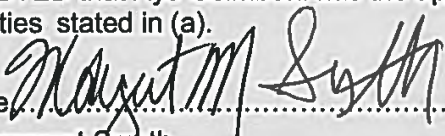

2 Decisions

The Senior Executive Sanctioning Committee Committee (SESC) at a meeting held on 02/22/16:

(a) APPROVED the investment of \$13.937M and a tolerance of +/- 10% for construction activities associated with building the 69/13.8kV feeder at Gate 2 substation and begin the distribution upgrade of Gate 2 feeder 38W2 and 122J6 which are all part of Aquidneck Island Reliability Project.

(b) NOTED the potential distribution investment \$55.827M to and a tolerance of - 25% +50%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

(c) NOTED that Ayo Osimboni has the approved financial delegation to undertake the activities stated in (a).

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

US Sanction Paper



3 Sanction Paper Detail

Title:	Aquidneck Island	Sanction Paper #:	USSC-14-262 V2
Project #:	C028628, CD00649, C015158, C054054, C024159, CD00649, CD00651, CD00652, C058401, C058310, C058404, C054052, C058407	Sanction Type:	Partial Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	02/10/16
Author:	Ayo Osimboni	Sponsor:	John Gauvin Vice President Electric Asset Management
Utility Service:	Electricity T&D	Project Manager:	Ayo Osimboni

3.1 Background

The Newport Study Area encompasses the City of Newport and the towns of Portsmouth, Middletown, Jamestown and Prudence Island. Figure 1 shows a geographic map of the study area. 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. Figure 2 shows a one-line of the existing transmission system.

A single 115/13.8kV transformer at Dexter 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 the 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. Figure 3 shows a one-line of the existing sub-transmission system and Figure 4 shows the approximate geographic areas supplied by the distribution system.



US Sanction Paper

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 Utility 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 US Navy 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 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 is projected to start in the spring 2018 with an in-service date of fall 2019.

Transmission Planning has recently 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 transmission sanction paper along with 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.



US Sanction Paper

3.2 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 Navy 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 which 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.

In the summer of 2003, interruptions to the electrical system in Newport resulted in significant customer outages. One of the action items proposed by the Company to the Rhode Island Public Utility Commission was to conduct a planning study to identify and resolve electrical related issues in the area.

3.3 Project Description

Install a 69/13.8kV feeder at Gate 2 substation in the City of Newport with a recommended in-service date of March 2016. This feeder addresses near-term thermal concerns in Newport until a new substation is built to provide the required long-term relief. All the work associated with this feeder is in-line with the long-term plan for the area resulting in no out of line expenditures.

Build a new 69/13.8kV substation in Newport on a parcel of land recently purchased for this purpose. The substation will consist of a single transformer supplying four (4) 13.8kV feeders. A short 69kV tap is required to supply this station. A one-line of the proposed station is shown on Figure 5.

Build a new substation in Middletown (Jepson Substation) on company owned land. The substation will consist of two (2) 115/13.8kV transformers supplying six (6) feeders and



US Sanction Paper

two (2) 115/23kV transformers supplying three (3) supply lines. A new 115kV station will also be built on this site to replace the existing Jepson 69kV substation. This 115kV station will be sanctioned separately as part of transmission reinforcements required on Aquidneck Island. A one-line of the proposed 115/23kV station is shown on Figure 6. A one-line of the proposed 115/13.8kV station is shown on Figure 7.

The 23kV supply system on Aquidneck Island needs relief. The most economical approach is to retire a number of 23/4.16kV stations and to convert the load to the 13.8kV system. This approach addresses asset condition, safety, environmental, thermal, and reliability concerns with these assets at least cost. This approach is part of a comprehensive solution that eliminates the need to install a new 69kV line to Newport (a \$32M investment). This approach retires four 23/4.16kV stations which include:

- Vernon substation is a metal-clad station built in 1949. It has two transformers, TR231 installed in 1949 and TR232 installed in 1963. The metal-clad switchgear is obsolete and needs to be replaced to address safety & reliability concerns. Station breakers are obsolete and the TR231 needs to be replaced due to poor condition. The estimated cost to rebuild this station is \$4.90M. The retirement of this station eliminates this \$4.9M investment.
- Bailey Brook was built in 1941 on a small site with no room for expansion. It is located within local wetlands and adjacent to a brook that is the source of island water supply. Rebuilding the station outside the floodplain is not an economical approach because station is located in downtown Middletown and in a congested area. Locating and permitting a new site is not practical or economical. There is no economic or reliability benefit to keeping this station.
- South Aquidneck is a metal-clad station located within the flood plain. It has a single LTC transformer supplying 3-feeders. The station breakers are obsolete along with the station insulators and arresters. The estimated cost to address these concerns is \$0.80M. However, this station cannot be offloaded due to lack of feeder ties and because the site is too small to install a mobile transformer. The LTC is an arcing in oil design which requires a higher level of maintenance.
- North Aquidneck is a metal-clad station with a single transformer supplying 3-feeders. The station has non-standard breakers and limited EMS. The LTC is an arcing in oil design which requires a higher level of maintenance. Station has similar offloading challenges to South Aquidneck making station maintenance very challenging.

The retirement of these 4.16kV station increases the reliability on the 13.8kV distribution system with increased feeder ties. The conversion of the 4.16kV load to 13.8kV also reduces line losses by approximately 90%. A one-line of the proposed station retirements is shown on Figure 8.



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3.4 Benefits Summary

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.

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.

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.

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.

3.5 Business and Customer Issues

The project follows up on action items proposed by the Company to the Rhode Island Public Utility Commission to identify and resolve electrical related issues in the area as a result of interruptions to the Newport electrical system resulting in significant customer outages that occurred in the summer of 2003. Failure to execute this project may impact commitment made by the Company to state regulators.

3.6 Alternatives

Alternative 1: New 69kV Line to Newport and substation additions (\$82.85M)

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.

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 metal-clad switchgear with (3) 23kV supply lines.

Construct a new 69/13.8kV substation in Newport on a parcel of land recently acquired for this purpose. The station would consist of two (2) transformers supplying metal-clad switchgear with (8) 13.8kV feeder positions with five feeders being initially installed.

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The 115/23kV station would consist of two (2) transformers supplying 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. Upgrading the 23kV supply system is not an economical approach since 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. Upgrading this infrastructure is not recommended due to the significant cost impact.

The estimated cost of this plan is \$82.85M, or \$29.00M higher than the preferred plan. This plan has similar reliability benefits to the preferred plan. However, there is no economic or reliability benefit to implement this plan over the preferred plan.

Alternative 2: Non-Wires Alternative

The recommended plan is part of a comprehensive solution to address asset condition, safety, reliability, and environmental concerns on Aquidneck Island. The need for these investments is immediate. Due to the immediate need for these investment and because many concerns are related to asset condition and environmental issues, a non-wires solution is not applicable. New supply and distribution capacity is the only reasonable alternative to address the identified concerns.

3.7 Safety, Environmental and Project Planning Issues

A filing to the Rhode Island Energy Facility Siting Board ("EFSB") is required to build the proposed new 115kV substation in Middletown and to upgrade the 69kV lines (Line 61 and Line 62) to 115kV. The ER report was filed on December 23rd 2015 with the board.

An Environmental Report is required to support the application to the EFSB for construction of jurisdictional facilities. The Environmental Report was prepared in accordance with the EFSB Rules to provide information on the potential environmental impacts of the electric transmission system improvements proposed by National Grid.

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.



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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Risk Owner	Comments/Actions
			Cost	Schedule	Cost	Schedule			
1	Drawn out EFSB approval of Jepson substation relocation.	3	3	5	9		Mitigate	Project Manager/RDW	Meet with abutters during stakeholder outreach process to discuss mitigative measures.
2	Limited opportunities for outage for Line 63 Loop construction.	3	1	3		9	Mitigate	Project Manager	Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. Schedule construction to finish during off peak period.
3	Construction delays due to poor weather or damage from major storms.	2	3	3	6	6	Accept	Project Manager	Create some slack within the schedule
4	Limited opportunities for outage for Newport Substation connection to Line 63.	3	1	3		9	Mitigate	Project Manager	Gate 2 has a breaker position that may be used to prevent the need for or an outage. Working with the engineering team to decide best options to eliminate the need for an outage.
5	Drawn out EFSB approval of Line 61/62 conversions.	3	1	5			Mitigate	Legal/RDW/PM	Public outreach consultant (RDW) has been brought onto the project team.
6	Limited opportunities for Line 61/62 outages for construction cutovers.	4	1	3		12	Mitigate	Project Manager/Construction Supervisor	Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team. Construction will be scheduled so that cutovers will be performed during off peak periods.
7	Limited opportunities for Jepson Substation construction cutovers.	3	1	3		9	Mitigate	Project Manager	Outages will be planned one year in advance and an outage coordination consultant will be brought onto the project team.
8	Limited opportunities for distribution system outages for cutovers during construction.	5	1	5	5		Mitigate	Project Manager	An outage coordination consultant will be brought onto the project team.
9	Change in ADA clearance requirement from 3' to 4' during design/construction	2	2	2			Avoid	Project Manager/Legal	Obtain construction permits from DOT early prior to possible change in ADA regulations.
10	Construction delays due to other utilities not transferring their lines within the project schedule.	4	1	3		12	Avoid	Project Manager/Construction Supervisor	Coordinate construction plan with Verizon during constructability review process. Coordination during design has started and will be maintained through project.
11	General public opposition to the project.	3	2	4	6	12	Mitigate	RDW/PM/Outreach Group	Public outreach consultant (RDW) has been brought onto the project team. Project information (facts sheets/talking points) for all projects on Aquidneck Island to be developed.
12	Negative impacts to wetlands contained on Jepson substation parcel during construction/relocation.	2	2	2			Mitigate	VHB/Substation Engineering/Construction Supervisor	VHB has delineated all wetlands and will ID construction mitigation requirements. Design will account for minimizing wetlands impacts. Construction activities will need to follow SESC measures.
13	FAA may require certain mitigative measures for construction near Newport Airport.	3	2	1	6		Accept	Distribution Design	Submit required documentation for each pole to be installed early in the design process.
14	Majority of the distribution and subtransmission work is on well traveled roadways.	5	3	1		5	Accept	Distribution Line Construction/Contractor	Develop traffic control and detour plans for the project and perform extensive coordination with the DOT and cities/towns.
15	Numerous poles appear to be encroaching on private property and easements/rights are believed to not have been obtained.	4	1	1			Accept	Real Estate/PM	Budget and time to be allocated to obtain proper rights/easements as required.
16	Approval to install 2 additional steel poles within the existing easement with US Navy along Line 63 involves extensive coordination and takes a significant amount of time to get the necessary approvals.	5	1	5	5		Accept	Real Estate/PM	Early coordination with the navy has begun and will continue so as to mitigate the issue prior to commencement of construction.
17	Approval from US Navy for Gate 2 substation work is required from base commander. Construction work at the substation is schedule to begin in mid 2015	5	1	5	5		Accept	Real Estate/PM	Early coordination with the Navy has begun in order to mitigate this issue.
18	Limited construction windows for work in Middletown and Newport.	4	2	5	8		Accept	Project Manager	Extensive coordination of all construction activities and schedule, traffic management plan, detour plans etc will be necessary in advance of any construction work.



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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
RIDEM Permit	Likely	6 months	Not Applied For	TBD
Newport - Special Use Permit	Certain	7 months	Not Applied For	10/31/17
EFSB Permit Approval – Jepson substation and 61/62 line Upgrade	Likely	12 to 18 months	In-progress	03/31/17
Road Opening Permit	Certain	3 months	Not Applied For	TBD
Building Permit	Certain	4 months	Not Applied For	TBD

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Investment recovery will be through standard rate recovery mechanisms approved by the appropriate 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 \$9.247M. This is indicative only. The actual revenue requirement will differ, 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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3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table: Distribution Project

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 +	
					2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	
C028626	Newport SubTran & Dist	Est Lvl (e.g +/- 25%)	CapEx	0.752	2.022	3.620	3.620	3.620	0.000	0.000	13.634
			OpEx	0.011	0.213	0.272	0.272	0.453	0.000	0.000	1.221
			Removal	0.022	0.426	0.634	0.634	0.453	0.000	0.000	2.169
			Total	0.785	2.661	4.526	4.526	4.526	0.000	0.000	17.024
CD00649	Gate 2 Substation	Est Lvl (e.g +/- 25%)	CapEx	1.804	0.000	0.000	0.000	0.000	0.000	0.000	1.804
			OpEx	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.051
			Removal	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.035
			Total	1.890	0.000	0.000	0.000	0.000	0.000	0.000	1.890
C024159	Newport 69kV line 63	Est Lvl (e.g +/- 25%)	CapEx	0.156	0.093	0.108	0.855	0.000	0.000	0.000	1.212
			OpEx	0.000	0.000	0.007	0.052	0.000	0.000	0.000	0.059
			Removal	0.000	0.000	0.016	0.124	0.000	0.000	0.000	0.140
			Total	0.156	0.093	0.131	1.031	0.000	0.000	0.000	1.411
C054054	Jepson Sub	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.320	0.078	2.580	1.940	1.523	0.000	6.441
			OpEx	0.000	0.000	0.001	0.040	0.030	0.024	0.000	0.095
			Removal	0.000	0.000	0.001	0.040	0.030	0.024	0.000	0.095
			Total	0.000	0.320	0.080	2.660	2.000	1.571	0.000	6.631
C015158	Newport Sub	Est Lvl (e.g +/- 25%)	CapEx	1.124	1.028	1.153	3.943	1.944	0.000	0.000	9.192
			OpEx	0.001	0.044	0.050	0.170	0.840	0.000	0.000	1.105
			Removal	0.000	0.033	0.037	0.127	0.063	0.000	0.000	0.260
			Total	1.125	1.105	1.240	4.240	2.847	0.000	0.000	10.557
C054052	N. Aquidneck Retirement	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.032	0.010	0.110	0.180	0.000	0.000	0.332
			Total	0.000	0.032	0.010	0.110	0.180	0.000	0.000	0.332
C058310	Harrison Sub Improvement	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.023	0.151	0.100	0.000	0.000	0.274
			OpEx	0.000	0.000	0.012	0.025	0.015	0.000	0.000	0.052
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.000	0.035	0.176	0.115	0.000	0.000	0.326
C058401	Merton Sub Improvements	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.052	0.023	0.155	0.104	0.000	0.000	0.334
			OpEx	0.000	0.000	0.012	0.025	0.016	0.000	0.000	0.053
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.052	0.035	0.180	0.120	0.000	0.000	0.387
C058404	Kingston Sub Improvements	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.114	0.212	0.162	0.000	0.000	0.488
			OpEx	0.000	0.000	0.011	0.053	0.043	0.000	0.000	0.107
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	0.000	0.125	0.265	0.205	0.000	0.000	0.595
C058407	S. Aquidneck Retirements	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.032	0.020	0.110	0.180	0.000	0.000	0.342
			Total	0.000	0.032	0.020	0.110	0.180	0.000	0.000	0.342
CD00651	Bailey Brook Retirement	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			OpEx	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.003	0.040	0.040	0.150	0.230	0.000	0.000	0.463
			Total	0.003	0.040	0.040	0.150	0.230	0.000	0.000	0.463
CD00652	Vernon Retirement	Est Lvl (e.g +/- 25%)	CapEx	0.000	0.000	0.023	0.109	0.108	0.000	0.000	0.240
			OpEx	0.000	0.000	0.003	0.014	0.014	0.000	0.000	0.031
			Removal	0.000	0.000	0.003	0.014	0.014	0.000	0.000	0.031
			Total	0.000	0.000	0.029	0.137	0.136	0.000	0.000	0.302
CD00656	Jepson Substation	Est Lvl (e.g +/- 10%)	CapEx	0.135	0.161	0.105	4.080	4.000	4.000	0.000	12.481
			OpEx	0.000	0.020	0.013	0.510	0.500	0.500	0.000	1.543
			Removal	0.000	0.020	0.013	0.510	0.500	0.500	0.000	1.543
			Total	0.135	0.201	0.131	5.100	5.000	5.000	0.000	15.567
Total Project Sanction			CapEx	3.971	3.676	5.247	15.705	11.978	5.523	0.000	46.100
			OpEx	0.063	0.277	0.381	1.161	1.911	0.524	0.000	4.317
			Removal	0.060	0.583	0.774	1.819	1.650	0.524	0.000	5.410
			Total	4.094	4.536	6.402	18.685	15.539	6.571	0.000	55.827



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3.11.2 Project Budget Summary Table

Project Costs per Business Plan

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	
\$M								
CapEx	3.971	2.882	7.225	16.687	11.600	1.200	0.000	43.565
OpEx	0.063	0.190	0.426	1.088	0.783	0.036	0.000	2.586
Removal	0.060	0.361	0.544	1.499	1.508	0.024	0.000	3.996
Total Cost in Bus. Plan	4.094	3.433	8.195	19.274	13.891	1.260	0.000	50.147

Variance (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2016/17	Yr. 2 2017/18	Yr. 3 2018/19	Yr. 4 2019/20	Yr. 5 2020/21	Yr. 6 + 2021/22	
\$M								
CapEx	0.000	(0.794)	1.978	0.982	(0.378)	(4.323)	0.000	(2.535)
OpEx	0.000	(0.087)	0.045	(0.073)	(1.128)	(0.488)	0.000	(1.731)
Removal	0.000	(0.222)	(0.230)	(0.320)	(0.142)	(0.500)	0.000	(1.414)
Total Cost in Bus. Plan	0.000	(1.103)	1.793	0.589	(1.648)	(5.311)	0.000	(5.680)

3.11.3 Cost Assumptions

Substation estimates were obtained from Conceptual Engineering Reports prepared by substation engineering. Conceptual Grade Estimates have been developed with only the conceptual understanding of the project. The estimates have been prepared using historical cost data or data from similar projects with an accuracy of -25% to +50%.

The estimate for the 69kV transmission line was obtained from Routing Analysis Report prepared by transmission line engineering and consultants to the company. This Conceptual Engineering Estimate has been developed with only the conceptual understanding of the project. The estimates have been prepared using historical cost data or data from similar projects with an accuracy of -25% to +50%.

The overall distribution line work estimate was developed utilizing generic construction costs. Minimal field work has been performed to assess the actual condition of the assets or the number of poles and transformers needing replacement associated with the conversion from 4kV to 13kV. This is an Investment Grade Estimate with a level of accuracy ranging from -50% to +200%.for

The estimates for the distribution work to be completed under funding C028628 and CD00649 are based on STORMS estimate.

3.11.4 Net Present Value / Cost Benefit Analysis

N/A



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3.11.5 Additional Impacts

N/A

3.12 Statements of Support

None

3.12.1 Supporters

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

Role	Individual	Responsibilities
Investment Planning	Glen DiConza	Endorses relative to distribution 5-year business plan or emergent work
Resource Planning	Anne Wyman	Endorses D-Line resources, cost estimate, schedule and portfolio alignment
Resource Planning	Mark Phillips	Endorses substation resources, cost estimate, schedule and portfolio alignment
Asset Management/ Planning	Kasia Kulbacka	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Asset Management/ Planning	Alan Labarre	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Engineering / Design	Suzan Martuscello	Endorses substation scope, design, conformance with design standards
Engineering / Design	Mark Browne	Endorses sub-transmission line scope, design, conformance with design standards
Engineering / Design	Len Swanson	Endorses substation scope, design, conformance with design standards
Project Management	Andrew Schneller	Endorses Resources, cost estimate, schedule

3.12.2 Reviewers

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

Function	Individual
Finance	Keith Fowler / Phillip Horowitz
Regulatory	Peter Zschokke
Jurisdictional Delegates	Jim Patterson
Procurement	Art Curran
Control Center	Michael Gallagher
Control Center	Will Houston



US Sanction Paper

4 Appendices

4.1 Sanction Request Breakdown by Project

\$M	C028628	CD00649	C024159	C054054	C015158	C054052	C058310	CD00656	CD00652	CD058404	C058407	C058401	CD00651	Total
CapEx	5.623	2.200	0.200	0.800	1.000		0.050	2.100		0.600		0.050		12.623
OpEx	0.423													0.423
Removal	0.647	0.044				0.050			0.050		0.050		0.050	0.891
Total	6.693	2.244	0.200	0.800	1.000	0.050	0.050	2.100	0.050	0.600	0.050	0.050	0.050	13.937

4.2 Other Appendices

N/A

4.3 NPV Summary

N/A

4.4 Customer Outreach Plan

A Customer Outreach is ongoing as part of the Energy Facilities Siting Board (EFSB) Filing process. The company has hired a consultant to develop a comprehensive public outreach plan for all of proposed projects on Aquidneck Island.

This outreach effort will be 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 will be 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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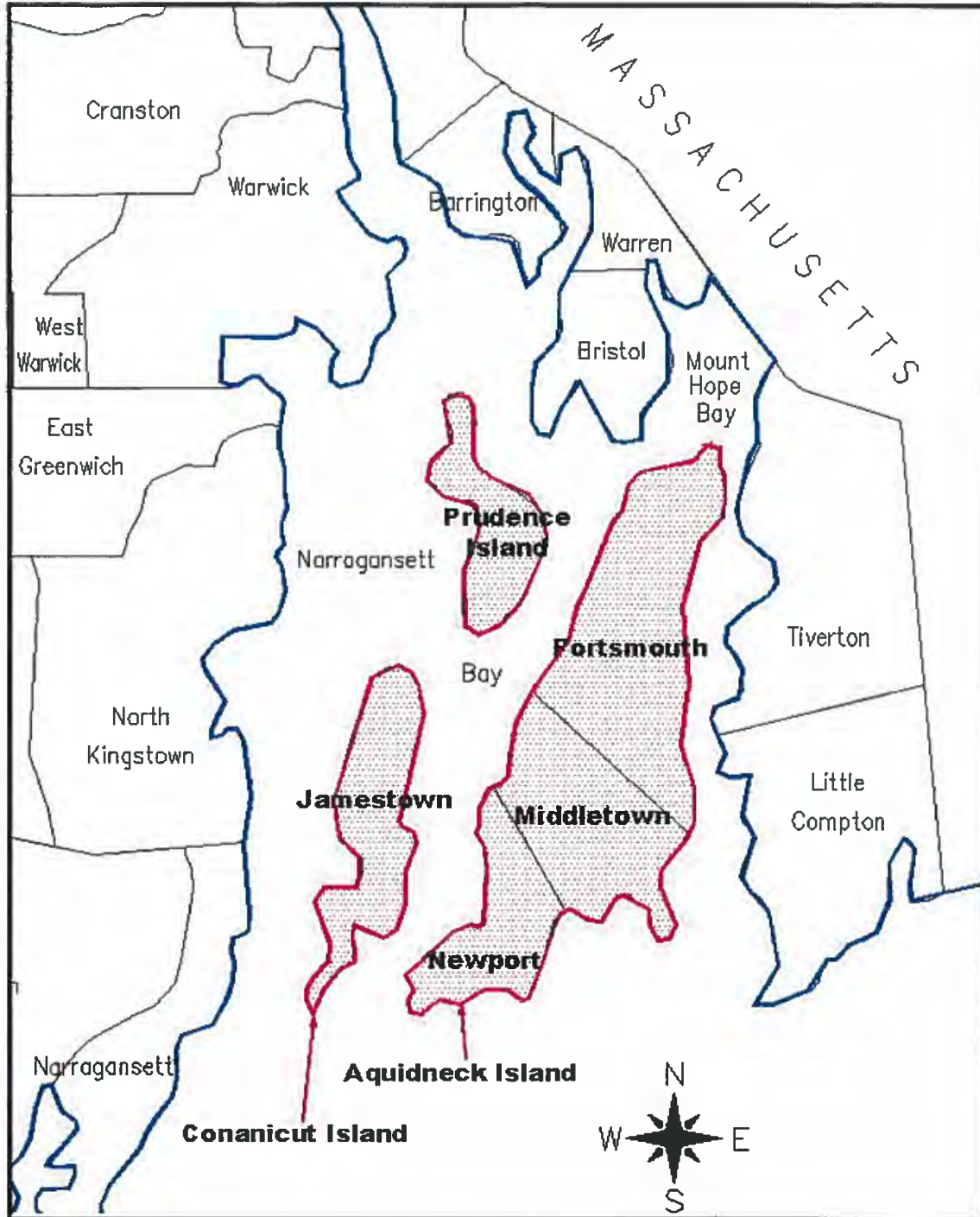
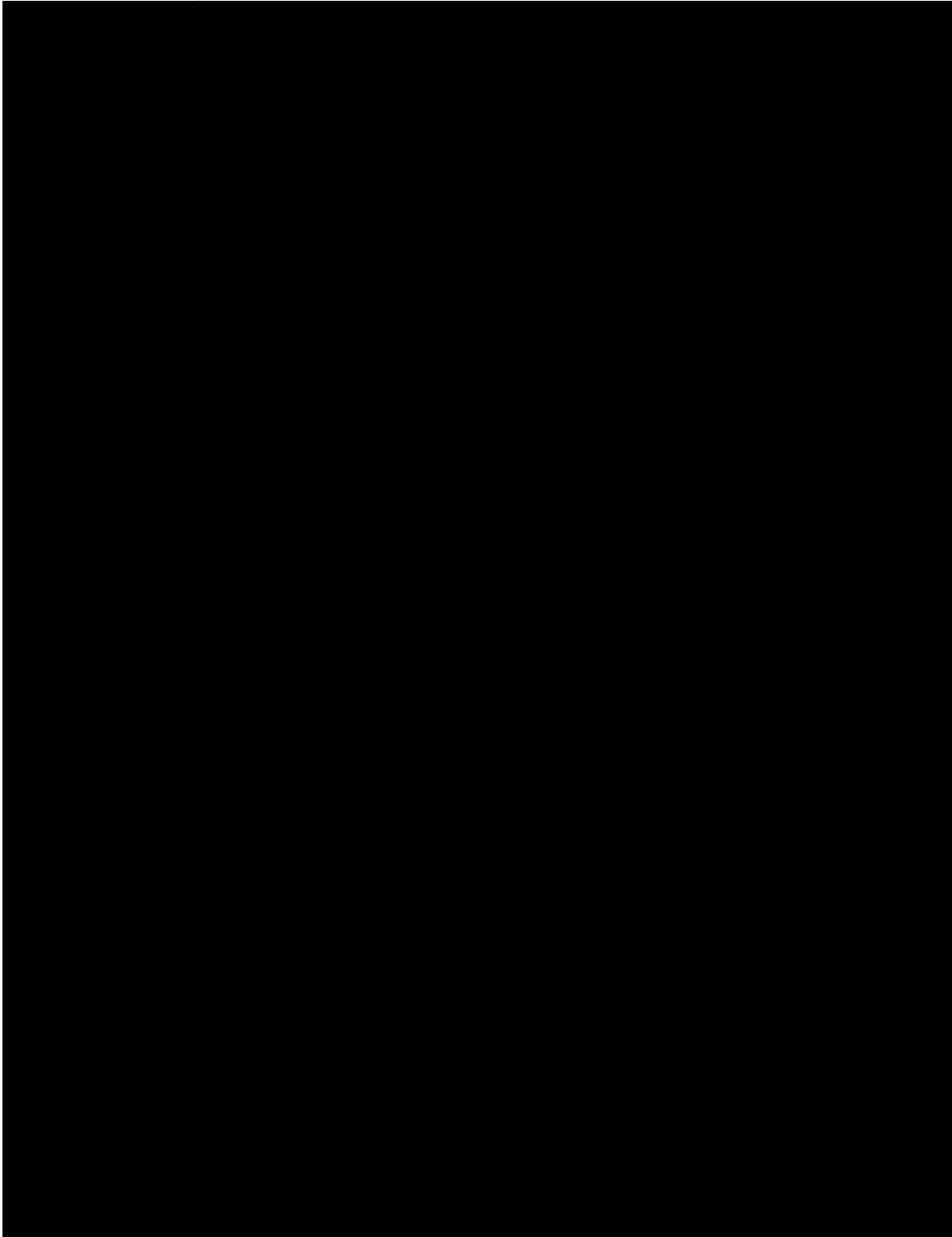


FIGURE 1 – GEOGRAPHIC AREA MAP

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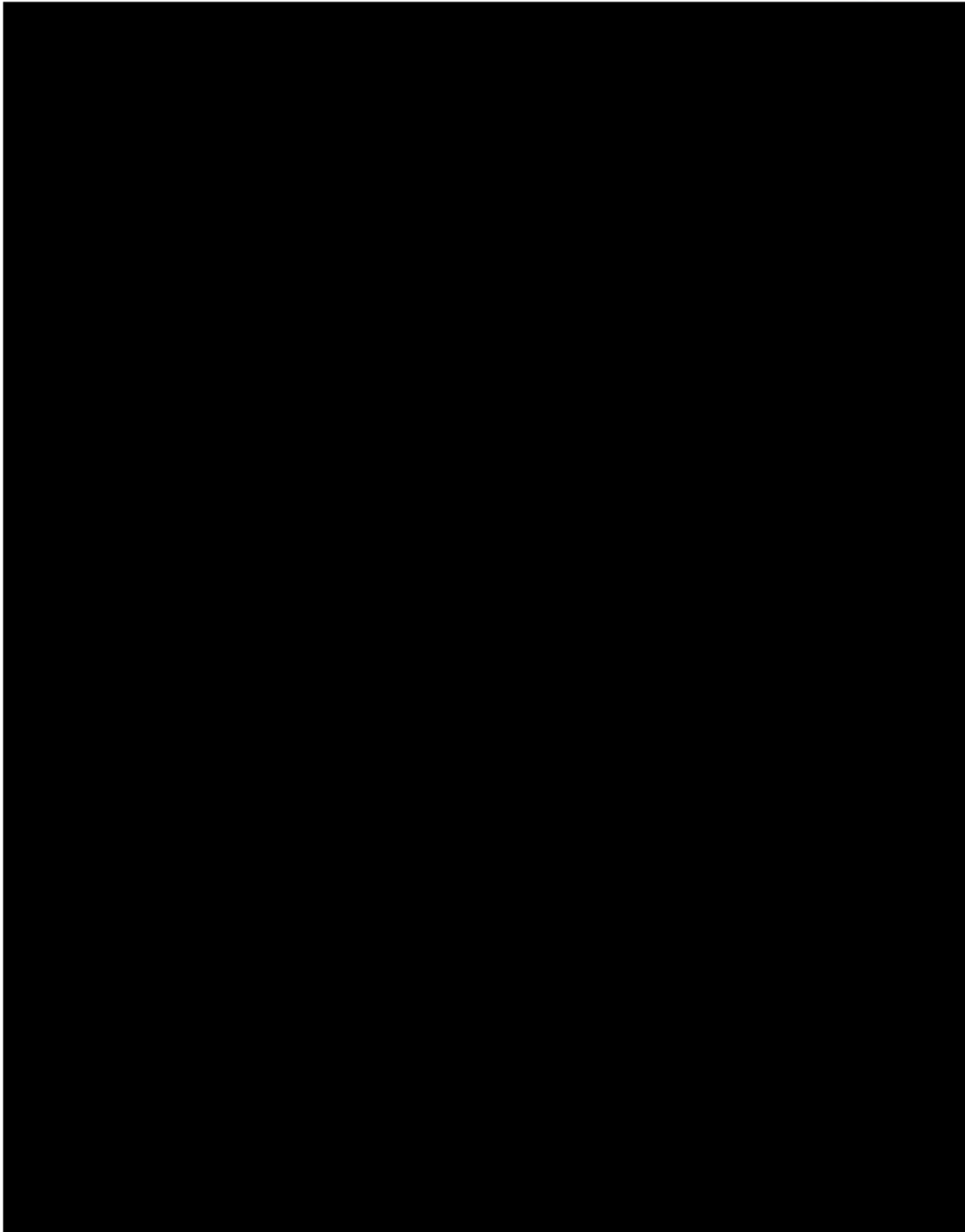


FIGURE 3 – EXISTING SUB-TRANSMISSION SYSTEM ONE-LINE DIAGRAM

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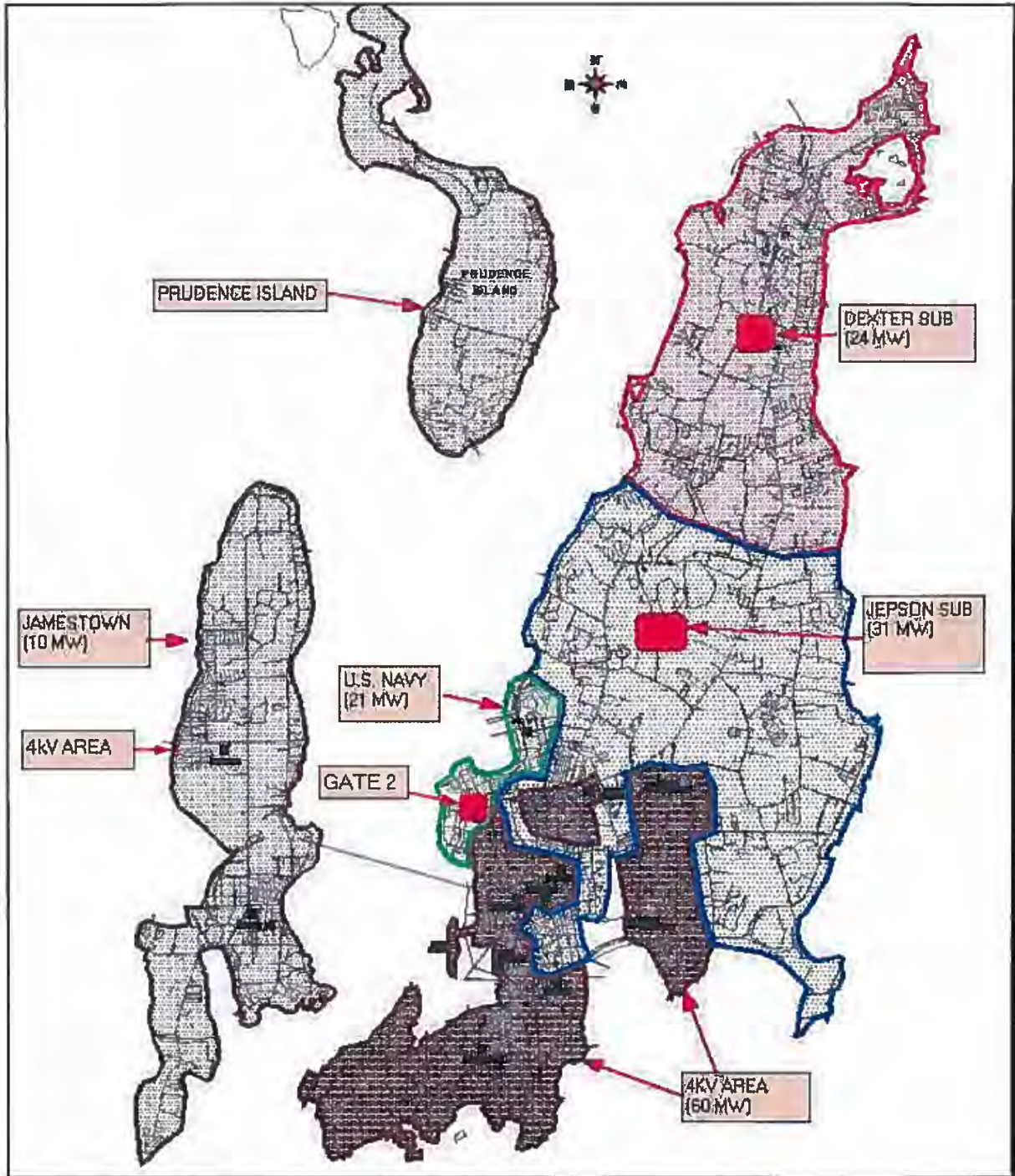


FIGURE 4 – GEOGRAPHIC MAP OF EXISTING DISTRIBUTION

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nationalgrid

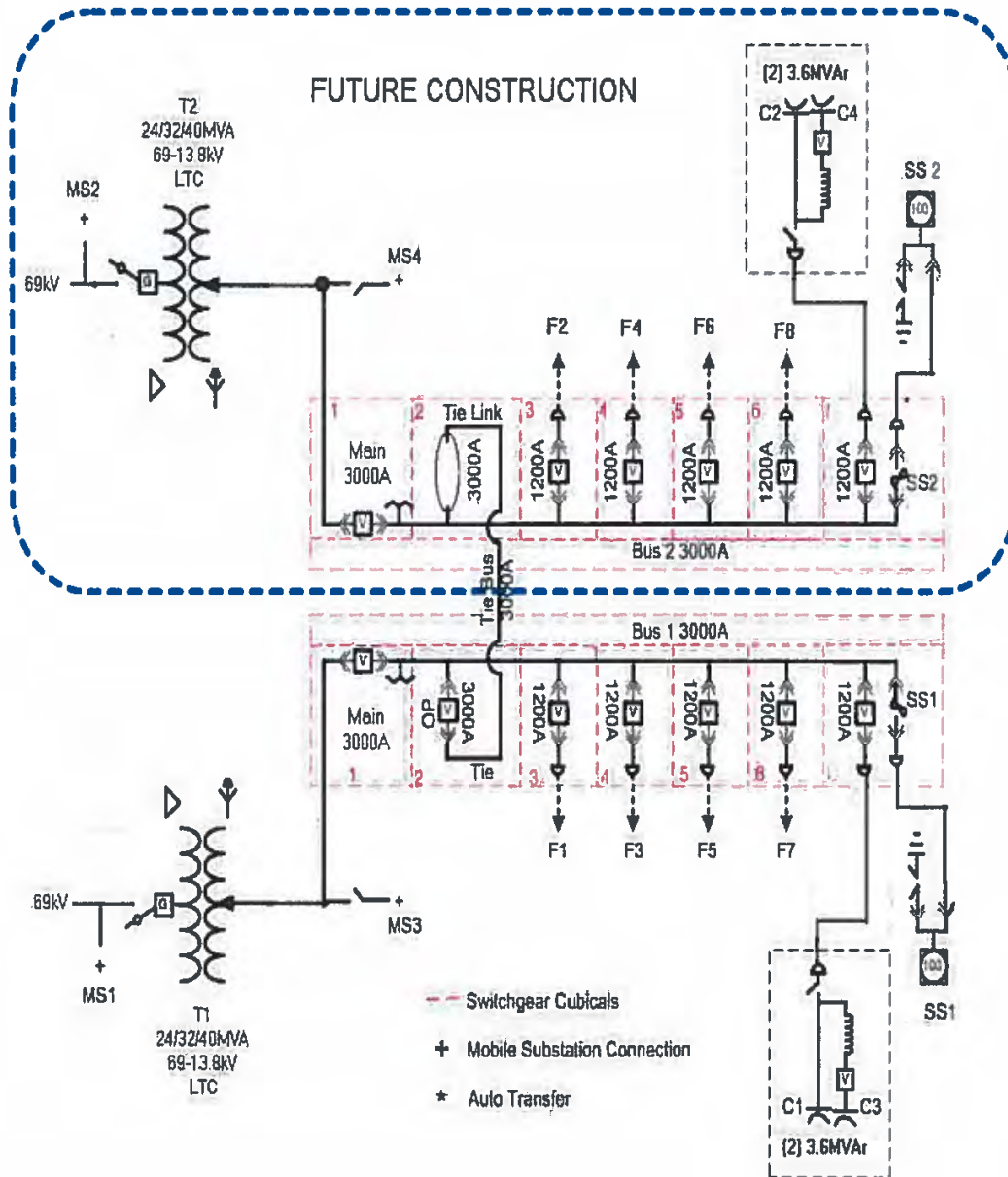


FIGURE 5 – NEWPORT 69/13.8kV SUBSTATION PROPOSED ONE-LINE

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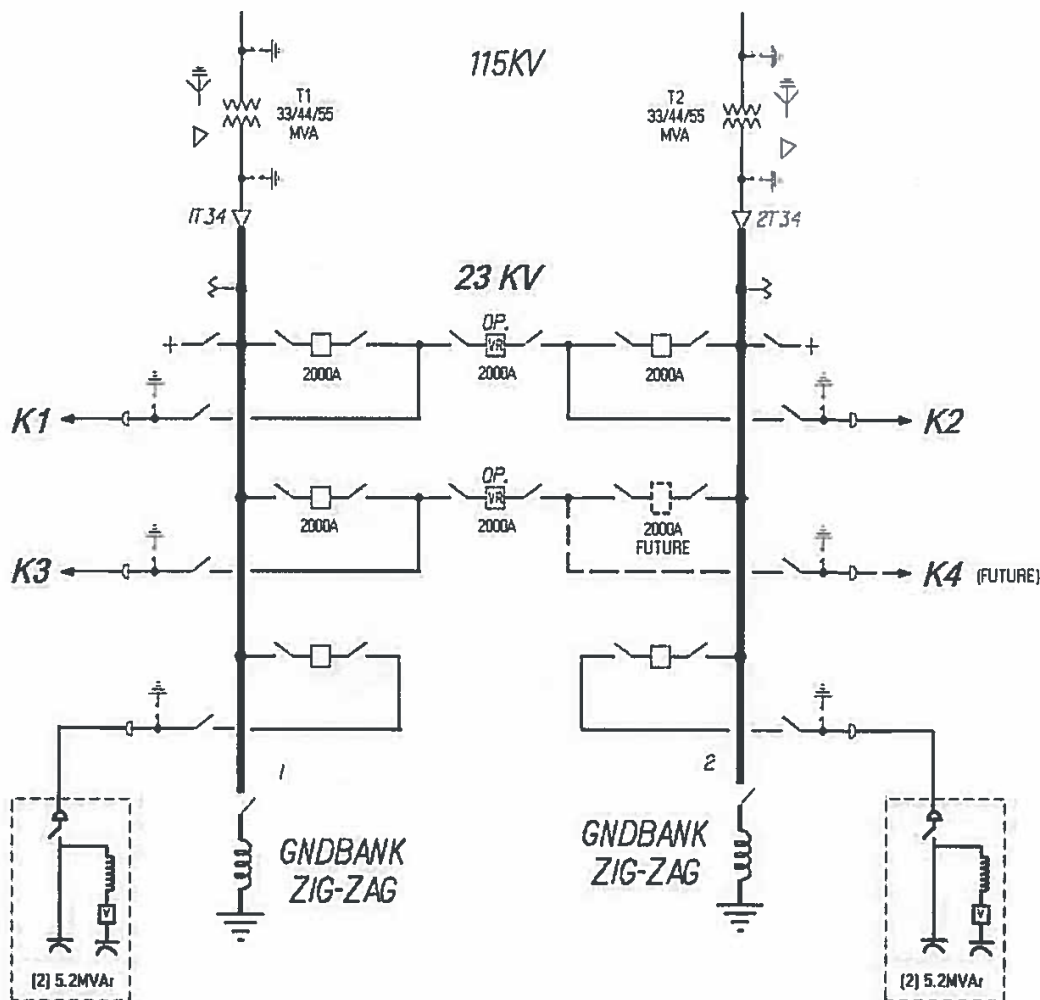


FIGURE 6 – MIDDLETOWN 115/23kV SUBSTATION PROPOSED ONE-LINE

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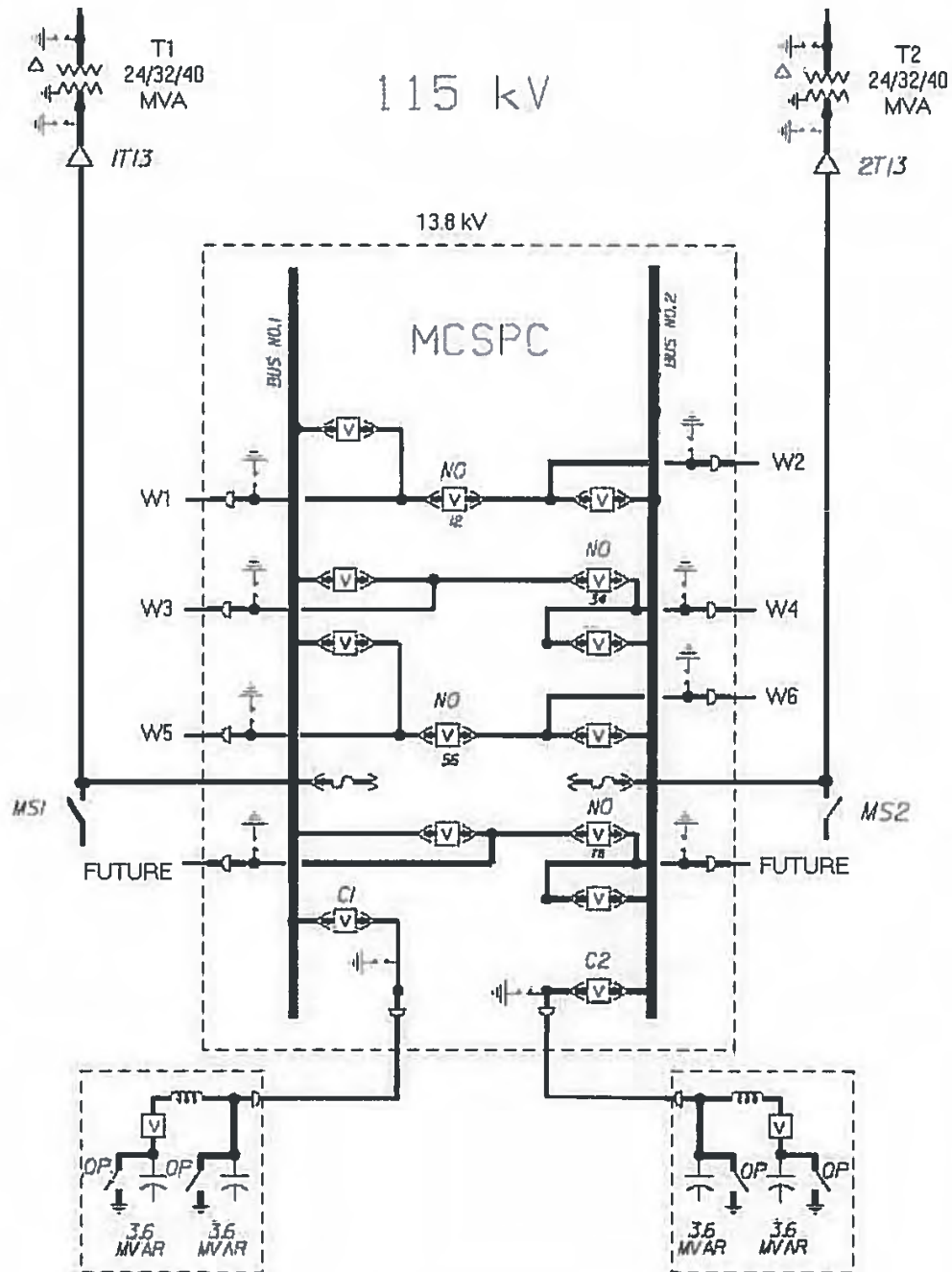


FIG 7 – MIDDLETOWN 115/13.8kV SUBSTATION PROPOSED ONE-LINE

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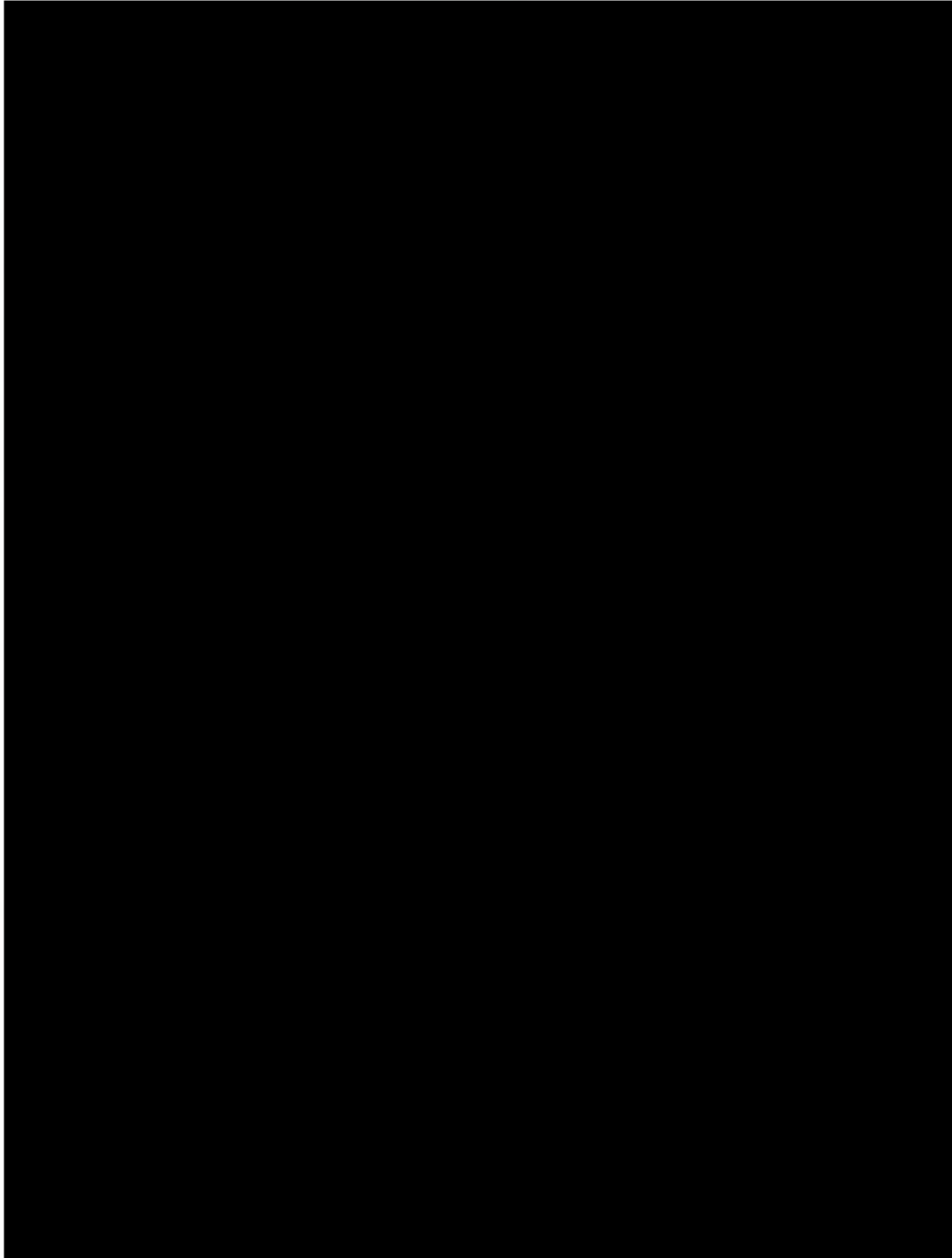


FIGURE 8 – PROPOSED STATION RETIREMENTS

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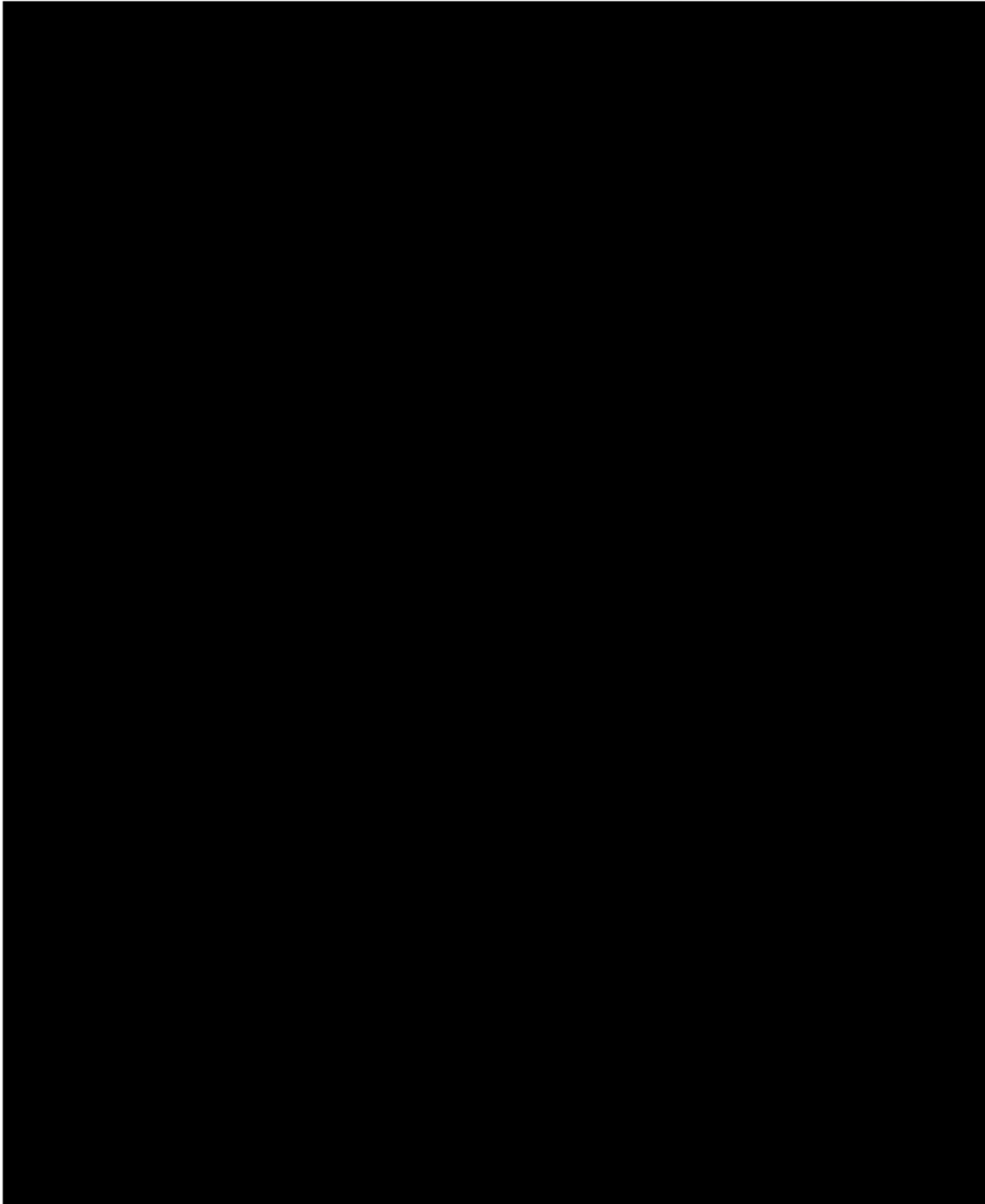


FIG 9 – PROPOSED SUBTRANSMISSION SYSTEM ONE-LINE

C028851

Recon. 38F5 and 2227 Greenville Ave

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C028851</u>	USSC #:
Revision: <u>6</u>	Budget Version: <u>Default</u>
Project Title: <u>Recon. 38F5 and 2227 Greenville Ave</u>	
Project Description: Reconductor the 2227 with 795 kmil AI and the 38F5 feeder with 477 kmil AI between P187 Greenville Ave and P.9396 and 38F5 between P9396 Greenville and P.171 Putnam Pike.	

Project Status: <u>Closed</u>	
Responsible Person: <u>CURLEY, JOSEPH</u>	Initiator: <u>Worme, Chris</u>
Spending Rationale: <u>System Capacity & Performance</u>	Funding Type: <u>P Electric Distribution Line RI</u>
Budget Class: <u>Load Relief</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>27</u>	Project Complexity Score: <u>15</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>											
Est Start Date: <u>11/1/2009</u>	Est Complete Date: <u>3/31/2014</u>										
Est In-Service Date: <u>6/1/2010</u>											
TTD Actuals: <u>\$899,905</u>	As Of: <u>10/2/2017</u>										
Cost Breakdown	<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;"><u>Capital</u></th> <th style="text-align: left;"><u>Expense</u></th> <th style="text-align: left;"><u>Removal</u></th> <th style="text-align: left;"><u>Total</u></th> <th style="text-align: left;"><u>Credits</u></th> </tr> <tr> <td><u>\$633,000</u></td> <td><u>\$63,000</u></td> <td><u>\$189,500</u></td> <td><u>\$885,500</u></td> <td><u>\$0</u></td> </tr> </table>	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>	<u>\$633,000</u>	<u>\$63,000</u>	<u>\$189,500</u>	<u>\$885,500</u>	<u>\$0</u>
<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>							
<u>\$633,000</u>	<u>\$63,000</u>	<u>\$189,500</u>	<u>\$885,500</u>	<u>\$0</u>							

Justification / Risk Identification:

The 2227 is located above the 38F5. The 38F5 consists of a mix of 1/0 and 4/0 AI in subject area.

Project Scope:

<Enter data here>

Project Alternatives Considered:

Additional Notes:

Related Projects:

Project Name:

Approvals

Line 1:	Date	<u>5/7/2013 09:58:16</u>	Approver	<u>sherir</u>	Approver 1
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028851 Current Total Authorized Amount: \$885,000.00

Title: Recon. 38F5 and 2227 Greenville Ave

Project Number: C028851

Budget Version Default (active)

Revision:

Revision Status: Approved

Revision No.: 6

Est Start Date: 11/01/2009

Est Complete Date: 12/01/2010

Est In Srvc Date: 06/01/2010

Capital: \$633,000.00

Expense: \$63,000.00

Jobbing: \$0.00

Retirement: \$0.00

Removal: \$189,500.00

Total (excl. Rets.): \$885,500.00

Credits: \$0.00

Net: \$885,500.00

Revision Info: Other Updates

Revision: 6 of 7

Find Revision

Send for Approval

☐ Show 'Budget Only' Revisions

Spending Estimates:

Grid Estimates

Forecast

Summarize from W/O

Copy Estimate

Property Estimates:

Unit Estimates

Create As Built

Delete Used Estimates

Edit:

New Revision

Delete Revision

Update

Update With Actuals

Import Estimates

Other:

Revision Comments

Released Dollars

Substitution

Slide

Version Compare

Close

Record 1 of 1

Audits

Project Re-Sanction Request

Date: 5/1/2013

Company: 49
PPM Project Id*: 03655 (C28851)
Project Name:
Recon. 38F5 and 2227 Greenville Ave, Johnston, RI
Project Engineer:

Project Manager: Pat Cody

Original Project Estimate:

Date of Original Sanction: 10/5/2012

Total: 295,000

Capex: 150,000

Opex: 130,000

Removal: 15,000

Revised Project Estimate:

Total: 885,500

Capex: 633,000

Opex: 63,000

Removal: 189,500

Cash Flows:

Previous FY: 885,500

Capex: 633,000

Opex: 63,000

Removal: 189,500

Current FY: 0

Capex:

Opex:

Removal:

FY+1: 0

Capex:

Opex:

Removal:

FY+2: 0

Capex:

Opex:

Removal:

Customer Contribution:

Reason for Revision

☐ Revised Forecast exceeds Approved Amount – Project Still In-Process
New Project Estimated Completion Date:

☒ Actual Spending exceeded Approved Amount – Project is Complete

☐ PPM (conversion issues)

Reason for Increased Spending:

☒ Change in Scope (Material, Labor or Other)

Reconductor the 2227 and 795 kcmil Al and the 38F5 feeder with 477 kcmil AL between P187 Greenville Ave and P.9396 and 38F5 between P.9396 Greenville and P.171 Putnam Pike. Upgraded construction grade estimate.

☐ Resource Allocation (Schedule, Delay, OT, or Contractor)

☒ **Low Estimate**

This project was approved for 295K in October 2012. The original estimate was for Design, Engineering, and projected cost for construction of this project. Based on design it has been determined that the job will cost 885K for the total project including construction. The following is a breakdown of costs for the project: 39K Design and Engineering, 445K labor and Labor Overheads, 140K materials and Material Overheads, 31K joint ownership, 44K transportation, and 186K removal

☒ **External Forces (Permitting Requirements, Weather, Contractor Issues, etc)**

project was delayed due to Verizon Pole sets

In-service Dates

Original In-service Date: 2/4/2013

Revised In-service Date: 2/5/2013

Reason for Change in Schedule:

☐ **Budget Deferral**

☐ **Permitting/Licensing**

☒ **Resource Availability**

additional resources were available to assist Telco and project was completed ahead of schedule.

☐ **Deferral due to change in system conditions**

☐ **Material Delay**

☐ **Outage Scheduling**

☐ **Other**

Prior to May 2010 PPM Project Id represents the Power Plant funding number

Version 3

C028884

Install Johnston 18F10 Feeder

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number:	<u>C028884</u>	USSC #:	<u>USSC0110W259 v3C</u>
Revision:	<u>10</u>	Budget Version:	
Project Title:	<u>Install Johnston 18F10 Feeder</u>		
Project Description:	Install a new feeder getaway at Johnston, construct approximately 4,200 ft of mainline and rearrange the area distribution.		

Project Status:	<u>Closed</u>		
Responsible Person:	<u>HURLEY, KATHLEEN</u>	Initiator:	<u>Worme, Chris</u>
Spending Rationale:	<u>System Capacity & Performance</u>	Funding Type:	<u>P Electric Distribution Line RI</u>
Budget Class:	<u>Load Relief</u>		
Capital by Category:			
Program Code:			
Project Risk Score:	<u>35</u>	Project Complexity Score:	<u>23</u>

Project Schedule / Expenditures

Revision Status:	<u>Approved</u>				
Est Start Date:	<u>5/20/2010</u>	Est Complete Date:	<u>9/30/2015</u>		
Est In-Service Date:	<u>9/30/2015</u>				
TTD Actuals:	<u>\$1,078,185</u>	As Of:	<u>10/2/2017</u>		
Cost Breakdown	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>
	<u>\$848,000</u>	<u>\$67,000</u>	<u>\$164,000</u>	<u>\$1,079,000</u>	<u>\$0</u>

Justification / Risk Identification:

This project covers the preliminary engineering associated with this project. The DOA dollars were reallocated 2-26-2010 based upon DCIG strategy paper. The three Johnston feeders supplying load west of the station, 18F1, 18F3 and 18F7, are projected at 111%, 90% and 100% in 2011 and 115%, 94% and 104% of summer normal ratings by 2012. Load in this area is expected to continue to increase with the continued development of the industrial park on Scituate Ave. These feeders have ties to the West Cranston feeder 21F2 with a projected load of 64% in 2011. Switching load between these feeders is not an option to relieve the

Project Scope:

<Enter data here>

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Total DOA \$0.695M over 4 projects 4443, 3435, 4415 and DxT 4442.

USSC0110W259 v2: C036072 \$1.000M; C033535 \$290K; C034002 \$260K; C028884 \$720K.

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>1/28/2017 18:27:21</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4770
Attachment PUC 1-16-1 part 1 of 2
Page 226 of 889

PowerPlan ----- PPGPRD Database

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Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028884 Current Total Authorized Amount: \$1,07...

Title: Install Johnston 18F10 Feeder
Project Number: C028884

Budget Version Default (active)
Revision: v3
Revision Status: Approved
Revision No.: 9
Est Start Date: 05/20/2010
Est Complete Date: 09/30/2015
Est In Srvc Date: 09/30/2015
Capital: \$848,000.00
Expense: \$67,000.00
Jobbing: \$0.00
Retirement: \$0.00
Removal: \$163,000.00
Total (excl. Rets.): \$1,078,000.00
Credits: \$0.00
Net: \$1,078,000.00

Revision Info: Other Updates

Revision: 9 of 10
[Find Revision](#)
☐ Show 'Budget Only' Revisions

Spending Estimates:
Grid Estimates
Forecast
Summarize from W/O
Copy Estimate

Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates

Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates

Other:
Revision Comments
Released Dollars
Substitution
Slide

Version Compare

Record 1 of 1

Audits

Close

Send for Approval

This document has been reviewed for Critical Energy
Infrastructure Information (CEII). 1/26/2017



USSC Closure Paper

Title:	Johnston #18 Substation	Sanction Paper #:	USSC0110W259 v3C
Project #:	C033535, C034002, C028884, C036072	Sanction Type:	Closure
Operating Company:	The Narragansett Electric Co.	Date of Request:	January 11, 2017
Author:	Kathleen Hurley	Sponsor:	Carol Sedewitz, VP Electric Asset Management
Utility Service:	Electricity T&D	Project Manager:	Kathleen Hurley

1 Executive Summary

This paper is presented to close the Johnston #18 Substation Project, the funding numbers consists of: C033535, C034002, C028884 and C036072. The total spend was \$8.203M. The latest sanctioned amount for this project was \$8.138M.

The original requested sanction amount was \$7.345M.

The final spend amount is \$8.203M broken down into:

\$6.515M Capex
\$0.078M Opex
\$0.752M Removal

2 Project Summary

This project replaced the No. 3 Transformer at the Johnston Substation, installed three feeder positions and retired and removed all equipment in the old 12.47 kV substation.

The project consisted of the following activities:

- Completed a 3rd bay by adding a second feeder position, this consisted of a feeder breaker, regulators, switches, relays, control and other associated equipment.
- Added a 4th and 5th bay consisting of a tie breaker and two feeder positions.
- Added two substation capacitor banks.
- Installed the underground ducts and cables to the new feeder position.
- Replaced the existing No.3 Transformer with a newer unit rated at 33/44/55 MVA.
- Retired and removed all equipment in the old 12.47 kV substation.

USSC Closure Paper



3 Over / Under Expenditure Analysis

3.1 Summary Table

Actual Spending (\$M)			
Project #	Description		Total Spend
C033535	Johnston Substation Work and Retirement of the old Substation	Capex	4.579
		Opex	0.010
		Removal	0.200
		Total	4.789
Project #	Description		Total Spend
C034002	Johnston Sub 12kV Expansion Getaways	Capex	0.317
		Opex	0.007
		Removal	0.016
		Total	0.340
Project #	Description		Total Spend
C028884	Johnston 18F10 Feeder Installation	Capex	0.848
		Opex	0.067
		Removal	0.164
		Total	1.079
Project #	Description		Total Spend
C036072	Johnson T#3 Replacement	Capex	1.989
		Opex	0.005
		Removal	0.001
		Total	1.995
Total		Capex	7.733
		Opex	0.089
		Removal	0.381
		Total	8.203

USSC Closure Paper



Project Sanction Summary Table			
Project Sanction Approval (\$M)			Total Spend
		Capex	6.515
		Opex	0.078
		Removal	0.752
		Total Cost	7.345
Sanction Variance (\$M)			Total Spend
		Capex	(1.218)
		Opex	(0.011)
		Removal	0.371
		Total Variance	(0.858)

3.2 Analysis

The original design called for removing all protection on the 13kV tertiary winding because all load was being removed from that winding. However, because it is a delta winding, a ground fault protection was required to detect ground faults on the 13kV winding.

This issue was caught in the field, reviewed by the team and was added to the scope after the design and estimate had been approved. A PCR was created for this change.

4 Improvements / Lessons Learned

Lessons Learned: The original design called for removing all protection on the 13kV tertiary winding because all load was being removed from that winding. However, because it is a delta winding, ground fault protection was required. This issue was caught in the field, reviewed by the team and added to the scope after the design and estimate had been approved.

A thorough design review including input from all team members should be held prior to issuing for construction to prevent any potential design work from being overlooked or omitted prior to the construction phase.

Please refer to ID #480 in the Lessons Learned Database.

5 Closeout Activities

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	<input checked="" type="radio"/> Yes <input type="radio"/> N/A



USSC Closure Paper

All relevant costs have been charged to project	<input checked="" type="radio"/> Yes <input type="radio"/> N/A
All work orders and funding projects have been closed	<input checked="" type="radio"/> Yes <input type="radio"/> N/A
All unused materials have been returned	<input checked="" type="radio"/> Yes <input type="radio"/> N/A
All as-builts have been completed	<input checked="" type="radio"/> Yes <input type="radio"/> N/A
All lessons learned have been entered appropriately into the lesson learned database	<input checked="" type="radio"/> Yes <input type="radio"/> N/A

6 Statements of Support

6.1 Supporters

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

Department	Individual	Responsibilities
Investment Planning	DiConza, Glen/ Park, Michelle	Endorses relative to 5-year business plan or emergent work
Resource Planning	Wyman, Anne/ Philips, Mark	Endorses construction resources, cost estimate, schedule, and portfolio alignment
Asset Management / Planning	Hayduk, Brian/ Labarre, Alan T.	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Engineering and Design	Martuscello, Suzan E.	Endorses scope, design, conformance with design standards
Project Management	Schneller, Andrew	Endorses resources, cost estimate, schedule
Electric Project Estimation	Simonds, Jammie	Endorses Cost Estimate

6.2 Reviewers

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

Function	Individual
Finance	Easterly Patricia/Helm, Richard
Regulatory	Zschokke, Peter

USSC Closure Paper



Jurisdictional Delegate(s)	Patterson Jim/ Terron Hill
Procurement	Curran, Art
Control Centers (CC)	Gallagher Michael Houston, Will

USSC Closure Paper



7 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on January 11, 2017.

Signature..........Date..........

Christopher Kelly

Acting Senior Vice President Electric Process and Engineering

C028920

New London Ave (D-Sub)

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C028920</u> Revision: <u>7</u> Project Title: <u>New London Ave (D-Sub)</u> Project Description: This project recommends the installation of a new 115/12.47kV metal-clad substation near New London Turnpike with a single transformer, 3000 A bus, four 12.47kV distribution feeders and capacitor bank.	USSC #: <u>USSC-12-472v2 (DCIG100)</u> Budget Version: <u>Default</u>
---	--

Project Status: <u>open</u> Responsible Person: <u>HURLEY, KATHLEEN</u> Spending Rationale: <u>System Capacity & Performance</u> Budget Class: <u>Load Relief</u> Capital by Category: Program Code: Project Risk Score: <u>39</u>	Initiator: <u>Worme, Chris</u> Funding Type: <u>P Electric Distribution Sub RI</u> Project Complexity Score: <u>29</u>
---	---

Project Schedule / Expenditures

Revision Status: <u>Approved</u> Est Start Date: <u>4/21/2009</u> Est In-Service Date: <u>12/31/2016</u> TTD Actuals: <u>\$2,907,244</u>	Est Complete Date: <u>2/28/2017</u> As Of: <u>10/2/2017</u>
---	--

Cost Breakdown	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>
	<u>\$2,525,000</u>	<u>\$18,000</u>	<u>\$0</u>	<u>\$2,543,000</u>	<u>\$0</u>

Justification / Risk Identification:

This project recommends the installation of a new 115/12.47kV metal-clad substation near New London Turnpike with a single transformer, 3000 A bus, four 12.47kV distribution feeders and capacitor bank.

Project Scope:

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick. This project will add distribution capacity in an area that is heavily loaded. The new capacity will relieve transformers, supply lines and distribution feeders that are projected to exceed their summer normal ratings

Project Alternatives Considered:

<Enter data here>

Additional Notes:

USSC-12-472 Partial Sanction total DoA \$770K. C031696 \$100K; C028920 \$250K; C028921 \$250K; C045313 \$75K; C030161 \$70K; C030161 \$25K

Related Projects:

Project Number:

C045313

Project Name:

New London WaveTrap

Approvals

Line 1:	Date	<u>6/9/2014 14:41:13</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028920 Current Total Authorized Amount: \$2,54...

Title: New London Ave (D-Sub)
Project Number: C028920

Budget Version Default (active)
Revision: 12-472 v2
Revision Status: Approved
Revision No.: 7
Est Start Date: 04/21/2009
Est Complete Date: 02/28/2017
Est In Srvc Date: 12/31/2016
Capital: \$2,525,000.00
Expense: \$18,000.00
Jobbing: \$0.00
Retirement: \$0.00
Removal: \$0.00
Total (excl. Rets.): \$2,543,000.00
Credits: \$0.00
Net: \$2,543,000.00

Revision Info: Other Updates

Revision: 7 of 7
Find Revision
Send for Approval

☐ Show 'Budget Only' Revisions

Spending Estimates:
Grid Estimates
Forecast
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Import Estimates

Other:
Revision Comments
Released Dollars
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This document has been reviewed for Critical
Energy Infrastructure Information (CEII)

D+T



US Sanction Paper

Title:	New London Avenue Substation #150	Sanction Paper #:	USSC-12-472 v2
Project #:	C028920, C031696, C028921, C030161, C054764, C045313, C054434, C054436	Sanction Type:	Partial Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	5/14/14
Author:	Marc Bristol	Sponsor:	Cheryl A. Warren, Vice President Asset Management
Utility Service:	Electricity T&D	Project Manager:	Marc Bristol

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of projects C028920, C031696, C028921, C030161, C054764, C045313, C054434, and C054436 in the amount \$12.600M with a tolerance of +/- 10% for the purposes of final engineering and design, procurement of long lead materials, and initial construction activities.

This sanction amount is \$12.600M broken down into:

\$10.490 Capex
\$0.372 Opex
\$1.729 Removal

NOTE the potential investment of \$18.600M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

1.2 Project Summary

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick, RI. This project will add distribution capacity in an area that is heavily loaded. The new capacity will relieve transformers, supply lines and distribution feeders that are projected to exceed their summer normal ratings.

The station will be located between West Cranston #21 and Drumrock #14 substations and supplied by a 115kV tap from the existing T-172S transmission line.

The station will be located on a purchased parcel of land adjacent to another company-owned parcel on New London Avenue.



US Sanction Paper

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C028920	Distribution Substation	New London Ave Substation	6.778
C031696	Transmission Line	T172S Line Tap	2.026
C028921	Distribution Line	Distribution Getaways and 4kV Conversions	8.613
C030161	Transmission (SubT-Line)	3310 Reconductoring	0.650
C054764	Transmission (SubT-Line)	3311 Upgrades	0.059
C045313	Transmission Substation	New London Ave Circuit Switcher and Wave Trap	0.182
C054434	Transmission	W Cranston Substation- Install Wave Trap	0.150
C054436	Transmission	Johnston Substation - Install Wave Trap	0.150
Total			18.608

1.4 Associated Projects

Project Number	Project Title	Estimate Amount (\$M)
C053723	Arctic Substation Retirement (D-Sub)	0.250
Total		0.250

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
12/12/2012	USSC USSC-12-472	\$0.770M	New London Ave Substation #150	Partial
06/30/2009	AMIC SG114	\$0.00M	Strategy to Build a 115/12.5kV Substation in West Warwick, RI	Strategy
06/18/2009	AMIC PWS0922	\$0.175M	A New 115/12.5kV Substation in West Warwick RI	Partial
10/01/2008	DCIG DCIG1008P92	\$0.365M	West Warwick Substation – Install Metal Clad Switchgear With Four Distribution Feeders and Rebuild the 3310 and 3311 Sub- Transmission Lines	Partial

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
July 2015	Full implementation



US Sanction Paper

1.7 Category

Category	Reference to Mandate, Policy, or NPV Assumptions
<input type="radio"/> Mandatory	The investment has been classified as policy driven. Without this project the company will not be able to provide a reliable electric service to the customers in the study area.
<input checked="" type="radio"/> Policy- Driven	
<input type="radio"/> Justified NPV	

1.8 Asset Management Risk Score

Asset Management Risk Score: 39

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: 29

1.10 Process Hazard Assessment

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

☒ Yes ☐ No



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 (\$)
New England Distribution FY15-FY19 C028920, C028921,	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	\$9.300M
New England Transmission FY15-FY19 C031696, C045313, C054434, C054436, C030161, C054764	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	\$1.830M

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

Re-allocation of funds within the portfolio will be managed 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 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
CapEx	0.679	2.443	6.301	7.002	0.000	0.000	0.000	16.425
OpEx	0.019	0.063	0.244	0.085	0.000	0.000	0.000	0.411
Removal	0.002	0.273	1.100	0.397	0.000	0.000	0.000	1.772
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.700	2.779	7.645	7.484	0.000	0.000	0.000	18.608



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1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Preliminary Engineering (kick-off meeting)	May 2009
Partial Sanction	May 2014
Distribution Line Design Complete – EDC	July 2014
Distribution Line Construction Start	December 2014
Substation Engineering Design Complete – EDC	May 2015
Project Sanction	August 2015
Substation Construction Start	October 2015
Submit Facility Ratings to ISO	July 2016
Substation Construction Complete – CC	November 2016
Ready for Load - RFL	November 2016
Distribution Line Construction Complete – CC	December 2016
Project Closure Report	February 2017

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

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

1	Special use permit from the City of Warwick required
2	Outage required on the T172S for new 115kV tap; summer outage should be avoided
3	Historical raw material found on site, additional site exploration required for characterization



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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 checked="" type="radio"/> Neutral	<input type="radio"/> Positive	<input type="radio"/> Negative

1.18 List References

1	USSC-12-472 – New London Ave Substation #150 December 2012
2	SG114 - Strategy to Build a 115/12.5kV Substation in West Warwick, RI June 2009
3	PWS0922 - A New 115/12.5kV Substation in West Warwick RI June 2009
4	DCIG1008P92 – West Warwick Substation – Install Metal Clad Switchgear With Four Distribution Feeders and Rebuild the 3310 and 3311 Sub-Transmission Lines May 2009

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2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on May 14, 2014:

- (a) APPROVED the investment of \$12.600M and a tolerance of +/- 10% for final engineering and design, procurement of long lead materials, and initial construction activities.
- (b) NOTED the potential investment \$18.600M to and a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.
- (c) NOTED that Marc Bristol has the approved financial delegation to undertake the activities stated in (a).

Signature.....

A handwritten signature in blue ink, appearing to read "Lee Eckert", written over a dotted line.

.....Date.....

5/27/14

Lee S. Eckert

US Chief Financial Officer

Chairman, US Sanctioning Committee



US Sanction Paper

3 Sanction Paper Detail

Title:	New London Avenue Substation #150	Sanction Paper #:	USSC-12-472 v2
Project #:	C028920, C031696, C028921, C030161, C054764, C045313, C054434, C054436	Sanction Type:	Partial Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	5/14/14
Author:	Marc Bristol	Sponsor:	Cheryl A. Warren
Utility Service:	Electricity T&D	Project Manager:	Marc Bristol

3.1 *Background*

The Central Rhode Island West study area encompasses the Towns of Coventry, West Greenwich, and West Warwick and sections of the Cities of Cranston and Warwick, and Towns of East Greenwich, Exeter, and Scituate. The area load peaked at approximately 169 MVA in 2012 with 47,000 customers served. The study area and existing area substations are shown in Figure 1 of the appendix.

In 2008 a comprehensive study was completed for this area. This study identified an immediate need for new distribution capacity in the area to resolve short-term loading concerns and a new substation in the Warwick/West Warwick area to resolve long-term loading concerns and significant exposure for various n-1 contingencies. The 2012 Annual Capacity Plan still supports the need for a new substation in this area.

The Central Rhode Island West study area is still supplied by a highly utilized supply and distribution system. It is becoming increasingly challenging to operate this system within normal loading limits and to supply load growth in this area. This strategy paper documents the long-term solution for the area.

3.2 *Drivers*

The primary driver is projected thermal overloads of transformers, distribution feeders and supply lines during period of system peak loading. There have been a number of large developments in the area such as The Centre of New England and the Royal Mills complex that continue to add load to an area with heavily loaded feeders and supply lines. A new modular feeder along with load transfers have been utilized to prevent thermal overloads as a result of the new load.

The tables below show the facilities in the study area that are projected to exceed 100% of their rating during either normal operation or contingencies. Table 1 below shows feeders in the area with loads projected to exceed 100% of their normal rating; Table 2 shows transformers with loads projected to exceed 100% of their normal rating; and Table 3 shows the supply lines that are overloaded during contingencies.

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Substation	Feeder	SN Rating (Amps)	2014		2016		2018		2020	
			Amps	%SN	Amps	%SN	Amps	%SN	Amps	%SN
ANTHONY	64F1	361	336	93%	353	98%	359	99%	363	101%
ANTHONY	64F2	361	344	95%	361	100%	367	102%	372	103%
HOPE	15F2	476	465	98%	487	102%	496	104%	502	105%
HOPKINS HILL	63F2	530	512	97%	537	101%	546	103%	553	104%
KENT COUNTY	22F3	530	487	92%	511	96%	520	98%	527	99%
KENT COUNTY	22F4	586	579	99%	607	104%	618	105%	626	107%
ARCTIC	49J4	295	294	100%	308	104%	313	106%	317	108%

Table 1 - Projected loads through 2020 for feeders and loads greater than 100%

Substation	Transformer	2014		2016		2018		2020	
		MVA	% SN	MVA	% SN	MVA	% SN	MVA	% SN
ANTHONY	1	7.3	93%	7.6	98%	7.7	99%	7.8	101%
ANTHONY	2	7.4	95%	7.8	100%	7.9	102%	8.0	103%

Table 2 - Projected Loads through 2020 for Transformers with Loads Greater than 100%

Circuit	Line Section		2014		2016		2018		2020	
	From	To	MVA	% SE	MVA	% SE	MVA	% SE	MVA	% SE
2230	Natick 29 Tap	Artic 49 Tap	37.5	106%	39.3	111%	40.0	113%	40.5	114%
2230	Warwick Mall 28 Tap	Natick 29	16.1	105%	16.9	110%	17.2	112%	17.4	113%
2232	Anthony Tap	Coventry Tap	16.0	104%	16.8	110%	17.1	112%	17.3	113%
3310	Kent County 22	Major Potter Rd								
3310	Major Potter Rd	Hopkins Hill Riser								
3311	Kent County 22	Hopkins Hill Tap								
3311	Hopkins Hill Tap	Hopkins Hill 63								

Table 3 - Projected Contingency Loads through 2020 for Supply Line Segments with Loads Greater than 100%

The tables below show projected loading after the New London Ave substation is placed in service. Table 4 below shows projected feeder loading; Table 5 below shows projected transformer loading; and Table 6 below shows projected supply line loading post an n-1 contingency.



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Substation	Feeder	SN Rating (Amps)	2014		2016		2018		2020	
			Amps	%SN	Amps	%SN	Amps	%SN	Amps	%SN
ANTHONY	64F1	361	355	98%	304	84%	317	88%	329	91%
ANTHONY	64F2	361	363	101%	313	87%	327	91%	339	94%
HOPE	15F2	476	529	111%	402	84%	419	88%	435	91%
HOPKINS HILL	63F2	530	536	101%	515	97%	537	101%	558	105%
KENT COUNTY	22F3	530	547	103%	289	54%	301	57%	313	59%
KENT COUNTY	22F4	586	580	99%	555	95%	579	99%	601	103%
ARCTIC	49J4	452	317	70%	274	61%	285	63%	296	66%
WEST WARWICK	F1				455	71%	474	74%	493	76%
WEST WARWICK	F2				347	66%	362	68%	376	71%
WEST WARWICK	F3				309	58%	322	61%	334	63%
WEST WARWICK	F4				327	51%	341	53%	354	55%

Table 4 - Project Loads through 2020 for Feeders Post New London Ave Substation

Substation	Tranf. ID.	2016		2018		2020	
		MVA	% SN	MVA	% SN	MVA	% SN
ANTHONY	1	6.6	84%	6.8	88%	7.1	91%
ANTHONY	2	6.8	87%	7.1	90%	7.3	94%

Table 5 - Project Loads through 2020 for Transformers Post New London Ave Substation

Circuit	Line Section		2016		2018		2020	
	From	To	MVA	% SE	MVA	% SE	MVA	% SE
2230	Natick 29 Tap	Artic 49 Tap	33.6	95%	34.2	96%	34.6	98%
2230	Warwick Mall 28 Tap	Natick 29	15.3	100%	15.6	102%	15.8	103%
2232	Anthony Tap	Coventry Tap	14.8	96%	15.0	98%	15.2	99%
3310	Kent County 22	Major Potter Rd						
3310	Major Potter Rd	Hopkins Hill Riser						
3311	Kent County 22	Hopkins Hill Tap						
3311	Hopkins Hill Tap	Hopkins Hill 63						

Table 6 - Projected Contingency Loads through 2020 for Supply Line Segments Post New London Ave Substation



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3.3 Project Description

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick, RI. The station will be located adjacent to the transmission corridor between West Cranston and Drumrock substations and supplied by a 115 kV tap from an existing transmission line. The proposed geographical location of the proposed new substation is shown in Figure 2, and proposed one line shown in Figure 3 of the appendix.

Initially, four 12.47 kV feeders will be installed through approximately 2500 ft manhole and duct system, and the existing distribution system will be rearranged to offload existing transformers, supply lines and distribution feeders. The new feeders will supply load currently fed from the four 4kV Arctic substation feeders, these circuits will be converted to 12.47 kV and the substation retired under associated project funding number C053723.

The layout of the 12.47 kV distribution feeders, after installation of the substation is shown in Figure 5 of the appendix.

There are two sections of the 3310 and 3311 supply lines that are projected to be overloaded on contingency after the new station is in service. These lines are classified as transmission assets. The estimated cost of reconductoring approximately 5,000 ft of the 3310 line to eliminate the overloads is estimated at \$650,000 and the cost of upgrading the 3311 for 120°C operation is \$20,000. The alternative to the reconductoring and upgrading these lines is to remotely drop a feeder at Hopkins Hill substation on supply line contingency. It is recommended that these two circuits be upgraded.

Simulation results indicate that the addition of the New London Ave substation and 0.04 mile transmission tap would result in unacceptable attenuation of the 240 kHz power line carrier (PLC) signal. Acceptable channel performance will be achieved by installing wave traps at New London Ave, Johnston, and West Cranston substations.

3.4 Benefits Summary

Relief of the customer's (Narragansett Electric Company) potential distribution loading issues and improving the reliability of the distribution supply system in the Central Rhode Island West area are the primary benefits of this project.

3.5 Business and Customer Issues

The land purchase was completed as of August 28, 2013.

3.6 Alternatives

Alternative 1: Expansion of West Cranston and Kent County substations

One alternative involved the expansion of existing 115/12.47kV substations at West Cranston and Kent and Kent County substations. The supply lines would have to be rebuilt for a larger capacity to accommodate two new modular stations in West Warwick and Coventry. It will be necessary to procure sites with the appropriate zoning for each station. The distribution system



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will be modified to accommodate the new stations. The estimated distribution cost of this option is \$11,300,000. There will be an additional \$3,800,000 in associated transmission costs. This option exceeded the cost of the preferred option; there are no additional benefits; and the uncertainty of finding appropriate lots make this option unattractive at this time.

Alternative 2: New 115/12.47kV substation in Cranston

A second alternative considered was the development of a new 115/12.47kV metal clad station on a site in Cranston near Phenix Avenue. The transmission costs are similar to the preferred plan, however, the distribution costs to extend feeders from this site to relieve the overloaded feeders and supply lines would be significantly more due to the limited routes available and the distance from the overloaded facilities. The detail of this option were not fully developed as the estimated distribution costs far exceeded those of the preferred alternative which was near the stations with loading issues. This option is also not recommended at this time.

3.7 Safety, Environmental and Project Planning Issues

Safety

All National Grid safety procedures will be followed at the site. This is a green field site and the majority of the work can be done before the station is energized. Clearances to live equipment must be maintained.

The equipment and fencing yard will be dimensioned to allow safe access around the yard for O&M equipment.

A secondary gate, remote from the primary yard entrance, will be provided for emergency egress from the yard.

The new Metal-Clad Switchgear Power Center (MCSPC) is designed with the switchgear in one room and the control switchboards in another to minimize personnel exposure to unsafe conditions. A door is provided between the two rooms as added protection from a fault in the switchgear area entering unimpeded into the control area.

Protective relays and controls will not be installed on the doors of the switchgear to eliminate potential personnel exposure to an arc fault condition while performing control or maintenance activities.

Environmental

As part of the due diligence process, a Phase 1 Environmental Site Assessment (ESA) was conducted with no Recognizable Environmental Conditions (RECs) found.

An Archaeological site review identified historical raw materials within the bounds of the proposed substation. A Phase 2 Archaeological site evaluation will be performed for characterization.

A Storm Water Pollution Prevention Plan (SWPPP) will be required.



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The land parcel has several wetlands. It is likely that the Rhode Island Department of Environmental Management (RIDEM) freshwater wetlands permitting will be required.

A Soil Erosion and Sediment Control Plan may be required by the City of Warwick.

Planning

A special use permit will be required to use the property for a substation. As part of that permit, requirements for fencing, driveways, landscape and screening, and setbacks must be met, or variances applied for and obtained.

The level of Stakeholder Management involvement is high as a result of proximity to abutters. The team will meet with the City of Warwick and abutters after site plans are finalized. The site design shall attempt to maintain natural screening to the residential abutters and landscaping will be provided to enhance the natural screening.

A noise study is being performed using the assumptions of 67 dBA NEMA low noise or 65 dBA very low noise to limit noise increases at nearby residences to 5 dBA or less.

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	Wetlands mitigation required by agencies may be greater than anticipated	3	2	4	6	12	Accept	Begin permitting process as early as possible to quantify risk and develop mitigation plans and designs	N/A	Address with offsets
2	Data recovery may be required for historical raw material found on site	4	2	3	8	12	Accept	Perform Phase 2 Archaeological site evaluation for characterization	N/A	Perform Data Recovery of material
3	Abutters views of substation, T-line construction could cause delays	3	2	1	6		Accept	Initiate outreach plan early	N/A	Address identified abutter issues with potential solutions early
4	Subsurface conditions may include rock and/or ledge	4	2	2	8	8	Accept	Conduct geotechnical studies	N/A	Final engineering design to address and mitigate risk
5	Critical material delivery delays	2	2	2			Mitigate	Start bid process early, obtain multiple bids	N/A	Work with vendor to avoid schedule impacts and/or revise construction activities sequence
6	Civil work for construction of substation entrance in close proximity of 345kV circuit, crews could inadvertently make contact with conductor causing circuit outage or property damage	3	2	2	6	6	Mitigate	Develop PHA	N/A	Revise PHA



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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
Warwick, RI, Special Use Permit	Certain	4 Months	Not Applied For	January 2015
Warwick, RI, Curb Cut Permit	Certain	3 Months	Not Applied For	February 2015
Warwick, RI, Street Opening Permit	Certain	3 Months	Not Applied For	February 2015
Building Permit	Certain	3 Months	Not Applied For	January 2015
RIDEM Wetlands Permitting	Likely	9 Months	Not Applied For	February 2015
EFSB Notice of Intent	Certain	4 Months	Not Applied For	May 2015

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Based on current schedule the substation will enter service in FY17 and the distribution projects will be included in each fiscal year's Annual ISR Filing until that time.

The circuit switcher and wave trap at New London Ave (C045313) is 100% PTF.

Wave traps at Johnston (C054436) and W Cranston substations are 100% PTF.

The transmission line tap (C031696) is non-PTF, however assets that are part of the mainline are PTF. PTF work on the T172S consists of removing existing structure #225 and its foundation, and installing new structure 225-1 approximately 65 feet back from the existing structure. Structure #225 is a davit arm suspension; Structure #225-1 will be a single pole deadend tap structure on concrete foundation, supporting two motor operated vertical break switches. Non-PTF work on the T172S consists of installing a new 3-pole deadend structure on concrete foundations, and two spans of 477 kcmil ACSR conductor. The tap line will have no Shieldwire.

Work on S171S (C031696) consists of replacing structure #241 with a 20-foot taller structure to provide clearance below for the tap line. The capacity of structure #241's existing foundation is insufficient for the loads applied by the taller pole, and therefore will also need to be replaced. All work on S171S will be PTF.

Work on 359 consists of replacing structure #201 with a 15-foot taller structure to provide clearance below for the tap line. The capacity of structure #201's foundation appears to be sufficient for the loads applied by the taller pole, however, work with the steel pole supplier may



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require retrofitting the foundation with additional anchor bolts. This need will be determined during step 2B in coordination with the steel pole supplier. All work on 359 will be PTF.

Work on 332 consists of installing phaseraisers at structures #198 and #199 to provide clearance below for the tap line. Structure #198 will be raised five feet, and structure #199 will be raised 15 feet. All work on 332 will be PTF.

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 \$3.285M. This is indicative only. The actual revenue requirement will differ, 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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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+		
					2014/15	2015/16	2016/17	2017/18	2018/19	2019/20		
C028920	New London Ave Substation	+/- 25%	CapEx	0.399	1.050	2.532	2.750	0.000	0.000	0.000	6.731	
			OpEx	0.018	0.009	0.010	0.010	0.000	0.000	0.047		
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
			Total	0.417	1.059	2.542	2.760	0.000	0.000	6.778		
C031696	T172S Line Tap	+/- 25%	CapEx	0.148	0.070	0.350	1.404	0.000	0.000	0.000	1.972	
			OpEx	0.001	0.000	0.000	0.010	0.000	0.000	0.011		
			Removal	0.000	0.000	0.000	0.043	0.000	0.000	0.043		
			Total	0.149	0.070	0.350	1.457	0.000	0.000	2.026		
C028921	Distribution Getaways and 4kV Conversions	+/- 25%	CapEx	0.010	0.800	3.300	2.500	0.000	0.000	0.000	6.610	
			OpEx	0.000	0.050	0.234	0.085	0.000	0.000	0.349		
			Removal	0.000	0.200	1.100	0.354	0.000	0.000	1.654		
			Total	0.010	1.050	4.634	2.919	0.000	0.000	8.613		
C030161	3310 Reconductoring	+/- 25%	CapEx	0.122	0.456	0.000	0.000	0.000	0.000	0.000	0.578	
			OpEx	0.000	0.002	0.000	0.000	0.000	0.000	0.002		
			Removal	0.002	0.088	0.000	0.000	0.000	0.000	0.070		
			Total	0.124	0.526	0.000	0.000	0.000	0.000	0.650		
C054764	3311 Upgrades	+/- 25%	CapEx	0.000	0.052	0.000	0.000	0.000	0.000	0.000	0.052	
			OpEx	0.000	0.002	0.000	0.000	0.000	0.000	0.002		
			Removal	0.000	0.005	0.000	0.000	0.000	0.000	0.005		
			Total	0.000	0.000	0.000	0.000	0.000	0.000	0.059		
C045313	New London Ave Circuit Switcher and Wave Trap	+/- 25%	CapEx	0.000	0.005	0.089	0.088	0.000	0.000	0.000	0.182	
			OpEx	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		
			Total	0.000	0.005	0.089	0.088	0.000	0.000	0.182		
C054434	W Cranston Substation- Install Wave Trap	+/- 25%	CapEx	0.000	0.005	0.015	0.130	0.000	0.000	0.000	0.150	
			OpEx	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		
			Total	0.000	0.005	0.015	0.130	0.000	0.000	0.150		
C054436	Johnston Substation - Install Wave Trap	+/- 25%	CapEx	0.000	0.005	0.015	0.130	0.000	0.000	0.150	0.300	
			OpEx	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		
			Total	0.000	0.005	0.015	0.130	0.000	0.150	0.300		
Total Project Sanction			CapEx	0.679	2.443	6.301	7.002	0.000	0.000	0.000	16.425	
			OpEx	0.019	0.063	0.244	0.085	0.000	0.000	0.000	0.411	
			Removal	0.002	0.273	1.100	0.397	0.000	0.000	0.000	1.772	
			Total	0.700	2.779	7.645	7.484	0.000	0.000	0.000	18.608	

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



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3.11.2 Project Budget Summary Table

Project Costs Per Business Plan (Transmission)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
\$M								
CapEx	0.270	0.560	0.450	0.000				1.280
OpEx	0.001	0.020	0.000	0.000				0.021
Removal	0.002	0.020	0.000	0.000				0.022
Total Cost in Bus. Plan	0.273	0.600	0.450	0.000				1.323

Variance (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
\$M								
CapEx	0.000	0.029	(0.149)	(0.788)				(0.908)
OpEx	0.000	0.018	(0.010)	(0.010)				(0.002)
Removal	0.000	(0.048)	(0.070)	(0.030)				(0.148)
Total Cost in Bus. Plan	0.000	(0.001)	(0.229)	(0.828)				(1.058)

Project Costs Per Business Plan (Distribution)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
\$M								
CapEx	0.409	2.300	2.600	0.200	0.000	0.000	0.000	5.509
OpEx	0.018	0.101	0.134	0.014	0.000	0.000	0.000	0.267
Removal	0.000	0.102	0.188	0.028	0.000	0.000	0.000	0.318
Total Cost in Bus. Plan	0.427	2.503	2.922	0.242	0.000	0.000	0.000	6.094

Variance (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
\$M								
CapEx	0.000	0.450	(3.232)	(5.050)	0.000	0.000	0.000	(7.832)
OpEx	0.000	0.042	(0.110)	(0.061)	0.000	0.000	0.000	(0.129)
Removal	0.000	(0.098)	(0.912)	(0.326)	0.000	0.000	0.000	(1.336)
Total Cost in Bus. Plan	0.000	0.394	(4.254)	(5.437)	0.000	0.000	0.000	(9.297)

3.11.3 Cost Assumptions

These cost estimates are based on planning grade (+/- 25%). Project sanction cost estimates will be developed after final design is completed.



US Sanction Paper

3.11.4 Net Present Value / Cost Benefit Analysis

3.11.4.1 NPV Summary Table

This is not an NPV project.

3.11.4.2 NPV Assumptions and Calculations

This is not an NPV project.

3.11.5 Additional Impacts

N/A

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	Endorses relative to distribution 5-year business plan or emergent work
Investment Planning	Michelle Park	Endorses relative to transmission 5-year business plan or emergent work
Resource Planning	Jim Patterson	Endorses D-Line resources, cost, estimate, schedule and Portfolio alignment
Resource Planning	Mark Phillips	Endorses D-Sub and T-Sub resources, cost, estimate, schedule and Portfolio alignment
Engineering / Design	John Gavin	Endorses substation scope, design, conformance with design standards
Engineering / Design	Mark Browne	Endorses transmission line scope, design, conformance with design standards
Engineering / Design	Len Swanson	Endorses substation scope, design, conformance with design standards



US Sanction Paper

Engineering / Design	Alan Labarre	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Engineering / Design	Carol Sedewitz	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Project Management	Tim Moore	Endorses Resources, cost estimate, schedule

3.12.2 Reviewers

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

Function	Individual
Finance	Keith Fowler
Regulatory	Peter Zschokke
Jurisdictional Delegates	Jennifer Grimsley / Nabil Hitti
Procurement	Art Curran
Control Center	Michael Gallagher
Control Center	Will Houston

4 Appendices

4.1 Sanction Request Breakdown by Project

\$M	C028920	C031696	C028921	C030161	C054764	C045313	C054434	C054436	Total
CapEx	2.525	0.425	6.610	0.578	0.052	0.100	0.100	0.100	10.490
OpEx	0.018	0.001	0.349	0.002	0.002	0.000	0.000	0.000	0.372
Removal	0.000	0.000	1.654	0.070	0.005	0.000	0.000	0.000	1.729
Total	2.543	0.426	8.613	0.650	0.059	0.100	0.100	0.100	12.591

Figure 1 - Central Rhode Island West Study Area

US Sanction Paper

nationalgrid

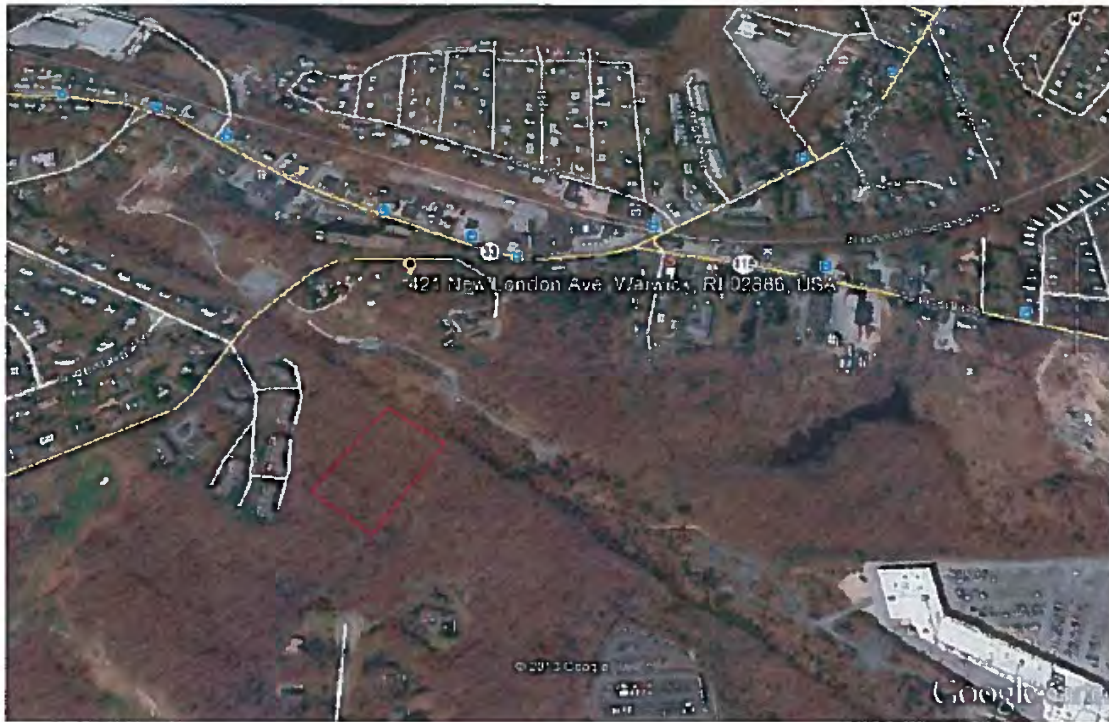
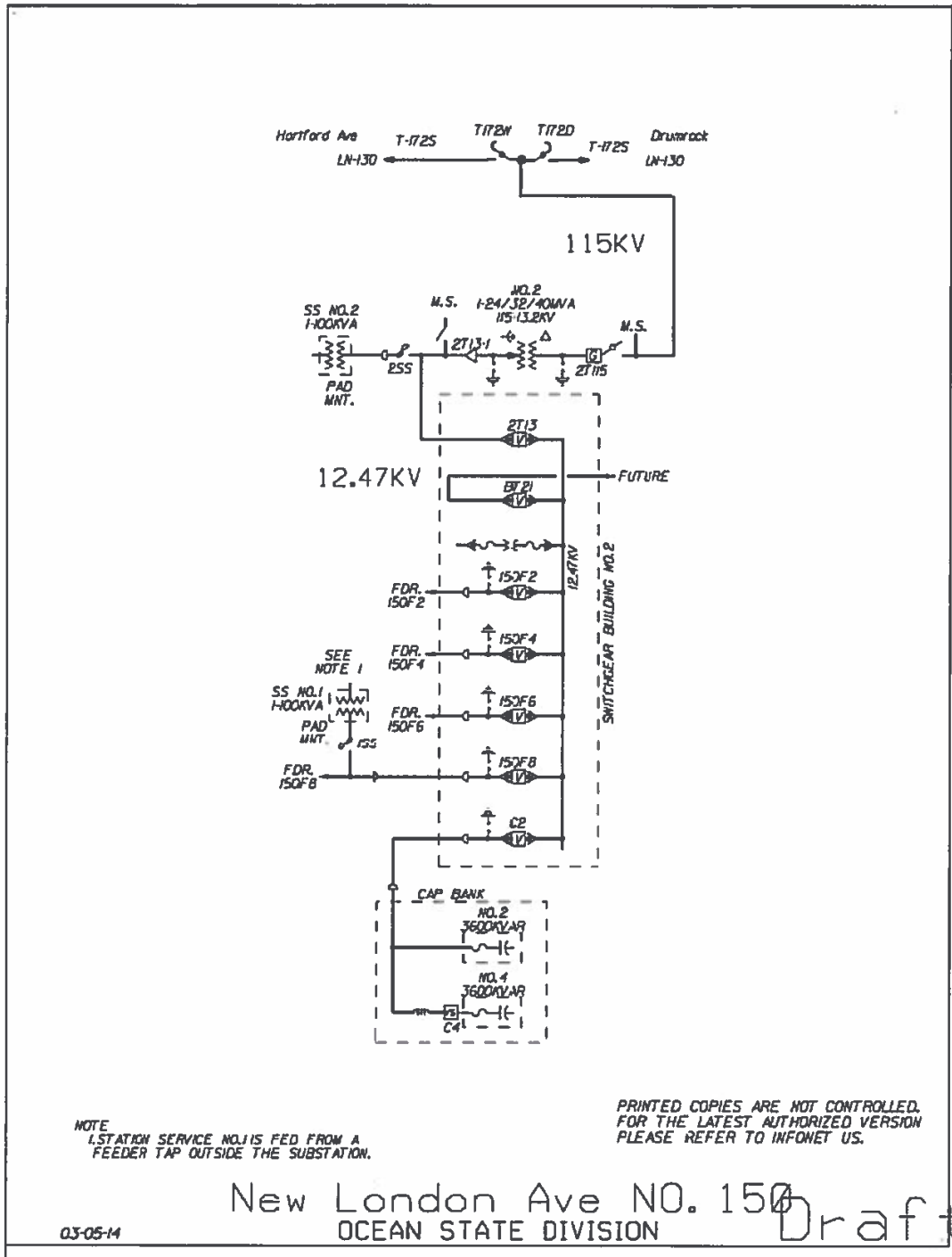


Figure 2 - Geographic Location of New London Ave Substation

US Sanction Paper

nationalgrid



New London Ave.dgn 03/05/2014 9:46:27 AM

Figure 3 - New London Ave Proposed One Line

US Sanction Paper

nationalgrid

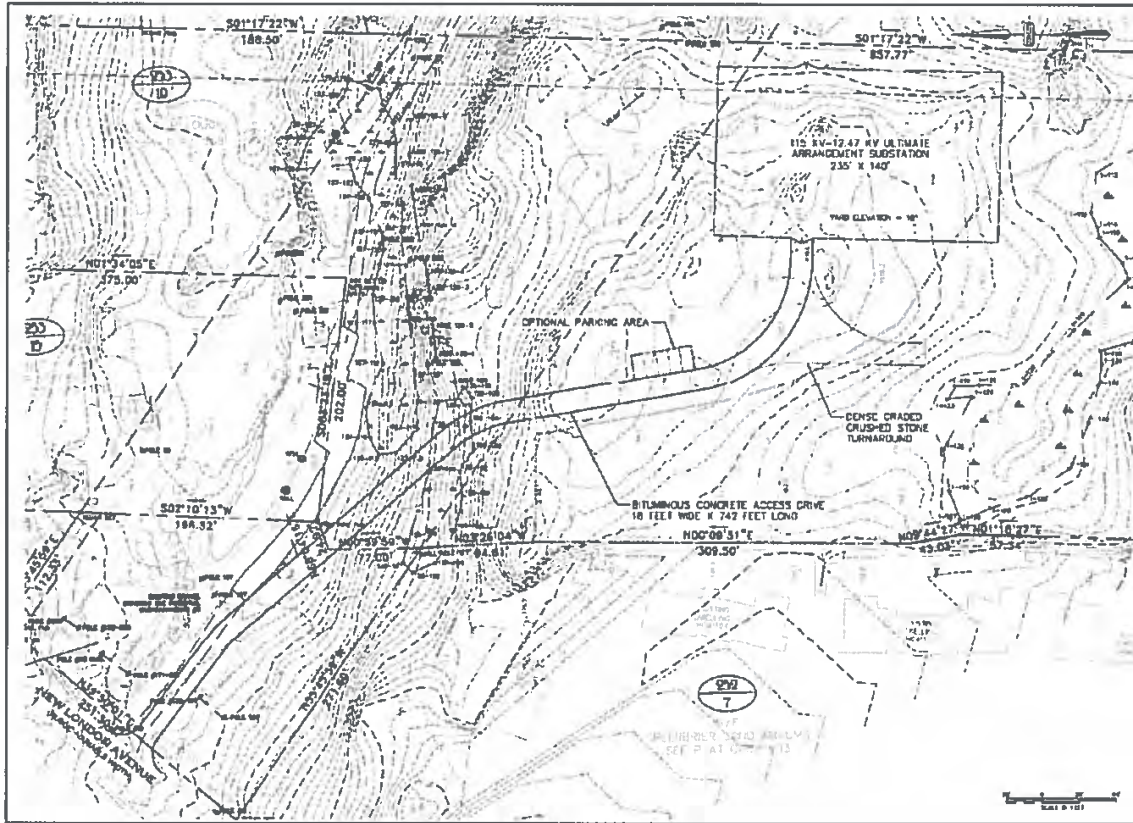


Figure 4 - New London Ave Substation Site Layout

US Sanction Paper

nationalgrid

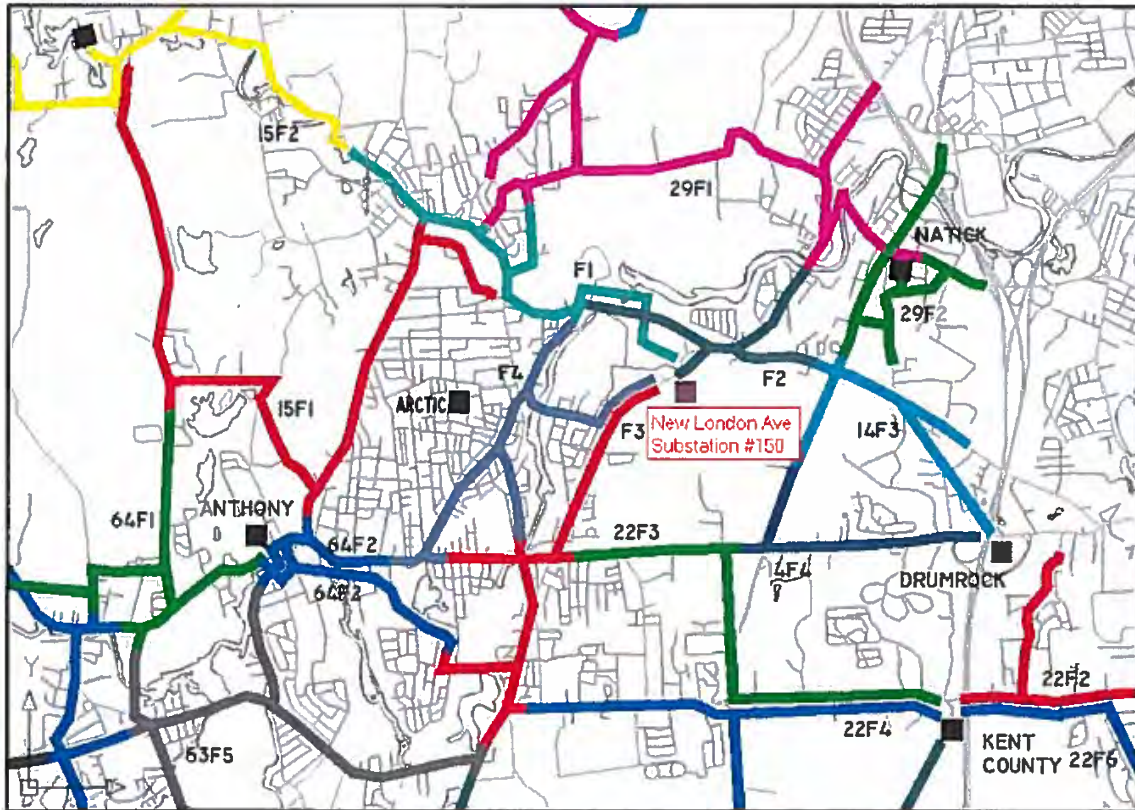


Figure 5 – Proposed 12.47kV Distribution Mainline Feeders

C028921

New London Ave (D-Line)

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C028921</u>	USSC #: <u>USSC-12-472v2 (DCIG100)</u>
Revision: <u>7</u>	Budget Version: <u>Default</u>
Project Title: <u>New London Ave (D-Line)</u>	
Project Description: This project recommends the installation of getaways for four distribution feeders and to reconductor existing distribution circuits on New London Ave.	

Project Status: <u>open</u>	
Responsible Person: <u>HURLEY, KATHLEEN</u>	Initiator: <u>Worme, Chris</u>
Spending Rationale: <u>System Capacity & Performance</u>	Funding Type: <u>P Electric Distribution Line RI</u>
Budget Class: <u>Load Relief</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>39</u>	Project Complexity Score: <u>29</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>											
Est Start Date: <u>5/21/2008</u>	Est Complete Date: <u>2/28/2017</u>										
Est In-Service Date: <u>12/31/2016</u>											
TTD Actuals: <u>\$1,310,887</u>	As Of: <u>10/2/2017</u>										
Cost Breakdown	<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;"><u>Capital</u></th> <th style="text-align: left;"><u>Expense</u></th> <th style="text-align: left;"><u>Removal</u></th> <th style="text-align: left;"><u>Total</u></th> <th style="text-align: left;"><u>Credits</u></th> </tr> <tr> <td><u>\$6,610,000</u></td> <td><u>\$349,000</u></td> <td><u>\$1,654,000</u></td> <td><u>\$8,613,000</u></td> <td><u>\$0</u></td> </tr> </table>	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>	<u>\$6,610,000</u>	<u>\$349,000</u>	<u>\$1,654,000</u>	<u>\$8,613,000</u>	<u>\$0</u>
<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>							
<u>\$6,610,000</u>	<u>\$349,000</u>	<u>\$1,654,000</u>	<u>\$8,613,000</u>	<u>\$0</u>							

Justification / Risk Identification:

This project recommends the installation of getaways for four distribution feeders and to reconductor existing distribution circuits on New London Ave.

Project Scope:

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick. This project will add distribution capacity in an area that is heavily loaded. The new capacity will relieve transformers, supply lines and distribution feeders that are projected to exceed their summer normal ratings

Project Alternatives Considered:

<Enter data here>

Additional Notes:

USSC-12-472 Partial Sanction total DoA \$770K. C031696 \$100K; C028920 \$250K; C028921 \$250K; C045313 \$75K; C030161 \$70K; C030161 \$25K

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>6/9/2014 14:41:15</u>	Approver	<u>carlim</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4770
Attachment PUC 1-16-1 part 1 of 2
Page 264 of 889

PowerPlan ----- PPGPRD Database

File Edit Subsystem Batch Admin Preferences Window Help

Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C028921 Current Total Authorized Amount: \$8,61...

Title: New London Ave (D-Line)
Project Number: C028921

Budget Version Default (active)
Revision: 12-472 v2
Revision Status: Approved
Revision No.: 7
Est Start Date: 05/21/2008
Est Complete Date: 02/28/2017
Est In Srvc Date: 12/31/2016
Capital: \$6,610,000.00
Expense: \$349,000.00
Jobbing: \$0.00
Retirement: \$0.00
Removal: \$1,654,000.00
Total (excl. Rets.): \$8,613,000.00
Credits: \$0.00
Net: \$8,613,000.00

Revision Info: Other Updates

Revision: 7 of 7
[Find Revision](#)
☐ Show 'Budget Only' Revisions

Spending Estimates:
Grid Estimates
Forecast
Summarize from W/O
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Unit Estimates
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New Revision
Delete Revision
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Import Estimates

Other:
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Released Dollars
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Slide

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Record 1 of 1

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This document has been reviewed for Critical
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D+T



US Sanction Paper

Title:	New London Avenue Substation #150	Sanction Paper #:	USSC-12-472 v2
Project #:	C028920, C031696, C028921, C030161, C054764, C045313, C054434, C054436	Sanction Type:	Partial Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	5/14/14
Author:	Marc Bristol	Sponsor:	Cheryl A. Warren, Vice President Asset Management
Utility Service:	Electricity T&D	Project Manager:	Marc Bristol

1 Executive Summary

1.1 Sanctioning Summary

This paper requests partial sanction of projects C028920, C031696, C028921, C030161, C054764, C045313, C054434, and C054436 in the amount \$12.600M with a tolerance of +/- 10% for the purposes of final engineering and design, procurement of long lead materials, and initial construction activities.

This sanction amount is \$12.600M broken down into:

\$10.490 Capex
\$0.372 Opex
\$1.729 Removal

NOTE the potential investment of \$18.600M with a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.

1.2 Project Summary

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick, RI. This project will add distribution capacity in an area that is heavily loaded. The new capacity will relieve transformers, supply lines and distribution feeders that are projected to exceed their summer normal ratings.

The station will be located between West Cranston #21 and Drumrock #14 substations and supplied by a 115kV tap from the existing T-172S transmission line.

The station will be located on a purchased parcel of land adjacent to another company-owned parcel on New London Avenue.



US Sanction Paper

1.3 Summary of Projects

Project Number	Project Type (Elec only)	Project Title	Estimate Amount (\$M)
C028920	Distribution Substation	New London Ave Substation	6.778
C031696	Transmission Line	T172S Line Tap	2.026
C028921	Distribution Line	Distribution Getaways and 4kV Conversions	8.613
C030161	Transmission (SubT-Line)	3310 Reconductoring	0.650
C054764	Transmission (SubT-Line)	3311 Upgrades	0.059
C045313	Transmission Substation	New London Ave Circuit Switcher and Wave Trap	0.182
C054434	Transmission	W Cranston Substation- Install Wave Trap	0.150
C054436	Transmission	Johnston Substation - Install Wave Trap	0.150
Total			18.608

1.4 Associated Projects

Project Number	Project Title	Estimate Amount (\$M)
C053723	Arctic Substation Retirement (D-Sub)	0.250
Total		0.250

1.5 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
12/12/2012	USSC USSC-12-472	\$0.770M	New London Ave Substation #150	Partial
06/30/2009	AMIC SG114	\$0.00M	Strategy to Build a 115/12.5kV Substation in West Warwick, RI	Strategy
06/18/2009	AMIC PWS0922	\$0.175M	A New 115/12.5kV Substation in West Warwick RI	Partial
10/01/2008	DCIG DCIG1008P92	\$0.365M	West Warwick Substation – Install Metal Clad Switchgear With Four Distribution Feeders and Rebuild the 3310 and 3311 Sub- Transmission Lines	Partial

1.6 Next Planned Sanction Review

Date (Month/Year)	Purpose of Sanction Review
July 2015	Full implementation



US Sanction Paper

1.7 Category

Category	Reference to Mandate, Policy, or NPV Assumptions
<input type="radio"/> Mandatory	The investment has been classified as policy driven. Without this project the company will not be able to provide a reliable electric service to the customers in the study area.
<input checked="" type="radio"/> Policy- Driven	
<input type="radio"/> Justified NPV	

1.8 Asset Management Risk Score

Asset Management Risk Score: 39

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: 29

1.10 Process Hazard Assessment

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

☒ Yes ☐ No



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 (\$)
New England Distribution FY15-FY19 C028920, C028921,	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	\$9.300M
New England Transmission FY15-FY19 C031696, C045313, C054434, C054436, C030161, C054764	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> NA	\$1.830M

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

Re-allocation of funds within the portfolio will be managed 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 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
CapEx	0.679	2.443	6.301	7.002	0.000	0.000	0.000	16.425
OpEx	0.019	0.063	0.244	0.085	0.000	0.000	0.000	0.411
Removal	0.002	0.273	1.100	0.397	0.000	0.000	0.000	1.772
CIAC/Reimbursement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.700	2.779	7.645	7.484	0.000	0.000	0.000	18.608



US Sanction Paper

1.14 Key Milestones

Milestone	Target Date: (Month/Year)
Start Preliminary Engineering (kick-off meeting)	May 2009
Partial Sanction	May 2014
Distribution Line Design Complete – EDC	July 2014
Distribution Line Construction Start	December 2014
Substation Engineering Design Complete – EDC	May 2015
Project Sanction	August 2015
Substation Construction Start	October 2015
Submit Facility Ratings to ISO	July 2016
Substation Construction Complete – CC	November 2016
Ready for Load - RFL	November 2016
Distribution Line Construction Complete – CC	December 2016
Project Closure Report	February 2017

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

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

1	Special use permit from the City of Warwick required
2	Outage required on the T172S for new 115kV tap; summer outage should be avoided
3	Historical raw material found on site, additional site exploration required for characterization



US Sanction Paper

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 checked="" type="radio"/> Neutral	<input type="radio"/> Positive	<input type="radio"/> Negative

1.18 List References

1	USSC-12-472 – New London Ave Substation #150 December 2012
2	SG114 - Strategy to Build a 115/12.5kV Substation in West Warwick, RI June 2009
3	PWS0922 - A New 115/12.5kV Substation in West Warwick RI June 2009
4	DCIG1008P92 – West Warwick Substation – Install Metal Clad Switchgear With Four Distribution Feeders and Rebuild the 3310 and 3311 Sub-Transmission Lines May 2009

US Sanction Paper



2 Decisions

The US Sanctioning Committee (USSC) at a meeting held on May 14, 2014:

- (a) APPROVED the investment of \$12.600M and a tolerance of +/- 10% for final engineering and design, procurement of long lead materials, and initial construction activities.
- (b) NOTED the potential investment \$18.600M to and a tolerance of +/- 25%, contingent upon submittal and approval of a Project Sanction paper following completion of final engineering and design.
- (c) NOTED that Marc Bristol has the approved financial delegation to undertake the activities stated in (a).

Signature.....

A handwritten signature in blue ink, appearing to read "Lee Eckert", written over a dotted line.

.....Date.....

5/27/14

Lee S. Eckert

US Chief Financial Officer

Chairman, US Sanctioning Committee



US Sanction Paper

3 Sanction Paper Detail

Title:	New London Avenue Substation #150	Sanction Paper #:	USSC-12-472 v2
Project #:	C028920, C031696, C028921, C030161, C054764, C045313, C054434, C054436	Sanction Type:	Partial Sanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	5/14/14
Author:	Marc Bristol	Sponsor:	Cheryl A. Warren
Utility Service:	Electricity T&D	Project Manager:	Marc Bristol

3.1 *Background*

The Central Rhode Island West study area encompasses the Towns of Coventry, West Greenwich, and West Warwick and sections of the Cities of Cranston and Warwick, and Towns of East Greenwich, Exeter, and Scituate. The area load peaked at approximately 169 MVA in 2012 with 47,000 customers served. The study area and existing area substations are shown in Figure 1 of the appendix.

In 2008 a comprehensive study was completed for this area. This study identified an immediate need for new distribution capacity in the area to resolve short-term loading concerns and a new substation in the Warwick/West Warwick area to resolve long-term loading concerns and significant exposure for various n-1 contingencies. The 2012 Annual Capacity Plan still supports the need for a new substation in this area.

The Central Rhode Island West study area is still supplied by a highly utilized supply and distribution system. It is becoming increasingly challenging to operate this system within normal loading limits and to supply load growth in this area. This strategy paper documents the long-term solution for the area.

3.2 *Drivers*

The primary driver is projected thermal overloads of transformers, distribution feeders and supply lines during period of system peak loading. There have been a number of large developments in the area such as The Centre of New England and the Royal Mills complex that continue to add load to an area with heavily loaded feeders and supply lines. A new modular feeder along with load transfers have been utilized to prevent thermal overloads as a result of the new load.

The tables below show the facilities in the study area that are projected to exceed 100% of their rating during either normal operation or contingencies. Table 1 below shows feeders in the area with loads projected to exceed 100% of their normal rating; Table 2 shows transformers with loads projected to exceed 100% of their normal rating; and Table 3 shows the supply lines that are overloaded during contingencies.

US Sanction Paper



Substation	Feeder	SN Rating (Amps)	2014		2016		2018		2020	
			Amps	%SN	Amps	%SN	Amps	%SN	Amps	%SN
ANTHONY	64F1	361	336	93%	353	98%	359	99%	363	101%
ANTHONY	64F2	361	344	95%	361	100%	367	102%	372	103%
HOPE	15F2	476	465	98%	487	102%	496	104%	502	105%
HOPKINS HILL	63F2	530	512	97%	537	101%	546	103%	553	104%
KENT COUNTY	22F3	530	487	92%	511	96%	520	98%	527	99%
KENT COUNTY	22F4	586	579	99%	607	104%	618	105%	626	107%
ARCTIC	49J4	295	294	100%	308	104%	313	106%	317	108%

Table 1 - Projected loads through 2020 for feeders and loads greater than 100%

Substation	Transformer	2014		2016		2018		2020	
		MVA	% SN	MVA	% SN	MVA	% SN	MVA	% SN
ANTHONY	1	7.3	93%	7.6	98%	7.7	99%	7.8	101%
ANTHONY	2	7.4	95%	7.8	100%	7.9	102%	8.0	103%

Table 2 - Projected Loads through 2020 for Transformers with Loads Greater than 100%

Circuit	Line Section		2014		2016		2018		2020	
	From	To	MVA	% SE	MVA	% SE	MVA	% SE	MVA	% SE
2230	Natick 29 Tap	Artic 49 Tap	37.5	106%	39.3	111%	40.0	113%	40.5	114%
2230	Warwick Mall 28 Tap	Natick 29	16.1	105%	16.9	110%	17.2	112%	17.4	113%
2232	Anthony Tap	Coventry Tap	16.0	104%	16.8	110%	17.1	112%	17.3	113%
3310	Kent County 22	Major Potter Rd								
3310	Major Potter Rd	Hopkins Hill Riser								
3311	Kent County 22	Hopkins Hill Tap								
3311	Hopkins Hill Tap	Hopkins Hill 63								

Table 3 - Projected Contingency Loads through 2020 for Supply Line Segments with Loads Greater than 100%

The tables below show projected loading after the New London Ave substation is placed in service. Table 4 below shows projected feeder loading; Table 5 below shows projected transformer loading; and Table 6 below shows projected supply line loading post an n-1 contingency.



US Sanction Paper

Substation	Feeder	SN Rating (Amps)	2014		2016		2018		2020	
			Amps	%SN	Amps	%SN	Amps	%SN	Amps	%SN
ANTHONY	64F1	361	355	98%	304	84%	317	88%	329	91%
ANTHONY	64F2	361	363	101%	313	87%	327	91%	339	94%
HOPE	15F2	476	529	111%	402	84%	419	88%	435	91%
HOPKINS HILL	63F2	530	536	101%	515	97%	537	101%	558	105%
KENT COUNTY	22F3	530	547	103%	289	54%	301	57%	313	59%
KENT COUNTY	22F4	586	580	99%	555	95%	579	99%	601	103%
ARCTIC	49J4	452	317	70%	274	61%	285	63%	296	66%
WEST WARWICK	F1				455	71%	474	74%	493	76%
WEST WARWICK	F2				347	66%	362	68%	376	71%
WEST WARWICK	F3				309	58%	322	61%	334	63%
WEST WARWICK	F4				327	51%	341	53%	354	55%

Table 4 - Project Loads through 2020 for Feeders Post New London Ave Substation

Substation	Tranf. ID.	2016		2018		2020	
		MVA	% SN	MVA	% SN	MVA	% SN
ANTHONY	1	6.6	84%	6.8	88%	7.1	91%
ANTHONY	2	6.8	87%	7.1	90%	7.3	94%

Table 5 - Project Loads through 2020 for Transformers Post New London Ave Substation

Circuit	Line Section		2016		2018		2020	
	From	To	MVA	% SE	MVA	% SE	MVA	% SE
2230	Natick 29 Tap	Artic 49 Tap	33.6	95%	34.2	96%	34.6	98%
2230	Warwick Mall 28 Tap	Natick 29	15.3	100%	15.6	102%	15.8	103%
2232	Anthony Tap	Coventry Tap	14.8	96%	15.0	98%	15.2	99%
3310	Kent County 22	Major Potter Rd						
3310	Major Potter Rd	Hopkins Hill Riser						
3311	Kent County 22	Hopkins Hill Tap						
3311	Hopkins Hill Tap	Hopkins Hill 63						

Table 6 - Projected Contingency Loads through 2020 for Supply Line Segments Post New London Ave Substation



US Sanction Paper

3.3 Project Description

A new 115/12.47 kV metal clad substation with 24/32/40 MVA LTC transformer and four feeder positions is proposed for New London Avenue, Warwick, RI. The station will be located adjacent to the transmission corridor between West Cranston and Drumrock substations and supplied by a 115 kV tap from an existing transmission line. The proposed geographical location of the proposed new substation is shown in Figure 2, and proposed one line shown in Figure 3 of the appendix.

Initially, four 12.47 kV feeders will be installed through approximately 2500 ft manhole and duct system, and the existing distribution system will be rearranged to offload existing transformers, supply lines and distribution feeders. The new feeders will supply load currently fed from the four 4kV Arctic substation feeders, these circuits will be converted to 12.47 kV and the substation retired under associated project funding number C053723.

The layout of the 12.47 kV distribution feeders, after installation of the substation is shown in Figure 5 of the appendix.

There are two sections of the 3310 and 3311 supply lines that are projected to be overloaded on contingency after the new station is in service. These lines are classified as transmission assets. The estimated cost of reconductoring approximately 5,000 ft of the 3310 line to eliminate the overloads is estimated at \$650,000 and the cost of upgrading the 3311 for 120°C operation is \$20,000. The alternative to the reconductoring and upgrading these lines is to remotely drop a feeder at Hopkins Hill substation on supply line contingency. It is recommended that these two circuits be upgraded.

Simulation results indicate that the addition of the New London Ave substation and 0.04 mile transmission tap would result in unacceptable attenuation of the 240 kHz power line carrier (PLC) signal. Acceptable channel performance will be achieved by installing wave traps at New London Ave, Johnston, and West Cranston substations.

3.4 Benefits Summary

Relief of the customer's (Narragansett Electric Company) potential distribution loading issues and improving the reliability of the distribution supply system in the Central Rhode Island West area are the primary benefits of this project.

3.5 Business and Customer Issues

The land purchase was completed as of August 28, 2013.

3.6 Alternatives

Alternative 1: Expansion of West Cranston and Kent County substations

One alternative involved the expansion of existing 115/12.47kV substations at West Cranston and Kent and Kent County substations. The supply lines would have to be rebuilt for a larger capacity to accommodate two new modular stations in West Warwick and Coventry. It will be necessary to procure sites with the appropriate zoning for each station. The distribution system



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will be modified to accommodate the new stations. The estimated distribution cost of this option is \$11,300,000. There will be an additional \$3,800,000 in associated transmission costs. This option exceeded the cost of the preferred option; there are no additional benefits; and the uncertainty of finding appropriate lots make this option unattractive at this time.

Alternative 2: New 115/12.47kV substation in Cranston

A second alternative considered was the development of a new 115/12.47kV metal clad station on a site in Cranston near Phenix Avenue. The transmission costs are similar to the preferred plan, however, the distribution costs to extend feeders from this site to relieve the overloaded feeders and supply lines would be significantly more due to the limited routes available and the distance from the overloaded facilities. The detail of this option were not fully developed as the estimated distribution costs far exceeded those of the preferred alternative which was near the stations with loading issues. This option is also not recommended at this time.

3.7 Safety, Environmental and Project Planning Issues

Safety

All National Grid safety procedures will be followed at the site. This is a green field site and the majority of the work can be done before the station is energized. Clearances to live equipment must be maintained.

The equipment and fencing yard will be dimensioned to allow safe access around the yard for O&M equipment.

A secondary gate, remote from the primary yard entrance, will be provided for emergency egress from the yard.

The new Metal-Clad Switchgear Power Center (MCSPC) is designed with the switchgear in one room and the control switchboards in another to minimize personnel exposure to unsafe conditions. A door is provided between the two rooms as added protection from a fault in the switchgear area entering unimpeded into the control area.

Protective relays and controls will not be installed on the doors of the switchgear to eliminate potential personnel exposure to an arc fault condition while performing control or maintenance activities.

Environmental

As part of the due diligence process, a Phase 1 Environmental Site Assessment (ESA) was conducted with no Recognizable Environmental Conditions (RECs) found.

An Archaeological site review identified historical raw materials within the bounds of the proposed substation. A Phase 2 Archaeological site evaluation will be performed for characterization.

A Storm Water Pollution Prevention Plan (SWPPP) will be required.



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The land parcel has several wetlands. It is likely that the Rhode Island Department of Environmental Management (RIDEM) freshwater wetlands permitting will be required.

A Soil Erosion and Sediment Control Plan may be required by the City of Warwick.

Planning

A special use permit will be required to use the property for a substation. As part of that permit, requirements for fencing, driveways, landscape and screening, and setbacks must be met, or variances applied for and obtained.

The level of Stakeholder Management involvement is high as a result of proximity to abutters. The team will meet with the City of Warwick and abutters after site plans are finalized. The site design shall attempt to maintain natural screening to the residential abutters and landscaping will be provided to enhance the natural screening.

A noise study is being performed using the assumptions of 67 dBA NEMA low noise or 65 dBA very low noise to limit noise increases at nearby residences to 5 dBA or less.

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	Wetlands mitigation required by agencies may be greater than anticipated	3	2	4	6	12	Accept	Begin permitting process as early as possible to quantify risk and develop mitigation plans and designs	N/A	Address with offsets
2	Data recovery may be required for historical raw material found on site	4	2	3	8	12	Accept	Perform Phase 2 Archaeological site evaluation for characterization	N/A	Perform Data Recovery of material
3	Abutters views of substation, T-line construction could cause delays	3	2	1	6		Accept	Initiate outreach plan early	N/A	Address identified abutter issues with potential solutions early
4	Subsurface conditions may include rock and/or ledge	4	2	2	8	8	Accept	Conduct geotechnical studies	N/A	Final engineering design to address and mitigate risk
5	Critical material delivery delays	2	2	2			Mitigate	Start bid process early, obtain multiple bids	N/A	Work with vendor to avoid schedule impacts and/or revise construction activities sequence
6	Civil work for construction of substation entrance in close proximity of 345kV circuit, crews could inadvertently make contact with conductor causing circuit outage or property damage	3	2	2	6	6	Mitigate	Develop PHA	N/A	Revise PHA



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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
Warwick, RI, Special Use Permit	Certain	4 Months	Not Applied For	January 2015
Warwick, RI, Curb Cut Permit	Certain	3 Months	Not Applied For	February 2015
Warwick, RI, Street Opening Permit	Certain	3 Months	Not Applied For	February 2015
Building Permit	Certain	3 Months	Not Applied For	January 2015
RIDEM Wetlands Permitting	Likely	9 Months	Not Applied For	February 2015
EFSB Notice of Intent	Certain	4 Months	Not Applied For	May 2015

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Based on current schedule the substation will enter service in FY17 and the distribution projects will be included in each fiscal year's Annual ISR Filing until that time.

The circuit switcher and wave trap at New London Ave (C045313) is 100% PTF.

Wave traps at Johnston (C054436) and W Cranston substations are 100% PTF.

The transmission line tap (C031696) is non-PTF, however assets that are part of the mainline are PTF. PTF work on the T172S consists of removing existing structure #225 and its foundation, and installing new structure 225-1 approximately 65 feet back from the existing structure. Structure #225 is a davit arm suspension; Structure #225-1 will be a single pole deadend tap structure on concrete foundation, supporting two motor operated vertical break switches. Non-PTF work on the T172S consists of installing a new 3-pole deadend structure on concrete foundations, and two spans of 477 kcmil ACSR conductor. The tap line will have no Shieldwire.

Work on S171S (C031696) consists of replacing structure #241 with a 20-foot taller structure to provide clearance below for the tap line. The capacity of structure #241's existing foundation is insufficient for the loads applied by the taller pole, and therefore will also need to be replaced. All work on S171S will be PTF.

Work on 359 consists of replacing structure #201 with a 15-foot taller structure to provide clearance below for the tap line. The capacity of structure #201's foundation appears to be sufficient for the loads applied by the taller pole, however, work with the steel pole supplier may



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require retrofitting the foundation with additional anchor bolts. This need will be determined during step 2B in coordination with the steel pole supplier. All work on 359 will be PTF.

Work on 332 consists of installing phaseraisers at structures #198 and #199 to provide clearance below for the tap line. Structure #198 will be raised five feet, and structure #199 will be raised 15 feet. All work on 332 will be PTF.

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 \$3.285M. This is indicative only. The actual revenue requirement will differ, 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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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						
					Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6+	Total
					2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
C028920	New London Ave Substation	+/- 25%	CapEx	0.399	1.050	2.532	2.750	0.000	0.000	0.000	6.731
			OpEx	0.018	0.009	0.010	0.010	0.000	0.000	0.000	0.047
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.417	1.059	2.542	2.760	0.000	0.000	0.000	6.778
C031696	T172S Line Tap	+/- 25%	CapEx	0.148	0.070	0.350	1.404	0.000	0.000	0.000	1.972
			OpEx	0.001	0.000	0.000	0.010	0.000	0.000	0.000	0.011
			Removal	0.000	0.000	0.000	0.043	0.000	0.000	0.000	0.043
			Total	0.149	0.070	0.350	1.457	0.000	0.000	0.000	2.026
C028921	Distribution Getaways and 4kV Conversions	+/- 25%	CapEx	0.010	0.800	3.300	2.500	0.000	0.000	0.000	6.610
			OpEx	0.000	0.050	0.234	0.085	0.000	0.000	0.000	0.349
			Removal	0.000	0.200	1.100	0.354	0.000	0.000	0.000	1.654
			Total	0.010	1.050	4.634	2.919	0.000	0.000	0.000	8.613
C030161	3310 Reconductoring	+/- 25%	CapEx	0.122	0.456	0.000	0.000	0.000	0.000	0.000	0.578
			OpEx	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002
			Removal	0.002	0.088	0.000	0.000	0.000	0.000	0.000	0.070
			Total	0.124	0.526	0.000	0.000	0.000	0.000	0.000	0.650
C054764	3311 Upgrades	+/- 25%	CapEx	0.000	0.052	0.000	0.000	0.000	0.000	0.000	0.052
			OpEx	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002
			Removal	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.005
			Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059
C045313	New London Ave Circuit Switcher and Wave Trap	+/- 25%	CapEx	0.000	0.005	0.089	0.088	0.000	0.000	0.000	0.182
			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	0.000	0.005	0.089	0.088	0.000	0.000	0.000	0.182
C054434	W Cranston Substation- Install Wave Trap	+/- 25%	CapEx	0.000	0.005	0.015	0.130	0.000	0.000	0.000	0.150
			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	0.000	0.005	0.015	0.130	0.000	0.000	0.000	0.150
C054436	Johnston Substation - Install Wave Trap	+/- 25%	CapEx	0.000	0.005	0.015	0.130	0.000	0.000	0.150	0.300
			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	0.000	0.005	0.015	0.130	0.000	0.000	0.150	0.300
Total Project Sanction			CapEx	0.679	2.443	6.301	7.002	0.000	0.000	0.000	16.425
			OpEx	0.019	0.063	0.244	0.085	0.000	0.000	0.000	0.411
			Removal	0.002	0.273	1.100	0.397	0.000	0.000	0.000	1.772
			Total	0.700	2.779	7.645	7.484	0.000	0.000	0.000	18.608

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



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3.11.2 Project Budget Summary Table

Project Costs Per Business Plan (Transmission)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
\$M								
CapEx	0.270	0.560	0.450	0.000				1.280
OpEx	0.001	0.020	0.000	0.000				0.021
Removal	0.002	0.020	0.000	0.000				0.022
Total Cost in Bus. Plan	0.273	0.600	0.450	0.000				1.323

Variance (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
\$M								
CapEx	0.000	0.029	(0.149)	(0.788)				(0.908)
OpEx	0.000	0.018	(0.010)	(0.010)				(0.002)
Removal	0.000	(0.048)	(0.070)	(0.030)				(0.148)
Total Cost in Bus. Plan	0.000	(0.001)	(0.229)	(0.828)				(1.058)

Project Costs Per Business Plan (Distribution)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
\$M								
CapEx	0.409	2.300	2.600	0.200	0.000	0.000	0.000	5.509
OpEx	0.018	0.101	0.134	0.014	0.000	0.000	0.000	0.267
Removal	0.000	0.102	0.188	0.028	0.000	0.000	0.000	0.318
Total Cost in Bus. Plan	0.427	2.503	2.922	0.242	0.000	0.000	0.000	6.094

Variance (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon						Total
		Yr. 1 2014/15	Yr. 2 2015/16	Yr. 3 2016/17	Yr. 4 2017/18	Yr. 5 2018/19	Yr. 6 + 2019/20	
\$M								
CapEx	0.000	0.450	(3.232)	(5.050)	0.000	0.000	0.000	(7.832)
OpEx	0.000	0.042	(0.110)	(0.061)	0.000	0.000	0.000	(0.129)
Removal	0.000	(0.098)	(0.912)	(0.326)	0.000	0.000	0.000	(1.336)
Total Cost in Bus. Plan	0.000	0.394	(4.254)	(5.437)	0.000	0.000	0.000	(9.297)

3.11.3 Cost Assumptions

These cost estimates are based on planning grade (+/- 25%). Project sanction cost estimates will be developed after final design is completed.



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3.11.4 Net Present Value / Cost Benefit Analysis

3.11.4.1 NPV Summary Table

This is not an NPV project.

3.11.4.2 NPV Assumptions and Calculations

This is not an NPV project.

3.11.5 Additional Impacts

N/A

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	Endorses relative to distribution 5-year business plan or emergent work
Investment Planning	Michelle Park	Endorses relative to transmission 5-year business plan or emergent work
Resource Planning	Jim Patterson	Endorses D-Line resources, cost, estimate, schedule and Portfolio alignment
Resource Planning	Mark Phillips	Endorses D-Sub and T-Sub resources, cost, estimate, schedule and Portfolio alignment
Engineering / Design	John Gavin	Endorses substation scope, design, conformance with design standards
Engineering / Design	Mark Browne	Endorses transmission line scope, design, conformance with design standards
Engineering / Design	Len Swanson	Endorses substation scope, design, conformance with design standards



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Engineering / Design	Alan Labarre	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Engineering / Design	Carol Sedewitz	Endorses scope, estimate, and schedule with the company's goals, strategies, and objectives
Project Management	Tim Moore	Endorses Resources, cost estimate, schedule

3.12.2 Reviewers

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

Function	Individual
Finance	Keith Fowler
Regulatory	Peter Zschokke
Jurisdictional Delegates	Jennifer Grimsley / Nabil Hitti
Procurement	Art Curran
Control Center	Michael Gallagher
Control Center	Will Houston

4 Appendices

4.1 Sanction Request Breakdown by Project

\$M	C028920	C031696	C028921	C030161	C054764	C045313	C054434	C054436	Total
CapEx	2.525	0.425	6.610	0.578	0.052	0.100	0.100	0.100	10.490
OpEx	0.018	0.001	0.349	0.002	0.002	0.000	0.000	0.000	0.372
Removal	0.000	0.000	1.654	0.070	0.005	0.000	0.000	0.000	1.729
Total	2.543	0.426	8.613	0.650	0.059	0.100	0.100	0.100	12.591

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nationalgrid

4.2 Other Appendices

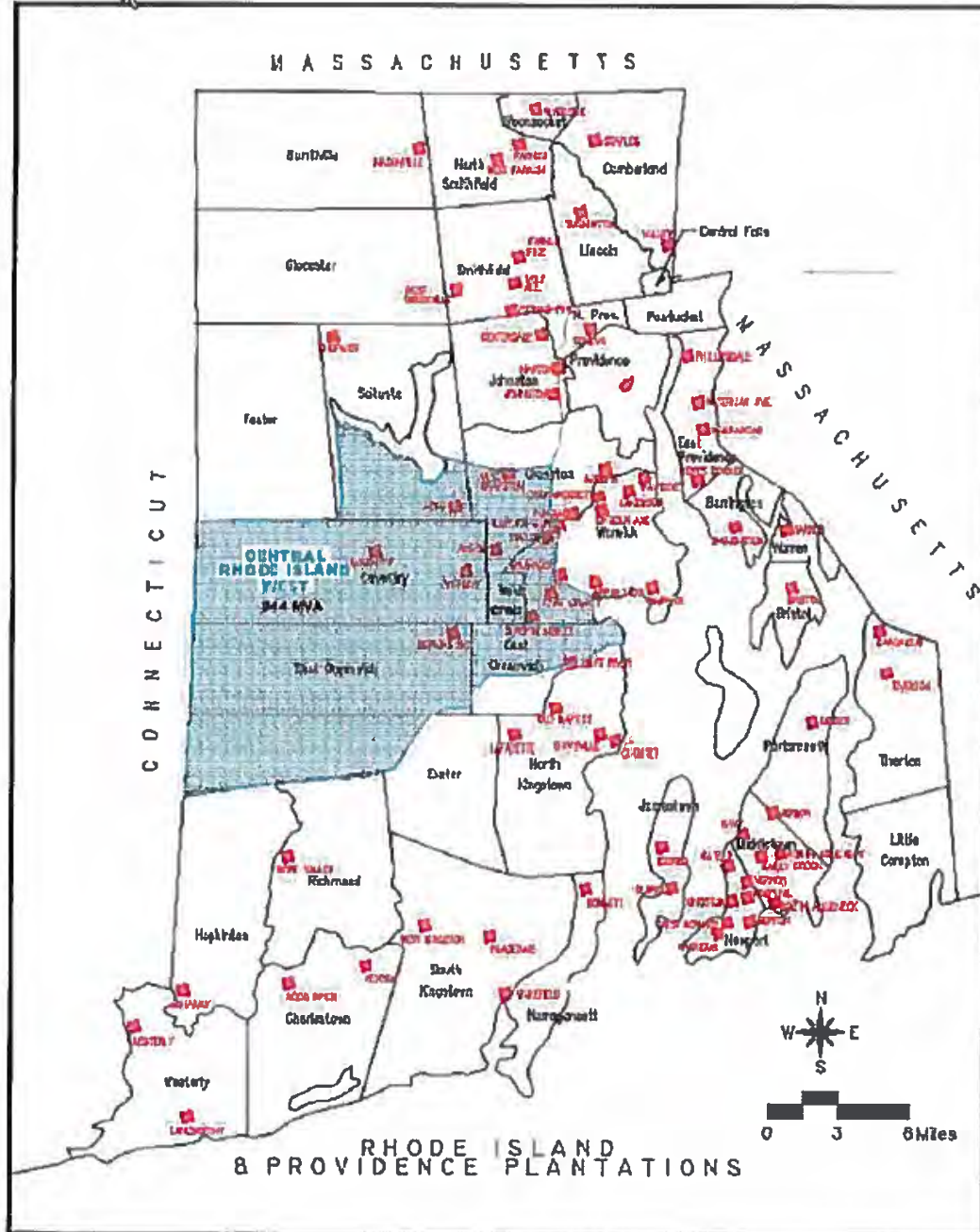


Figure 1 - Central Rhode Island West Study Area

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nationalgrid

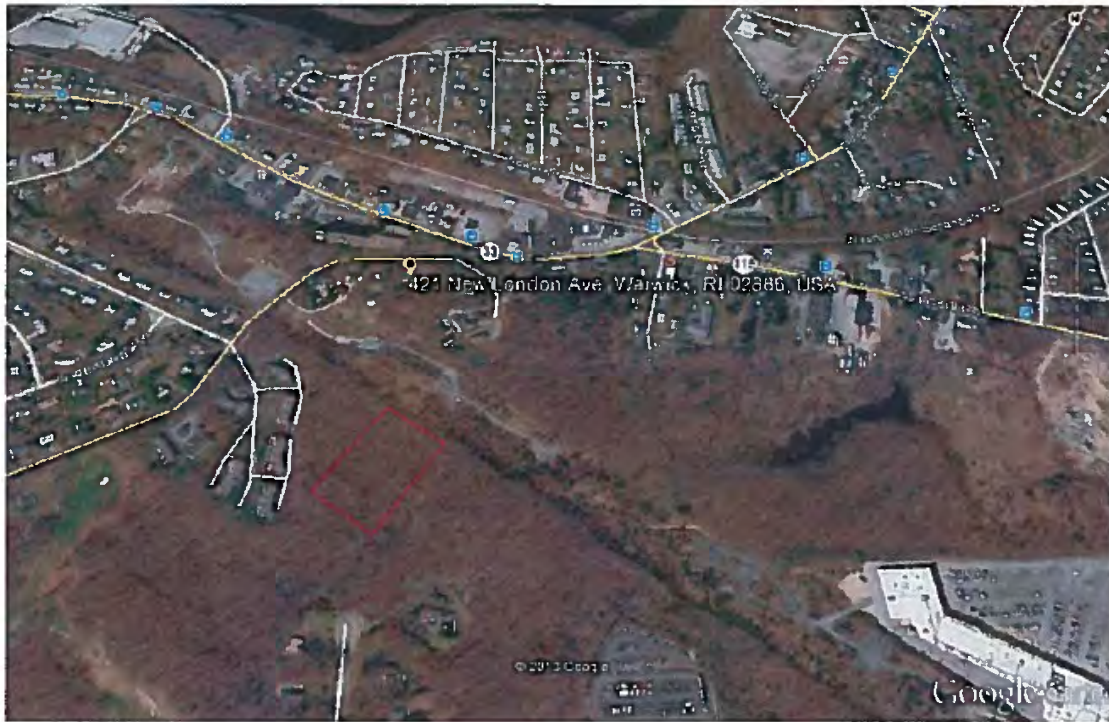
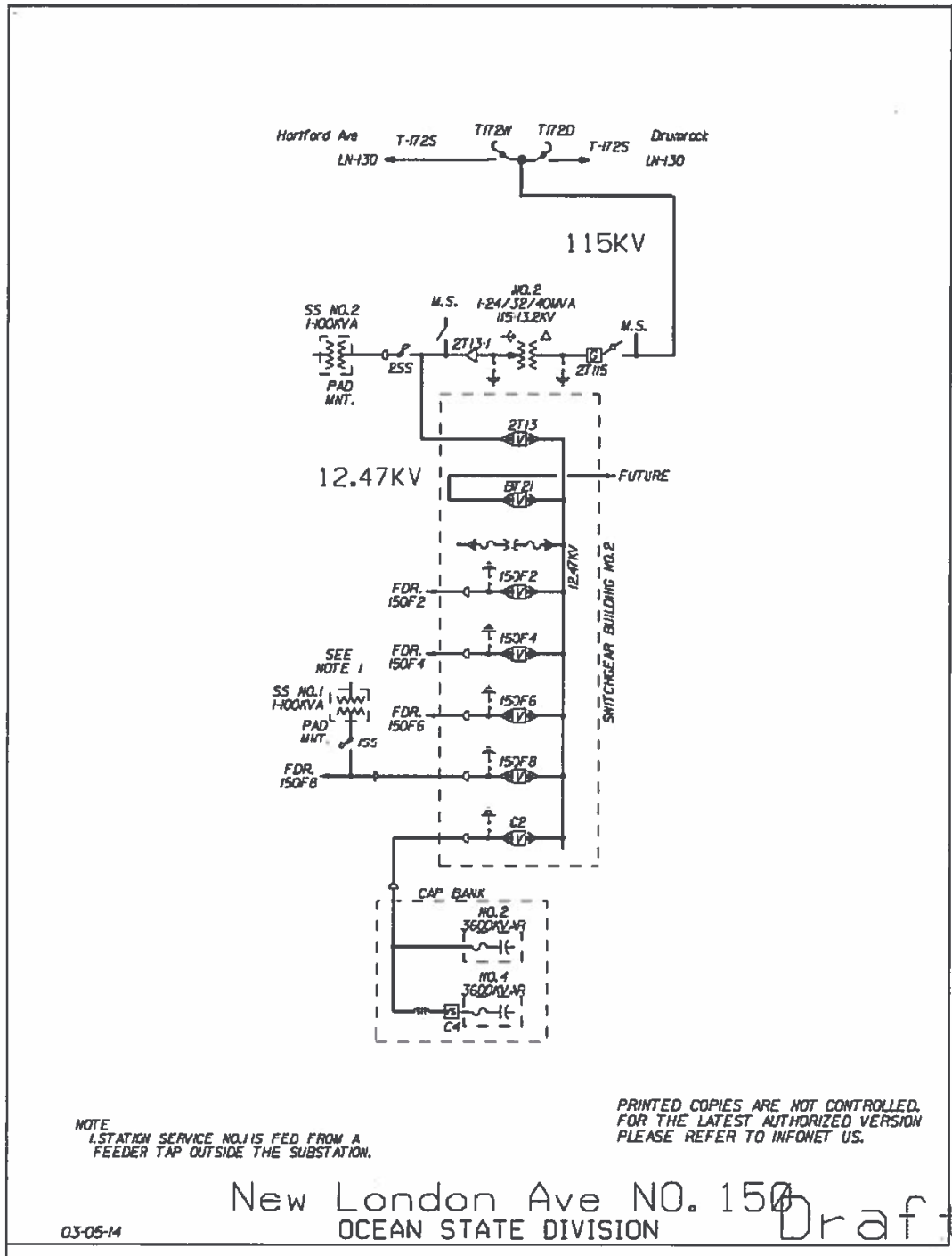


Figure 2 - Geographic Location of New London Ave Substation

US Sanction Paper

nationalgrid



New London Ave.dgn 03/05/2014 9:46:27 AM

Figure 3 - New London Ave Proposed One Line

US Sanction Paper

nationalgrid

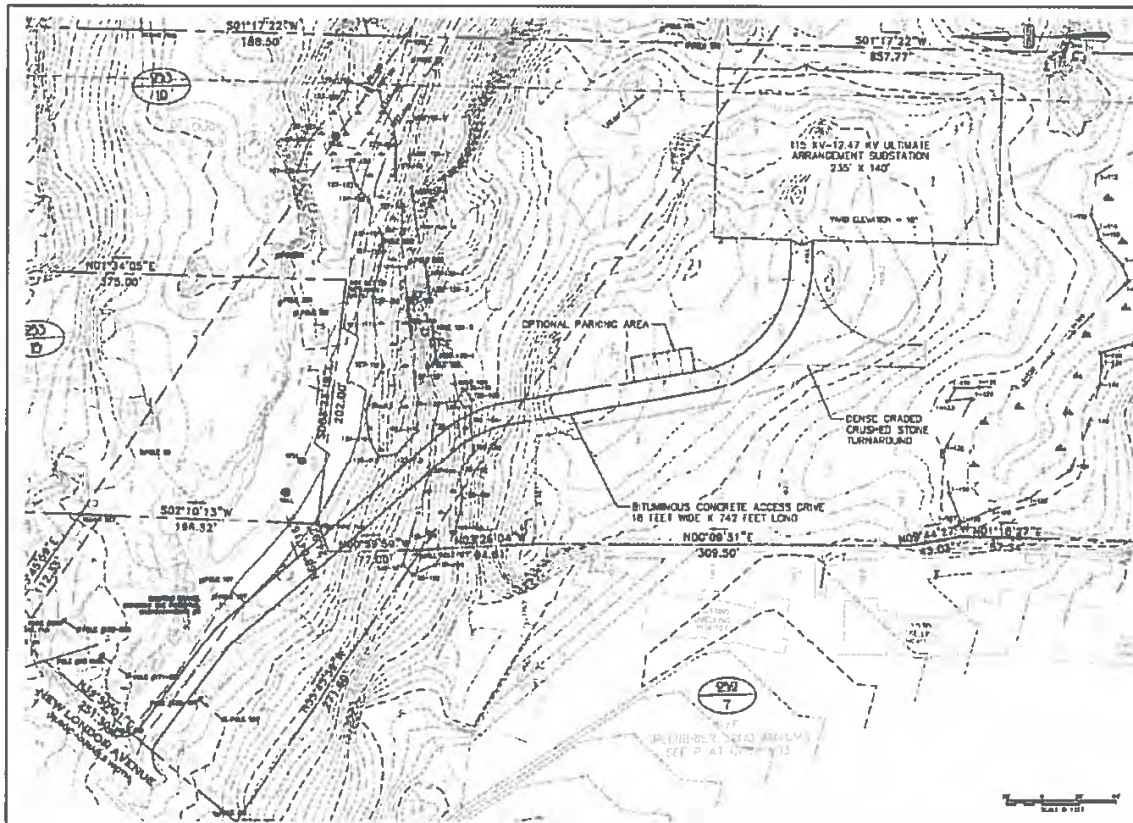


Figure 4 - New London Ave Substation Site Layout

US Sanction Paper

nationalgrid

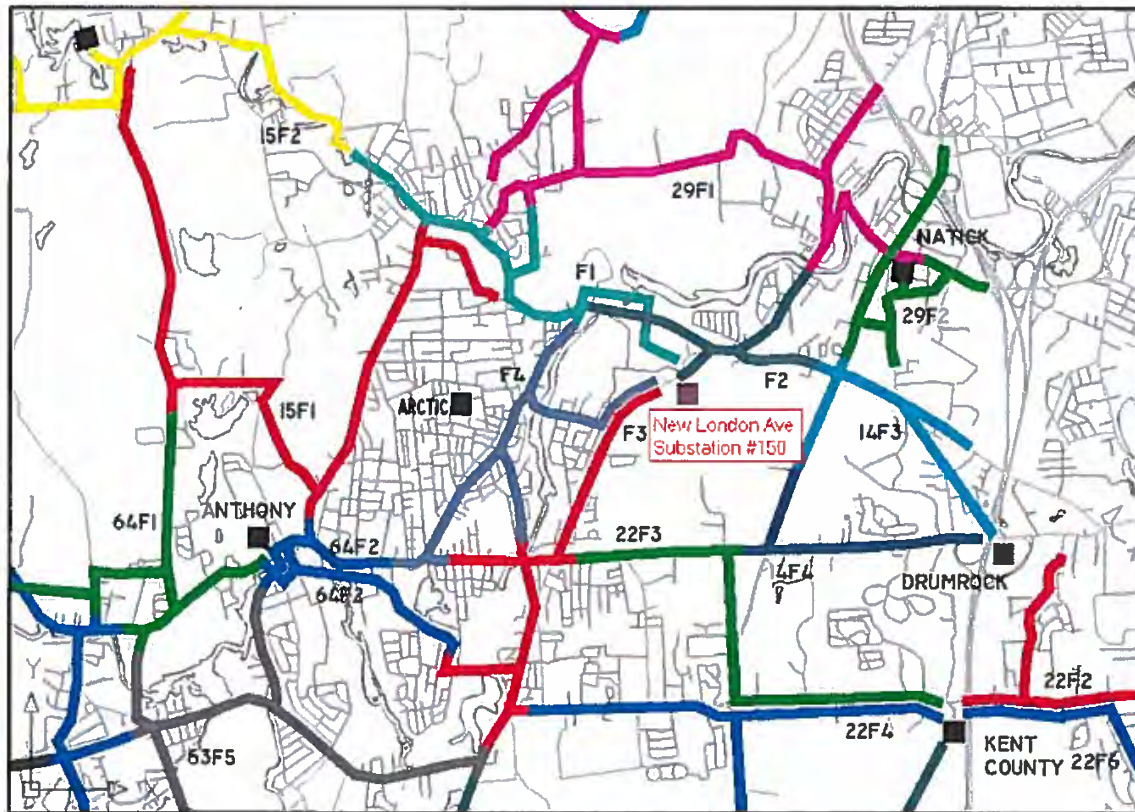


Figure 5 – Proposed 12.47kV Distribution Mainline Feeders

C028932

Recon. 0.5 Miles Segment of 2232

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C028932</u> Revision: <u>3</u> Project Title: <u>Recon. 0.5 Miles Segment of 2232</u> Project Description: Replace the 2/0 AL on a 0.75 segment of the 2232 line on streets between Drumrock and Arctic substations with 795 kcmil AL.	USSC #: Budget Version: <u>PPM Project Authorizations</u>
---	--

Project Status: <u>Closed</u> Responsible Person: <u>CODY, PATRICK</u> Spending Rationale: <u>System Capacity & Performance</u> Budget Class: <u>Load Relief</u> Capital by Category: Program Code: Project Risk Score: <u>30</u>	Initiator: <u>Worme, Chris</u> Funding Type: <u>P Electric Distribution Line RI</u> Project Complexity Score: <u>15</u>
--	--

Project Schedule / Expenditures

Revision Status: <u>Approved</u> Est Start Date: <u>11/1/2009</u> Est In-Service Date: <u>5/31/2010</u> TTD Actuals: <u>\$340,517</u>	Est Complete Date: <u>3/31/2014</u> As Of: <u>10/2/2017</u>
--	--

Cost Breakdown	<u>Capital</u>	<u>Expense</u>	<u>Removal</u>	<u>Total</u>	<u>Credits</u>
	\$549,000	\$36,500	\$160,000	\$745,500	\$0

Justification / Risk Identification:

The 0.75 miles of 2/0 AL is the limiting element between Drumrock and Arctic substations. This section of the 2232 is overloaded to 103% of its SN rating and 84% of it SE rating. Under contingency loss of the 2230 line, the 2232 would be rated at 266% of the SN rating and 218% of the SE rating.

Project Scope:

Replace old unsafe poles and reconductor sections of 2/0 AL from P9212 Centerville Rd Warwick RI to P9199 Warwick RI, approximately 3000' of OH conductor

Project Alternatives Considered:

Additional Notes:

see attached document for additional info on the project

The Drumrock station work that is NEWS related work takes priority over this job. When that job is completed, this 2232 reconductor job can take place.

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>10/31/2012 00:00:00</u>	Approver	<u>pwrconv</u>	<u>SAP Default Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4770
Attachment PUC 1-16-1 part 1 of 2
Page 292 of 889

Project: Recon. 0.5 Miles Segment of 2232
Project Number: C028932

Budget Version PPM Project Authorizations [a]
Revision:
Revision Status: Approved
Revision No.: 3
Est Start Date: 11/01/2009
Est Complete Date: 10/31/2010
Est In Svc Date: 05/31/2010
Capital: \$549,000.00
Expense: \$36,500.00
Jobbing: \$0.00
Retirement: \$0.00
Removal: \$160,000.00
Total (excl. Rets.): \$745,500.00
Credits: \$0.00
Net: \$745,500.00

Spending Estimates:
Grid Estimates
Forecast
Summarize from W/O
Copy Estimate

Property Estimates:
Unit Estimates
Create As Built
Delete Used Estimates

Edit:
New Revision
Delete Revision
Update
Update With Actuals
Import Estimates

Other:
Revision Comments
Released Dollars
Substitution
Slide

Version Compare
Close

Revision Info Other Updates
Revision: 2 3 of 5
Find Revision
Send for Approval

☐ Show 'Budget Only' Revisions

Record 43 of 284
Audits

C032258

ACNW Vlt47 Full Rebuild Prov

5360-Narragansett Electric and Gas Project Revision Detail Report

Fund Project Number: <u>C032258</u>	USSC #: <u>USSC-17-212</u>
Revision: <u>4</u>	Budget Version:
Project Title: <u>ACNW Vlt47 Full Rebuild Prov</u>	
Project Description: Install and equip one network vault, and remove one network vault.	

Project Status: <u>open</u>	
Responsible Person: <u>MORAN, HEATHER</u>	Initiator: <u>Livingston, Claire L</u>
Spending Rationale: <u>Asset Condition</u>	Funding Type: <u>P Electric Distribution Line RI</u>
Budget Class: <u>Asset Replacement</u>	
Capital by Category:	
Program Code:	
Project Risk Score: <u>42</u>	Project Complexity Score: <u>17</u>

Project Schedule / Expenditures

Revision Status: <u>Approved</u>	
Est Start Date: <u>5/12/2009</u>	Est Complete Date: <u>9/30/2017</u>
Est In-Service Date: <u>6/30/2017</u>	
TTD Actuals: <u>\$1,457,027</u>	As Of: <u>10/2/2017</u>
Cost Breakdown	
<u>Capital</u>	<u>Expense</u>
<u>\$947,000</u>	<u>\$116,000</u>
<u>Removal</u>	<u>Total</u>
<u>\$434,000</u>	<u>\$1,497,000</u>
	<u>Credits</u>
	<u>\$0</u>

Justification / Risk Identification:

Network Vault 47 on Washington Street in Providence was initially built as a single-unit vault in 1939. It was enlarged in 1972 to accommodate a second unit. The oldest part of the vault structure is deteriorated beyond repair, but cannot be removed without replacement. This project covers expenditures necessary to install and equip a new single unit vault adjacent to the existing structure, and to remove the original part of the vault. Removal and disposal must be done in accordance with EPA requirements because testing at the site indicates the vault structure is PCB contaminated. The transformer and network vaults from the portion of the vault to be removed will be

Project Scope:

Install one network vault structure, one mole-type secondary collector bus, 300 ft of 3-1/C-4/0 Cu 15 kV cable, 780 ft of 4-1C-500 kcmil Cu 600 V cable, 340 ft of 1C-500 kcmil Cu 600 V cable, 260 ft of 3-1/C-750 kcmil Cu 600 V cable, and miscellaneous underground and network vault equipment. Remove 215 ft of 6" Cu bus bar, 155 ft of 5" Cu bus bar, 135 ft of 3/C-1/0 PL 15 kV cable, 110 ft of 3-1/C-1/0 PL 15 kV cable, 60 ft of 3-1/C-500 kcmil Cu RL 600 V cable, one network vault structure, and miscellaneous underground and network vault equipment.

Project Alternatives Considered:

<Enter data here>

Additional Notes:

Sanction from \$25K to \$970K from Claire Livingston. Previous DOA (\$25K) was for engineering only, to determine scope of work and cost. Revised DOA (\$970K) includes final design and construction.

CL 3/4/14 - Estimate rev 3 conceptual estimate: \$970K (590K capital, 70K O&M, 310K removal).
CL - Estimate rev 1 - \$25K eng/design.

Related Projects:

Project Number:

Project Name:

Approvals

Line 1:	Date	<u>5/17/2017 07:59:19</u>	Approver	<u>monted</u>	<u>USSC Approver</u>
Line 2:	Date		Approver		
Line 3:	Date		Approver		
Line 4:	Date		Approver		
Line 5:	Date		Approver		

*****Project Authorization is for Approved Revision Total Estimated Cost +10%*****

REDACTED - CEII Information has been Redacted

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4770
Attachment PUC 1-16-1 part 1 of 2
Page 296 of 889

PowerPlan ----- PPGPRD Database

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Projects Assets Tables CR MyPPlan Help Calc Print Win

Funding Project Estimates - Summary C032258 Current Total Authorized Amount: \$1,49...

Title ACNW Vlt47 Full Rebuild Prov
Project Number C032258

Budget Version No Assigned Versions

Revision 17-212
Revision Status Approved
Revision No. 4
Est Start Date 05/12/2009
Est Complete Date 09/30/2017
Est In Srv Date 06/30/2017
Capital \$947,000.00
Expense \$116,000.00
Jobbing \$0.00
Retirement \$0.00
Removal \$434,000.00
Total (excl. Rets.) \$1,497,000.00
Credits \$0.00
Net \$1,497,000.00

Revision Info Other Updates

Revision 4 of 4
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Resanction Request

Title:	Vault 47 Full Rebuild Providence RI	Sanction Paper #:	USSC-17-212
Project #:	C032258	Sanction Type:	Resanction
Operating Company:	The Narragansett Electric Co.	Date of Request:	05/09/2017
Author:	Roger D. Cox	Sponsor:	Carol Sedewitz, VP of Electric Asset Management
Utility Service:	Electricity T&D	Project Manager:	Heather L. Moran

1 Executive Summary

This paper requests resanction of the Project C032258 in the amount \$1.497M with a tolerance of +/- 10% for the purposes of Engineering, Procurement and full construction.

This sanction amount is \$1.497M broken down into:

\$0.947M Capex

\$0.116M Opex

\$0.434M Removal

Note the previous requested sanction amount was \$0.970M

2 Resanction Details

2.1 Project Summary

Network Vault 47 on Washington Street in Providence was initially built as a single-unit vault in 1939. It was enlarged in 1972 to accommodate a second unit. The oldest part of the vault structure is deteriorated beyond repair, but cannot be removed without replacement. This project covers expenditures necessary to install and equip a new single unit vault adjacent to the existing structure, and to remove the original part of the vault. Removal and disposal must be done in accordance with EPA requirements because testing at the site indicates the vault structure is PCB-contaminated. The transformer and network protector from the portion of the vault to be removed will be re-used in the new structure. The 1972-portion of the vault will remain; the roof will be replaced in that portion due to deterioration.

Project will install one network vault structure, one mole-type secondary collector bus, 300 ft of 3-1/C-4/0 Cu 15 kV cable, 780 ft of 4-1C-500 kcmil Cu 600 V cable, 340 ft of 1C-500 kcmil Cu 600 V cable, 260 ft of 3-1/C-750 kcmil Cu 600 V cable, and miscellaneous underground and network vault equipment. Remove 215 ft of 6" Cu bus bar, 155 ft of 5" Cu bus bar, 135 ft of 3/C-1/0 PL 15 kV cable, 110 ft of 3-1/C-1/0 PL 15 kV cable, 60 ft of 3-1/C-500 kcmil Cu RL 600 V cable, one network vault structure, and miscellaneous underground and network vault equipment.



Resanction Request

2.2 Summary of Projects

Project Number	Project Type (Elect only)	Project Title	Estimate Amount (\$M)
C032258	Distribution Line	Vault 47 Full Rebuild Prov RI	1.497
Total			1.497

2.3 Prior Sanctioning History

Date	Governance Body	Sanctioned Amount	Potential Project Investment	Paper Title	Sanction Type	Paper Reference Number	Tolerance
3/07/14	Power Plant	\$0.970M	\$0.970M	NA	Sanction	NA	+50/-25%
5/14/09	Power Plant	\$0.025M	\$0.025M	NA	Sanction	NA	+200/-50%

Over / Under Expenditure Analysis

Summary Analysis (\$M)	Capex	Opex	Removal	Total
Resanction Amount	0.947	0.116	0.434	1.497
Latest Approval	0.590	0.070	0.310	0.970
Change*	0.357	0.046	0.124	0.527

*Change = (Re-sanction – Amount Latest Approval)

2.4 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 +		
					2017/18	2018/19	2019/20	2020/21	2021/22	2022/23		
C032258	Vault 47 Full Rebuild Prov RI	+/- 10%	CapEx	0.654	0.293	0.000	0.000	0.000	0.000	0.000	0.947	
			OpEx	0.072	0.044	0.000	0.000	0.000	0.000	0.000	0.116	
			Removal	0.400	0.034	0.000	0.000	0.000	0.000	0.000	0.434	
			Total	1.126	0.371	0.000	0.000	0.000	0.000	0.000	1.497	
Total Project Sanction			CapEx	0.654	0.293	0.000	0.000	0.000	0.000	0.000	0.947	
			OpEx	0.072	0.044	0.000	0.000	0.000	0.000	0.000	0.000	0.116
			Removal	0.400	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.434
			Total	1.126	0.371	0.000	0.000	0.000	0.000	0.000	0.000	1.497

Resanction Request



2.5 Business Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan (\$)
FY18-22 NE Distribution Business plan	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input checked="" type="radio"/> Over <input type="radio"/> Under <input type="radio"/> N/A	\$0.371M

2.6 Drivers

2.6.1 Detailed Analysis Table

The following table indicates the major key variations that account for the difference between the original sanction amount and the requested resanction amount.

Detail Analysis (M's)	Over/Under Expenditure?	Amount
Additional Design/Engineering Cost	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.082
Additional Construction Costs	<input checked="" type="checkbox"/> Over <input type="checkbox"/> Under	\$0.445

2.6.2 Explanation of Key Variations

Ventilation system:

- This downtown vault had a required forced ventilation system as it could not utilize a simple grate venting system. The original estimate assumed forced vent system materials that were standard at that time. The actual installation used explosion proof design which was the first installation in the NE system. This increased engineering, material, & labor costs. After design but before construction, the RI standards changed requiring any vault that requires the installation of forced ventilation, also require that the ventilation system installed to meet the new explosion proof standard.

Precast network vault roofs

- This was the first installation of solid network vault hatch covers, or prefabricated concrete vault sections, in the System. Increased engineering & design costs.