# *Long Term Firm*
# *System Impact Study Report*

# *For*

# *PJM Transmission Service Request*
# *Queue Positions*

## *Z2-065 – OASIS # 4641473 – 55 MW*
## *Z2-066 – OASIS # 4641474 – 55 MW*
## *Z2-067 – OASIS # 4641475 – 55 MW*

**Revised – March 2015**

**October 2014**

# Preface

The intent of the System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the New Service Customer. As a requirement for interconnection, the New Service Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a New Service Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, merchant transmission upgrade, or transmission service request may also contribute to the need for the same network reinforcement.

# General

North Carolina Electric Membership, the New Service Customer (NSC), has requested a maximum amount of 165 MW of yearly firm network transmission service on the CPLE to PJM path, beginning June 1, 2019 and ending June 1, 2024. The Point of Receipt (POR) for this request is CPLE and the Point of Delivery (POD) is PJM. This request has been assigned PJM OASIS reference identification 4641473, 4641474, 4641475 and was submitted on the PJM OASIS per the PJM Open Access Transmission Tariff (PJM OATT).

| OASIS-ID | Start | Stop | Path | POR | POD | MW |
|---|---|---|---|---|---|---|
| 4641473 | 06/01/2019 | 06/01/2024 | CPLE - PJM | CPLE | PJM | 55 |
| 4641474 | 06/01/2019 | 06/01/2024 | CPLE - PJM | CPLE | PJM | 55 |
| 4641475 | 06/01/2019 | 06/01/2024 | CPLE - PJM | CPLE | PJM | 55 |

## Cost Summary

The Z2-065 / Z2-066 / Z2-067 projects will be responsible for the following costs:

| Description | Total Cost |
|---|---|
| Allocation for New System Upgrades | $ 0 |
| Contribution for Previously Identified Upgrades | $ 0 |
| **Total Costs** | **$ 0** |

**Service can be granted on June 1, 2019.**

# Network Impacts

The Queue Project #Z2-067 was studied as a 165.0 MW long term firm transfer from the Hamlet units 1, 4 and 5 in CPLE to PJM. Project Z2-067 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project Z2-067 was studied with a commercial probability of 100%. Potential network impacts were as follows:

## Contingency Descriptions

The following contingencies resulted in overloads:

None.

# Summer Peak Analysis - 2018

## Generator Deliverability

*(Single or N-1 contingencies for the Capacity portion only of the interconnection)*

None.

## Multiple Facility Contingency

*(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)*

None.

## Contribution to Previously Identified Overloads

*(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)*

None.

## New System Reinforcements

*(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)*

None.

## Contribution to Previously Identified System Reinforcements

*(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)*

None.

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## *Z2-065 – OASIS # 4641473 – 55 MW*
## *Z2-066 – OASIS # 4641474 – 55 MW*
## *Z2-067 – OASIS # 4641475 – 55 MW*

**October 2014**

# Preface

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In some instances a New Service Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, merchant transmission upgrade, or transmission service request may also contribute to the need for the same network reinforcement.

# General

North Carolina Electric Membership, the New Service Customer (NSC), has requested a maximum amount of 165 MW of yearly firm network transmission service on the CPLE to PJM path, beginning June 1, 2019 and ending June 1, 2024. The Point of Receipt (POR) for this request is CPLE and the Point of Delivery (POD) is PJM. This request has been assigned PJM OASIS reference identification 4641473, 4641474, 4641475 and was submitted on the PJM OASIS per the PJM Open Access Transmission Tariff (PJM OATT).

| OASIS-ID | Start | Stop | Path | POR | POD | MW |
|---|---|---|---|---|---|---|
| 4641473 | 06/01/2019 | 06/01/2024 | CPLE - PJM | CPLE | PJM | 55 |
| 4641474 | 06/01/2019 | 06/01/2024 | CPLE - PJM | CPLE | PJM | 55 |
| 4641475 | 06/01/2019 | 06/01/2024 | CPLE - PJM | CPLE | PJM | 55 |

## Cost Summary

The Z2-065 / Z2-066 / Z2-067 projects will be responsible for the following costs:

| Description | Total Cost |
|---|---|
| Allocation for New System Upgrades | $ 0 |
| Contribution for Previously Identified Upgrades | $ 189,800,000 |
| **Total Costs** | **$ 189,800,000** |

Cost allocations for these upgrades will be provided in a revised System Impact Study Report.

# Network Impacts

The Queue Project Z2-067 was studied as a 165.0 MW injection from the Hamlet units 1, 4 and 5 in CPLE into PJM. Project Z2-067 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project Z2-067 was studied with a commercial probability of 100%. Potential network impacts were as follows:

## Contingency Descriptions

The following contingencies resulted in overloads:

| Contingency Name | Description |
|---|---|
| 511T595 | CONTINGENCY '511T595' /*CARSON<br>OPEN BRANCH FROM BUS 314902 TO BUS 314935 CKT 1<br>/*CARSON TO BRUNSWICK (LINE 595)<br>OPEN BRANCH FROM BUS 314936 TO BUS 314902 CKT 1<br>/*RAWLINGS TO CARSON (LINE 511)<br>END |
| LN 595 | CONTINGENCY 'LN 595'<br>OPEN BRANCH FROM BUS 314902 TO BUS 314935 CKT 1 /*<br>8CARSON 500.00 - 8BRUNSWICK 500.00<br>END |

# Summer Peak Analysis - 2018

## Generator Deliverability

*(Single or N-1 contingencies for the Capacity portion only of the interconnection)*

None.

## Multiple Facility Contingency

*(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)*

None.

## Contribution to Previously Identified Overloads

*(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)*

| | Contingency | | Affected | | Bus | | | Power | Loading % | | Rating | | MW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Type | Name | Area | Facility Description | From | To | Circuit | Flow | Initial | Final | Type | MVA | Contribution |
| 1 | LFFB | 511T595 | DVP - DVP | 6PRINCE EDW-6FARMVIL 230 kV line | 313802 | 314692 | 1 | AC | 121.88 | 123.82 | ER | 608 | 11.76 |
| 2 | LFFB | 511T595 | DVP - DVP | 6BRIERY-6PRINCE EDW 230 kV line | 314268 | 313802 | 1 | AC | 122.92 | 124.85 | ER | 608 | 11.76 |
| 3 | LFFB | 511T595 | DVP - DVP | 6CLOVER-6BRIERY 230 kV line | 314686 | 314268 | 1 | AC | 123.91 | 125.84 | ER | 608 | 11.76 |
| 4 | N-1 | LN 595 | DVP - DVP | 8RAWLINGS-8CARSON 500 kV line | 314936 | 314902 | 1 | AC | 131.93 | 133.33 | ER | 2598 | 36.35 |

## New System Reinforcements

*(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)*

None.

## Contribution to Previously Identified System Reinforcements

*(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)*

| Violation # | Overloaded Facility | Upgrade Description | Network Upgrade Number | Upgrade Cost |
|---|---|---|---|---|
| #1 | 6PRINCE EDW-6FARMVIL 230 kV line | A double circuit 230 kV line solution between 6PRINCE EDW (bus 313802) and 6FARMVIL (bus 314692) is proposed to solve the overload. It is estimated to cost $18,500,000 to resolve this deficiency. | n4255 | $ 18,500,000 |
| #2 | 6BRIERY-6PRINCE EDW 230 kV line | A double circuit 230 kV line solution between 6BRIERY (bus 314268) and 6PRINCE EDW (bus 313802) is proposed to solve the overload. It is estimated to cost $14,225,000 to resolve this deficiency. | n4256 | $ 14,225,000 |
| #3 | 6CLOVER-6BRIERY 230 kV line | A double circuit 230 kV line solution between 6CLOVER (bus 314686) and 6BRIERY (bus 314268) is proposed to solve the overload. It is estimated to cost $107,075,000 to resolve this deficiency. | n4257 | $ 107,075,000 |
| #4 | 8RAWLINGS-8CARSON 500 kV line | The 500 kV Line section between 8RAWLINGS (bus 314936) and 8CARSON (bus 314902) is proposed to be upgraded as part of work related to X2-076. This section of 500 kV Line will have a minimum emergency rating of 4000 amps (3619 MVA) however, this line rating is not sufficient for this contingency condition. This line will be uprated as part of Z1-086 and is estimated to cost $ 50,000,000 to resolve this contingency condition. | n4258 | $ 50,000,000 |
| | | | **Total New Network Upgrades** | **$ 189,800,000** |