

## Exhibit B – Interconnection Studies

### Interconnection Study for Matthews Avenue Substation:

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**National Grid Upstate New York**  
**115kV Electric Service Modification**  
**for the**  
**Interconnection Customer Facilities**  
**of**  
**Village of Solvay**  
**Mathews Ave.**  
**Solvay, NY**  
(Work Order #9000105367)

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## **INTRODUCTION:**

This document defines the electrical installation requirements for the Village of Solvay's ("Village") interconnection to the National Grid ("Company") electric system. The requirements specified herein are specific to the Village of Solvay Mathews Ave. Substation Upgrade Project ("Project").

## **ACRONYMS/SYNONYMS USED IN THIS PROJECT DOCUMENT:**

Energization - "In Service"  
 ESB - "Electric System Bulletin"  
 FERC - "Federal Energy Regulatory Commission"  
 IA - "Interconnection Agreement"  
 NY ISO - "New York Independent System Operator"  
 NY PSL - "NYS Public Service Law"  
 NY PSC - "New York Public Service Commission"  
 NYPA - "New York Power Authority"  
 OATT - "Open Access Transmission Tariff"  
 PSL - "Public Service Law"  
 WO - "Work Order"

## **1.0 SCOPE**

1. This Service Plan describes the Village's upgrade of their Mathews Ave substation connecting to the 115kV electric power system (EPS) located in Solvay, N.Y. This plan identifies the expected scope, schedule, and costs of providing support services and 115kV modifications and additions specific to the Village's installation requirements subject to the Company's typical specifications in the ESB 750 series bulletins to supply the upgrade of Mathews Ave. substation. This Service Plan may be used in conjunction with other Company agreements with the Village to provide service.
2. The Company has evaluated the service proposal and the following is the Village's service plan along with the Company's requirements for the Village's decision to proceed with any design development and installation activities. Also, the Company requires the information listed in ESB's 752 and 755 (as applicable) and items requested in this plan for review and acceptance to continue with the Village's written commitment to proceed.

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## 2.0 OBJECTIVES

The objectives of this service plan include:

- Define the engineering design parameters, installation and operating requirements associated with the Village's facilities and
- Describe all submittals required for review and acceptance of the Village's facilities at various stages of the Project, including: engineering design, construction, testing and commissioning, energization, and close out, and the process for completing such submittals.

## 3.0 REFERENCES

### 3.1 Company:

The following Company electric system bulletins<sup>1</sup> pertain to this Project and are incorporated into this service plan:

- ESB No. 750 – Specifications for Electrical Installations, April 2010 ("ESB 750")
- ESB No. 750 series Errata and Change Revision List, September 2010 ("ESB 750 Errata")
- ESB No. 752 – Service above 15,000 Volts, October 2004, 2<sup>nd</sup> printing April 2002 ("ESB 752")
- ESB No. 755 – Operation & Maintenance Requirements for Services Above 600 Volts, June 2003 ("ESB 755")

In addition to these bulletins as specific to this project,

- February 23, 2011 meeting between Warner Consulting Group, Village of Solvay, and National Grid.

### 3.2 Other:

Other references pertaining to this Project include:

- PSC No. 220 – Niagara Mohawk Power Corporation Electricity Tariff  
<https://www2.dps.state.ny.us/ETS/jobs/display/download/4912540.pdf>
- New York State Consolidated Laws, Public Service, Article 4, Section 65.<sup>2</sup>
- Regarding unqualified persons approaching the area of work: Laws of New York – Labor - Article 7 § 202-h. High-voltage proximity.  
<http://www.labor.state.ny.us/workerprotection/safetyhealth/sh57.shtm>

## 4.0 PROJECT DESCRIPTION

(See Attachments A and B)

<sup>1</sup> All ESB's are available at <http://www.nationalgridus.com/electricalspecifications>.

<sup>2</sup> The NY Public Service Law is the governing document where the utility derives its authority to assert its electric service connection requirements to those who take electric service from the utility's electric system. The utility is responsible to provide safe and adequate service in a just and reasonably charged manner. This is achieved through the Company's electricity tariff, PSC No. 220 in NY State and its Specifications for Electrical Installations. Refer to: <http://public.leginfo.state.ny.us/menugetf.cgi?COMMONQUERY=LAWS> then select "PBS".

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#### 4.1 Customer Proposal

1. The Nov. 8th, 2010 scoping document from Warner Consulting Group in **Attachment A** describes the Village of Solvay's proposed upgrade of their 115kV Mathews Ave. substation.
  - The Village is planning to be within the same load parameters discussed in the Nov. 22<sup>nd</sup>, 2010 Support Services Agreement with the Company.
2. The construction start of the Village's project is expected **end-June 2011** for the 115kV circuit tap change at their Industrial Substation site on Bridge St.
  - The Village plans to de-energize their Mathews Ave. Substation at the end of August 2011 to begin upgrades.
  - The Village plans to re-energize their Mathews Ave. Substation in **early January 2012**.
3. The Village desires scope, cost, and schedule for providing service to meet their needs for their Mathews Ave. substation upgrade.

#### 4.2 National Grid Work Scope

From the Company's perspective, the work will be comprised of two projects. The first project will include the reconfiguration of the tap outside the Industrial substation, as well as de-energizing the existing tap lines to Solvay Village Mathews Ave. The intent of this phase is to enable the load transfer from Mathews Ave to the Industrial substation in order to allow Mathews Ave to be de-energized for its rebuild. The second project involves the construction of two new tap lines to Mathews Ave, including any structural installations required, and removal of existing tap lines. The intent of this phase is to allow Mathews Ave substation to support the increased loading associated with the growth in the area. Refer to **Attachment B**.

*This service plan excludes any relocation for the 115kV span of line #12 which is intended to make space available for the Empire Tissue facility.*

National Grid will review the Village's engineering design documents in accordance with the terms of an executed Cost Reimbursement Agreement.

#### 4.3 Customer Responsibilities

The Village is responsible for:

1. Providing the design and operating documentation for their 115kV substation's installation upgrades in accordance with the Company's ESB's 750, 752, and 755.

#### 4.4 Company Costs

1. The Company shall provide the Village any estimated cost contributions, as well as any required reconciliation, in accordance with the terms and conditions established in the Cost Reimbursement Agreements and Interconnection Agreement.

#### 4.5 Company Scheduling

1. The Company is aware of the Village's project schedule referenced in Section 5.1; however, the dates may be impacted by the Company's obligations to serve others, execution of the Cost Reimbursement Agreement and Interconnection

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Agreement, payment of all applicable charges, update (if necessary) of the NY ISO service arrangement, and any other regulatory filing requirements.

#### 4.6 Company's Conditions and Limitations

1. Refer to Section 5.4 for costs to be recovered that are associated with the supply additions and service.
2. The Company will strive to meet the Village's desired in-service dates depending upon execution of the Cost Reimbursement Agreement and Interconnection Agreement, final design and installation acceptance by the Company. However, equipment delivery, weather and soil conditions, right-of-way, environmental permits, and construction obstacles may affect this schedule.
3. The service recommendations in this plan are contingent upon the Company's review of the Village's 115kV construction design submittal. Once the review is completed, a detailed service configuration and a revised service plan, if necessary, with detailed estimates can be provided.
4. If the Village takes exception to this plan, they shall submit it in writing to the Company.

### 5.0 COMPANY 115kV SERVICE CONFIGURATION and SYSTEM IMPACTS

#### 5.1 115kV Supply

The Company has reviewed the request from the Village of Solvay to upgrade their substation at Mathews Avenue, as well as all associated work required in conjunction with that upgrade, and has concluded the following:

1. The existing configuration of the Solvay area 115kV electric power system (EPS) is adequate to meet the current loading at Mathews Ave. substation, as well as any loadings at the Village's Industrial substation on Bridge St. However, based on the details of the work planned by the Village to upgrade these two stations, the Company determines additional work is required to satisfactorily and reliably serve the loading at these two Municipal-owned substations.
2. The Village's Industrial substation which is being upgraded as a temporary site to supply load during the construction at their Mathews Ave. substation cannot support the entirety of the increased load from its existing configuration. During thermal and voltage analysis performed by the Company on the 115kV EPS, it was found that the #8 line cannot sufficiently supply the entirety of the existing load without needing upgrades. Prior to moving load to this station, the tap that currently exists to line #8 should be moved to the other line in the double circuit, line #2. This line has adequate capability to serve any needs at the station. This should be a permanent change to the line configuration for the Industrial substation, in order to facilitate additional load growth (if needed), as well as to allow it to serve as a backup to Mathews Ave. substation should that be required at a future date.
3. Similarly to the situation with the Industrial substation, the Company sees cause for concern should the Mathews Ave. substation continue to be served from the existing taps once the increased load is added to the substation. To prepare for expected growth in the full time loading on the Mathews Ave. substation (once

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placed back into service following the upgrades), the taps currently in place will be reconfigured..The tap which currently extends from the #8 line will be reconnected to the Mathews Avenue substation. The second tap should extend from the Eastern end of the station to the #12 line. This will not be a new tap position, but will replace the existing tap from the #2 line. In addition to better serving the load at the station, these taps will reduce the number of line crossings in the area, increasing reliability. Refer to **Attachment B**.

4. The combination of these changes will alleviate any voltage and thermal concerns for the Mathews Ave. substation.

#### 5.2 115kV Outage Coordination Risk Assessment

1. At this time, National Grid has not performed an outage coordination risk assessment or scheduling analysis. This type of study is generally performed during the final engineering assessment.

#### 5.3 115kV Operations

1. The Company's 115kV overhead transmission delivery voltage typically operates between +/-5% of normal operating 115kV nominal conditions. Under emergency operation, voltage on this system could reach 110% or 90% of nominal prior to corrective action being taken.
2. The Company has reviewed the Village's proposed scope of work in **Attachment A** and has concluded that the requested protection scheme for the Industrial substation (automatic throw over with live transfer capability) is not acceptable on this 115kV EPS. However, live transfer on the low voltage side (i.e. secondary bus of the main transformers) is acceptable provided that the closed transition switching is supervised by a 15 second timer that will trip the Village's bus tie.
3. Attention is called to Sections 10.0 and 12.0 of ESB 750-2010 regarding disturbances and capacitor installation. Also, reactive power loading by the Village on the Company's system may be subject to added costs.

### 6.0 115kV CUSTOMER-OWNED SUBSTATION

#### 6.1 Interrupting Rating

1. The Village's service equipment shall be suitable for the maximum fault current available at its supply. Without any of the Village's equipment contribution, the following are National Grid's 115kV system characteristic maximum values<sup>3</sup> on a 100MVA base at the Village's 115kV bus locations from the proposed new sources.

**Source: 115kV #12 circuit at Mathews Ave. Substation**

**Available Fault Current:**

**I(3-Phase) = 20,660 Amp, X/R Ratio = 5.81**

**I(L-G) = 18,947 Amp, X/R Ratio = 6.55**

<sup>3</sup> Refer to Section 1.10 of the Company's ESB750-0410 regarding the use of the information provided by the Company. Also, refer to Section 1.7 of the Company's ESB750-0410 and ESB 755 regarding their responsibility for their electric service operating and maintenance requirements. NFPA 70E provides information where to find work safety practices for premises wiring.

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**System Impedance:**

Z1 = 0.55434 + j3.22098 Ohm

Z0 = 0.50343 + j4.12653 Ohm

**Source: 115kV #8 circuit at Mathews Ave. Substation**

**Available Fault Current:**

I(3-Phase) = 20,797 Amp, X/R Ratio = 5.13

I(L-G) = 17,995 Amp, X/R Ratio = 5.41

**System Impedance:**

Z1 = 0.62069 + j3.18704 Ohm

Z0 = 0.80552 + j4.69478 Ohm

**Source: 115kV #2 circuit at Industrial Substation**

**Available Fault Current:**

I(3-Phase) = 20,262 Amp, X/R Ratio = 5.15

I(L-G) = 17,355 Amp, X/R Ratio = 5.38

**System Impedance:**

Z1 = 0.63485 + j3.27162 Ohm

Z0 = 0.86338 + j4.93151 Ohm

**Source: 115kV #14 circuit at Industrial Substation**

**Available Fault Current:**

I(3-Phase) = 19,479 Amp, X/R Ratio = 5.60

I(L-G) = 17,002 Amp, X/R Ratio = 6.16

**System Impedance:**

Z1 = 0.60914 + j3.41145 Ohm

Z0 = 0.68841 + j4.93360 Ohm

As changes occur to the Company's system these values will be affected. Future system modifications or load growth may require the service equipment to have a larger interrupting rating. Any costs associated with changes to Municipal-owned equipment shall be borne by the Village.

**6.2 Facility Provisions**

1. The Village shall submit their construction design submittal to the Company for acceptance review according to the Company's ESB 752, sealed by their design professional licensed in NY State (see Section 1.7 in ESB 750).
2. The Company's 115kV supply to the Village's substations is an effectively grounded wye source, 121kV maximum, 550kV BIL rating. Refer to the Company's ESB's 752 and 755 for required submittals and installation requirements of the Village's 115kV substations' modifications.
3. The Company does not provide any guarantees or warranties, expressed or implied, with respect to work, equipment, and materials, otherwise referenced in this service plan.

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