

Facilities Study

Request

MISO

| Oasis # | Start | End | From | To | MW |
|----------|----------|----------|------|----|-----|
| 76037796 | 1/1/2009 | 1/1/2032 | WE | WE | 650 |
| 76037797 | 1/1/2010 | 1/1/2034 | WE | WE | 650 |
| 76037801 | 1/1/2013 | 1/1/2036 | WE | WE | 650 |

Required Facilities:

1. The requested service for Phase 1 (OASIS request #76037796) requires the following facilities to be completed as described in this report:
 - a. Increase the rating on the Oak Creek – Ramsey 138 kV line (1/1/2009).
 - b. Terminate the Ramsey – Harbor 138 kV line into the Norwich substation to create Ramsey – Norwich and Norwich – Harbor 138 kV lines (1/1/2009).
 - c. Increase the rating on the Norwich – 43rd St. 138 kV line (1/1/2009).
 - d. Increase the rating on the Oak Creek – Allerton 138 kV line (1/1/2009).
 - e. Install a second Oak Creek 345/138 kV Transformer (6/1/2009).
2. The requested service for Phase 2 (OASIS request #76037797) requires the following facilities to be completed as described in this report:
 - a. Increase the line rating for the Oak Creek – Ramsey 138 kV line (1/1/2010).
 - b. Increase the line rating for the Kansas – Ramsey 138 kV line (1/1/2010).
 - c. Increase the line rating for the Oak Creek – Root River 138 kV line (1/1/2010).
 - d. Increase the line rating for the Oak Creek – Nicholson 138 kV line (1/1/2010).
3. The requested service for Phase 3 (OASIS request #76037801) requires one of the following combination of facilities to be completed as described in this report:
 - a. Project Package #1 (1/1/2013)
 - i. Loop the Zion – Arcadian 345 kV line into the Pleasant Prairie Substation to create a second Zion – Pleasant Prairie and a second Pleasant Prairie – Arcadian 345 kV line.
 - ii. String a Oak Creek – Brookdale and a Brookdale – Granville 345 kV lines.
 - iii. Install a 345/138 kV transformer at Brookdale.
 - iv. Construct a Oak Creek – St. Martins 138 kV line.
 - v. Construct a Brookdale – West Junction 138 kV line.
 - b. Project Package #2 (1/1/2013)
 - i. String a Oak Creek – Brookdale and a Brookdale – Granville 345 kV line.
 - ii. Install a 345/138 kV transformer at Brookdale.
 - iii. Construct a Oak Creek – St. Martins 138 kV line.
 - iv. Construct a Brookdale – West Junction 138 kV line.
 - v. Tap the Arcadian – Forest Junction and Granville – Arcadian 345 kV lines and the Tamarack – Sussex and the Bark River – Germantown 138 kV lines to create the Lannon Junction Substation.
 - vi. Construct a Rockdale – Concord – Bark River – Lannon Junction 345 kV line.
 - vii. Install 345/138 kV Transformers at Concord, Bark River and Lannon Junction.

Facilities Study Report

Revision 1 (4/10/2008) – Updated required in-service date of second Oak Creek 345/138 kV transformer from 1/1/2009 to 6/1/2009. The allowable delay of this project is based on a recent rating adjustment of the existing Oak Creek 345/138 kV transformer from 500 MVA to 625 MVA.

Models used in this study correlated with the summer and winter peaks of 2009, 2010, 2011 and 2013. The following sections of this report show the results of the Facilities Study for MISO OASIS request numbers **76037796, 76037797 and 76037801** for 650 MW each, for a total of 1950 MW of transfer from the source in the WE control area to the WE control area from 1/1/2009 to 1/1/2036.

Purpose of this Study:

OASIS requests 76037796, 76037797 and 76037801 have already been approved by MISO and are currently have a status of “Confirmed”. This study was performed due to new results in the Generator Interconnection (GIC) analysis related to OASIS requests 76037796, 76037797 and 76037801. The new results of the GIC analysis prompted an updated analysis be performed for the Transmission Service Requests (TSR). Transmission Service for the three requests is still valid but with a new set of required facilities to be constructed in order to grant service as detailed in this report. No action is required to be taken by MISO.

The costs in this report solely reflect Transmission Service Request requirements. The costs associated with the GIC are presented in the related GIC report(s).

76037796 (Phase 1) Results:

Summer 2009 Results: Analysis results show that there is zero MW of transfer capability available for the first 650 MW segment of requested service from the source to WE to support the requested transfer without the facilities identified. With the facilities identified, the full 650 MW of requested service is available from the source to WE.

The following projects are required to be in-service by 1/1/2009:

1. Increase the rating of the Oak Creek – Ramsey 138 kV line (1/1/2009).
 - a. Reconductor the 556 ACSR section of conductor with 795 ACSR at 167°F or increase the existing line conductor clearances to support operation up to 230°F.
 - b. In order to achieve the rating required to support Phase 2 and Phase 3 it is recommended that the 556 ACSR have clearances to 300°F or the 795 ACSR have clearances for 230°F.
2. Terminate the Ramsey – Harbor 138 kV line into the Norwich substation to create Ramsey – Norwich and Norwich – Harbor 138 kV lines (1/1/2009).
3. Increase the line rating on the Norwich – 43rd St. 138 kV line (1/1/2009).
 - a. Reconductor the 477 ACSR line conductor with 795 ACSR conductor at a 200°F clearance.
4. Increase the line rating on the Oak Creek – Allerton 138 kV line (1/1/2009).
 - a. Reconductor the 556 ACSR section of conductor with 795 ACSR or increase the line conductor clearances to support operation up to 230°F.

5. Installation of a second Oak Creek 345/138 kV transformer with an emergency rating of 625 MVA (1/1/2010).
 - a. This project was originally identified as a requirement with an in-service date of 1/1/2010, but due to recent TSR evaluations the in-service date is being accelerated to 1/1/2009.
 - b. *Revision 1 (4/10/2008) – Due to an increase in the rating of the existing Oak Creek 345/138 kV transformer from 500 MVA to 625 MVA, this project has been delayed to 6/1/2009.*

Summer 2009 and Beyond Results: Initial results show that there is zero MW of transfer capability available from the source to WE to support the requested transfer without the facilities identified. With the facilities identified for the summer 2009 service, the full 650 MW of requested service is available from the source to WE for the entire duration of the requested service.

76037797 (Phase 2) Results:

Summer 2010 Results: Analysis results show that there is zero MW of transfer capability available for the second 650 MW segment of requested service from the source to WE to support the requested transfer without the facilities identified. With the facilities identified, the full 650 MW of requested service is available from the source to WE.

The following projects are required to be in-service by 1/1/2010:

1. All projects required for granting service for TSR #73037796 must be completed and in-service.
2. Increase the rating of the Oak Creek – Ramsey 138 kV line (1/1/2009).
 - a. This line is being upgraded in the year 2009 to the rating this is required for future years.
3. Ensure a rating on the Ramsey – Kansas 138 kV line of 1225 amps (1/1/2010).
4. Increase the rating of the Oak Creek – Root River 138 kV line (1/1/2010)
 - a. Reconductor the 556 ACSR section of conductor with 795 ACSR at 200°F or increase the existing line conductor clearances to support operation up to 230°F.
5. Increase the rating of the Oak Creek – Nicholson 138 kV line (1/1/2010)
 - a. Upgrade terminal equipment and increase the 795 ACSR line conductor to support clearances of 230°F.

Summer 2010 and Beyond Results: Initial results show that there is zero MW of transfer capability available from the source to WE to support the requested transfer without the facilities identified. With the facilities identified for the summer 2010 service, the full 650 MW of requested service is available from the source to WE for the entire duration of the requested service.

76037801 (Phase 3) Results:

Summer 2013 Results: Analysis results show that there is zero MW of transfer capability available for the third 650 MW segment of requested service from the source to WE to support the requested transfer without the facilities identified. With the facilities identified, the full 650 MW of requested service is available from the source to WE.

There are two project packages being evaluated for serving the requested service. The two project packages are as follows:

Project Package #1

The following projects are required to be in-service by 1/1/2013:

1. All projects required for granting service for TSR #73037796 must be completed and in-service.
2. All projects required for granting service for TSR #73037797 must be completed and in-service.
3. Loop the Zion – Arcadian 345 kV line into the Pleasant Prairie Substation to create a second Zion – Pleasant Prairie 345 kV line and a second Pleasant Prairie – Arcadian 345 kV line (1/1/2013).
4. String an Oak Creek – Brookdale 345 kV line and a Brookdale – Granville 345 kV line (1/1/2013).
5. Install a 345/138 kV transformer at Brookdale (1/1/2013).
6. Construct a Oak Creek – St. Martins 138 kV line (1/1/2013).
7. Construct a Brookdale – West Junction 138 kV line (1/1/2013).

Project Package #2

The following projects are required to be in-service by 1/1/2013:

1. All projects required for granting service for TSR #73037796 must be completed and in-service.
2. All projects required for granting service for TSR #73037797 must be completed and in-service.
3. String an Oak Creek – Brookdale 345 kV line and a Brookdale – Granville 345 kV line (1/1/2013).
4. Install a 345/138 kV transformer at Brookdale (1/1/2013).
5. Construct a Oak Creek – St. Martins 138 kV line (1/1/2013).
6. Construct a Brookdale – West Junction 138 kV line (1/1/2013).
7. Tap the Arcadian – Forest Junction and Granville – Arcadian 345 kV lines and the Tamarack – Sussex and the Bark River – Germantown 138 kV lines to create the Lannon Junction Substation (1/1/2013).
8. Construct a Rockdale – Concord – Bark River – Lannon Junction 345 kV line (1/1/2013).
9. Install 345/138 kV Transformers at Concord, Bark River and Lannon Junction (1/1/2013).

Summer 2013 and Beyond Results: Initial results show that there is zero MW of transfer capability available from the source to WE to support the requested transfer without the facilities identified. With the facilities identified for the 2013 service, the full 650 MW of requested service is available from the source to WE for the entire duration of the requested service.

Facilities Required and Associated Costs of Construction:

Table 1. Estimated Project Costs – All Estimates are preliminary and may be subject to change due to new information or plans being refined and only reflect TSR requirements.

| Project | Required In-Service Date | Cost |
|--|--------------------------|-------------------------------------|
| Oak Creek – Ramsey 138 kV Line Rating Increase | 1/1/2009 | \$370,000 ¹ |
| Ramsey – Harbor 138 kV termination at Norwich | 1/1/2009 | \$680,000 |
| Norwich – 43 rd St. Line Rating Increase | 1/1/2009 | Completed with the Lakeside Project |
| Oak Creek – Allerton 138 kV Line Rating Increase | 1/1/2009 | \$2,034,000 ¹ |
| 2009 Sub-Total | | \$3,084,000 |
| Second Oak Creek 345/138 kV Transformer | 6/1/2009 | \$4,644,800 |
| Oak Creek – Ramsey 138 kV Line Rating Increase | 1/1/2009 | Cost provided in 2009 estimates. |
| Kansas – Ramsey 138 kV Line Rating Increase | 1/1/2010 | \$130,000 ² |
| Oak Creek – Root River 138 kV Line Rating Increase | 1/1/2010 | \$415,000 |
| Oak Creek – Nicholson 138 kV Line Rating Increase | 1/1/2010 | \$1,240,000 |
| 2010 Sub-Total | | \$6,429,800 |
| Project Package #1 | | |
| Looping of the Zion – Arcadian 345 kV Line into Pleasant Prairie | 1/1/2013 | \$6,500,000 |
| String Oak Creek – Brookdale and Brookdale – Granville 345 kV Lines and Construct an Oak Creek – St. Martins 138 kV Line and Brookdale – West Junction 138 kV Line | 1/1/2013 | \$81,836,282 ¹ |
| Installation of a 345/138 kV transformer at Brookdale | 1/1/2013 | \$14,814,000 ¹ |
| 2013 Project Package #1 Sub-Total | | \$103,150,282 |
| Project Package #2 | | |
| String Oak Creek – Brookdale and Brookdale – Granville 345 kV Lines and Construct an Oak Creek – St. Martins 138 kV Line and Brookdale – West Junction 138 kV Line | 1/1/2013 | \$81,836,282 ¹ |
| Installation of a 345/138 kV transformer at Brookdale | 1/1/2013 | \$14,814,000 ¹ |
| Tap the Arcadian – Forest Junction and Granville – Arcadian 345 kV Lines and the Tamarack – Susses and Bark River – Germantown 138 kV Lines to create the Lannon Junction Substation with a 345/138 kV Transformer | 1/1/2013 | \$4,490,000 ² |
| Construct a Rockdale – Concord 345 kV line with a 345/138 kV Transformer at Concord | 1/1/2013 | \$42,130,000 ² |
| Construct a Concord – Bark River – Lannon Junction 345 kV Line with a 345/138 kV Transformer at Bark River | 1/1/2013 | \$24,940,000 ² |
| 2013 Project Package #2 Sub-Total | | \$168,210,282 |
| Total Project Costs for Phase 1, 2 and 3 with 2013 Project Package #1 | | \$112,664,082 |
| Total Project Costs for Phase 1, 2 and 3 with 2013 Project Package #2 | | \$177,724,082 |

1. Costs were obtained from the previous Facility Study for TSR # 76037796, 76037797 and 76037801 dated 12/31/01.

2. Costs were obtained from the ATCLLC, 2003 10-Year Transmission System Assessment.