SUBSTATION ENGINEERING COMPANY

Western New York Public Policy Transmission Need

Technical Review Report

Draft Public Version

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This report summarizes the independent consultant evaluation of transmission solution for Western New York Public Policy Need.

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1. Introduction

This report documents the technical evaluation of the ten proposals for the Western NY Public Policy Transmission Need (Western NY PPTN) that the New York Independent System Operator, Inc. (NYISO) determined, in its May 31, 2016 Viability and Sufficiency Assessment Report, would be able to satisfy the public policy transmission need criteria. The ten proposals evaluated are :

- North America Transmission (NAT) – Proposal #1 (T006)
- North America Transmission (NAT) – Proposal #2 (T007)
- North America Transmission (NAT) – Proposal #3 (T008)
- North America Transmission (NAT) – Proposal #4 (T009)
- National Grid (NGRID)_– Moderate Power Transfer Solution (T011)
- National Grid (NGRID) – High Power Transfer Solution (T012)
- New York Power Authority (NYPA)/ New York State Electric and Gas (NYSEG) – Western NY Energy Link (T013)
- NextEra Energy Transmission New York – Empire State Line #1 (T014)
- NextEra Energy Transmission New York – Empire State Line #2 (T015)
- Exelon Transmission Company – Niagara Area Transmission Expansion (T017)

The evaluation included review of the initial proposals received as well as answers to the Requests For Information (RFIs) issued to the Developers in January and March 2017.

This evaluation focused on the following areas:

- Site review and “walk down” of proposed sites and routes to evaluate their constructability and identify potential issues with the proposed design, siting and routing.
- Review of the environmental and permitting requirements for the project as proposed by Developers and identify gaps and issues. The environmental reviews were completed predominately using “desktop” analysis supplemented with occasional field review.
- Evaluate completeness and reasonableness of the proposed project schedules, including identification of potential issues associated with delay in obtaining permits for and construction of the proposed project.
- Evaluate cost estimates and develop independent cost estimates.
- Review, identify and estimate real estate requirements.
- Review proposals and identify risks to licensing and construction of the project on a timely basis.
- Determine expandability of proposed project.
- Assess the Developer’s plans for site control.
- Evaluate the Developer’s operating plan.

The review team's evaluation did not include further review of Developers' qualifications or credentials beyond the initial screening completed prior to the submittal of proposals.

2. Executive Summary

This technical review focused primarily on schedule, cost, identifiable risks, the ability to expand on the project in the future, site control plan and availability of Rights of Way (ROW), and the operating plan provided by each Developer. Below is a brief summary of our findings. Please see the remainder of the report for further detail.

2.1. Schedule

Each Developer's schedule for permitting and construction of its project was reviewed based on the review team's collective experience with transmission projects sited by the New York State Public Service Commission (NYPSC) under Article VII of the New York Public Service Law and constructed in New York State. A review of recent Article VII project timelines was completed to identify comparable schedules. A summary of the expected durations for each Developer's proposed scope is shown on the table below:

Proposal	Developer Proposed Total Duration	Estimated Duration	Minimum Duration
T006 NAT Proposal #1	41 Months	43 Months	40 months
T007 NAT Proposal #2	48 Months	63 Months	59 months
T008 NAT Proposal #3	51 Months	69 Months	65 months
T009 NAT Proposal #3	53 Months	75 Months	71 months
T011 NGRID Moderate Power Transfer	51 Months	57 Months	57 months
T012 NGRID High Power Transfer	51 Months	60 Months	60 months
T013 NYPA/NYSEG	53 Months	55 Months	44 months
T014 NextEra w/ phase shifter	42 Months	49 (53 Months for alternative with new ROW)	40 months (49 months for alternative with new ROW)
T015 NextEra w/ no phase shifter	42 Months	49 (53 Months for alternative with new ROW	40 months (49 months for alternative with new ROW)
T017 Exelon	75 Months	82 Months	66 months

"Estimated Duration" is calculated using the anticipated time for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. For each of these time periods the review team used the greater of the duration shown by the Developer or what the review team believes to be the minimum. The review team also assumed that the Environmental Management & Construction Plan ("EM&CP") preparation is completed and ready for submission when the Article VII certificate is received. All of these components will depend on the experience and the level of resources of the Developer and the complexity of the project. If the "Estimated Duration" is shown to be shorter than that proposed by the Developer, that does not lead to the conclusion that the Developer should or could accelerate its schedule but rather is intended to highlight schedules that the review team believes to be deficient.

The "Minimum Duration" is calculated using what the review team considered to be the minimum duration for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. This is an absolute best case and is shown for comparative purposes.

2.2. Cost

In evaluating the construction cost of each proposal, Kenny Construction ("Kenny") prepared independent estimates for each proposal. Kenny reviewed the Developers' proposals with the costs redacted. GEI Consultants, Inc. estimated the environmental licensing and permitting costs. An independent real estate agent estimated the cost of obtaining ROW. The results are shown below:

Project	Independent Estimate
T006 NAT Proposal #1	$158,028,558
T007 NAT Proposal #2	$275,875,943
T008 NAT Proposal #3	$347,529,010
T009 NAT Proposal #4	$478,606,515
T011 NGRID Moderate Power Transfer	$181,520,521
T012 NGRID High Power Transfer	$432,243,342
T013 NYPA/NYSEG	$232,204,336
T014 NextEra w/ phase shifter	$177,177,899
T014 NextEra w/ phase shifter Alternate ROW	$219,085,375
T015 NextEra w/ no phase shifter	$157,505,646
T015 NextEra w/ no phase shifter Alternate ROW	$199,413,121
T017 Exelon	$285,625,546

The review team conducted an analysis to place the proposals on a common basis by adjusting the cost estimates to 2017 costs, and identify reasons for the most significant variances.

2.3. Risk

2.3.1. The review team completed a review of the potential risks associated with the proposals focusing on the most significant drivers to the project risks including:

- Article VII review approval process and potential environmental issues
- Procurement of major equipment
- Construction
- Site Control and procurement of real estate
- Operational Plan

2.3.2. The proposals share many risks in common such as potential delays in preparation and approval of regulatory licenses and permits.

2.3.3. The most significant risk to the projects is the acquisition of significant new real estate for the transmission line ROWs, and most notably, the corridor between Stolle Road and Gardenville. That corridor traverses many commercial and residential properties and requires the acquisition of homes. Those projects affected include NAT -T007, NAT -T008, NAT -T009 and Exelon –T017.

2.4. Expandability

The review identified several items that may be considered common to all proposals:

- New line segments could be designed for double circuit capability. The Developers have not proposed such a design.
- The transmission lines could be constructed with higher ampacity conductor or re-conductored in the future.
- The western New York system could be expanded in the future with modifications proposed by Developers in addition to the one ultimately selected by the NYISO. For example, National Grid's solution could be further expanded by a number of the new lines and modifications proposed by the other Developers.

2.5. Site Control and Real Estate

2.5.1. In all proposals, the following is common for the property rights acquisition process:

- Use existing ROW as much as practical.
- Where additional ROWs must be acquired, it will be accomplished through arm's length negotiation with property owners.
- If negotiations are unsuccessful, the property will be acquired through eminent domain.
- All Developers have completed preliminary routing of their proposed lines.

2.5.2. The non-incumbent Developers all claim two common rights to assist in obtaining property:

- They cite the recent 12/17/15 NYPSC order (Case 12-T-0502) related to the AC Transmission proceeding as having applicability to this project in terms of obtaining access to the incumbent utility ROW. The Order stated on page 60: *"Incumbent utilities should offer competitors the same terms they offer Transco; there should be no bias shown to Transco."*
  Further on page 60 the NYPSC Order states:
  "Commission expects the utility company owner to bargain in good faith to reach an agreement with the developer of the transmission solution as to property access and compensation as it would for other linear project developers that seek to co-locate on utility property."
- If negotiations with private land owners are unsuccessful they believe, under New York State Law, Developers may have eminent domain authority after certification of a route by the NYPSC.

2.6. Operational Plan

2.6.1. The review team conducted a review of the Developers' operations and maintenance plans associated with the proposals. The review team did not identify any major flaw with any Developer's plans and the plans are essentially the same.

2.6.2. For the non-incumbent entity proposals, the following is common :

- The Developers stated that all O&M activities will comply with required NERC regulations.
- Developer owned facilities will be part of the NYISO Bulk Power System with real-time reporting of operating data to the NYISO.

2.6.3. The non-incumbent Developers proposed the following arrangements for Control Center services:

- North American Transmission proposes to use Cross Texas Transmission, an affiliate of NAT, to provide control center services.
- NextEra also proposes to use an out-of-state affiliate control center.
- Exelon plans to contract with an incumbent utility or third party for control center services.

3. Discussion of Proposals

Brief descriptions of the proposed projects are provided below.

3.1. T006 –North American Transmission –Proposal #1

NAT proposal T006 includes the following major work items:

- New Dysinger 345 kV Switchyard (loops Niagara-Somerset & Niagara-Rochester 345 kV lines into station)
- New Dysinger-Stolle Road 345 kV line #1
- New (third) 345-115 kV transformer at Stolle Road

Additional system upgrades that Developer identified to support proposal T006 include:

- Gardenville to Stolle Road 230 kV terminal upgrades
- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV Line #103 reconductoring
- Roll Road 115-34.5 kV transformer replacement
- Lockport to Shaw 115 kV terminal upgrades

3.2. T007 –North American Transmission –Proposal #2

NAT proposal T007 builds on T006 by adding a new 345 kV line between Stolle Road and Gardenville and a new 345-230kV transformer at Gardenville and includes the following major work items:

- New Dysinger 345 kV Switchyard (loops Niagara-Somerset & Niagara-Rochester 345 kV lines into station)
- New Dysinger-Stolle Road 345 kV line #1
- New Stolle Road-Gardenville 345 kV line
- New 345-230 kV transformer at Gardenville 230 kV

Additional possible system upgrades that Developer identified to support proposal T007 include:

- Gardenville to Stolle Road 230 kV terminal upgrades
- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV Line #103 reconductoring
- Roll Road 115-34.5 kV transformer replacement
- Lockport to Shaw 115 kV terminal upgrades
- New South Perry 230-115 kV transformer

3.3. T008 –North American Transmission –Proposal #3

NAT proposal T008 builds on T007 by adding a second 345kV line between Dysinger and Stolle Road and includes the following major work items:

- New Dysinger 345 kV Switchyard (loops Niagara-Somerset & Niagara-Rochester 345 kV lines into station)
- New Dysinger-Stolle Road 345 kV line #1
- New Stolle Road-Gardenville 345 kV line
- New 345-230 kV transformer at Gardenville 230 kV
- Second new Dysinger-Stolle Road 345 kV line #2

Additional possible system upgrades that Developer identified to support proposal T008 include:

- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV Line #103 reconductoring
- Roll Road - 115-34.5 kV transformer replacement
- Lockport to Shaw 115 kV terminal upgrades
- New South Perry 230-115 kV transformer

3.4. T009 –North American Transmission –Proposal #4

NAT proposal T009 builds on T008 by adding a new Niagara to Dysinger 345kV line and includes the following major work items:

- New Dysinger 345 kV Switchyard (loops Niagara-Somerset & Niagara-Rochester 345 kV lines into station)
- New Dysinger-Stolle Road 345 kV line #1
- New Stolle Road-Gardenville 345 kV line
- New 345-230 kV transformer at Gardenville 230 kV (connecting to the NYSEG 230 kV yard)
- Second new Dysinger-Stolle Road 345 kV line #2
- New Niagara-Dysinger 345 kV line

Additional possible system upgrades that Developer identified to support proposal T009 include:

- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV Line #103 reconductoring
- Roll Road 115-34.5 kV transformer replacement
- Lockport to Shaw 115 kV terminal upgrades
- New South Perry 230-115 kV transformer

3.5. T011 –National Grid - Moderate Power Transfer Solution

National Grid's "Moderate Power Transfer Solution" proposal T011 includes the following major work items:

- Reconductor 115 kV lines (~62 miles) including:
  - Niagara/Packard-Gardenville 115 kV (180, 181, 182) reconductor ("Minimal Solution")
  - Niagara-Packard (191, 192) reconductoring
  - Packard-Huntley (130, 133) partial reconductoring
  - Niagara-Lockport (103, 104) partial reconductoring
  - Tower separation of 61/64 230 kV lines
  - Replacement of thermally limiting equipment at Packard, Huntley, Lockport, Robinson Rd, Erie St. and Niagara stations

3.6. T012 –National Grid – High Power Transfer Solution

National Grid's "High Power Transfer Solution" proposal T012 includes the following major work items:

- New Niagara-Gardenville 230 kV line (connecting to the National Grid 230kV yard)
- New Park Club Lane 115 kV switching station (connects to Packard, Stolle Road, Gardenville)
- Reconductor 115 kV lines (~76 miles worth) including:
  - Niagara/Packard-Gardenville 115 kV (180, 181, 182) reconductor ("Full solution")
  - Niagara-Packard (191, 192) reconductoring
  - Packard-Huntley (130, 133) partial reconductoring
  - Niagara-Lockport (103, 104) partial reconductoring
  - Tower separation of 61/64 230 kV lines
  - Replacement of thermally-limiting equipment at Packard, Huntley, Lockport, Robinson Road, Erie St. and Niagara stations

3.7. T013 –NYPA/NYSEG - Western NY Energy Link

NYPA/NYSEG proposal T013 includes the following major work items:

- New Dysinger 345 kV Switchyard (loops in Niagara-Somerset & Niagara-Rochester 345 kV lines)
- New Dysinger-Stolle Road 345 kV line
- Reconductoring Stolle Road-Gardenville 230 kV line
- Protection relay upgrade at Gardenville for the reconductored Stolle-Gardenville 230 kV line
- Two new 345-230 kV transformers at Stolle Road

- Tower separation of 230 kV Line Nos. 61/64 at Niagara
- New 230-115 kV transformer at South Perry
- New 115 kV Phase Angle Regulator (PAR) at South Perry substation (on South Perry – Meyer 115 kV line)

3.8. T014 –NextEra – Empire State Line #1

NextEra proposal T014 includes the following major work items:

- New Dysinger 345 kV Switchyard (loops in Niagara-Somerset & Niagara-Rochester 345 kV lines, and cuts out the 345 kV line loop to Somerset 345 kV)
- New East Stolle Switchyard (near Stolle Road substation)
- New Dysinger-East Stolle 345 kV line with 700 MVA PAR at Dysinger end and a shunt reactor at East Stolle

Additional possible system upgrades that Developer identified to support proposal T014 include:

- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV - Reconductor approximately 12 miles of line
- Roll Road - 40MVAR capacitor bank
- Add 100 MVAR shunt reactor at Rochester

3.9. T015 –NextEra – Empire State Line #2

NextEra proposal T015 is the same as T014 except that it does not have the 700 MVA PAR. Proposal T015 includes the following major work items:

- New Dysinger 345 kV Switchyard (loops in Niagara-Somerset & Niagara-Rochester 345 kV lines)
- New East Stolle Switchyard (near Stolle Road substation)
- New Dysinger-East Stolle 345 kV line and a shunt reactor at East Stolle Road

Additional possible system upgrades that Developer identified to support proposal T015 include:

- Depew to Erie 115 kV terminal upgrades
- Swann Road to Shawnee Station 115 kV - Reconductor approximately 12 miles of line
- Roll Road - Add 40 MVAR capacitor bank
- Add 100MVAR shunt reactor at Rochester

3.10. T017 –Exelon - Niagara Area Transmission Expansion

Exelon proposal T017 includes the following major work items:

- New Niagara-Stolle Road 345 kV line
- New Gardenville-Stolle Road 230 kV line
- Reconductoring 115 kV lines (~33.1 miles worth) including:
    - Packard –Huntley (130, 133) (approximately 19.6 miles of line reconductoring)
    - Packard-Niagara Falls Blvd(181) (approximately 3.7 miles of line reconductoring)
    - Watch Road-Huntley (133) (approximately 9.8 miles of line reconductoring)

4. Evaluation

4.1. Schedule

The NYISO OATT section 31.4.8.1.7 states the following: "The potential issues associated with delay in constructing the proposed regulated Public Policy Transmission Project consistent with the major milestone schedule and the schedule for obtaining any permits and other certifications as required to timely meet the need."

The review team completed a review of the schedules submitted with the proposals. All show proposed start dates that are not achievable at this point, so the team focused on task durations instead of the dates. The review teams evaluation was based on the team's collective experience with transmission line and substation projects in New York State, and comparison of each schedule to actual Article VII projects completed.

The main drivers to the project schedule durations considered were:

- Article VII approval process including preliminary and final engineering
- Procurement of major equipment
- Real Estate acquisition
- Construction requirements.

The review team's conclusion for minimum durations for the Article VII process is:

	Scope of the Proposed Transmission Project		
Task	Re-conductor/minor rebuild on existing ROW	Rebuild on Existing ROW	Widen or New ROW
Prepare and submit Article VII application (minimum)	3 mo.	3-6 mo.	8 mo.
PSC issue certificate (minimum)	12 mo.	12 mo.	18-24 mo.
DPS review and approve EM&CP (assumes drafted during Article VII proceedings)	3 mo.	6 mo.	9 mo.
Total: Best Case Submit application -Start Construction	**15 mo.**	**18 mo.**	**27-33 mo.**

The project durations discussed in this evaluation assume that preparation of the Article VII application will begin at the time the project is awarded to the selected Developer and that any preliminary work required has already been completed by the Developer prior to that date. The review team also assumed that the EM&CP preparation will be completed and ready for submission when the Article VII certificate is received.

The review team's estimated duration for each project was calculated using the anticipated time for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. For each of these time periods, the review team used the greater of the duration shown by the Developer or what the review team believed to be the minimum. All of these components will depend on the experience and the level of resources of the Developer and the complexity of the project. Therefore, if the review team's estimate of the minimum duration for an activity was shorter than that proposed by the

Developer, the review team did not accelerate the Developer's schedule. The analysis is intended to highlight scheduled tasks that the review team believes to be deficient.

In general, all of the Developers' schedules should show more break down of the construction phases to help ensure they understand all the requirements. The selected Developer should submit a more detailed construction milestone schedule for inclusion in the Development Agreement with the NYISO. Summarized below are the review team's findings for each Developer.

4.1.1. North American Transmission

4.1.1.1. NAT Proposal T006

- Includes 6 months for Preliminary Engineering and Article VII preparation. Based on the review team's experience, the Developer should allocate 8 months.
- Overall Article VII review process schedule is adequate.
- Engineering is not shown on the schedule but it is reasonable to expect that the preliminary engineering will progress in parallel with Article VII application preparation and that final engineering will be progressed during Article VII review and approval and preparation of EM&CP. Those time frames appear reasonable.
- Procurement of major equipment and materials is not detailed in the schedule but would be significant based on the project scope. The large power transformer has a minimum 12 month lead time. The Developer's schedule shows nine months between Article VII review approval and start of substation construction. The proposed construction period is approximately 19 months. Therefore, there is adequate time to procure equipment, but the Developer needs to add equipment procurement on their schedule.
- Overall construction schedule appears adequate.
- The Developer's proposed project duration is 41 months. The review team estimates that a total of 43 months should be allocated for licensing and construction of this project.

4.1.1.2. NAT Proposal T007

- NAT has proposed 12 months for preliminary engineering and Article Vll application preparation. Considering the additional scope of this proposal, including new Stolle Road to Gardenville 345kV line, a 12 month period appears appropriate.
- Overall Article VII review process schedule is not adequate. Based on past Article VII projects a minimum of 27 months is required.
- Engineering is not shown on the schedule but it is anticipated that the preliminary engineering will progress in parallel with Article VII application preparation and final engineering will progress during the Article VII application review and approval, and preparation of EM&CP. The Developer's time frames appear reasonable.

- Procurement of major equipment and materials is not detailed in the schedule but would be significant based on the project scope. The large power transformer has a minimum 12 month lead time. The Developer's schedule shows 12 months between Article VII application approval and start of substation construction. The review team recommends that additional time be added to the construction schedule. If additional time is added to construction then the overall project schedule provides adequate time to procure equipment. However, the procurement needs to be detailed on its schedule.
- Additional Real Estate ROW is required. There appears to be adequate time to procure ROW in parallel with other planned activities. See Section 4.3 for associated risks.
- The overall construction schedule is not adequate. Considering the additional Stolle Road to Gardenville 345kV Circuit, 13 miles in length, and the additional work requiring a 345-230kV transformer in the Gardenville Substation, the team estimates that an additional five months will be required to complete construction. Based on historical work in this region and with the impacted utilities, there is no evidence to support the likelihood for concurrent parallel path construction for the added work scope. Similar Article VII projects include Lockport to Mortimer and Rochester Transmission Project (RTP). The length of the proposed T007 proposal requires work through two potentially severe winter cycles and two summer cycles where outages will be difficult to obtain.
- The proposed project duration is 48 months. The review team estimates that a total of 63 months should be allocated for this project.

4.1.1.3. NAT Proposal T008

- NAT has proposed 12 months for preliminary engineering and Article Vll application preparation. Considering the additional scope of this proposal, including a new Stolle Road to Gardenville 345kV line and second Stolle Road to Dysinger 345kV line, it appears that that a 12 month period at minimum is appropriate.
- Overall Article VII review process schedule is not adequate. Based on past Article VII projects a minimum of 27 months is required.
- Non-Article VII permits can/should be done earlier.
- Engineering is not shown on the schedule but it is anticipated that the preliminary engineering will progress in parallel with Article VII application preparation and final engineering will progress during Article VII application review and approval, and preparation of EM&CP. The Developer's time frames appear reasonable.
- Procurement of major equipment and materials is not detailed in the schedule but would be significant based on the project scope. The large power transformer has a minimum 12 month lead time. The Developer's schedule shows 12 months between Article VII

application approval and start of substation construction. The review team recommends that additional time be added to the construction schedule. If additional time is added to construction then the overall project schedule provides adequate time to procure equipment. However, the procurement needs to be detailed on its schedule.

- Additional Real Estate ROW is required. The review team assumes that there will be adequate time to procure ROW in parallel with other planned activities. See Section 4.3 for associated risks.
- Overall Construction schedule is not adequate. Considering the scope addition of a second 345kV line from the proposed Dysinger Switchyard to the existing Stolle Road 345kV Substation, which will require new structures and foundations, as well as the expansion of the Dysinger Switchyard, the review team estimates a total duration of 30 months for construction. Exposure to as many as three winter and summer cycles in the region should be expected to impact outage availability, work day lengths, and create long periods of less than optimal construction performance. This is based on historical experience on Article VII projects performed in western New York. Examples include RTP, Auburn Transmission and Lockport to Mortimer.
- The Developer's proposed project duration is 51 months. The review team estimates a total of 69 months should be allocated for this project.

4.1.1.4. NAT Proposal T009

- NAT has proposed 12 months for preliminary engineering and Article Vll application preparation. Considering the additional scope of this proposal, including a new Niagara to Dysinger 345kV line, a 12 month period at minimum appears appropriate.
- Overall Article VII review process schedule is not adequate. Based on past Article VII projects a minimum of 27 months is required.
- Engineering is not shown on the schedule but it is anticipated that the preliminary engineering will progress in parallel with Article VII application preparation and final engineering will progress during Article VII application review and approval, and preparation of EM&CP. The Developer's time frames appear reasonable.
- Procurement of major equipment and materials is not detailed in the schedule but would be significant based on the project scope. The large power transformer has a minimum 12 month lead time. The Developer's schedule shows 12 months between Article VII application approval and start of substation construction. The review team recommends that additional time be added to the construction schedule. If additional time is added to construction then the overall project schedule provides adequate time to procure equipment. However, the procurement needs to be detailed on its schedule.

- Additional Real Estate ROW is required. The review team assumes that there will be adequate time to procure ROW in parallel with other planned activities. See Section 4.3 for associated risks.
- The Developer's construction schedule is not adequate. Considering the addition of a new 345kV transmission line from the Niagara Substation to the proposed Dysinger Switchyard and the requirement to expand the Dysinger Yard to seven positions, the review team estimates that 36 months will be required to complete the construction efforts for all items included in the scope. The scope of this proposal includes numerous components across wide geographical/service area. The risk/potential for outage restraints, and weather restraints, material issues, and schedule constraints is exacerbated. Example projects include Auburn Transmission, RTP and Lockport to Mortimer.
- The Developer's proposed project duration is 53 months. The review team estimates that a total of 75 months should be allocated for this project.

4.1.2. National Grid

4.1.2.1. Moderate Power Transfer T011

- National Grid has provided a very detailed and well thought out schedule. The review team estimates that additional time should be allocated for the Article VII application review and EM&CP process. National Grid has allocated 9 months. The review team estimates approximately 15 months should be allocated recognizing that previous National Grid projects have taken at least that much time. The review team agrees with construction durations and other aspects of the Developer's schedule.
- The Developer's proposed project duration is 51 months. The review team estimates that 57 months should be allocated for this project.

4.1.2.2. High Power Transfer T012

- National Grid has provided a very detailed and well thought out schedule. The review team estimates that additional time should be allocated for the Article VII application review and EM&CP process. National Grid has allocated 9 months. The review team estimates that approximately 18 months should be allocated since there will be a new Niagara to Gardenville 230kV line in this scope. The review team agrees with construction durations and other aspects of the Developer's schedule.
- The Developer's proposed project duration is 51 months. The review team estimates that 60 months should be allocated for this project

4.1.3. NYPA/NYSEG Proposal T013

- The review team believes that the NYPA/NYSEG proposal allows sufficient time to put the project in service. The proposed schedule shows a six month duration to prepare the Article VII application. Based on past history, the team expects this to take about eight months. The Developer has allocated sufficient durations for all other major activities and its overall schedule duration is adequate. However, the schedule is at a very high level at this stage and should be further detailed.
- The Developer's proposed project duration is 53 months. The review team estimates that 55 months should be allocated for this project.

4.1.4. NextEra

4.1.4.1. Proposal T014 w/phase shifter

- NextEra has proposed 12 months for Article Vll application preparation and 23 months for the overall Article VII approval process. The review team believes this is more than adequate if the existing NYSEG ROW is utilized.
- If the Developer procures new ROW for the 345kV line, then the proposed 12 month Article VII preparation period is appropriate. However, the overall Article VII approval process schedule is not adequate. Based on past Article VII projects and considering the new ROW, the review team recommends a minimum of 27 months.
- Procurement of major equipment including the phase shifting transformer which has a 16 month lead time can be accomplished in parallel with other activities.
- If the additional Real Estate ROW alternative is required, the review team estimates a minimum of 14 months to accomplish this, and believes it can be done in parallel with other activities, but would need to begin earlier than shown on its schedule. See Section 4.3 for associated risks.
- The Developer's construction schedule is not adequate. Considering the scope which includes new transmission line construction and considerable substation enhancements and construction, and based on historical project experience, NextEra has not allowed sufficient time for construction of 20 miles of new 345kV transmission line, substation construction and all other components as described in its proposal. The schedule targets a November to May time frame for construction. While this may be beneficial to avoid additional environmental concerns, it places all of the construction in the most unpredictable weather of the calendar year. Based on the review team's experience, 14 – 16 months is a reasonable duration for construction.
- The Developer's proposed project duration is 42 months assuming it is able to utilize NYSEG's existing ROW. The review team estimates that 49 months should be allocated for

this project. If NextEra is required to purchase new additional ROW, the review team estimates that 53 months should be allocated to this project.

4.1.4.2. Proposal T015 w/o phase shifter

- NextEra has proposed 12 months for Article Vll application preparation and 23 months for the overall Article VII approval process. The review team believes this is more than adequate if the existing NYSEG ROW is utilized.
- If the Developer procures new ROW for the 345kV line, then the proposed 12 month Article VII preparation period is appropriate. However, the overall Article VII approval process schedule is not adequate. Based on past Article VII projects and considering the new ROW, the review team recommends a minimum of 27 months.
- Procurement of major equipment can be accomplished in parallel with other activities.
- If the additional Real Estate ROW alternative is required, the review team estimates a minimum of 14 months to accomplish this, and believes it can be done in parallel with other activities, but would need to begin earlier than shown on its schedule. See Section 4.3 for associated risks.
- The Developer's construction schedule is not adequate. Considering the scope which include new transmission line construction and considerable substation enhancements and construction, and based on historical project experience, NextEra has not allowed sufficient time for construction of 20 miles of new 345kV transmission line, substation construction and all other components as described in its proposal. The schedule targets a November to May time frame for construction. While this may be beneficial to avoid additional environmental concerns, it places all of the construction in the most unpredictable weather of the calendar year. Based on the review team's experience, 14 – 16 months is a reasonable duration for construction.
- The Developer's proposed project duration is 42 months assuming it is able to utilize NYSEG's existing ROW. The review team estimates that 49 months should be allocated for this project. If NextEra is required to purchase new additional ROW, review team estimates that 53 months should be allocated to this project.

4.1.5. Exelon Proposal T017

- Exelon's schedule shows the overall Article VII approval process to be 20 months. Based on comparable Article VII projects and the need to obtain new ROW for the Stolle Road to Gardenville 230kV line, the review team estimates that a minimum of 27 months is required for the licensing process. However, Exelon appears to have included what would appear to

be more than adequate time for Article VII preparation and its overall schedule is more than sufficient.

- Additional Real Estate ROW is required. The review team believes that there will be adequate time to procure ROW in parallel with other planned activities. See Section 4.3 for associated risks.
- The Developer's schedule is very high level at this stage and should be further detailed.
- Exelon's proposed project duration is 75 months. The review team estimates that a total of 82 months should be allocated for this project.

Based on the review, the team estimates the following total project durations:

Proposal	Developer Proposed Total Duration	Estimated Duration (Note #1)	Minimum Duration (Note #2)
T006 NAT Proposal #1	41 Months	43 Months	40 months
T007 NAT Proposal #2	48 Months	63 Months	59 months
T008 NAT Proposal #3	51 Months	69 Months	65 months
T009 NAT Proposal #4	53 Months	75 Months	71 months
T011 NGRID Moderate Power Transfer	51 Months	57 Months	57 months
T012 NGRID High Power Transfer	51 Months	60 Months	60 months
T013 NYPA/NYSEG	53 Months	55 Months	44 months
T014 NextEra w/ phase shifter	42 Months	49 (53 Months for alternative with new ROW)	40 months (49 months for alternative with new ROW)
T015 NextEra w/ no phase shifter	42 Months	49 (53 Months for alternative with new ROW)	40 months (49 months for alternative with new ROW)
T017 Exelon	75 Months	82 Months	66 months

Note #1

"Estimated Duration" is calculated using the anticipated time for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. For each of these time periods, the review team used the greater of the duration shown by the Developer or what the review team believes to be the minimum. The review team also assumed that the EM&CP preparation is completed and ready for submission when the Article VII certificate is received. All of these components will depend on the experience and the level of resources of the Developer and the complexity of the project. If the "Estimated Duration" is shown to be shorter than that proposed by the Developer, that does not lead to the conclusion that the Developer should or could accelerate its schedule but rather is intended to highlight schedules that the review team believes to be deficient.

Note #2

The "Minimum Duration" is calculated using what the review team considered to be the minimum duration for Article VII application preparation, the anticipated time for the Article VII approval process, ROW procurement where significant and the anticipated time for construction of the project. This is absolute best case and is shown for comparison purposes.

4.2. Cost

Concerning the cost of proposed transmission projects, the NYISO OATT section 31.4.8.1.1 states the following: "The capital cost estimates for the proposed regulated Public Policy Transmission Project, including the accuracy of the proposed estimates. For this evaluation, the Developer shall provide the ISO with credible capital cost estimates for its proposed project, with itemized supporting work sheets that identify all material and labor cost assumptions, and related drawings to the extent applicable and available. The work sheets should include an estimated quantification of cost variance, providing an assumed plus/minus range around the capital cost estimate. The estimate shall include all components that are needed to meet the Public Policy Transmission Need. To the extent information is available, the Developer should itemize: material and labor cost by equipment, engineering and design work, permitting, site acquisition, procurement and construction work, and commissioning needed for the proposed project, all in accordance with Good Utility Practice. For each of these cost categories, the Developer should specify the nature and estimated cost of all major project components and estimate the cost of the work to be done at each substation and/or on each feeder to physically and electrically connect each facility to the existing system. The work sheets should itemize to the extent applicable and available all equipment for: (i) the proposed project, (ii) interconnection facilities (including Attachment Facilities and Direct Assignment Facilities), and (iii) Network Upgrade Facilities, System Upgrade Facilities, System Deliverability Upgrades, Network Upgrades, and Distribution Upgrades."

In evaluating the construction cost of each proposal, independent estimates were prepared. Kenny Construction prepared independent estimates for each proposal. Kenny reviewed the Developers' proposals with the costs redacted. GEI Consultants, Inc. estimated the environmental licensing and permitting costs. An independent real estate agent estimated the cost of obtaining the new ROW and estimated value of the existing incumbent utility-owned ROW.

The estimates were prepared in accordance with the Association for the Advancement of Cost Engineering International Recommended Practice for Class 4 Accuracy. The expected accuracy range typically varies from a low of (-15% to -30%) and high of (+20% to +50%).

ESTIMATE CLASS	**MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%

A summary of the results are shown below:

Project	Independent Estimate
T006 NAT Proposal #1	$158,028,558
T007 NAT Proposal #2	$275,875,943
T008 NAT Proposal #3	$347,529,010
T009 NAT Proposal #4	$478,606,515
T011 NGRID Moderate Power Transfer	$181,520,521
T012 NGRID High Power Transfer	$432,243,342
T013 NYPA/NYSEG	$232,204,336
T014 NextEra w/ phase shifter	$177,177,899
T014 NextEra w/ phase shifter Alternate ROW	$219,085,375
T015 NextEra w/ no phase shifter	$157,505,646
T015 NextEra w/ no phase shifter Alternate ROW	$199,413,121
T017 Exelon	$285,625,546

4.2.1. NAT T006

A summary of the independent cost estimate is shown below:

NAT T006		
	Description	**Total Amount**
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$ 11,969,030
2	TRANSMISSION LINE FOUNDATIONS	$ 6,777,500
3	STRUCTURES - TRANSMISSION LINE	$ 12,081,851
4	CONDUCTOR, SHIELDWIRE, OPGW	$ 5,187,754
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$ 1,328,890
6	NEW DYSINGER SWITCHYARD	$ 19,771,000
7	STOLLE ROAD SUBSTATION WORKS	$ 11,447,500
8	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 33,255,007
	CONTRACTOR MARK-UP (OH&P) 15%	$ 15,272,780
	SUBTOTAL:	$ 117,091,312
	CONTINGENCY (20%)	$ 23,418,262
	TOTAL (A):	**$ 140,509,574**
9	SYSTEM UPGRADE FACILITIES	$ 12,977,025
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 4,541,959
	TOTAL (B):	**$ 17,518,984**
	TOTAL PROJECT COST (A+B):	**$ 158,028,558**

4.2.2. NAT T007

A summary of the independent cost estimate is shown below:

NAT T007			
	Description		**Total Amount**
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$	18,052,638
2	TRANSMISSION LINE FOUNDATIONS	$	21,747,379
3	STRUCTURES - TRANSMISSION LINE	$	27,076,848
4	CONDUCTOR, SHIELDWIRE, OPGW	$	8,522,568
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$	2,536,564
6	NEW DYSINGER SWITCHYARD	$	19,771,000
7	STOLLE ROAD SUBSTATION WORKS	$	7,548,000
8	GARDENVILLE 345/230kV SUBSTATION WORKS	$	12,822,500
9	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$	51,993,883
	CONTRACTOR MARK-UP (OH&P) 15%	$	25,510,707
	SUBTOTAL:	$	195,582,087
	CONTINGENCY (25%)	$	48,895,522
	TOTAL (A):	$	244,477,609
10	SYSTEM UPGRADE FACILITIES	$	23,258,025
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$	8,140,309
	TOTAL (B):	$	31,398,334
	TOTAL PROJECT COST (A+B):	$	275,875,943

4.2.3. NAT T008

A summary of the independent cost estimate is shown below:

NAT T008		
	Description	**Total Amount**
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$ 22,007,195
2	TRANSMISSION LINE FOUNDATIONS	$ 28,417,010
3	STRUCTURES - TRANSMISSION LINE	$ 39,158,699
4	CONDUCTOR, SHIELDWIRE, OPGW	$ 13,710,320
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$ 3,821,694
6	NEW DYSINGER SWITCHYARD	$ 20,868,000
7	STOLLE ROAD SUBSTATION WORKS	$ 14,263,000
8	GARDENVILLE 345/230kV SUBSTATION WORKS	$ 12,822,500
9	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 64,848,574
	CONTRACTOR MARK-UP (OH&P) 15%	$ 32,987,549
	SUBTOTAL:	$ 252,904,541
	CONTINGENCY (25%)	$ 63,226,135
	TOTAL (A):	**$ 316,130,676**
10	SYSTEM UPGRADE FACILITIES	$ 23,258,025
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 8,140,309
	TOTAL (B):	**$ 31,398,334**
	TOTAL PROJECT COST (A+B):	**$ 347,529,010**

4.2.4. NAT T009

A summary of the independent cost estimate is shown below:

NAT T009			
	Description		**Total Amount**
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$	46,949,055
2	TRANSMISSION LINE FOUNDATIONS	$	40,444,048
3	STRUCTURES - TRANSMISSION LINE	$	57,905,468
4	CONDUCTOR, SHIELDWIRE, OPGW	$	21,865,190
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$	5,828,824
6	NEW DYSINGER SWITCHYARD	$	23,229,000
7	STOLLE ROAD SUBSTATION WORKS:	$	14,263,000
8	GARDENVILLE 345/230kV SUBSTATION WORKS	$	12,822,500
9	NIAGARA SUBSTATION WORK	$	4,246,500
10	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$	83,547,757
	CONTRACTOR MARK-UP (OH&P) 15%	$	46,665,201
	SUBTOTAL:	$	357,766,545
	CONTINGENCY ON ENTIRE PROJECT (25%)	$	89,441,636
	TOTAL (A):	$	447,208,181
11	SYSTEM UPGRADE FACILITIES	$	23,258,025
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$	8,140,309
	TOTAL (B):	$	31,398,334
	TOTAL PROJECT COST (A+B):	$	478,606,515

4.2.5. National Grid T011

A summary of the independent cost estimate is shown below:

National Grid T011		
	Description	**Total Amount**
1	WG D2 -IDENTIFIED LINE WORK 180, 181, 182 (MINIMAL SOLUTION)	$ 45,533,358
	WG E NEW BUS TIE BREAKER AT PACKARD STATION TO BE PLACED IN SERIES WITH EXISTING BREAKER R342	$ 880,000
	WG F REPLACE THERMALLY LIMITING EQUIPMENT AT PACKARD STATION FOR LINE 181	$ 200,000
2	WG-H IDENTIFIED LINE WORK 130, 133	$ 7,261,318
	WG-I REPLACE THERMALLY LIMITING EQUIPMENT AT HUNTLEY STATION	$ 235,000
3	WG-J IDENTIFIED LINE WORK 191	$ 3,670,736
4	WG-M IDENTIFIED LINE WORK 103, 104	$ 486,376
	WG-N REPLACE THERMALLY LIMITING EQUIPMENT AT LOCKPORT STATION FOR LINES 101,102	$ 500,000
5	WG-O - NYSEG/NYPA/N GRID - ELIMINATE DOUBLE CIRCUIT CONTINGENCY FOR LINE 61/64	$ 1,570,740
	WG-P2 - IDENTIFIED 181 LINE WORK (URBAN SWITCH TO ERIE, NYSEG)	$ 3,564,852
	WG-Q - REPLACE THERMALLY LIMITING EQUIPMENT AT ERIE STN FOR LINE 181	$ 1,250,000
	WG-R - REPLACE THERMALLY LIMITING EQUIPMENT LINE 54 (NYSEG 921)	$ 1,250,000
	WG-U - REPLACE THERMALLY LIMITING EQUIPMENT ROBINSON STN LINE 64	$ 1,700,000
	WG-V - REPLACE THERMALLY LIMITING EQUIPMENT NIAGARA STN LINE 102	$ 500,000
	MOBILIZATION, ACCESS, CIVILS, PROJECT MANAGEMENT, OVERHEADS, MISC:	$ 59,265,751
	CONTRACTOR MARK UP (OH&P) 15%	$ 19,180,220
	SUBTOTAL (A):	$ 147,048,351
	CONTINGENCY ON ENTIRE PROJECT (20%)	$ 29,409,670
	TOTAL (A):	**$ 176,458,021**
	SYSTEM UPGRADE FACILITIES	$ 3,750,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 1,312,500
	SUBTOTAL (B):	**$ 5,062,500**
	TOTAL PROJECT COST (A+B):	**$ 181,520,521**

4.2.6. National Grid T012

A summary of the independent cost estimate is shown below:

National Grid T012		
	Description	**Total Amount**
1	WG A - NEW 230kV NIAGARA TO GARDENVILLE LINE & RELOCATIONS	$ 70,767,955
	WG B NEW 230kV LINE ASSOCIATED WORK AT GARDENVILLE SUBSTATION	$ 1,105,500
	WG C NEW 230kV LINE - NIAGARA SUBSTATION CONNECTION	$ 1,075,000
2	WG-D1 REBUILD & RE-CONDUCTOR	$ 55,276,810
	WG-E NEW BUS BREAKER AT PACKARD STATION	$ 880,000
	WG-F REPLACE THERMALLY LIMITING EQUIPMENT AT PACKARD SUBSTATION FOR LINE 181	$ 200,000
	WG-G NEW 115kV SWITCHING STATION	$ 11,169,000
3	WG-H PACKARD-HUNTLEY & WALCK-HUNTLEY DOUBLE CIRCUIT LINE WORKS	$ 7,261,318
	WG-I - UPGRADE AMPACITY OF LINES 130 AND 133 AT HUNTLEY SUBSTATION	$ 235,000
4	WG-J - REFURBISHMENT WORKS ON LINES 191	$ 3,670,736
5	WG-M - LINE WORK 103,104	$ 486,376
	WG-N - LINE WORK 101, 102, 103, 104	$ 500,000
6	WG-O - NYSEG/NYPA/N GRID - ELIMINATE DOUBLE CIRCUIT CONTINGENCY FOR LINE 61/64	$ 1,570,740
	WG-P1 - IDENTIFIED 181 LINE WORK (URBAN SWITCH TO ERIE, NYSEG)	$ 5,366,640
	WG-Q - REPLACE THERMALLY LIMITING EQUIPMENT AT ERIE STN FOR LINE 181	$ 1,250,000
	WG-R - REPLACE THERMALLY LIMITING EQUIPMENT LINE 54 (NYSEG 921)	$ 1,250,000
	WG-U - REPLACE THERMALLY LIMITING EQUIPMENT ROBINSON STN LINE 64	$ 1,700,000
	WG-V - REPLACE THERMALLY LIMITING EQUIPMENT NIAGARA STN LINE 102	$ 500,000
	MOB/DEMOB, ACCESS, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:	$ 132,904,207
	CONTRACTOR MARK UP (OH&P) 15%	$ 44,575,392
	SUBTOTAL:	$ 341,744,674
	CONTINGENCY ON ENTIRE PROJECT (25%)	$ 85,436,168
	TOTAL:	**$ 427,180,842**
	SYSTEM UPGRADE FACILITIES	$ 3,750,000
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 1,312,500
	TOTAL (B):	**$ 5,062,500**
	TOTAL PROJECT COST (A+B):	**$ 432,243,342**

4.2.7. NYPA/NYSEG T013

A summary of the independent cost estimate is shown below:

NYPA/NYSEG T013		
	Description	**Total Amount**
1	DYSINGER SWITCHING STATION	$ 21,947,000
2	GARDENVILLE TO STOLLE ROAD 230KV TRANSMISSION LINE RECONDUCTORING	$ 14,140,200
3	LINE SEPARATION	$ 2,292,025
4	SOUTH PERRY SUBSTATION	$ 5,421,000
5	STOLLE ROAD SUBSTATION	$ 36,859,022
6	DYSINGER - STOLLE ROAD NEW 345kV TRANSMISSION LINE	$ 46,534,263
7	MOB/DEMOB, ACCESS, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 41,070,502
	CONTRACTOR MARK UP (OH&P) 15%	$ 25,239,602
	SUBTOTAL:	$ 193,503,613
	CONTINGENCY ON ENTIRE PROJECT (20%)	$ 38,700,723
	TOTAL PROJECT COST:	**$ 232,204,336**

4.2.8. NextEra T014

A summary of the independent cost estimate is shown below:

NextEra T014		
	Description	**Total Amount**
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$ 12,057,405
2	TRANSMISSION LINE FOUNDATIONS	$ 3,200,398
3	STRUCTURES - TRANSMISSION LINE	$ 4,688,312
4	CONDUCTOR, SHIELDWIRE, OPGW	$ 6,137,208
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$ 1,382,170
6	NEW DYSINGER SUBSTATION	$ 37,852,000
7	EAST STOLLE RD SUBSTATION	$ 13,963,000
8	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 28,037,173
	CONTRACTOR MARK-UP (OH&P) 15%	$ 16,097,650
	SUBTOTAL:	$ 123,415,316
	CONTINGENCY (20%)	$ 24,683,063
	TOTAL (A):	**$ 148,098,379**
9	SYSTEM UPGRADE FACILITIES	$ 21,540,385
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 7,539,135
	TOTAL (B):	**$ 29,079,520**
	TOTAL PROJECT COST (A+B):	**$ 177,177,899**

4.2.8.1. NextEra T014 Alternative

A summary of the independent cost estimate is shown below:

NextEra T014 Alternative			
	Description		**Total Amount**
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$	13,376,466
2	TRANSMISSION LINE FOUNDATIONS	$	10,001,353
3	STRUCTURES - TRANSMISSION LINE	$	12,215,200
4	CONDUCTOR, SHIELDWIRE, OPGW	$	6,089,688
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$	1,829,571
6	NEW DYSINGER SUBSTATION	$	37,852,000
7	EAST STOLLE RD SUBSTATION	$	13,963,000
8	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$	42,358,125
	CONTRACTOR MARK-UP (OH&P) 15%	$	20,652,810
	SUBTOTAL:	$	158,338,212
	CONTINGENCY (20%)	$	31,667,642
	TOTAL (A):	**$**	**190,005,855**
9	SYSTEM UPGRADE FACILITIES	$	21,540,385
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$	7,539,135
	TOTAL (B):	**$**	**29,079,520**
	TOTAL PROJECT COST (A+B):	**$**	**219,085,374**

4.2.9. NextEra T015

A summary of the independent cost estimate is shown below:

NextEra T015		
	Description	**Total Amount**
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$ 12,057,405
2	TRANSMISSION LINE FOUNDATIONS	$ 3,200,398
3	STRUCTURES - TRANSMISSION LINE	$ 4,688,312
4	CONDUCTOR, SHIELDWIRE, OPGW	$ 6,137,208
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$ 1,382,170
6	NEW DYSINGER SUBSTATION	$ 25,374,000
7	EAST STOLLE RD SUBSTATION	$ 13,963,000
8	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$ 26,259,917
	CONTRACTOR MARK-UP (OH&P) 15%	$ 13,959,361
	SUBTOTAL:	$ 107,021,771
	CONTINGENCY (20%)	$ 21,404,354
	TOTAL (A):	**$ 128,426,126**
9	SYSTEM UPGRADE FACILITIES	$ 21,540,385
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$ 7,539,135
	TOTAL (B):	**$ 29,079,520**
	TOTAL PROJECT COST (A+B):	**$ 157,505,645**

4.2.9.1. NextEra T015 Alternative

A summary of the independent cost estimate is shown below:

NextEra T015 Alternative			
	Description		**Total Amount**
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$	13,376,466
2	TRANSMISSION LINE FOUNDATIONS	$	10,001,353
3	STRUCTURES - TRANSMISSION LINE	$	12,215,200
4	CONDUCTOR, SHIELDWIRE, OPGW	$	6,089,688
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$	1,829,571
6	NEW DYSINGER SUBSTATION	$	25,374,000
7	EAST STOLLE RD SUBSTATION	$	13,963,000
8	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS	$	40,580,869
	CONTRACTOR MARK-UP (OH&P) 15%	$	18,514,522
	SUBTOTAL:	$	141,944,668
	CONTINGENCY (20%)	$	28,388,934
	TOTAL (A):	**$**	**170,333,601**
9	SYSTEM UPGRADE FACILITIES	$	21,540,385
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$	7,539,135
	TOTAL (B):	**$**	**29,079,520**
	TOTAL PROJECT COST (A+B):	**$**	**199,413,121**

4.2.10. Exelon T017

A summary of the independent cost estimate is shown below:

Exelon T017			
	Description		**Total Amount**
1	CLEARING & ACCESS FOR TRANSMISSION LINE CONSTRUCTION	$	36,693,420
2	TRANSMISSION LINE FOUNDATIONS	$	16,694,900
3	STRUCTURES - TRANSMISSION LINE	$	30,784,427
4	CONDUCTOR, SHIELDWIRE, OPGW	$	15,797,866
5	TRANSMISSION LINE INSULATOR, FITTINGS, HARDWARE	$	4,498,017
6	STOLLE ROAD SUBSTATION WORKS:	$	3,616,500
7	GARDENVILLE 230kV SUBSTATION WORKS	$	3,414,500
8	NIAGARA SUBSTATION WORK	$	4,209,000
9	MOB/DEMOB, ENGINEERING, PERMITTING, T&C, PM & INDIRECTS:	$	61,117,684
	CONTRACTOR MARK-UP (OH&P) 15%	$	26,523,947
	SUBTOTAL:	$	203,350,261
	CONTINGENCY ON ENTIRE PROJECT (25%)	$	50,837,565
	TOTAL (A):	**$**	**254,187,826**
10	SYSTEM UPGRADE FACILITIES	$	23,287,200
	CONTRACTOR MARKUP & CONTINGENCY (35%)	$	8,150,520
	TOTAL (B):	**$**	**31,437,720**
	TOTAL PROJECT COST (A+B):	**$**	**285,625,546**

4.3. Risk

The review team completed an evaluation of the potential risks associated with the proposals. The review team has summarized the significant risks, including those previously identified by each Developer. The review team's evaluation was based on the team's collective experience with transmission line and substation projects in New York State.

The significant drivers to the project risks considered were:

- Article VII review approval process and potential environmental issues
- Procurement of major equipment
- Real Estate acquisition
- Construction

A qualitative assessment of the risks was used in determining the potential impact on the schedule and the amount of contingency to be included in each Developers' independent cost estimates. The largest risk involves the projects where significant new ROW will be required. A larger contingency was factored

into those cost estimates. Also, since detailed studies have not been completed, additional contingency for unanticipated System Upgrade Facilities (SUF) such as overdutied breakers was included in the cost estimates.

4.3.1. Common Risks

Many of the risks are common to all proposals and are summarized below.

#	Risk Title	Description	Comment
1	Article VII Certificate	Article VII review approval process could take longer than estimated in schedule for a variety of reasons. (i.e., additional special studies requested by involved agencies, lack of stakeholder consensus)	Developer needs early outreach with all stakeholders and to prepare a comprehensive application. Teams experienced with Article VII process will be essential.
2	Other environmental approvals.	Federal agency and other approvals could take longer than State Article VII process. This could become more likely if cutbacks of funding to regulatory agencies affect employee staffing.	Developer needs early outreach with Federal Agencies and others, to prepare comprehensive applications and obtain approvals in parallel with Article VII process.
3	Public Opposition	If local groups or citizens oppose the project it could cause significant delays especially if opposition results in litigation.	Opposition and litigation risk is more likely with new ROW than with existing ROW. Developer needs early outreach to solicit public involvement, incorporate public concerns during planning stage before project execution, build mitigation into design, and foster community buy-in.
4	EM&CP Approval	EM&CP approval process could take longer than estimated in schedule.	Developer needs to prepare a comprehensive plan. Teams experience with DPS, DEC, Ags. & Markets and other agency

			requirements will be essential.
5	Environmental Study Findings	Environmental studies could find critical habitat; wetlands; agricultural lands; rare, threatened or endangered species; cultural or archeological sites: etc. that could require reroutes of lines or special conditions such as seasonal restriction on construction. Time of year when studies can be conducted could also affect project schedule.	Studies need to be scheduled and conducted early in the process to ensure design and EM&CP adequately minimizes, mitigates or avoids environmental impacts.
6	Unknown environmental conditions discovered during construction	During construction the Developer could encounter previously unidentified issues, such as contaminated soil, archeological remains, rare, threatened or endangered species, unidentified utilities, etc.	Environmental monitor will be on-site during construction. Such findings could require relocating and redesigning structures resulting in construction delays.
7	Work on Incumbent/Other Utilities Facilities	Upgrade to facilities not owned and operated by Developer are dependent on the specific design requirement, willingness and schedule of the incumbent utility companies.	Influence by the NYISO or PSC may be required to incentivize third party owners
8	Material Shortages	Material and equipment shortages and delayed shipments.	Mitigated by proper QA during engineering to insure adequate quantities ordered. Procurement with sufficient period of float between scheduled deliveries from suppliers and when material is needed for construction and proactive monitoring and expediting.

9	Need for additional System Upgrade Facilities	Completion of the detailed studies such as fault studies for the project will normally be completed during the SIS, the Facilities Study and detailed engineering.	The reinforcements proposed by the Developers may overduty and require replacement of some breakers and protection equipment on the existing system. Additional thermal overloads may be identified.

4.3.2. Developer Specific Risks

Summarized below are the review team's most significant findings for each Developer. This is not all inclusive but is intended to provide a summary of those items that are most critical.

4.3.2.1. *North American Transmission*

- **NAT Proposal T006** (Dysinger to Stolle 345 kV)

#	Risk Title	Description	Comment
1	Reliability Concern - Stolle Road Substation (Avangrid Owned) - Third Transformer	Proposal calls for the addition of a third 345 –115 kV transformer in parallel with the existing two transformers. This will expose all three transformers to outages for a single contingency.	The NYISO evaluated reliability impacts and considered the configuration in its technical analysis. Incumbent utility may request additional breakers, protective relays and associated equipment.
2	Design Concern - Stolle Road Substation (Avangrid Owned) - Third Transformer	Proposal calls for adding two 345kV breakers and related equipment to create a ring bus and a new line terminal. It also calls for the addition of a third 345 –115 kV transformer. This will be installed just west of existing transformers.	The proposed location of the new transformer will reduce access to the existing west transformer and the 345 kV yard. The transformer will also be in close proximity to the existing transformer and control house which would require fire walls. The new transformer should be relocated to the east and a fire wall installed between the new and existing east transformer. This will require expansion of fenced area. Included cost in independent estimate.

- **NAT Proposal T007** (Dysinger to Stolle 345kV and Stolle Gardenville 345kV)

#	Risk Title	Description	Comment
1	Right-of-way Acquisition	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. 6 gaps exist on the existing ROW to be utilized for the Dysinger to Stolle line. The Stolle to Gardenville 345kV line will require 179 acres of new ROW. 2 houses and 2 commercial properties are located on the proposed Stolle to Gardenville ROW. 35 parcels to be crossed by the proposed Stolle to Gardenville line contain houses within the parcel.	The ROW issue is mitigated by having a conservative estimate for ROW that includes a premium over market value, as well as project contingency funds.
2	Design Concern - Gardenville Substation (National Grid Owned) - Options 2 & 3	NAT proposes installing a new 345-230kV transformer in a new station adjacent to and connecting into NGRID's Gardenville substation and includes installing a three-bay breaker-and-a-half station with overhead transmission-lines interconnecting the new station with Gardenville. Option 1 involves the use of property located between the existing substations owned by National Grid. Option 2 and 3 require purchase of additional property adjacent to industrial and residential properties.	These two options represent improved reliability over NAT Option 1, but carry a significant cost increase to the project, additional construction time, and increased potential for public and land owner opposition in developing either of the two proposed sites. The NYISO considered Option 1 in its technical evaluations.

- **NAT Proposal T008** (Dysinger to Stolle 345kV and Stolle Gardenville 345kV and 2'nd Dysinger to Stolle line)

#	Risk Title	Description	Comment
1	Right-of-way Acquisition	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. 6 gaps exist on the existing ROW to be utilized for the Dysinger to Stolle line. The Stolle to Gardenville 345kV line will require 179 acres of new ROW. 2 houses and 2 commercial properties are located on the proposed Stolle to Gardenville ROW. 35 parcels to be crossed by the proposed Stolle to Gardenville line contain houses within the parcel.	The ROW issue is mitigated by having a conservative estimate for ROW that includes a premium over market value, as well as project contingency funds.
2	Design Concern - Gardenville Substation (National Grid Owned) - Options 2 & 3	NAT proposes installing a new 345-230kV transformer in a new station adjacent to and connecting into NGRID's Gardenville substation and includes installing a three-bay breaker-and-a-half station with overhead transmission-lines interconnecting the new station with Gardenville. Option 1 involves the use of property located between the existing substations owned by National Grid. Option 2 and 3 require purchase of additional property adjacent to industrial and residential properties.	These two options represent improved reliability over NAT Option 1, but carry a significant cost increase to the project, additional construction time, and increased potential for public and land owner opposition in developing either of the two proposed sites. The NYISO considered Option 1 in its technical evaluations.

- **NAT Proposal T009** (Dysinger to Stolle 345kV and Stolle Gardenville 345kV and 2'nd Dysinger to Stolle line and Niagara to Dysinger 345kV line)

#	Risk Title	Description	Comment
1	Right-of-way Acquisition	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. 6 gaps exist on the existing ROW to be utilized for the Dysinger to Stolle lines. The Stolle to Gardenville 345kV line will require 182 acres of new ROW. 2 houses and 2 commercial properties are located on the proposed Stolle to Gardenville ROW. 35 parcels to be crossed by the proposed Stolle to Gardenville line contain houses within the parcel. 6 gaps exist on the existing ROW to be utilized for the Niagara to Dysinger line. At the NYPA cross state 345kv crossing, it appears that the existing ROW may need to be widened to accommodate the proposed horizontal configuration of the new line.	The ROW issue is mitigated by having a conservative estimate for ROW that includes a premium over market value, as well as project contingency funds.
2	Design Concern - Gardenville Substation (National Grid Owned) - Options 2 & 3	NAT proposes installing a new 345-230kV transformer in a new station adjacent to and connecting into NGRID's Gardenville substation and includes installing a three-bay breaker-and-a-half station with overhead transmission lines interconnecting the new station with Gardenville. Option 1 involves the use of property located between the existing substations owned by National Grid. Option 2 and 3 require purchase of additional property adjacent to industrial and residential properties.	These two options represent improved reliability over NAT Option 1, but carry a significant cost increase to the project, additional construction time, and increased potential for public and land owner opposition in developing either of the two proposed sites. The NYISO considered Option 1 in its technical evaluation.

3	Crossing of the NYPA cross state 345kv lines	NAT proposed crossing over the existing 345kV with 3 pole horizontal configuration – each 195 ft. structure height on either side. In addition to the construction risks of crossing these lines, if the new line is to cross over the top of the existing lines, there may be concern that throughout the life of the facilities, failure of the top circuit would result in outage of both cross- state lines at the same time.	NYPA and/or other entities concerned with reliability of the Bulk Power System may require the incorporation of additional design measures to minimize or eliminate this risk. Crossing under would help mitigate the risk. From a contingency analysis perspective, line crossingis not a defined NERC design contingency in planning studies.

4.3.2.2. *National Grid*

- **Moderate Power Transfer T011**

#	Risk Title	Description	Comment
1	No critical risks identified		

- **High Power Transfer T012**

#	Risk Title	Description	Comment
1	No Critical risks identified		

4.3.2.3. *NYPA/NYSEG*

- **Proposal T013** (Dysinger to Stolle 345kV, Reconductor Stolle -Gardenville 230kV)

#	Risk Title	Description	Comment
1	No Critical risks identified		

4.3.2.4. *NextEra*

- **Proposal T014 Base Proposal on existing ROW** (Dysinger Stolle w/phase shifter)

#	Risk Title	Description	Comment
1	No Critical risks identified		

- **Proposal T014 Alternative Proposal on new ROW (Dysinger Stolle w/phase shifter)**

#	Risk Title	Description	Comment
1	Right-of-way Acquisition (*for Alternate to build on new ROW*)	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. Constructing the Dysinger to Stolle 345kV line off the existing ROW will require 252 acres of new ROW. 5 houses are located on the proposed new Dysinger to Stolle ROW. 86 parcels to be crossed by the proposed Dysinger to Stolle line contain houses within the parcel. NextEra's alternative proposal includes 9 crossings of the existing NYSEG ROW (with existing 230kV line). This has the risk of outages required during construction, potential of upper circuit falling into lower circuit taking out both lines at once throughout the life of the line(s) and could limit or impede future utilization of the existing ROW for additional circuit(s).	Mitigation is best achieved by allowing adequate time and money to acquire ROW and for possible condemnation. Also utilization of existing utility owned ROW will greatly reduce risk. The risk is minimal if they build on the existing ROW as included in their base proposal.

- **Proposal T015 Base Proposal on existing ROW** (Dysinger Stolle w/o phase shifter)

#	Risk Title	Description	Comment
1	No Critical risks identified		

- **Proposal T015 Alternative Proposal on new ROW (Dysinger Stolle w/o phase shifter)**

#	Risk Title	Description	Comment
1	Right-of-way Acquisition (*for Alternate to build on new ROW*)	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. Constructing the Dysinger to Stolle 345kV line off the existing ROW will require 252 acres of new ROW. 5 houses are located on the proposed new Dysinger to Stolle ROW. 86 parcels to be crossed by the proposed Dysinger to Stolle line contain houses within the parcel. NextEra's alternative proposal includes 9 crossings of the existing NYSEG ROW (with existing 230kV line). This has the risk of outages required during construction, potential of upper circuit falling into lower circuit taking out both lines at once throughout the life of the line(s) and could limit or impede future utilization of the existing ROW for additional circuit(s).	Mitigation is best achieved by allowing adequate time and money to acquire ROW and for possible condemnation. Also utilization of existing Utility owned ROW will greatly reduce risk. The risk is minimal if they build on the existing ROW as included in their base proposal.

4.3.2.5. *Exelon*

- **Exelon Proposal T017** (Niagara to Stolle and New Gardenville to Stolle 230kV)

#	Risk Title	Description	Comment
1	Right-of-way Acquisition	Acquisition cost of ROW may be higher than estimated and procurement may impact schedule. Many gaps exist on the existing National Grid ROW to be utilized for the Niagara to Dysinger line segment. To fill those gaps, 53 acres of new ROW will need to be acquired in addition to the ROW to be obtained from National Grid. Constructing the	Mitigation is best achieved by allowing adequate time and money to acquire ROW and for possible condemnation.

		Dysinger to Stolle line segment will require .68 acres of new ROW. Construction of the new Stolle to Gardenville line will require 141 acres of new ROW. 4 houses and 1 commercial properties are located on the proposed new Stolle to Gardenville ROW. 35 parcels to be crossed by the proposed Stolle to Gardenville line contain houses within the parcel.	
2	Crossing of the NYPA cross state 345kv lines	Exelon proposed crossing under the existing 345 kV with single pole delta configuration – 105 ft and 100 ft heights either side. In addition to the construction risks of crossing these lines, there may be concern that throughout the life of the facilities, failure of the top circuit would result in outage of both a cross state line and the new line at the same time.	NYPA and or other entities concerned with reliability of the Bulk system may require the incorporation of additional design measures to minimize or eliminate this risk. From a contingency analysis perspective, line crossing is not a defined NERC design contingency event in planning studies.
3	Re-use of existing structures	During construction the Developer could discover that structures originally planned for re-use are in worse condition than expected and require repair or replacement. Exelon is assuming that all existing structures and foundations on National Grid Line Nos. 130 & 133 can be re-used. It is highly likely that some of these structures will need to be replaced or repaired.	Thorough inspection of existing structures is advisable prior to completing final design.
4	Reliability Concern - Gardenville Substation (Avangrid Owned) -New Line Terminal	Exelon proposes connecting a new 230 kV transmission line into Gardenville with a new line terminal and a single 230kV circuit breaker.	While this may be the simplest arrangement, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 230kV Line 66 to Stolle Road and a loss of Transformer Bank #7. Incumbent utility may request additional breakers, protective relays

			and associated equipment, which would increase project cost.
5	Reliability Concern - Stolle Road Substation (Avangrid Owned) -New Line Terminal	Exelon proposes connecting a new 230kV transmission line into Stolle Road with a new line terminal and a single 230kV circuit breaker.	While this may be the simplest arrangement and it matches the existing 230kV transmission line arrangements, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 230kV Line 66 to Gardenville, a loss of 230kV Line 67 to High Sheldon, and a loss of 230kV Line 65 to Lewiston. Incumbent utility may request additional breakers, protective relays and associated equipment, which would increase project cost.
6	Reliability Concern - Stolle Road Substation (Avangrid Owned)	Exelon proposes connecting a new 345kV transmission line into Stolle Road by adding a 345kV circuit breaker with disconnect switches to the existing bay. The line will terminate at the existing east dead end tower.	While this may be the simplest arrangement, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 345kV Line 37 to Homer City and a loss of Transformer Banks #3 and #4. Incumbent utility may request additional breakers, protective relays and associated equipment, which would increase project cost.

4.4. Expandability

The NYISO OATT section 31.4.8.1.3 prescribed the following: "The expandability of the proposed regulated Public Policy Transmission Project. The ISO will consider the impact of the proposed project on future construction. The ISO will also consider the extent to which any subsequent expansion will continue to use this proposed project within the context of system expansion."

The review team conducted an evaluation of the expansion capability of the Developers' proposals. The review centered predominately on the Developers' claims as presented in their proposals and additional information provided in response to a NYISO RFI. Below is a summary of the most significant items.

Items that may be considered that would be common to all proposals:

1. New line segments could be designed for double circuit capability. The Developers have not included such a design in their proposals.
2. Similarly the transmission lines could be constructed with higher ampacity conductor or re-conductored in the future.
3. The western New York system could be expanded in the future with the modifications as proposed by Developers other than the project ultimately selected by the NYISO. For example, National Grid's solution could be further expanded by constructing new lines and modifications as proposed by the other Developers.

Significant items specific to each Developer:

#	Developer	Transmission Line Expandability	Substation Expandability
T006 T007 T008 T009	North American Transmission	NAT's four proposals build upon each other providing potential expandability should the NYISO select one of the lower tier proposals.	Dysinger substation could be expanded to bring the 345 kV Somerset to Rochester T-line or the 230 kV Niagara to Stolle Road line with the installation of a 345-230 kV transformer.
T011 T012	National Grid	No significant expandability to NGRID's proposal beyond the common items mentioned above.	For T012, the proposed New Park Club Lane station will include a spare bay position.
T013	NYPA/NYSEG	No significant expandability to NYPA/NYSEG proposal beyond the common items mentioned above.	As proposed, the new 345 kV Dysinger station and the expansion of the 345 kV Stolle Road station will include spare bays. At both stations, the control houses will be constructed to accommodate further yard expansions without adding on to the buildings. Their initial design also includes significant build out and conversion of 230 kV and 345 kV busses to breaker and half schemes at Stolle Rd.
T014 T015	NextEra	No significant expandability to NextEra proposal beyond the common items mentioned above.	NextEra's proposed design for the 345 kV Dysinger station includes one open bay position. Their initial design also includes the termination of both cross state transmission lines into Dysinger.
T017	Exelon	No significant expandability to Exelon proposal beyond the common items mentioned above.	Dysinger substation could be constructed in the future to provide additional operating flexibility.

4.5. Site Control and Real Estate

4.5.1. Site Control

The NYISO OATT section 31.4.8.1.6 states the following: "The extent to which the Developer of a proposed regulated Public Policy Transmission Project has the property rights, or ability to obtain the property rights, required to implement the project. The ISO will consider whether the Developer: (i) already possesses the rights of way necessary to implement the project; (ii) has completed a transmission routing study, which (a) identifies a specific routing plan with alternatives, (b) includes a schedule indicating the timing for obtaining siting and permitting, and (c) provides specific attention to sensitive areas (e.g., wetlands, river crossings, protected areas, and schools); or (iii) has specified a plan or approach for determining routing and acquiring property rights."

The review team conducted a review of the Developers' property rights acquisition plans associated with the proposals. The review centered on the Developers' claims as presented in their proposals and additional information provided in response to a NYISO RFI submitted to Developers in March 2017.

In all proposals, the following characteristics are common for the property rights acquisition process:

- Use existing ROW as much as practical.
- Where additional ROWs must be acquired, it will be accomplished through arm's length negotiation with property owners.
- If negotiations are unsuccessful, the property will be acquired through eminent domain.
- All Developers have completed preliminary routing of proposed line.

The non-incumbent Developers all claim two common rights to assist in obtaining property:

- They cite the recent 12/17/15 PSC order (Case 12-T-0502) related to the AC Transmission proceeding as have applicability to this project in terms of obtaining access to the incumbent utility ROW. The Order stated on page 60: *"Incumbent utilities should offer competitors the same terms they offer Transco; there should be no bias shown to Transco."* Further on page 60 the PSC Order states: *"Commission expects the utility company owner to bargain in good faith to reach an agreement with the developer of the transmission solution as to property access and compensation as it would for other linear project developers that seek to co-locate on utility property.*" If negotiations with private land owners are unsuccessful, the Developer believes that under New York State Law they will have eminent domain authority after certification of a route by the NYPSC.

Below is a summary of the teams' review:

#	Developer	Property Rights Acquisition
T006 T007 T008 T009	North American Transmission	Their plan for T006 relies on use of the incumbent utility ROW with the exception of property to be acquired for the Dysinger and Stolle Road substations. Proposals T007, T008 and T009 require significant new ROW.The real estate requirements are further detailed in the Real Estate Analysis. Risk associated with obtaining the new ROW is documented in the Risk Section. NAT lays out a detailed plan for obtaining site control. 1. They would rely on affiliates of LS Power who have experience in negotiating easements and joint use agreements, which have been developed for many past generation and transmission projects. 2. The Developer states that landowner outreach will be accomplished through direct mailings, a website, advertisements, and public meetings. 3. Regarding use of incumbent utility ROW, they cite the recent PSC order related to the AC Transmission proceeding as having applicability to this project in terms of obtaining access to the incumbent utility ROW. 4. Regarding private property, they provide an opinion letter from Harris Beach PLLC asserting the ability of private Developers of electric transmission facilities to acquire real property, including utility-owned rights-of-way, through condemnation if necessary. They state: "North America Transmission Corporation is a transportation corporation under New York State Law. Accordingly, North America Transmission Corporation will have eminent domain authority after certification of a route by the NYPSC, in the event bilateral negotiations with landowners is not successful. Such a condemnation will be possible after a public interest finding by the NYPSC under Article VII of the PSL." NAT does not yet possess the required ROWs. However, they have a well-documented plan to obtain property. North American Transmission Corporation, as a New York Transportation Corporation, will own the Bulk Power System assets included within its proposal, except for any real estate within the existing substations associated with the interconnections. NAT stated that they would acquire easements for the ROW.

T011 T012	National Grid	NGRID completed a routing study and states "the ROW targeted for this project is either fee-owned by, or under the control (via easement or permit)" of NGRID. There are a few minor parcels that will need to be obtained. As a New York utility, NGRID has a demonstrated history of negotiating and obtaining ROW for its transmission system. National Grid will own all assets included within its proposal.
T013	NYPA/NYSEG	Most property rights for this proposal are already owned by the Developer except for National Grid ROW required for line separation and an additional parcel to be acquired for Dysinger Switching station. As New York utilities, NYPA and NYSEG haves a demonstrated history of negotiating and obtaining ROW's for its transmission system. As proposed, NYPA will own, operate and maintain all assets for the Dysinger Switching Station, the 345 kV Dysinger to Stolle Road transmission line, and the additions at Niagara Station. NYSEG will own, operate and maintain the remaining assets within the proposal.
T014 T015	NextEra	Their preferred route would predominately use existing ROW owned by the incumbent utility with the exception of property to be acquired for the Dysinger and Stolle Road substations. They have provided an alternative plan to obtain all new ROW between Dysinger and Stolle Road should they not be able to obtain rights to the incumbent utility ROW. NextEra lays out a detailed plan for obtaining site control. 1. They would rely on affiliates of NextEra who have experience in negotiating easements for transmission projects. 2. Regarding use of incumbent utility ROW they cite the recent NYPSC order related to the AC Transmission proceeding as having applicability to this project in terms of obtaining access to and lease of the incumbent utility ROW. 3. Regarding private property, they provide a plan to obtain through negotiations with land owners. Should negotiations fail they cite precedent that allows for Developers of electric transmission facilities to acquire real property through condemnation, if necessary.

		NextEra does not yet possess the required ROWs. However, they have a well-documented plan to obtain property. NextEra Energy Transmission New York, Inc., as a New York Transportation Corporation, will own all assets included within its proposal, except for non-bulk transmission upgrades that will be constructed and owned by the transmission provider. NextEra states it has an option on a parcel of land (Parcel 8) as a potential location for Dysinger Substation.
T017	Exelon	Their plan utilizes existing ROW owned by incumbent utilities and significant new ROW to be obtained. The real estate requirements are further detailed in the Real Estate Analysis. Risk associated with obtaining the new ROW is documented in the Risk Section. Exelon lays out a detailed plan for obtaining site control. 1. They would have a Right of Way Project Manager directing internal and contract personnel. 2. Regarding use of incumbent utility ROW, they cite the recent PSC order related to the AC Transmission proceeding as having applicability to this project in terms of obtaining access to the incumbent utility ROW. 3. Regarding private property they provide a plan to obtain through negotiations with land owners. Should negotiations fail they cite precedent that allows for Developer of electric transmission facilities to acquire real property through condemnation if necessary. Exelon does not yet possess the required ROWs. However, they have a well-documented plan to obtain property. Exelon is proposing to own and maintain the transmission lines associated with its proposal. Substation additions required as part of its proposal will be owned and maintained by the existing transmission substation owner(s). Exelon stated that they would acquire easements for the ROW.

4.5.2. Real Estate Analysis

A review of the proposed routing for the transmission lines and substations was completed to identify where new property rights would need to be acquired. Estimates for the property were derived by obtaining recent comparable sales and tax assessments in the town and county where the property is located.

A summary of the property requirements for new transmission line ROW (substation property is not shown on this table):

PROPOSAL	DEVELOPER	SEGMENT	NEW RIGHT OF WAY (ROW)			SUB-TOTAL	TOTAL ROW REQUIRED		COMMENTS
			COMMER	RESIDENTI	AGRICULT				
			AREA (ACRES)	AREA (ACRES)	AREA (ACRES)	AREA (ACRES)	AREA (ACRES)	COST	
T006	North American Transmission (Proposal 1)	Dysinger SS to Stolle Rd SS - 19.98 miles	0.68			0.68	0.68	$ 4,376	ROW GAP
T007	North American Transmission (Proposal 2)	Dysinger SS to Stolle Rd SS - 19.98 miles	0.68			0.68	179.34	$ 7,471,224	ROW GAP
		Stolle Rd SS to Gardenville SS - 12.84 miles	67.56	40.27	70.83	178.66			ROW W/ 2 HOUSES AND 2 COMM BLDGS
T008	North American Transmission (Proposal 3)	Dysinger SS to Stolle Rd SS - 19.98 miles	0.68			0.68	179.34	$ 7,471,224	ROW GAP
		Stolle Rd SS to Gardenville SS - 12.84 miles	67.56	40.27	70.83	178.66			ROW W/ 2 HOUSES AND 2 COMM BLDGS
T009	North American Transmission (Proposal 4)	Dysinger SS to Stolle Rd SS - 19.98 miles	0.68			0.68	181.72	$ 7,522,784	ROW GAP
		Stolle Rd SS to Gardenville SS - 12.84 miles	67.56	40.27	70.83	178.66			ROW W/ 2 HOUSES AND 2 COMM BLDGS
		Niagara to Dysinger - 27.16	1.56		0.82	2.38			ROW GAP
T011	National Grid (Moderate Transfer)	No New Lines							
T012	National Grid (High Transfer)	Niagara to Gardenville - 36.2 miles	3.97		14.01	17.98	17.98	$ 172,069	ROW GAP
T013	NYPA and NYSEG	Dysinger to Stolle - 20.6 miles	0.68			0.68	0.68	$ 4,376	ROW GAP
T014	NextEra Energy	Dysinger SS to Stolle Rd SS - 19.93 miles	0.68			0.68	0.68	$ 4,376	ROW GAP
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	33.71	120.66	97.51	251.88	251.88	$ 7,606,569	ROW W/ 5 HOUSES
T015	NextEra Energy	Dysinger SS to Stolle Rd SS - 19.93 miles	0.68			0.68	0.68	$ 4,376	ROW GAP
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	33.71	120.66	97.51	251.88	251.88	$ 7,606,569	ROW W/ 5 HOUSES
T017	Exelon Transmission	Niagara to Stolle - 47.12 miles	4.25	3.48	45.67	53.40	53.40	$ 408,382	ROW GAP
		Stolle Rd SS to Gardenville SS - 12.10 miles	40.56	62.3	38.37	141.23	141.23	$ 6,609,030	ROW W/ 4 HOUSES AND 1 COMM BLDG

A summary of the estimated value for use of existing incumbent transmission ROW is shown below:

PROPOSAL	DEVELOPER	SEGMENT	COUNTY	EXISTING UTILITY RIGHT OF WAY (ROW)		TOTAL EXISTING UTILITY ROW USES (ACRES)	AVERAGE COMs (Agricultural)/ ACRES	SUB-TOTAL ROW COST	TOTAL ROW COST
				NIAGARA MOHAK (ACRES)	NYSEG (ACRES)				
T006	North American Transmission (Proposal 1)	Dysinger SS to Stolle Rd SS - 19.98 miles	Niagara		5.74	5.74	$ 3,400	$ 20,000	$ 1,502,000
			Erie		296.31	296.31	$ 5,000	$ 1,482,000	
T007	North American Transmission (Proposal 2)	Dysinger SS to Stolle Rd SS - 19.98 miles	Niagara		5.74	5.74	$ 3,400	$ 20,000	$ 1,640,000
			Erie		296.31	296.31	$ 5,000	$ 1,482,000	
		Stolle Rd SS to Gardenville SS - 12.84 miles	Erie		27.55	27.55	$ 5,000	$ 138,000	
T008	North American Transmission (Proposal 3)	Dysinger SS to Stolle Rd SS - 2x19.98 miles	Niagara		10.33	10.33	$ 3,400	$ 35,000	$ 2,846,000
			Erie		534.58	534.58	$ 5,000	$ 2,673,000	
		Stolle Rd SS to Gardenville SS - 12.84 miles	Erie		27.55	27.55	$ 5,000	$ 138,000	
T009	North American Transmission (Proposal 4)	Dysinger SS to Stolle Rd SS - 2x19.98 miles	Niagara		10.33	10.33	$ 3,400	$ 35,000	$ 4,234,000
			Erie		534.58	534.58	$ 5,000	$ 2,673,000	
		Stolle Rd SS to Gardenville SS - 12.84 miles	Erie		27.55	27.55	$ 5,000	$ 138,000	
		Niagara to Dysinger - 27.16	Niagara	42.05	366.27	408.32	$ 3,400	$ 1,388,000	
T011	National Grid (Moderate Transfer)	No New Lines							
T012	National Grid (High Transfer)	Niagara to Gardenville - 36.2 miles	Niagara	203.82		203.82	$ 3,400	$ 693,000	$ 1,157,000
			Erie	92.85		92.85	$ 5,000	$ 464,000	
T013	NYPA and NYSEG	Dysinger to Stolle - 20.6 miles	Niagara		5.97	5.97	$ 3,400	$ 20,000	$ 1,613,000
			Erie		318.64	318.64	$ 5,000	$ 1,593,000	
T014	NextEra Energy	Dysinger SS to Stolle Rd SS - 19.93 miles	Niagara		4.59	4.59	$ 3,400	$ 16,000	$ 1,201,000
			Erie		236.98	236.98	$ 5,000	$ 1,185,000	
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	Niagara		1.20	1.20	$ 3,400	$ 4,000	$ 90,000
			Erie		17.16	17.16	$ 5,000	$ 86,000	
T015	NextEra Energy	Dysinger SS to Stolle Rd SS - 19.93 miles	Niagara		4.59	4.59	$ 3,400	$ 16,000	$ 1,201,000
			Erie		236.98	236.98	$ 5,000	$ 1,185,000	
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS - 21.66 miles	Niagara		1.20	1.20	$ 3,400	$ 4,000	$ 90,000
			Erie		17.16	17.16	$ 5,000	$ 86,000	
T017	Exelon Transmission	Niagara to Stolle - 47.12 miles	Niagara	293.19	65.30	358.49	$ 3,400	$ 1,219,000	$ 2,701,000
			Erie		296.31	296.31	$ 5,000	$ 1,482,000	
		Stolle Rd SS to Gardenville SS - 12.10 miles	Erie		14.63	14.63	$ 5,000	$ 73,000	$ 73,000

4.6. Operational Plan

The review team conducted an evaluation of the Developers' operations and maintenance plans associated with the proposals. The review centered on the Developers' plans as presented in their proposals and additional information provided in response to a NYISO RFI submitted to Developers in March 2017.

For the non-incumbent Developers, the following is common among the proposals (The review team recognized that, while not stated in the proposals, these items are also common for the incumbent Developers):

- The Developers stated that all O&M activities will comply with required NERC regulations.
- Real time system operations will be conducted by the NYISO.
- Control center schedules will be 24-7-365.

Below is a summary of the review team's findings. The review team did not identify any major flaw with any Developers' plans. The review team believes the NYISO is best positioned to determine the suitability of non-incumbent utility providing control center services in New York.

#	Developer	Operations	Maintenance
T006 T007 T008 T009	North American Transmission	NAT states real time system monitoring and control center services will be provided under contract with an affiliate, Cross Texas Transmission (CTT). CTT primary and backup control centers are located in Austin, TX. The CTT control center has extensive experience. The NYISO should determine the suitability of this Texas affiliate to provide services in New York.	Transmission line and substation maintenance will be managed by local NAT staff. Maintenance activities will be performed by third-party contractors. NAT has experience maintaining transmission systems in other areas of the country and has provided a detailed maintenance plan.
T011 T012	National Grid	NGRID did not provide an operation and maintenance plan with its proposal. However, the review team recognizes that as a New York utility, NGRID has a demonstrated history of operating and maintaining its transmission and distribution systems.	See comment under Operations.
T013	NYPA/NYSEG	NYPA/NYSEG did not provide an operation and maintenance plan with its proposal. However, the review team recognizes that as New York utilities, they individually have demonstrated histories of operating and maintaining their transmission and distribution systems.	See comment under Operations

T014 T015	NextEra	NextEra preferred operations plan is to control its facilities via one of its existing out-of-NYS control centers. If preferred by NYISO, the Developer will build and operate a control center within New York. Alternatively, the Developer could contract with an incumbent utility for monitoring and control activities. The NYISO should determine the suitability of using an affiliate out-of-NYS control center to provide services in New York.	Transmission line and substation maintenance activities will be managed and performed by NextEra staff supplemented with third-party contractors. NextEra has experience maintaining transmission systems in other areas of the country and provided a detailed maintenance plan.
T017	Exelon	Exelon plans to contract with an incumbent utility or a third-party control center for monitoring and control activities.	Similarly, Exelon plans on contracting with an incumbent utility or third-party contractor for maintenance activities.

4.7. Field Reviews

Field review of proposed transmission line routes and substations was completed by the review team. The results of those field reviews are documented in a report supplemented with checklists and maps marked with comments and observations. This work was used to develop the project estimates and identify potential issues and risks with the proposed design, siting and routing.

4.8. Work Plans

- All selected Developers have a history of managing successful transmission and substation projects. In response to RFI's on work plans, there was variation in the degree of self-performance; all respondents will manage internal and external resources.
- It was not possible to evaluate external team members at this stage, as they are expected to be selected competitively after award from among leading engineering, geo-technical, environmental and construction firms.
- Generally, all Developers included work plan activities in their estimates and schedules.
- They all indicated they will contract for a portion of the engineering and self-perform the remainder. Exelon plans to outsource most engineering.
- All are expected to contract for site work and construction.
- National Grid plans to self-perform above grade/structures and electrical construction (including protection and control).

- All are expected to contract geo-tech and surveying and self-perform real estate acquisition and public outreach.

4.9. Technical Discussions and Investigations

A summary of the technical investigations of significant issues, concerns and design verification is shown below:

4.9.1. North America Transmission – Proposal #1 (T006) Stolle Road Transformer

4.9.1.1. NAT's proposal calls for the addition of a third 345 – 115 kV transformer in parallel with the existing two transformers at Stolle Rd. This will expose all three transformers to outages for a single contingency. The NYISO evaluated reliability impacts and considered the configuration in its technical analysis.

4.9.1.2. Proposal calls for adding two 345kV breakers and related equipment to create a ring bus and a new line terminal with the addition of a third 345 – 115 kV transformer. This equipment will be installed just west of existing transformers. The proposed location of the new transformer will reduce access to the existing west transformer and the 345 kV yard. The transformer will also be in close proximity to the existing transformer and control house which would require fire walls. The new transformer should be relocated to the east and a fire wall installed between the new and existing east transformer. This will require expansion of fenced area. This additional work was included in the independent estimate.

4.9.2. North America Transmission – Proposal #2(T007) Gardenville Substation

4.9.2.1. NAT proposes installing a new 345-230kV transformer in a new station adjacent to and connecting into NGRID's Gardenville substation. Option 1 involves the use of property located between the existing substations owned by National Grid and connects to Gardenville with a single breaker. Options 2 and 3 require purchase of additional property adjacent to industrial and residential properties and include installing a three-bay breaker-and-a-half station. These two options represent improved reliability over NAT Option 1, but carry a significant cost increase to the project, additional construction time, and increased potential for public and land owner opposition in developing either of the two proposed sites. The NYISO considered Option 1 in its technical evaluations. Our estimate is based on Option 1. NAT proposed cost also based on Option 1.

4.9.3. North America Transmission – Proposal #3(T008)

4.9.3.1. Same as 4.9.2.1 above

4.9.4. North America Transmission – Proposal #4 (T009)

4.9.4.1. Same as 4.9.2.1 above

4.9.4.2. NAT proposed crossing over the existing 345 kV with 3 pole horizontal configuration – each 195 ft. structure height either sides. In addition to the construction risks of crossing these lines, if the new line is to cross over the top of the existing lines, there may be concern that throughout the life of the facilities, failure of the top circuit would result in outage of both cross-state lines at the same time. NYPA and/or other entities concerned with reliability of the Bulk Power System may require the incorporation of additional design measures to minimize or eliminate this risk. Crossing under would help mitigate the risk. From a contingency analysis perspective, line crossing is not a defined NERC design contingency event in planning studies. The review team did not make any adjustments to its independent cost estimate.

4.9.4.3. Niagara Station Connection - North American Transmission's proposal called for bringing the new 345 kV transmission line to Dysinger into a new terminal structure in Bay 32. The proposed terminal structure conductor takeoff height is within a few feet of the height of the north-south strain busses in Bay 32. This makes the proposed connection impractical unless the north-south strain bus is reconfigured. Also, the proposed transmission line conductors passing over Bay 32 and Bay 33 pose a risk in that a dropped conductor or static will create a significant outage in the 345 kV yard. Since NAT's proposed arrangement was not feasible, an underground cable was included in the independent estimate.

4.9.5. National Grid – Moderate Power Transfer Solution (T011)

4.9.5.1. No major Technical Issues

4.9.6. National Grid – High Power Transfer Solution (T012)

4.9.6.1. No major Technical Issues

4.9.7. NYPA/NYSEG – Western NY Energy Link (T013)

4.9.7.1. NYPA/NYSEG proposed approximately 20 miles, of new structures for the Dysinger – Stolle Road single circuit 345 kV transmission line using engineered weathering steel poles with delta configuration I-string insulation for tangent & light angles and two or three poles for heavy angle & dead-end structures. Out of the

estimated 159 total structures, 143 structures are tangent structures. The average span length is 660 ft.

All of the structures, including tangent poles, are estimated to be installed on drilled shaft reinforced concrete foundations, with no less than 5.5 feet shaft. The review team believes NYPA/NYSEG over-designed the tangent structures by building on drilled shaft concrete foundations. Directly embedded tangent structure foundations would be more economical for the tangent structures with pole baseline moments less than 1,500-2,000 ft.-kips. (kip = 1000 Pounds-force)

4.9.8. NextEra Energy Transmission New York – Empire State Line #1 (T014)

4.9.8.1. NextEra proposed a width of 80 ft. for the alternative where they proposed an alternate to procure new ROW adjacent to NYSEG's existing ROW. The review team believes this will be inadequate and a minimum of 90 ft. is required. See 4.9.11 below for further detail.

4.9.9. NextEra Energy Transmission New York – Empire State Line #2 (T015)

4.9.9.1. The same comments stated above in section 4.9.8.1 for proposal T014 also apply to proposal T015.

4.9.10. Exelon Transmission Company – Niagara Area Transmission Expansion (T017)

4.9.10.1. Niagara Station Connection -Exelon's original proposal called for bringing the new 345kV transmission line overhead into the south terminal dead-end tower of Bay 32. The south terminal of Bay 32 is already occupied by 345kV line PA-302 which exits the station underground. Therefore, the proposed solution is not feasible. Since Exelon's proposed arrangement was not feasible, an underground cable connection was included in the independent estimate.

4.9.10.2. Exelon proposed crossing under the existing 345 kV NYPA cross state 345kV lines with single pole delta configuration – 105 ft. and 100 ft. heights on either side. In addition to the construction risks of crossing these lines there may be a concern that throughout the life of the facilities, failure of a top circuit would result in outage of both a cross state line and the new Niagara to Stolle line at the same time. NYPA and/or other entities concerned with reliability of the Bulk Power System may require the incorporation of additional design measures to minimize or eliminate this risk. From a contingency analysis perspective, line crossing is not a defined NERC design contingency event in the power flow analysis

4.9.10.3. Exelon proposes connecting a new 230 kV line into Gardenville with a new line terminal and a single 230 kV circuit breaker. While this may be the simplest arrangement, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 230kV Line 66 to Stolle Road and a loss of Transformer Bank #7. Incumbent utility may object. Increased estimate contingency.

4.9.10.4. Exelon proposes connecting a new 230 kV line into Stolle Road with a new line terminal and a single 230 kV circuit breaker. While this may be the simplest arrangement and it matches the existing 230 kV transmission line arrangements, it also provides the least amount of reliability and operating flexibility. With this configuration, a failed breaker or a bus fault will cause a loss of 230 kV Line 66 to Gardenville, a loss of 230 kV Line 67 to High Sheldon, and a loss of 230 kV Line 65 to Lewiston. Incumbent utility may object. Increased estimate contingency.

4.9.10.5. Exelon proposes connecting a new 345 kV line into Stolle Road by adding a 345 kV circuit breaker with disconnect switches to the existing bay. The line will terminate at the existing east dead end tower. While this may be the simplest arrangement, it also provides the least amount of reliability. With this configuration, a failed breaker or a bus fault will cause a loss of 345 kV Line 37 to Homer City and a loss of Transformer Banks #3 and #4. Incumbent utility may object. Increased estimate contingency.

4.9.10.6. Exelon Transmission proposed approximately 20 miles of new structures for the Dysinger to Stolle Road single circuit 345 kV Transmission line using engineered steel poles with delta configuration I-string insulation for tangent & light angles structures. Out of the estimated 151 total structures, 143 structures are tangent structures. The average span length is 695 ft.

All the structures, including tangent poles, are estimated to be installed on drilled shaft reinforced concrete foundations, with no less than 5.0 feet shaft. The review team believes Exelon Transmission over-designed the tangent structures by building on drilled shaft concrete foundations. Directly embedded tangent structure foundations would be more economical for the tangent structures with pole baseline moments less than 1,500-2,000 ft.-kips.

4.9.11. General Design Verifications

4.9.11.1. Transmission Line Row, Structure Type and EMF Comparison

See table below for a summary of each Developer's proposed ROW:

NY State EMF Criteria	
Max. Electric Field @ 1meter above ground @ Edge of ROW	1.6kV/m
Max. Electric Field @ 1meter above ground over public road	7.0kV/m
Max. Magnetic Field @ 1meter above ground @ Edge of ROW	200 mG

PROPOSAL	DEVELOPER	SEGMENT	LINE			EMF				COMMENTS
			Voltage (kV)	Length (miles)	Structure Configuration	ROW Width (ft.)	Edge of ROW: Max. Electric Field (kV/m)	Edge of ROW: Max. Magnetic Field (mG)	Meets NY State Requirement	
T006	North American Transmission	Dysinger SS to Stolle Rd SS	345	19.98	St. Mono Pole Delta	500	0.20	99.00	Yes	500ft. Existing Utility Corridor
T007	North American Transmission	Dysinger SS to Stolle Rd SS	345	19.98	St. Mono Pole Delta	500	0.20	99.00	Yes	500ft. Existing Utility Corridor
		Stolle Rd SS to Gardenville SS	345	12.84	St. Mono Pole Delta	125	1.30	126.00	Yes	125ft. Proposed new ROW width meets the State EMF requirements
T008	North American Transmission	Dysinger SS to Stolle Rd SS	345	19.98	St. Mono Pole Delta	500	0.20	99.00	Yes	500ft. Existing Utility Corridor
		Stolle Rd SS to Gardenville SS	345	12.84	St. Mono Pole Delta	125	1.30	126.00	Yes	125ft. Proposed new ROW width meets the State EMF requirements
T009	North American Transmission	Dysinger SS to Stolle Rd SS	345	19.98	St. Mono Pole Delta	500	0.20	99.00	Yes	500ft. Existing Utility Corridor
		Stolle Rd SS to Gardenville SS	345	12.84	St. Mono Pole Delta	125	1.30	126.00	Yes	125ft. Proposed new ROW width meets the State EMF requirements
		Niagara SS to Dysinger SS	345	27.16	St. Mono Pole Delta	500	0.50	35.00	Yes	500ft. Existing Utility Corridor
T011	National Grid (Moderate Transfe	No New Lines								
T012	National Grid (High Transfer)	Niagara SS to Gardenville SS	230	36.20	St. Mono Pole Delta					EMF Study not provided, Proposed new line within the existing Utility ROW
T013	NYPA and NYSEG	Dysinger SS to Stolle Rd SS	345	20.60	St. Mono Pole Delta	500	0.33	73.52	Yes	500ft. Existing Utility Corridor
		Stolle Rd SS to Gardenville SS	230	12.00	St. Mono Pole Delta	150-500	0.97	189.30	Yes	150 to 500ft. Existing Utility Corridor, Restringing only
T014	NextEra Energy	Dysinger SS to Stolle Rd SS	345	19.93	Wood H-Pole Horz.	150	1.59	75.21	Yes	Within 500ft. Existing Utility Corridor
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS	345	21.66	St. Mono Pole Vertical	80	1.28	200.00	Yes	80ft. Proposed new ROW width meets the State EMF requirements
T015	NextEra Energy	Dysinger SS to Stolle Rd SS	345	19.93	Wood H-Pole Horz.	150	1.59	75.21	Yes	Within 500ft. Existing Utility Corridor
	NextEra Energy (Alternative)	Dysinger SS to Stolle Rd SS	345	21.66	St. Mono Pole Vertical	80	1.28	200.00	Yes	80ft. Proposed new ROW width meets the State EMF requirements
T017	Exelon Transmission	Niagara SS to Stolle SS	345	47.12	St. Mono Pole Delta	125				EMF Study not provided, but Noted "Exelon proposes a line design that will meet a maximum eletric field of 1.6kV/m and a max. magnetic field of 200 mG at the edge of the
		Stolle Rd SS to Gardenville SS	230	12.10	St. Mono Pole Delta	95				

The Developers' proposed ROW widths are acceptable with the exception of NextEra's alternate design. NextEra proposed a width of 80 ft. for the alternative where they proposed to procure new ROW adjacent to NYSEG's existing ROW. The review team believes this will be inadequate and a minimum of 90 ft. is required. Their distance from the conductor to ROW Edge (other side of NYSEG ROW) is only 37 ft., whereas OSHA requirement for 345 kV is 40.5 ft. (*i.e.*, electrical clearance of 20.5 ft. plus 10 ft. room for work plus 10 ft. growth).

4.9.11.2. Stolle Road 345kV Substation Arrangement Comparison

The review team compared the proposed bus arrangement for Stolle Road 345 kV substation. A summary table of the bus arrangement, number of lines, number of transformers and breakers is shown below. This comparison shows that the bus arrangements vary significantly.

Developer	# of new Lines	# of new Transformers	Total new elements	Proposed Breaker Arrangement	# of Breakers
NYPA/NYSEG T013	1	2	3	Breaker & Half *	10 (9 new)
NAT T006	1	1	2	Ring	3 (2 new)
NAT T007	2	0	2	Ring	4 (3 new)
NAT T008	3	0	3	Breaker & Half	8 (7 new)
NAT T009	3	0	3	Breaker & Half	8 (7 new)
NextEra T014 (includes PAR)	3	0	5	Ring	5 (4 new)
NextEra T015	3	0	5	Ring	5 (4 new)
Exelon	1	0	1	Straight Bus	2 (1new)

*Also includes two series breakers between transformers T4 and T6

Conclusion:

- Exelon is proposing the simplest solution with a single breaker to connect the new line from Dysinger, which of course has much less reliability and operating flexibility than the others.
- NYPA/NYSEG is proposing the most reliable and flexible system and are placing all transformers onto separate breaker positions (no parallel transformers).
- NAT has all three transformers in parallel.
- NextEra keeps the two existing transformers in parallel.

4.9.11.3. Dysinger 345 kV Substation Arrangement Comparison

The review team compared the proposed bus arrangement for Dysinger substation. A summary table of the bus arrangement, number of lines, and breakers is shown below. This comparison shows that the bus arrangements vary.

Developer	# of new Lines	# of new Transformers	Total new elements	Proposed Breaker Arrangement	# of Breakers
NYPA/NYSEG T013	5	0	5	Breaker & Half	8
NAT T006	5	0	5	Breaker & Half	8
NAT T007	5	0	5	Breaker & Half	8
NAT T008	6	0	6	Breaker & Half	9
NAT T009	7	0	7	Breaker & Half	11
NextEra T014 (includes PAR	7	0	7	Breaker & Half	11
NextEra T014	7	0	7	Breaker & Half	11
Exelon –New line by-passes Dysinger	NA	NA	NA	NA	NA

Conclusion:

- NextEra is the only Developer proposing to bring both 345kV cross state lines and both Somerset lines into Dysinger providing for additional operating flexibility.
- Exelon is not constructing a substation at Dysinger.

4.9.11.4. Environmental Discussion

All of the Developers' proposals recognize the need for environmental studies, permits and approvals from various federal and state government agencies. Standard permit requirements include transmission approval under Article VII, wetland delineation and protection, archeological studies, storm water pollution prevention requirements, stream protection, and agricultural land protection, rare, threatened and endangered species surveys and protection. The Developers acknowledge the possibility that the proposals could require modification to address additional permit conditions. At this stage in the development of the proposed projects, it is not possible to determine what those permit conditions would be. The following is a general discussion of the most significant potential environmental issues that could affect the proposals.

Except for T011, all the projects involve clearing of additional ROW for the transmission lines. There does not appear to be any environmental issues that would prevent the projects from being constructed based on the conceptual design information available for review. However, the clearing of new ROW or widening of existing ROW will somewhat proportionaly increase the environmental impacts and risks. These impacts and risks are further described below.

- Clearing of New ROWs or Expansion of Existing ROW.
  The table below contains the estimated acreage that will need to be cleared to construct the transmission lines for each proposed project. The new ROW or expanded ROW will require

archeological studies. These studies could discover archeologically sensitive areas that require actions up to and including re-routing the transmission line or structure to avoid the area. Visual assessments of the proposed line may also be required. If the line is determined to impact scenic resources or are not compatible with the community character, the line could require modifications. The project, including the substation footprint or new transmission structures, could have a permanent impact on emergent wetlands, which would require mitigation.

WNY TRANSMISSION PROJECT: Estimate of Mowing and Clearing (Acres)										
T006	T007	T008	T009	T011	T012	T013	T014	T014 Alt.	T015	T017
95	185	299	383	0	33	72	95	105	95	182

- Clearing of Forested Wetlands
  The table below contains the estimated acreage of forested wetlands that will likely be impacted by each proposed project. Forested wetlands are a very valuable ecological resource in New York and will require mitigation of impacts, including possible replacement offsite. While an estimate of these mitigation costs has been provided, there is the potential that project approval could take additional time and an alternate route could be required to avoid the wetland entirely.

WNY TRANSMISSION PROJECT: Estimate of Impacted Forested/Shrub Wetlands (Acres)										
T006	T007	T008	T009	T011	T012	T013	T014	T014 Alt.	T015	T017
39	47	96	117	0	21	30	35	46	35	106

- Clearing of Protected Species Habitat
  The project area could be determined to include habitat of threatened or endangered species, such as the Northern Long Eared Bat. If such habitat is identified, the project approval could take additional time and an alternate route could be required to avoid the habitat. Restrictions could be placed on when ROW clearing can be conducted which would further extend the project timeline.

- In–water Structures Construction (only T012 National Grid Grand Island Transmission Line)
  If T012 requires the replacement of transmission towers in the Niagara River, the project approval could take additional time. It may also require fishery resource and protected species habitat studies and protection measures such as restricted work windows, USFWS Incidental Take Permit, and open water habitat mitigation.

- Agricultural

  Early coordination with agricultural landowners and consideration of potential impacts to farmland will be needed for the proposed project. Siting and construction coordination will be needed to minimize impacts on prime agricultural lands and limit loss of crop production. Site restoration of disturbed and compacted soils will be required. Herbicide use may be restricted during construction and long-term ROW maintenance operations. Transmission line siting near Certified Organic Farms may require additional planning and consideration for compliance with organic certification. New ROWs will require additional agency coordination if the proposed route would cross properties within an Agricultural Conservation Easement Program or Land Trust.

  The table below contains the estimated acreage of agricultural land that will likely be impacted by each proposed project.

WNY TRANSMISSION PROJECT: Estimate of Impacted to Agricultural Land (Acres)									
T006	T007	T008	T009	T011	T012	T013	T014	T015	T017
16-32	19-37	19-37	53-106	0.3-0.6	50-100	17-34	30-60	30-60	69-137

  Area assumes Agricultural District lands adjacent to the project route with width of 25 ft. to 50 ft.