

APPENDIX J

Representative Inputs to and Outputs from the DYNEV II System

J. REPRESENTATIVE INPUTS TO AND OUTPUTS FROM THE DYNEV II SYSTEM

This appendix presents data input to and output from the DYNEV II System. Table J-1 provides the volume and queues for the ten highest volume signalized intersections in the study area. Refer to Table K-2 and the figures in Appendix K for a map showing the geographic location of each intersection.

Table J-2 provides source (vehicle loading) and destination information for several roadway segments (links) in the analysis network. Refer to Table K-1 and the figures in Appendix K for a map showing the geographic location of each link.

Table J-3 provides network-wide statistics (average travel time, average speed and number of vehicles) for an evacuation of the entire EPZ (Region R03) for each scenario. As expected, Scenarios 8 and 11, which are snow scenarios, exhibit slower average speeds and longer average travel times than good weather and rain scenarios. Scenario 13, which is the special event, exhibits a similar average speed and travel time as Scenario 3. This is because the special event does not have an impact on the ETE (see Section 7.5). Scenario 14, which is the roadway impact scenario, shows a significantly longer network-wide average travel time and a significantly slower network-wide average speed than the comparable Scenario 1. As discussed in Section 7.5, the roadway impact has a significant impact on the ETE.

Table J-4 provides statistics (average speed and travel time) for the major evacuation routes – US-10, I-94, SR-24, SR-55, SR-25, US-169, SR-101, CR-5 and CR-11 – for an evacuation of the entire EPZ (Region R03) under Scenario 1 conditions. As discussed in Section 7.3 and shown in Figures 7-3 through 7-9, I-94 EB, US-10 EB and SR-101 SB are congested for most of the evacuation. As such, the average speeds are comparably slower (and travel times longer) than other evacuation routes.

Table J-5 provides the number of vehicles discharged and the cumulative percent of total vehicles discharged for each link exiting the analysis network, for an evacuation of the entire EPZ (Region R03) under Scenario 1 conditions. Refer to Table K-1 and the figures in Appendix K for a map showing the geographic location of each link.

Figure J-1 through Figure J-14 plot the trip generation time versus the ETE for each of the 14 Scenarios considered. The distance between the trip generation and ETE curves is the travel time. Plots of trip generation versus ETE are indicative of the level of traffic congestion during evacuation. For low population density sites, the curves are close together, indicating short travel times and minimal traffic congestion. For higher population density sites, the curves are farther apart indicating longer travel times and the presence of traffic congestion. As seen in Figure J-1 through Figure J-14, the curves are spatially separated as a result of the traffic congestion in the EPZ, which was discussed in detail in Section 7.3.

Table J-1. Characteristics of the Ten Highest Volume Signalized Intersections

Node	Location	Intersection Control	Approach (Up Node)	Total Volume (Veh)	Max. Turn Queue (Veh)
237	US-10 & Main St	Actuated Signal	754	11,166	16
			236	2,337	0
			758	247	0
			TOTAL	13,750	-
754	US-10 & Jackson Ave	Actuated Signal	238	10,968	178
			237	2,340	0
			756	203	4
			TOTAL	13,511	-
239	US-10 & CR-1	Actuated Signal	240	10,817	83
			238	2,351	0
			822	178	2
			TOTAL	13,346	-
990	US-10 & Co Rd 44	Actuated Signal	240	2,393	0
			241	10,625	351
			992	79	0
			991	116	2
			TOTAL	13,213	-
993	US-10 & Joplin St	Actuated Signal	243	10,310	257
			242	2,414	0
			994	304	1
			TOTAL	13,028	-
245	US-10 & Waco St	Actuated Signal	1155	10,239	96
			244	2,428	0
			1000	19	0
			TOTAL	12,686	-
232	US-10 & 171st Ave NW	Actuated Signal	233	8,839	0
			231	2,306	0
			989	0	0
			TOTAL	11,145	-
254	US-10 & CR-43	Actuated Signal	255	4,100	69
			253	2,518	15
			1002	2,075	21
			1097	730	10
			TOTAL	9,423	-

Node	Location	Intersection Control	Approach (Up Node)	Total Volume (Veh)	Max. Turn Queue (Veh)
255	US-10 & CR-5	Actuated Signal	200	5,545	51
			279	1,261	30
			254	2,533	0
			TOTAL	9,339	-
200	US-10 & SR-25	Actuated Signal	199	842	44
			256	5,044	574
			255	2,729	0
			TOTAL	8,615	-

Table J-2. Sample Simulation Model Input

Link Number	Vehicles Entering Network on this Link	Directional Preference	Destination Nodes	Destination Capacity
122	80	NW	8003	4,500
			8087	1,700
256	20	W	8003	4,500
			8087	1,700
			8412	1,700
449	31	NW	8658	3,800
616	9	SW	8518	1,700
			8464	1,700
			8411	1,700
779	16	W	8412	1,700
912	13	SW	8528	1,700
			8657	1,700
1139	213	SE	8045	4,500
			8166	3,800
			8196	1,700
1239	162	N	8873	1,700
			8302	1,700
1307	86	E	8739	3,800
1397	298	E	8045	4,500
			8166	3,800
			8230	3,800

Table J-3. Selected Model Outputs for the Evacuation of the Entire EPZ (Region R03)

Scenario	1	2	3	4	5	6	7
Network-Wide Average Travel Time (Min/Veh-Mi)	2.4	2.8	2.4	2.9	2.4	2.3	2.8
Network-Wide Average Speed (mph)	25.5	21.4	24.8	21.0	25.0	25.7	21.3
Total Vehicles Exiting Network	64,920	64,969	64,035	64,189	52,762	65,087	65,243
Scenario	8	9	10	11	12	13	14
Network-Wide Average Travel Time (Min/Veh-Mi)	2.9	2.4	2.8	2.9	2.4	2.5	3.5
Network-Wide Average Speed (mph)	20.6	25.2	21.2	20.8	24.9	24.1	17.0
Total Vehicles Exiting Network	65,461	63,370	63,592	63,866	52,798	64,364	65,158

Table J-4. Average Speed (mph) and Travel Time (min) for Major Evacuation Routes (Region R03, Scenario 1)

Route	Length (miles)	Elapsed Time (hours)									
		1		2		3		4		5	
		Speed (mph)	Travel Time (min)	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time
US-10 EB	13.5	12.1	66.9	10.5	77.5	20.6	39.3	61.1	13.3	65.3	12.4
US-10 WB	12.4	67.0	11.1	66.8	11.2	65.8	11.3	68.8	10.8	69.6	10.7
I-94 EB	16.8	53.6	18.8	18.6	54.1	30.8	32.8	75.0	13.5	75.0	13.5
I-94 WB	16.7	71.6	14.0	71.9	13.9	74.6	13.4	75.0	13.4	75.0	13.4
SR-24 SB	12.4	48.5	15.3	48.7	15.3	48.9	15.2	49.8	14.9	49.8	14.9
SR-55 EB	6.9	53.5	7.8	54.4	7.6	56.3	7.4	59.0	7.0	59.0	7.0
SR-25 SB	8.3	25.6	19.5	49.9	10.0	55.0	9.1	56.0	8.9	56.9	8.8
SR-25 NB	6.9	50.9	8.2	58.0	7.1	58.3	7.1	59.0	7.0	60.0	6.9
US-169 NB	8.8	65.9	8.0	45.6	11.6	64.2	8.2	65.2	8.1	66.3	7.9
US-169 SB	3.4	43.9	4.6	43.9	4.6	47.4	4.3	54.3	3.8	65.5	3.1
SR-101 SB	6.6	10.5	37.9	3.3	119.6	3.2	125.3	9.6	41.4	16.8	23.5
CR-5 NB	7.4	59.1	7.5	59.6	7.5	59.3	7.5	60.0	7.4	60.0	7.4
CR-11 NB	9.5	56.2	10.2	58.9	9.7	58.9	9.7	59.4	9.6	60.0	9.5

Table J-5. Simulation Model Outputs at Network Exit Links for Region R03, Scenario 1

Network Exit Link	Elapsed Time (hours)				
	1	2	3	4	5
	Cumulative Vehicles Discharged by the Indicated Time				
	Cumulative Percent of Vehicles Discharged by the Indicated Time				
0	0	0	0	0	0
	0	0	0	0	0
2	998	2,452	3,572	3,972	3,972
	7	6	6	6	6
4	2,642	5,525	6,926	6,938	6,938
	17	14	12	11	11
98	3,394	7,313	11,258	13,755	15,093
	22	19	20	22	23
101	63	155	180	182	182
	0	0	0	0	0
167	257	709	848	868	868
	2	2	2	1	1
308	452	1,206	1,807	1,893	1,895
	3	3	3	3	3
351	517	1,326	1,925	1,957	1,958
	3	3	3	3	3
353	1,502	4,306	7,013	8,847	8,854
	10	11	13	14	14
483	535	1,431	1,926	1,971	1,971
	4	4	3	3	3
493	516	1,378	1,616	1,639	1,639
	3	4	3	3	3
519	58	148	187	192	192
	0	0	0	0	0
624	144	472	624	636	636
	1	1	1	1	1
625	329	1,076	1,306	1,339	1,340
	2	3	2	2	2
662	434	2,118	3,342	3,382	3,383
	3	5	6	5	5
689	165	424	488	494	494
	1	1	1	1	1
690	209	519	645	660	660
	1	1	1	1	1

Network Exit Link	Elapsed Time (hours)				
	1	2	3	4	5
	Cumulative Vehicles Discharged by the Indicated Time				
	Cumulative Percent of Vehicles Discharged by the Indicated Time				
711	231	599	896	937	938
	2	2	2	2	1
746	350	1,111	1,495	1,512	1,512
	2	3	3	2	2
767	179	505	581	592	592
	1	1	1	1	1
915	218	585	694	708	708
	1	1	1	1	1
950	249	530	598	601	601
	2	1	1	1	1
1004	782	2,521	3,676	3,794	3,799
	5	6	7	6	6
1317	0	0	0	0	0
	0	0	0	0	0
1474	398	1,487	1,866	1,931	1,934
	3	4	3	3	3
1483	634	1,411	2,214	3,319	4,547
	4	4	4	5	7

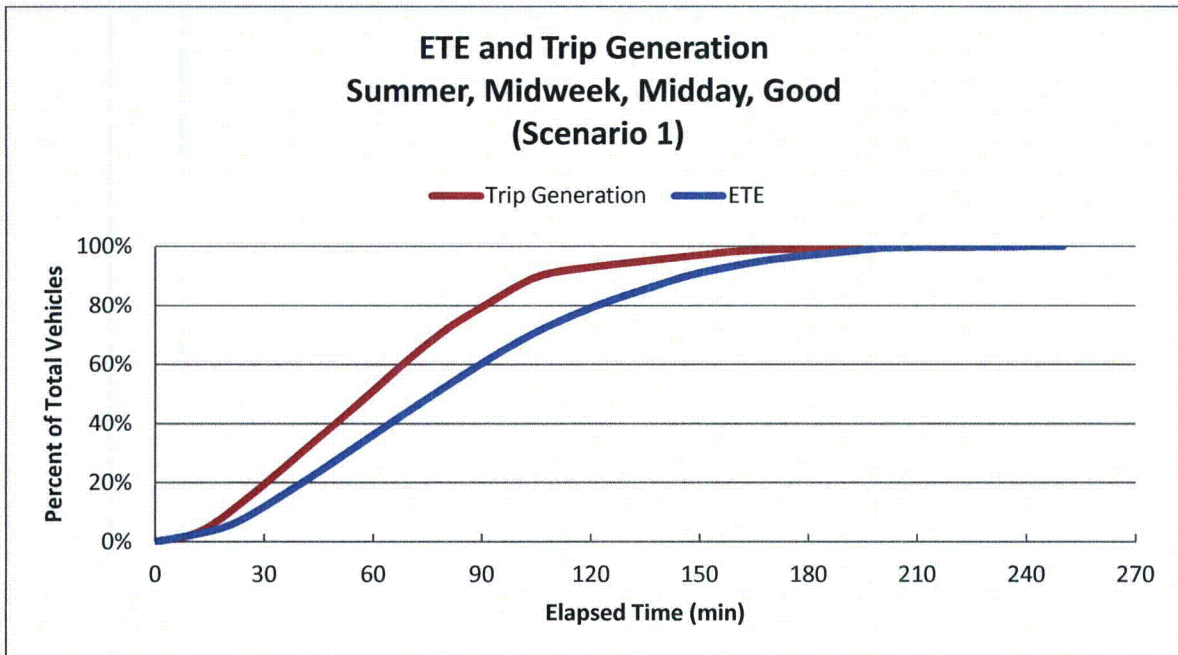


Figure J-1. ETE and Trip Generation: Summer, Midweek, Midday, Good Weather (Scenario 1)

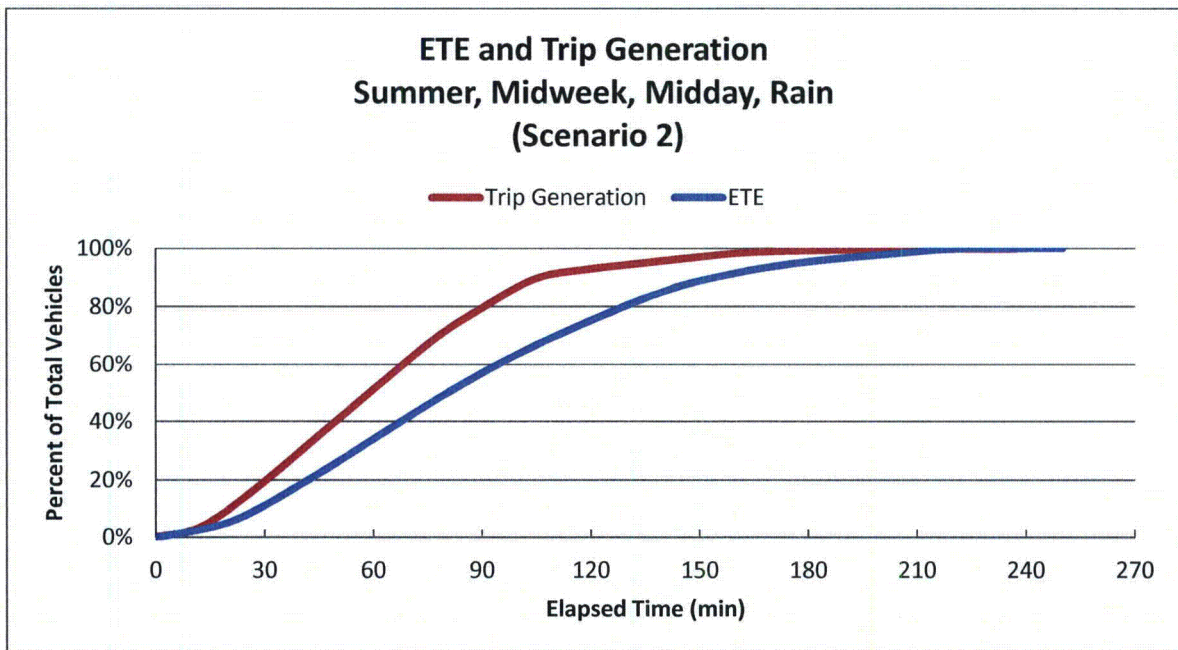


Figure J-2. ETE and Trip Generation: Summer, Midweek, Midday, Rain (Scenario 2)

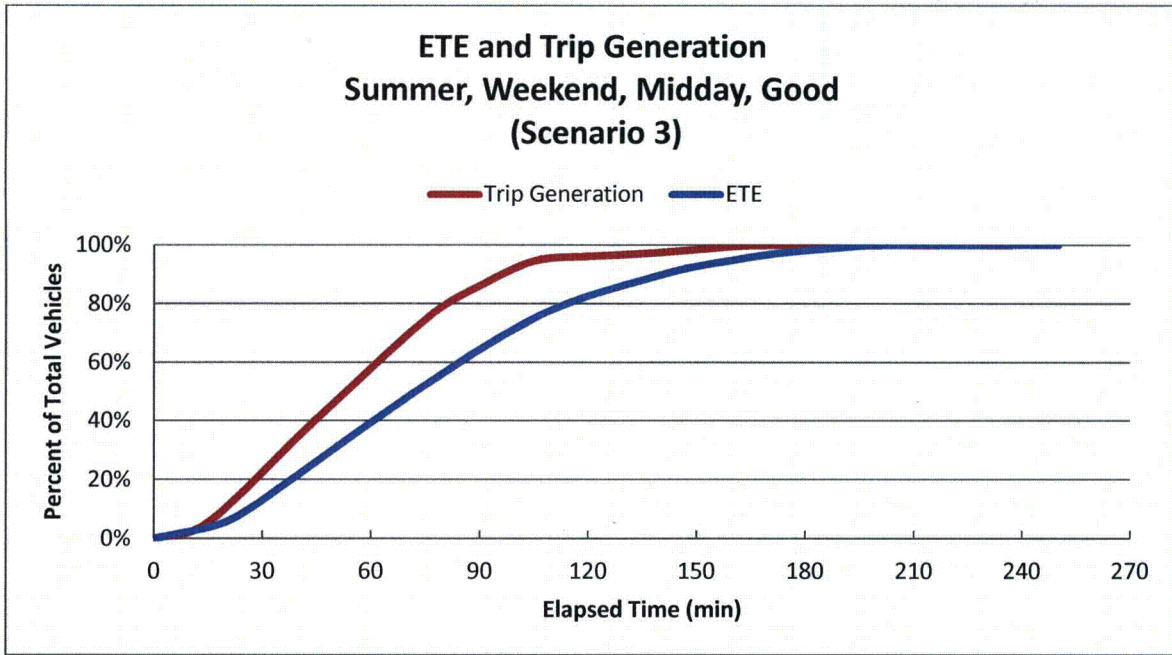


Figure J-3. ETE and Trip Generation: Summer, Weekend, Midday, Good Weather (Scenario 3)

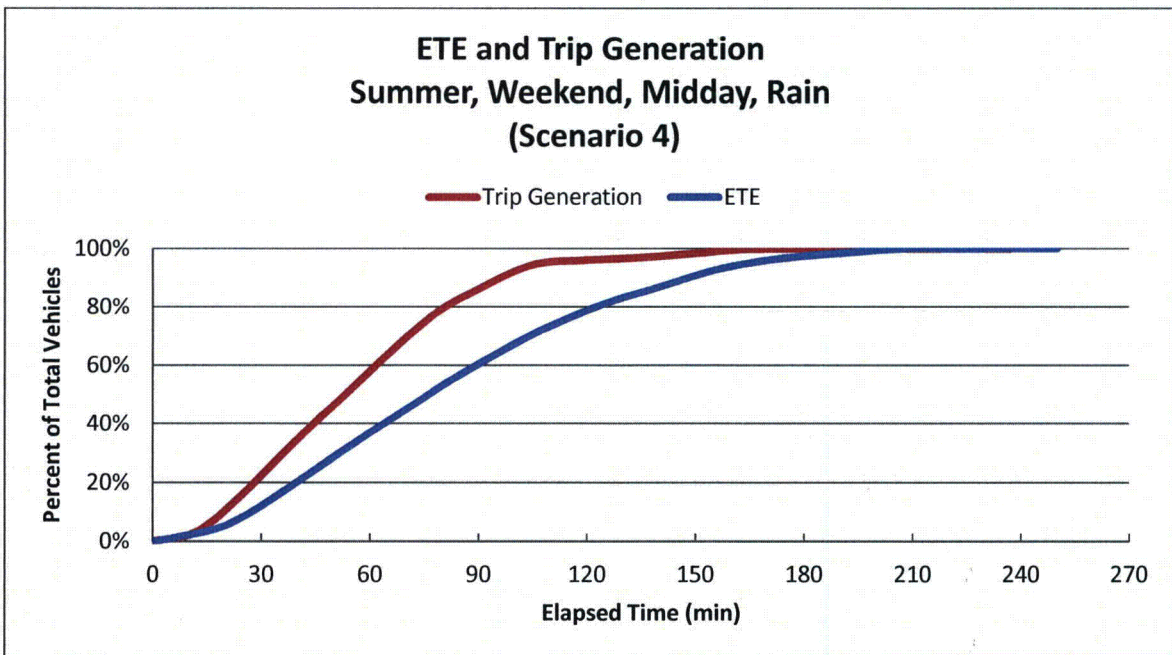


Figure J-4. ETE and Trip Generation: Summer, Weekend, Midday, Rain (Scenario 4)

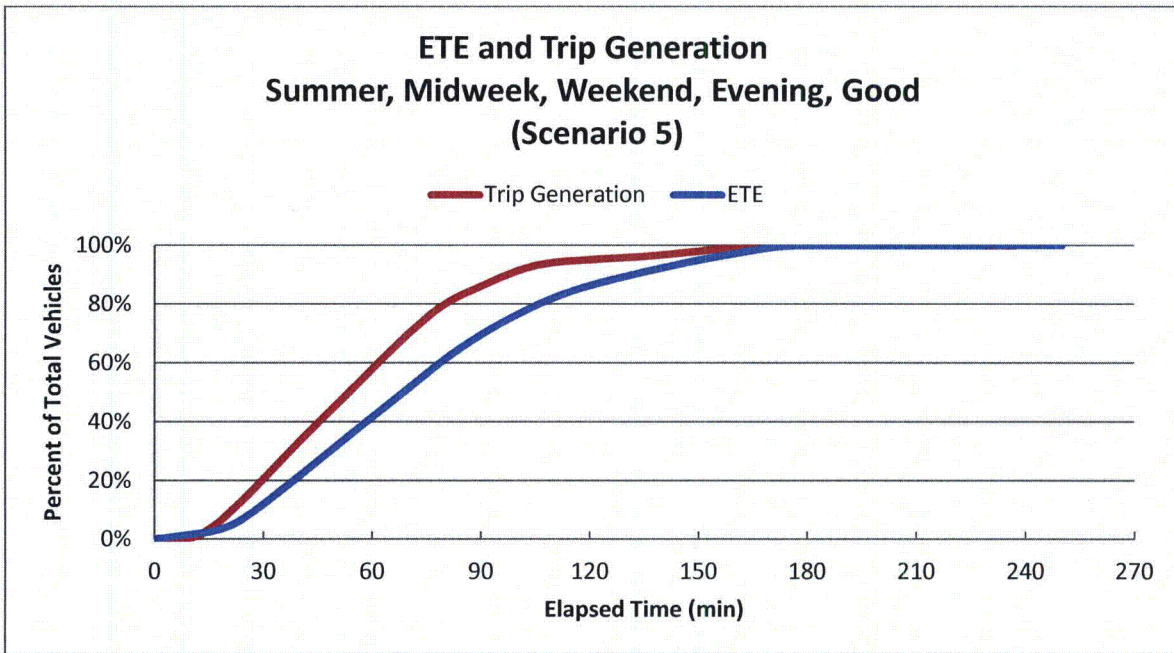


Figure J-5. ETE and Trip Generation: Summer, Midweek, Weekend, Evening, Good Weather (Scenario 5)

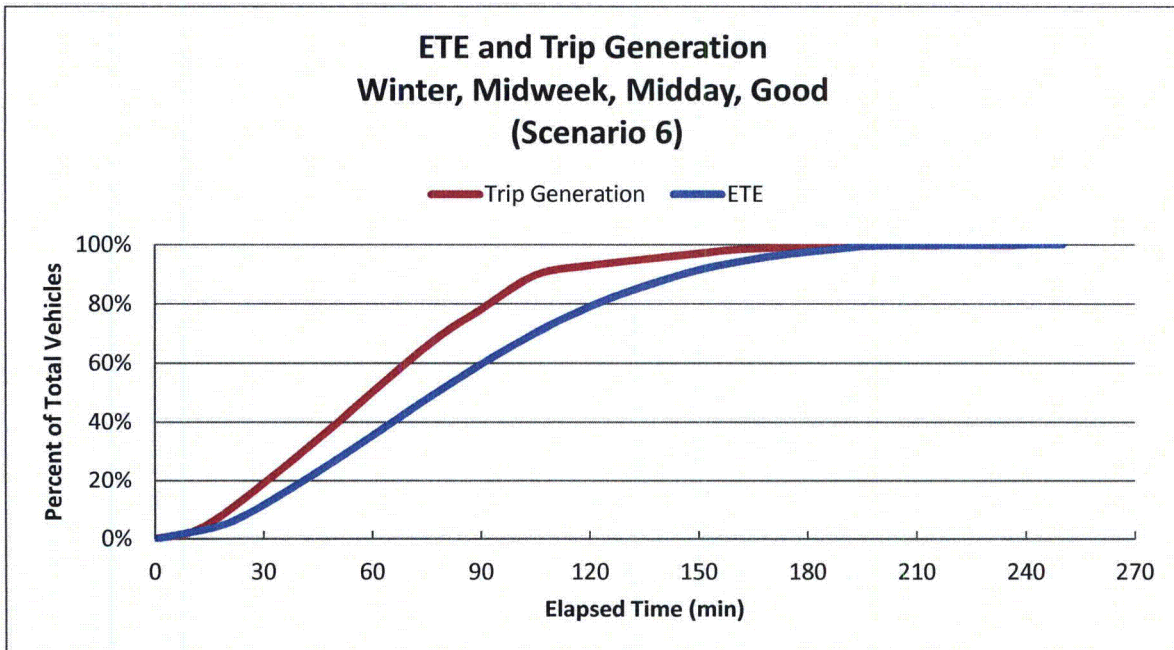


Figure J-6. ETE and Trip Generation: Winter, Midweek, Midday, Good Weather (Scenario 6)

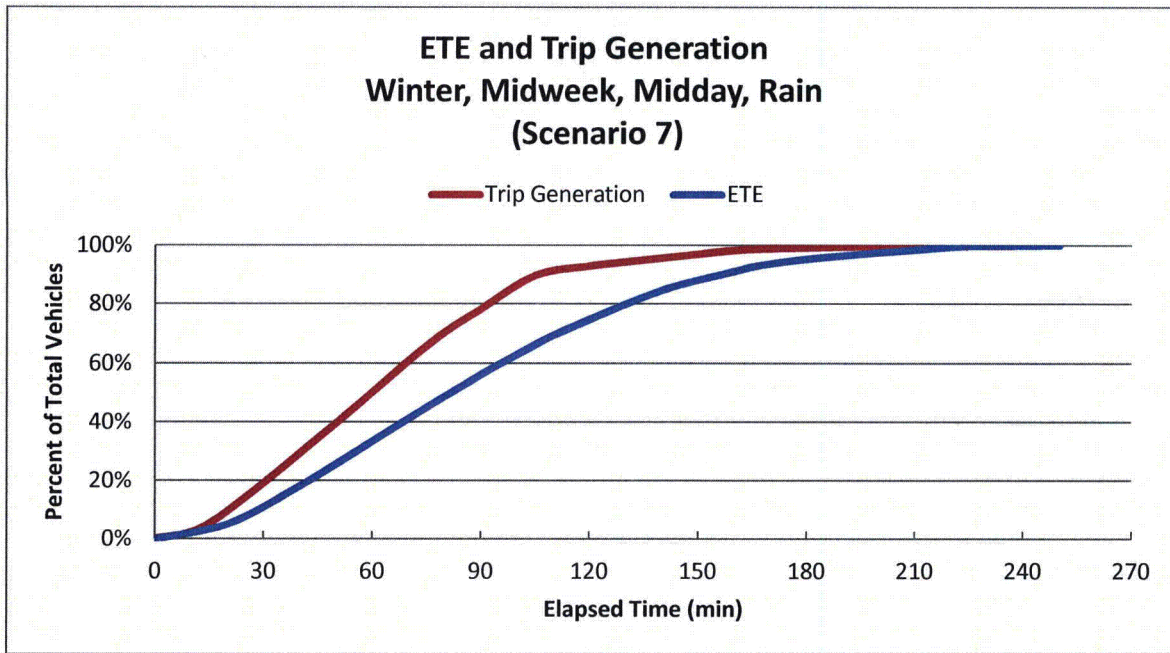


Figure J-7. ETE and Trip Generation: Winter, Midweek, Midday, Rain (Scenario 7)

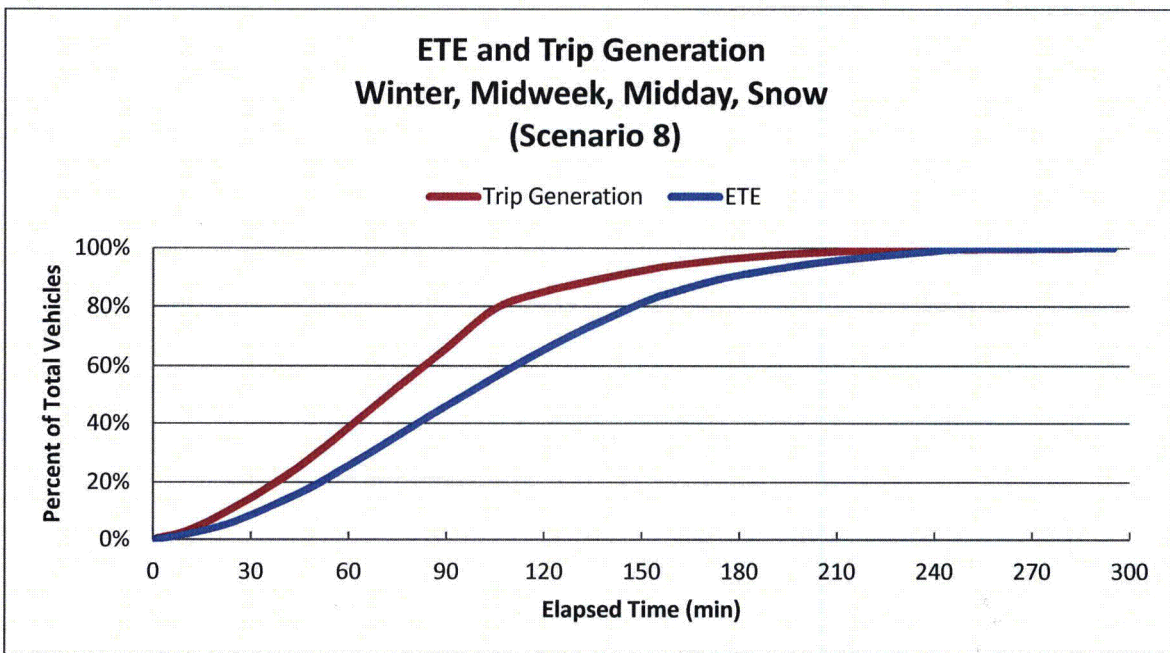


Figure J-8. ETE and Trip Generation: Winter, Midweek, Midday, Snow (Scenario 8)

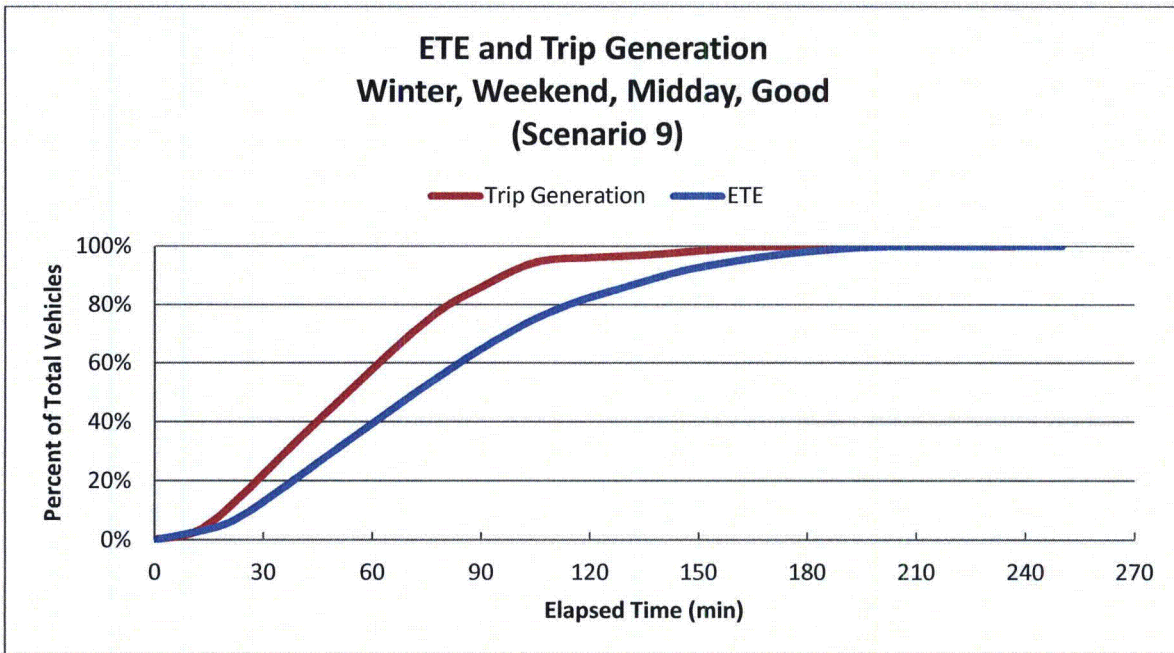


Figure J-9. ETE and Trip Generation: Winter, Weekend, Midday, Good Weather (Scenario 9)

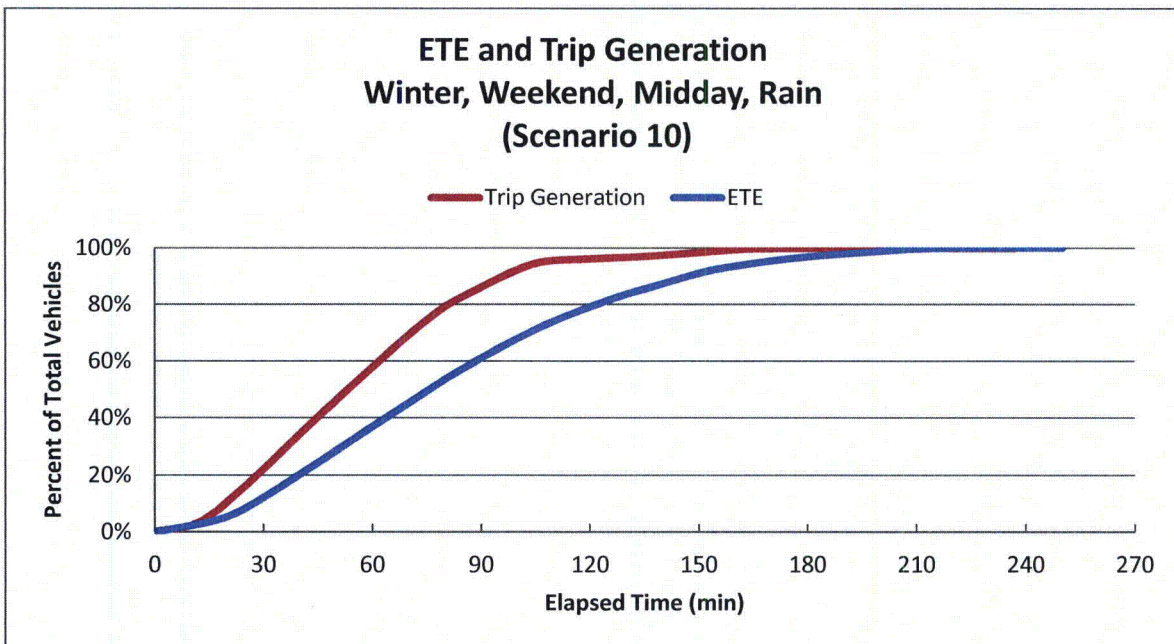


Figure J-10. ETE and Trip Generation: Winter, Weekend, Midday, Rain (Scenario 10)

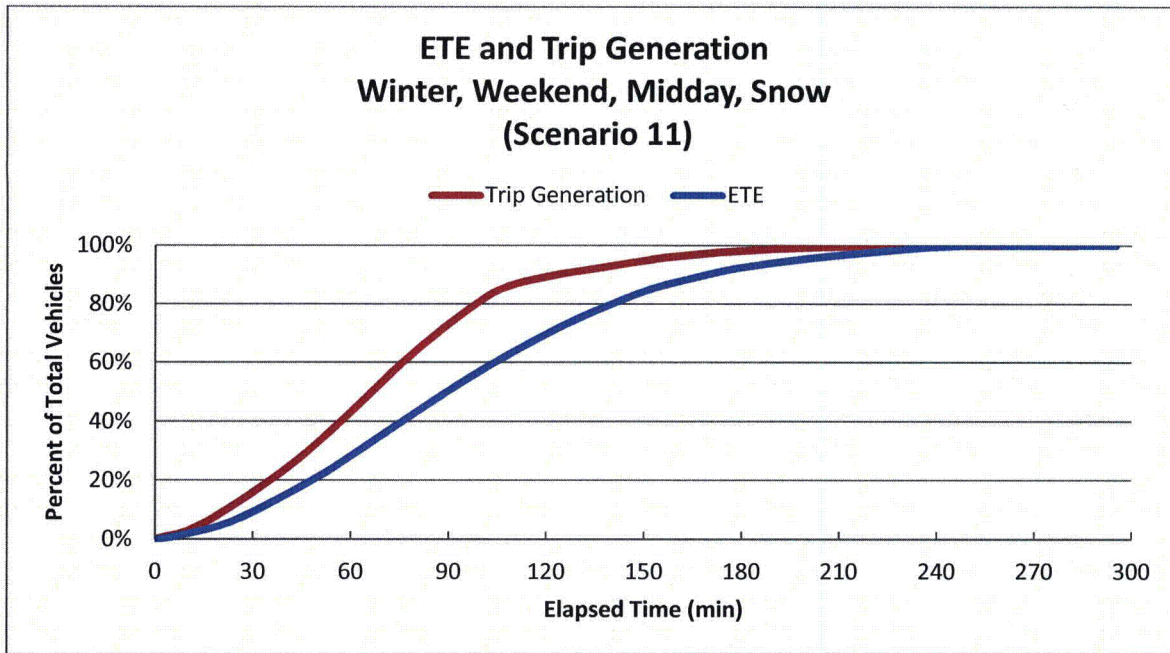


Figure J-11. ETE and Trip Generation: Winter, Weekend, Midday, Snow (Scenario 11)

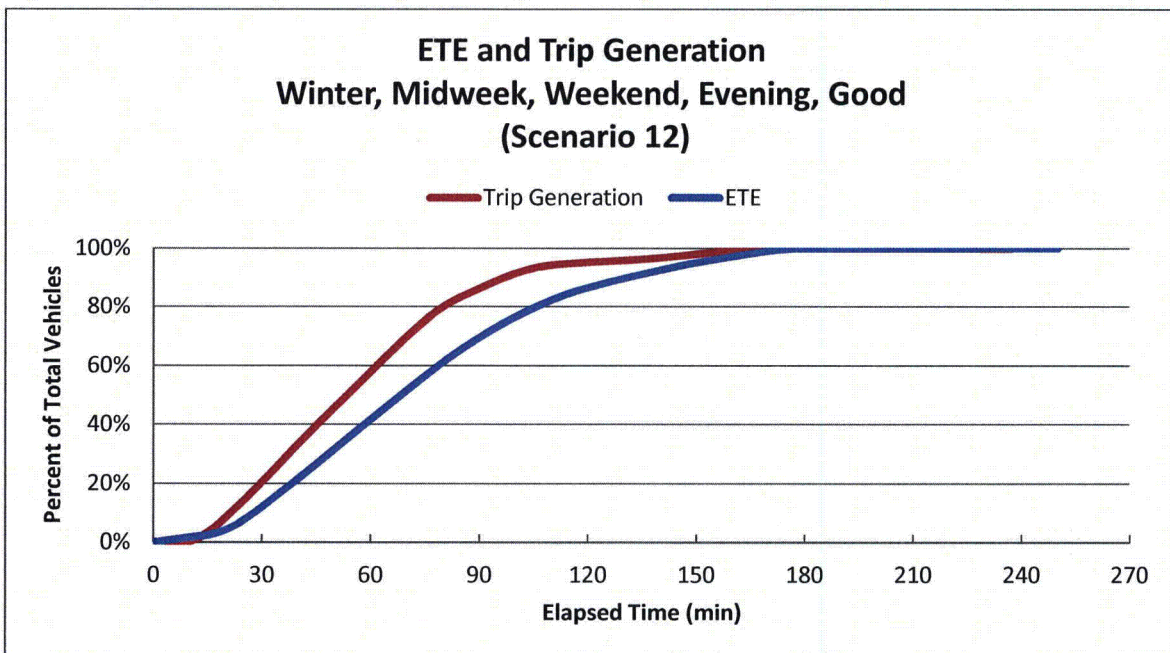


Figure J-12. ETE and Trip Generation: Winter, Midweek, Weekend, Evening, Good Weather (Scenario 12)

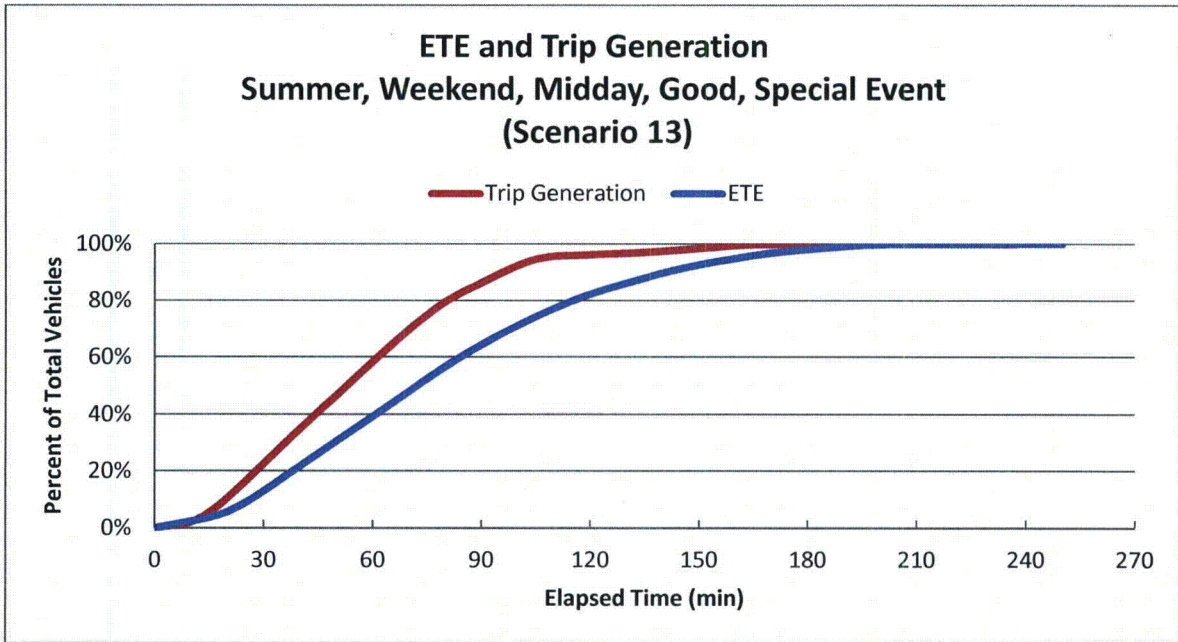


Figure J-13. ETE and Trip Generation: Summer, Weekend, Midday, Good Weather, Special Event (Scenario 13)

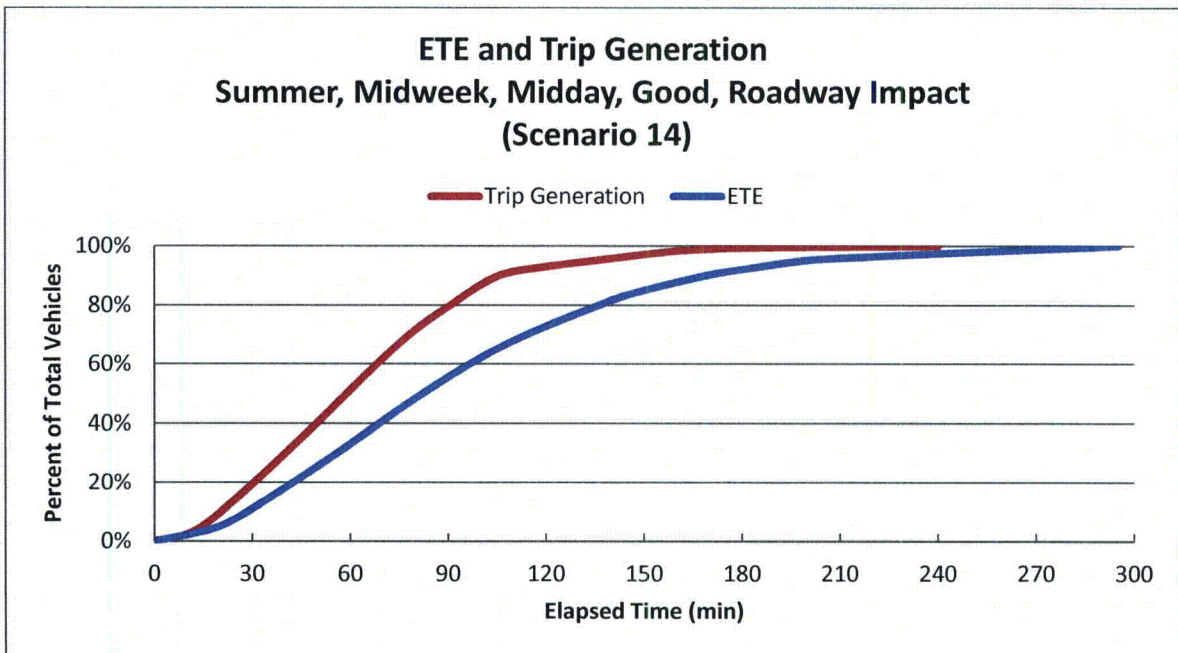


Figure J-14. ETE and Trip Generation: Summer, Midweek, Midday, Good Weather, Roadway Impact (Scenario 14)

APPENDIX K
Evacuation Roadway Network

K. EVACUATION ROADWAY NETWORK

As discussed in Section 1.3, a link-node analysis network was constructed to model the roadway network within the study area. Figure K-1 provides an overview of the link-node analysis network. The figure has been divided up into 41 more detailed figures (Figure K-2 through Figure K-42) which show each of the links and nodes in the network.

The analysis network was calibrated using the observations made during the field survey conducted in February 2012. Table K-1 lists the characteristics of each roadway section modeled in the ETE analysis. Each link is identified by its road name and the upstream and downstream node numbers. The geographic location of each link can be observed by referencing the grid map number provided in Table K-1. The roadway type identified in Table K-1 is generally based on the following criteria:

- Freeway: limited access highway, 2 or more lanes in each direction, high free flow speeds
- Freeway ramp: ramp on to or off of a limited access highway
- Major arterial: 3 or more lanes in each direction
- Minor arterial: 2 or more lanes in each direction
- Collector: single lane in each direction
- Local roadways: single lane in each direction, local roads with low free flow speeds

The term, "No. of Lanes" in Table K-1 identifies the number of lanes that extend throughout the length of the link. Many links have additional lanes on the immediate approach to an intersection (turn pockets); these have been recorded and entered into the input stream for the DYNEV II System.

As discussed in Section 1.3, lane width and shoulder width were not physically measured during the road survey. Rather, estimates of these measures were based on visual observations and recorded images.

Table K-2 identifies each node in the network that is controlled and the type of control (stop sign, yield sign, pre-timed signal, actuated signal, traffic control point) at that node. Uncontrolled nodes are not included in Table K-2. The location of each node can be observed by referencing the grid map number provided.

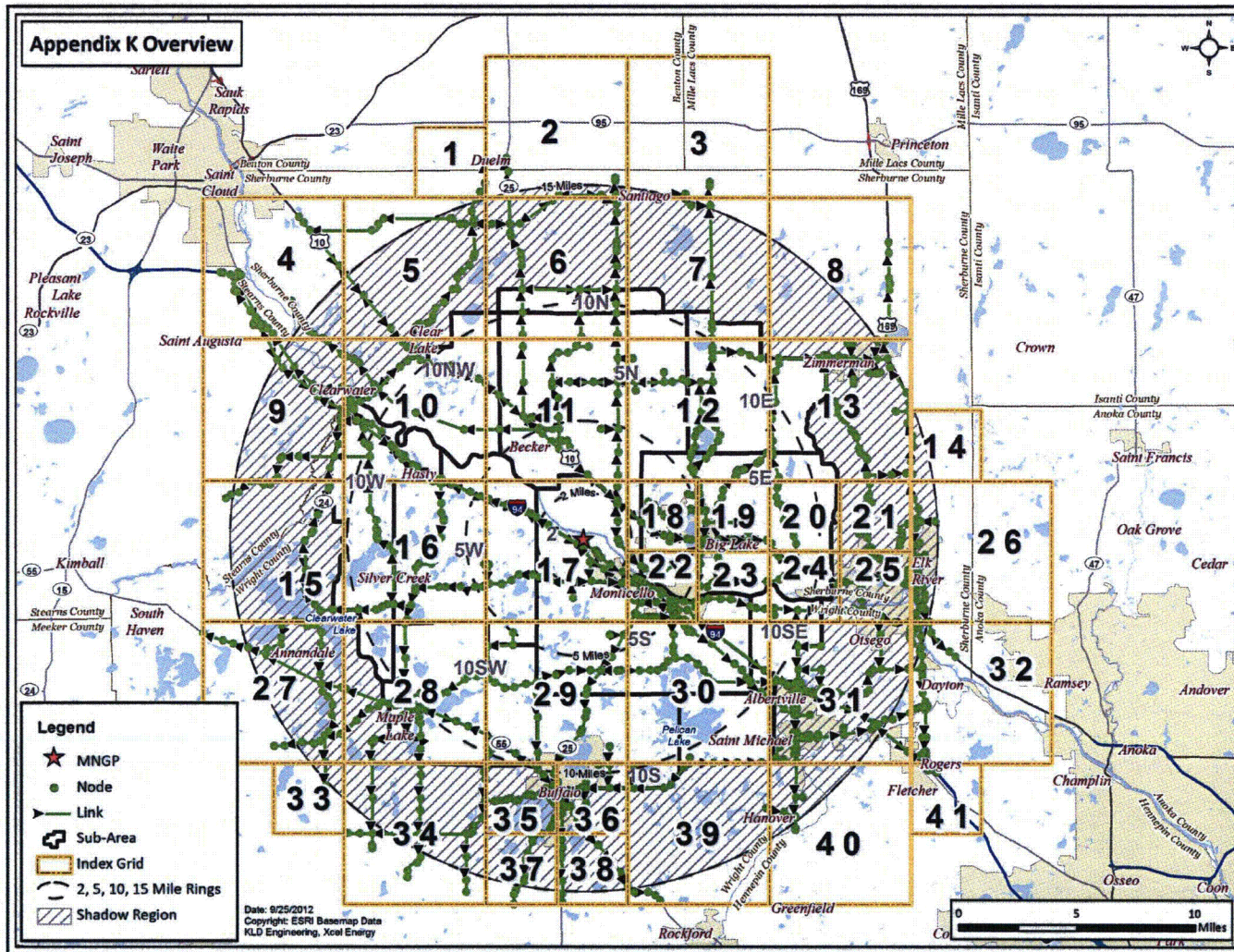


Figure K-1. MNGP Link-Node Analysis Network

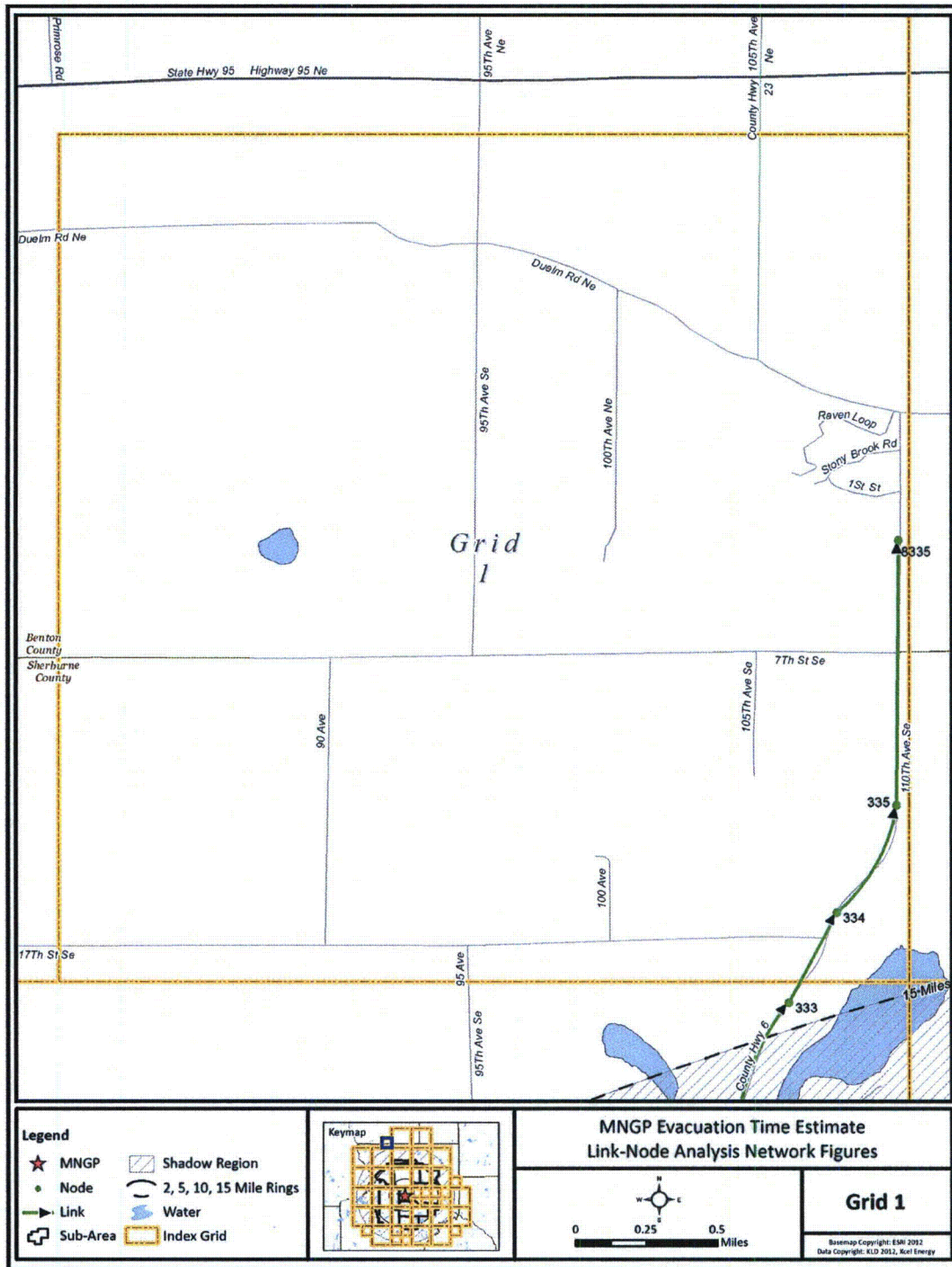


Figure K-2. Link-Node Analysis Network – Grid 1

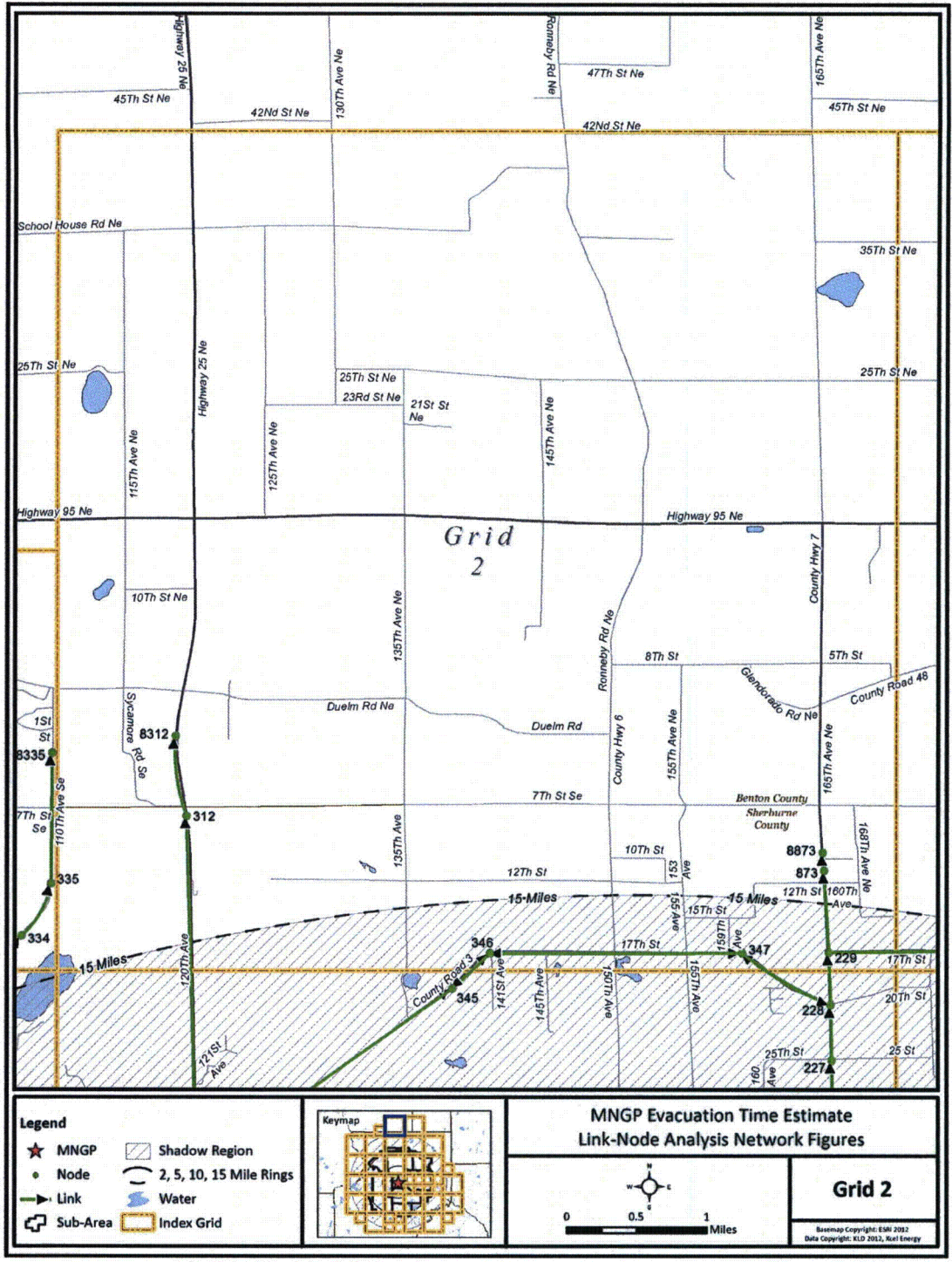


Figure K-3. Link-Node Analysis Network – Grid 2

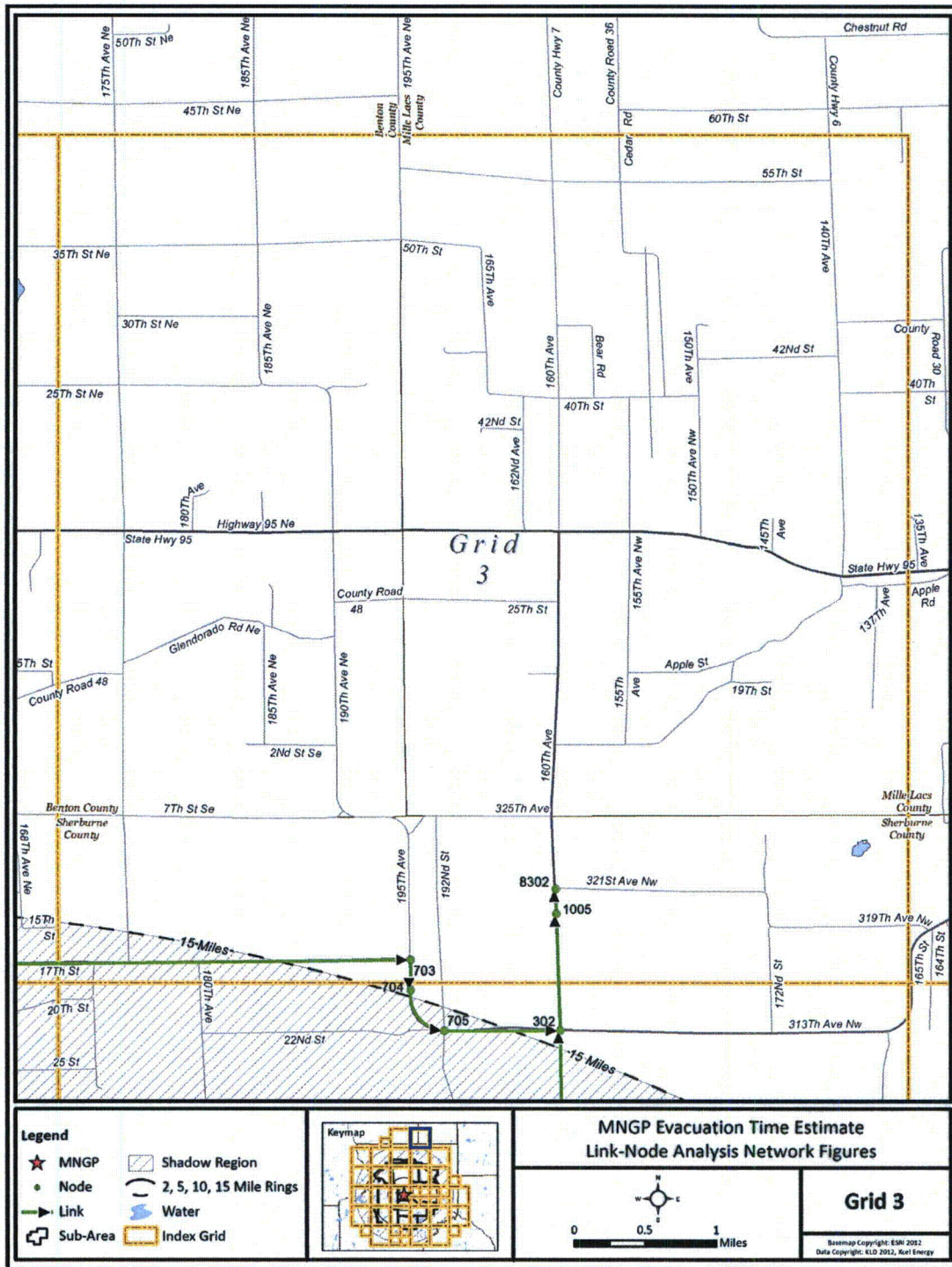


Figure K-4. Link-Node Analysis Network – Grid 3

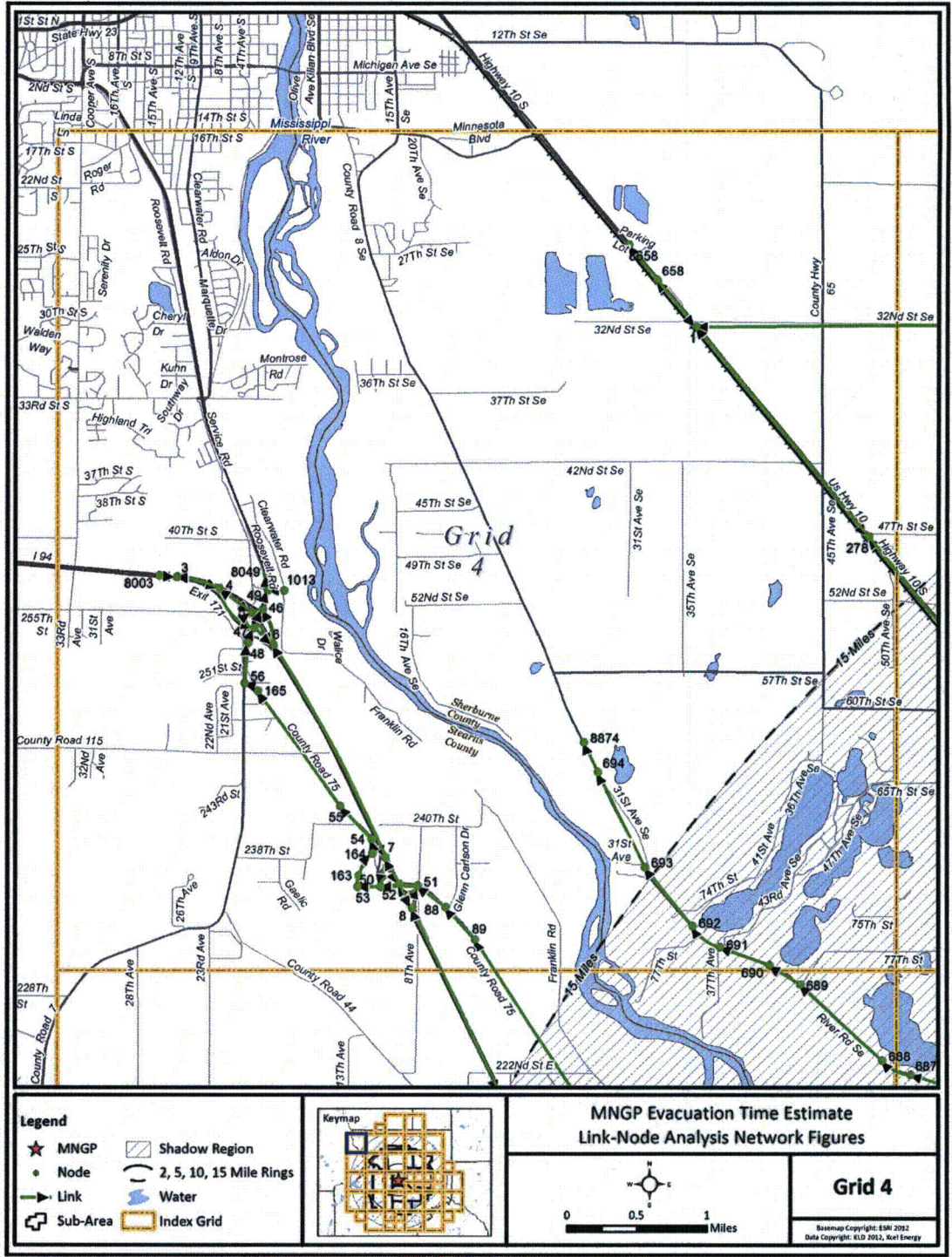


Figure K-5. Link-Node Analysis Network – Grid 4

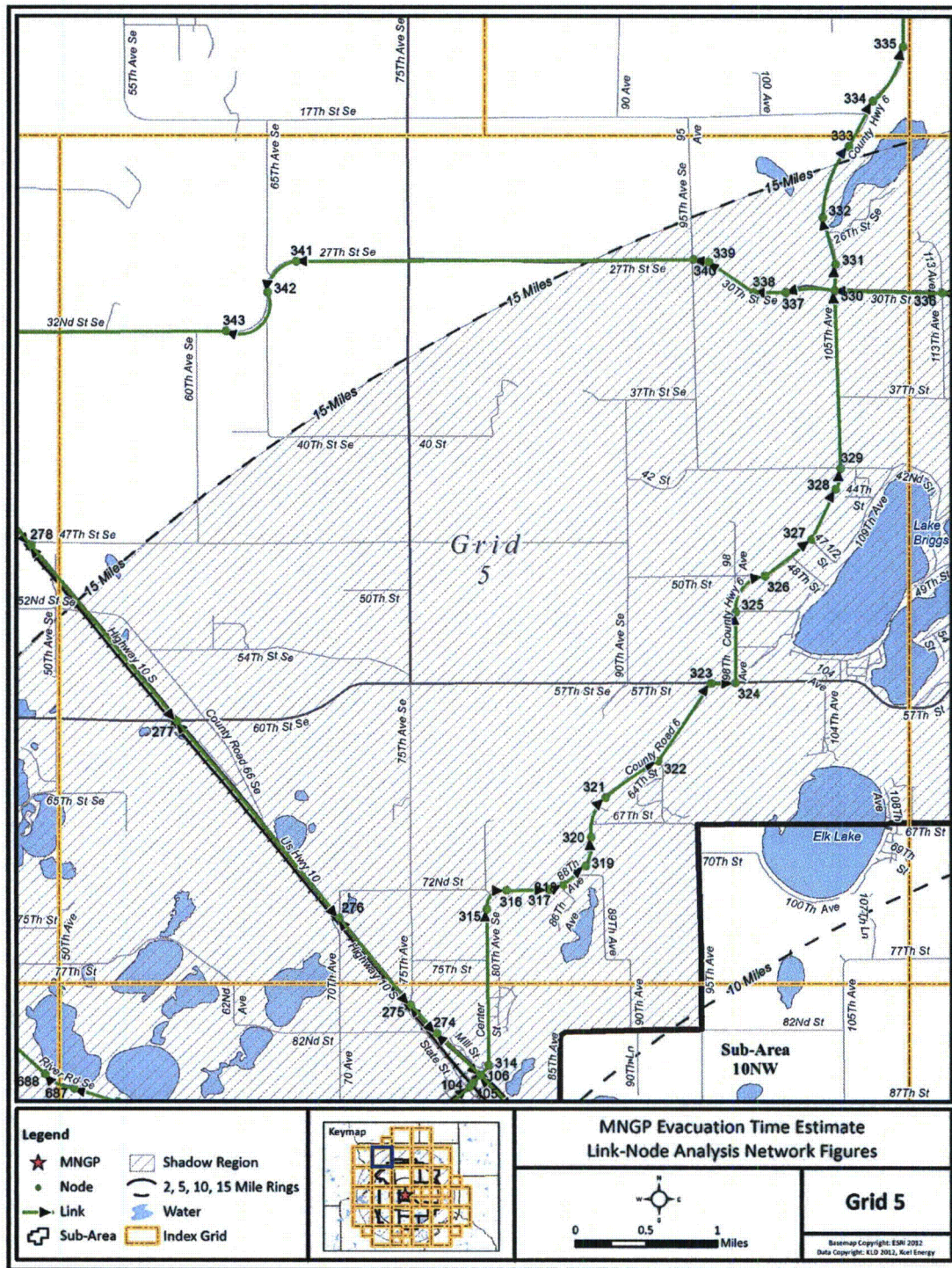


Figure K-6. Link-Node Analysis Network – Grid 5

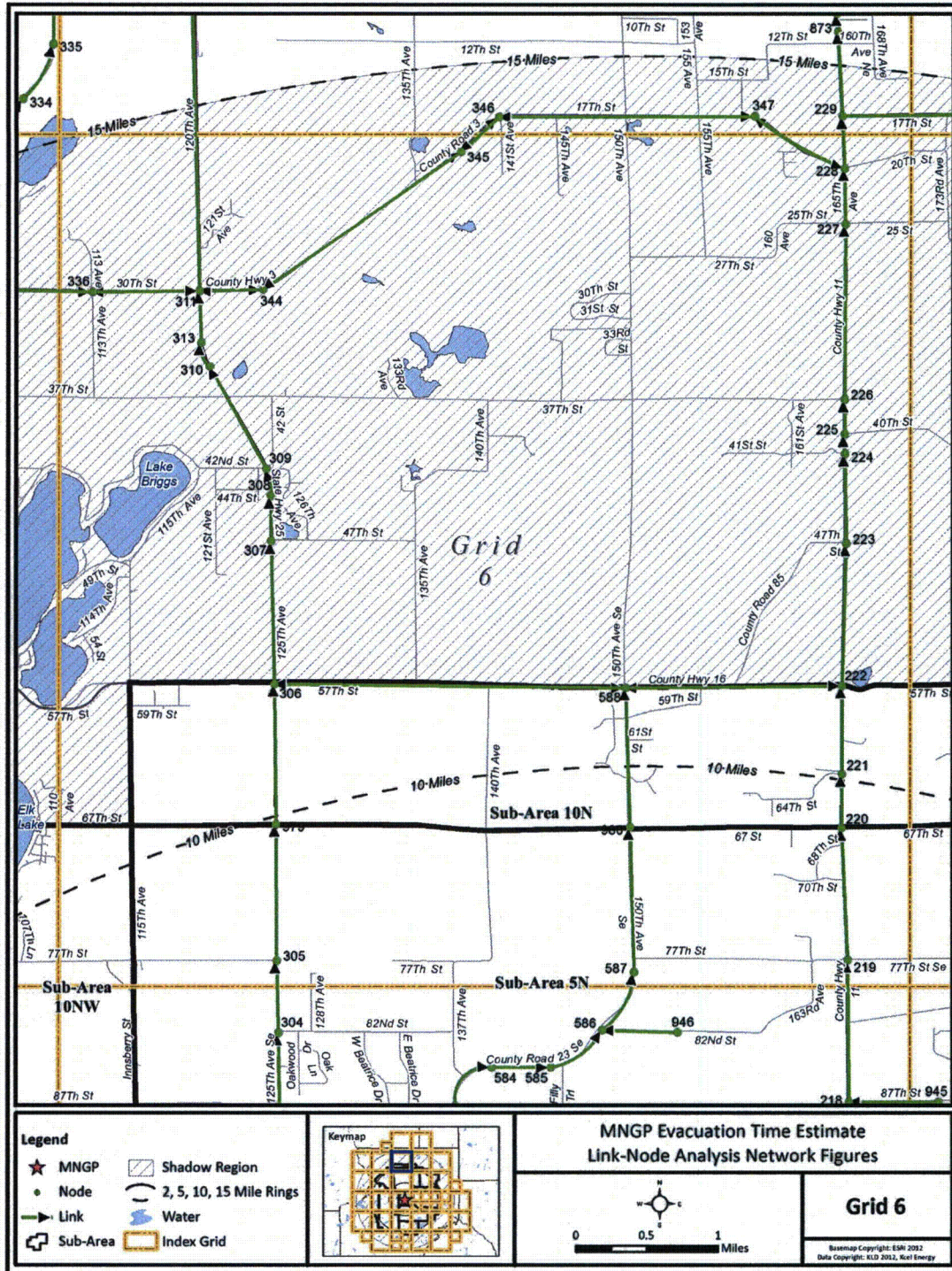


Figure K-7. Link-Node Analysis Network – Grid 6

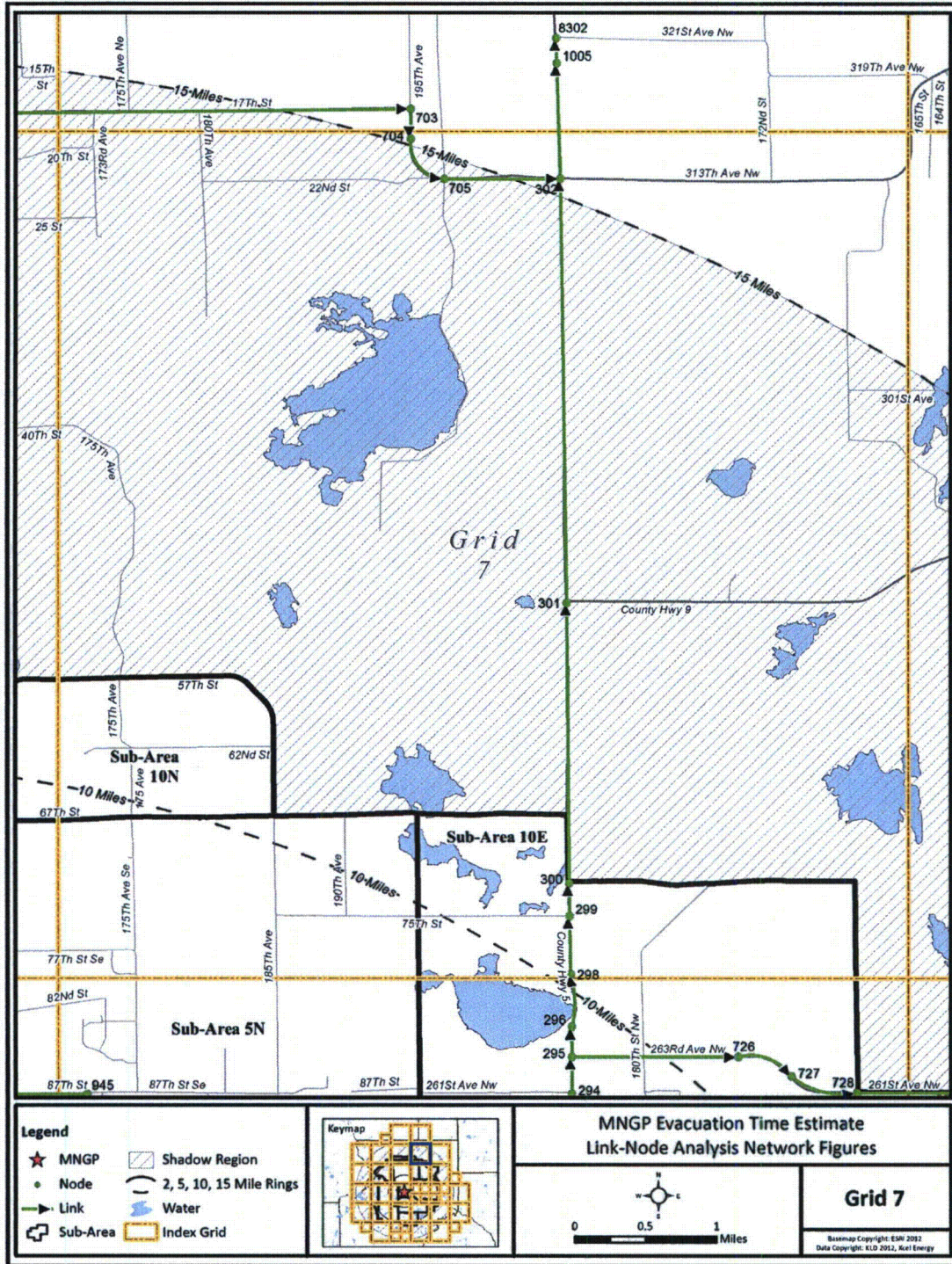


Figure K-8. Link-Node Analysis Network – Grid 7

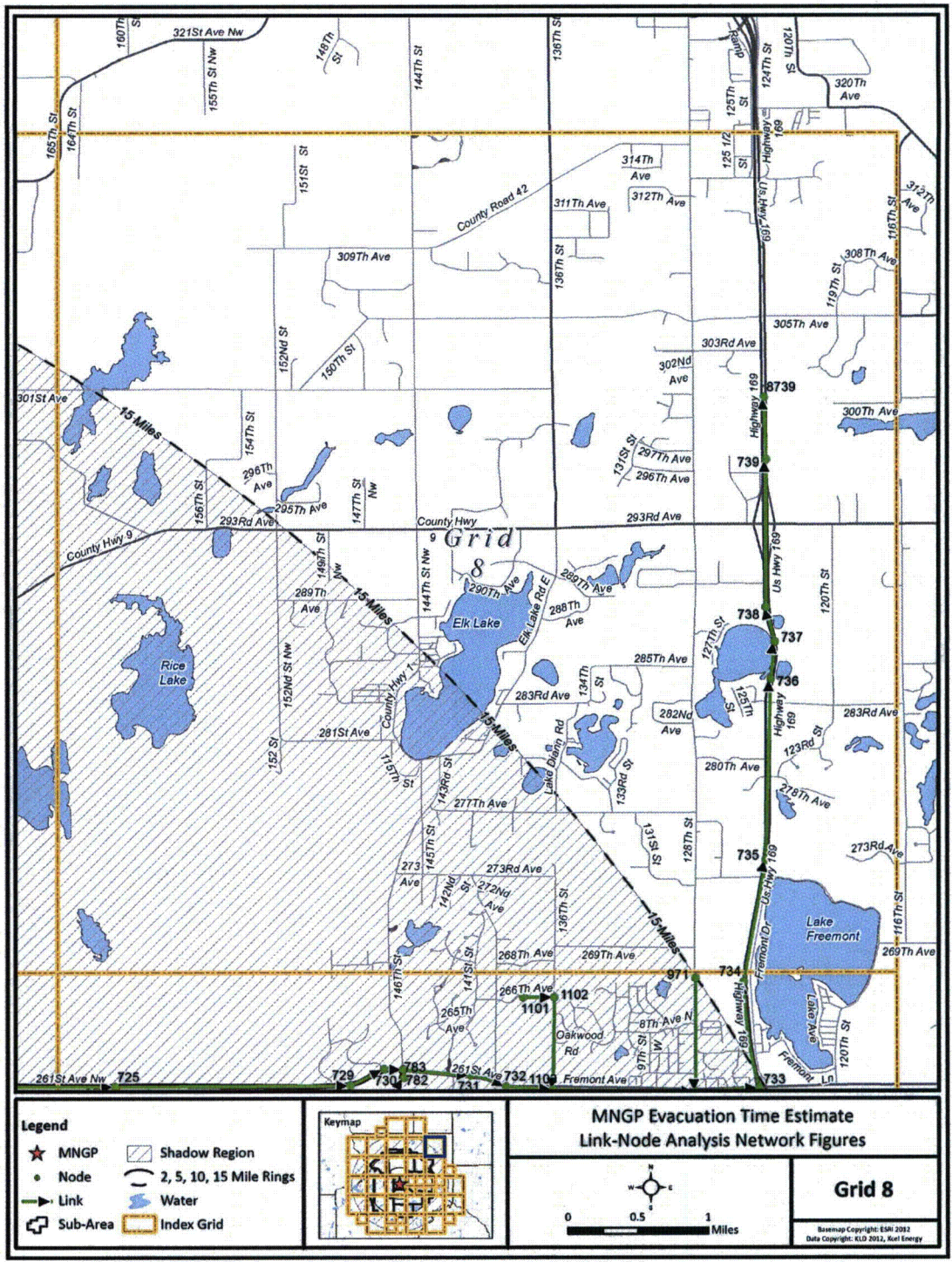


Figure K-9. Link-Node Analysis Network – Grid 8

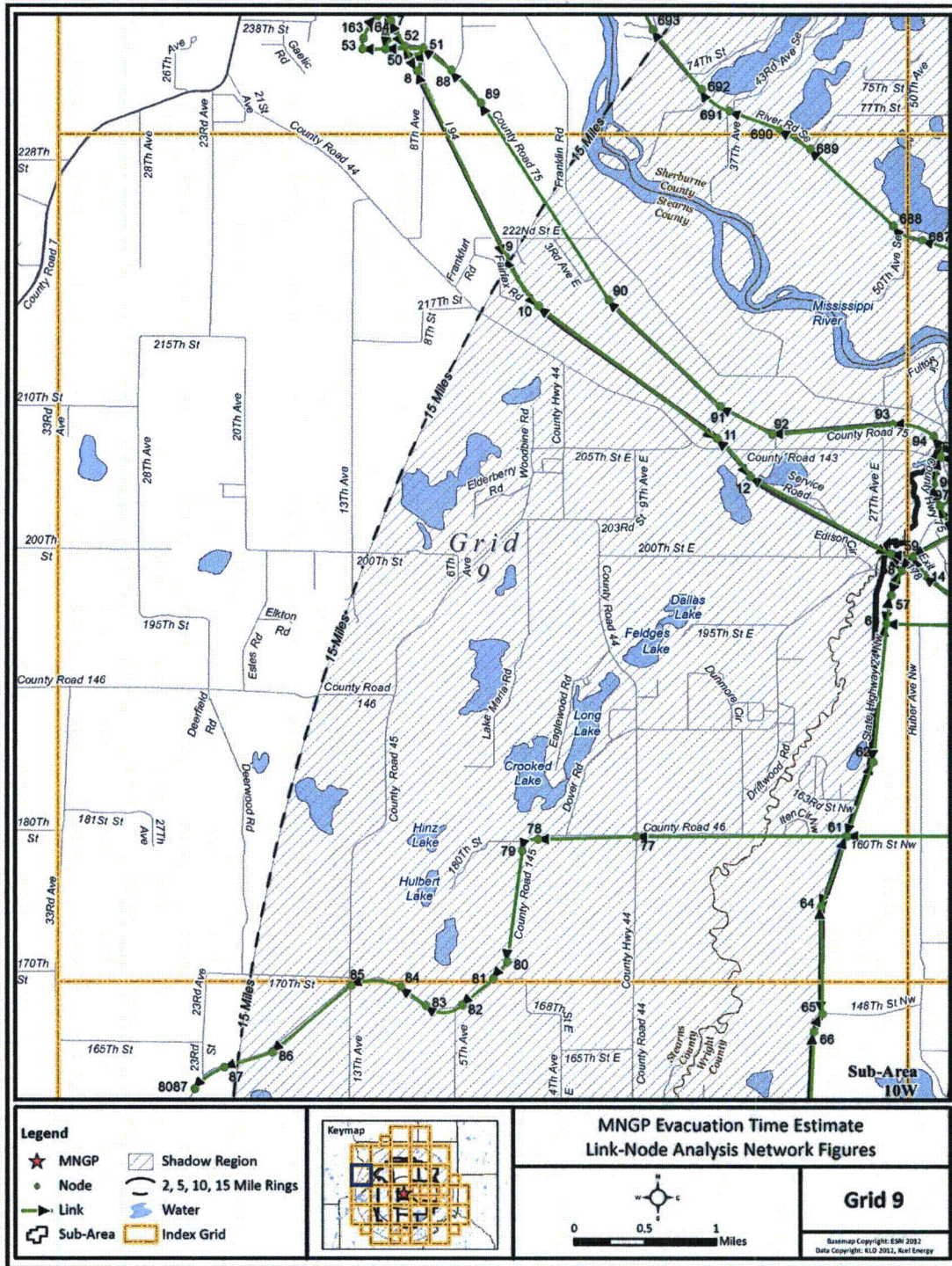


Figure K-10. Link-Node Analysis Network – Grid 9

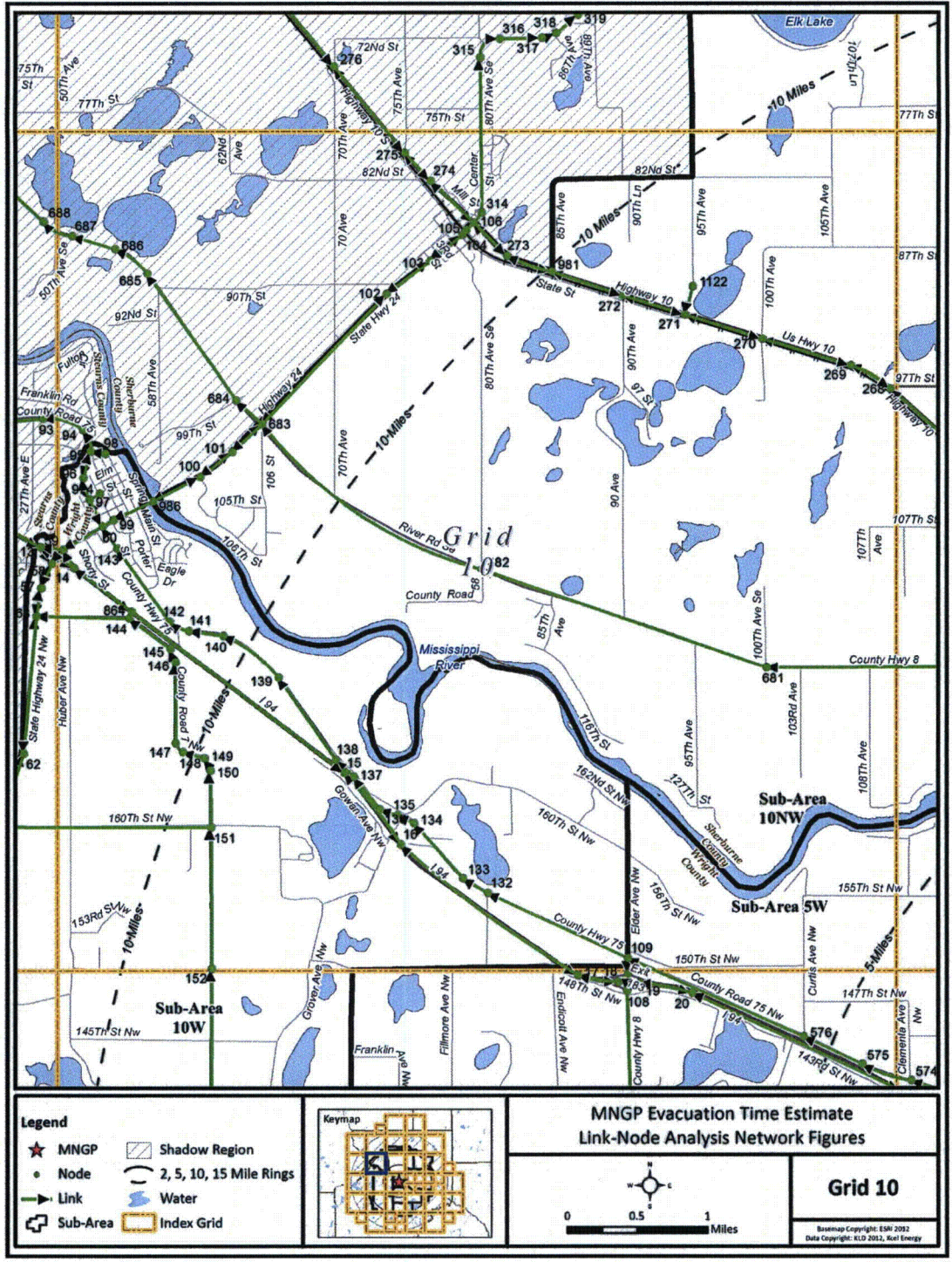


Figure K-11. Link-Node Analysis Network – Grid 10

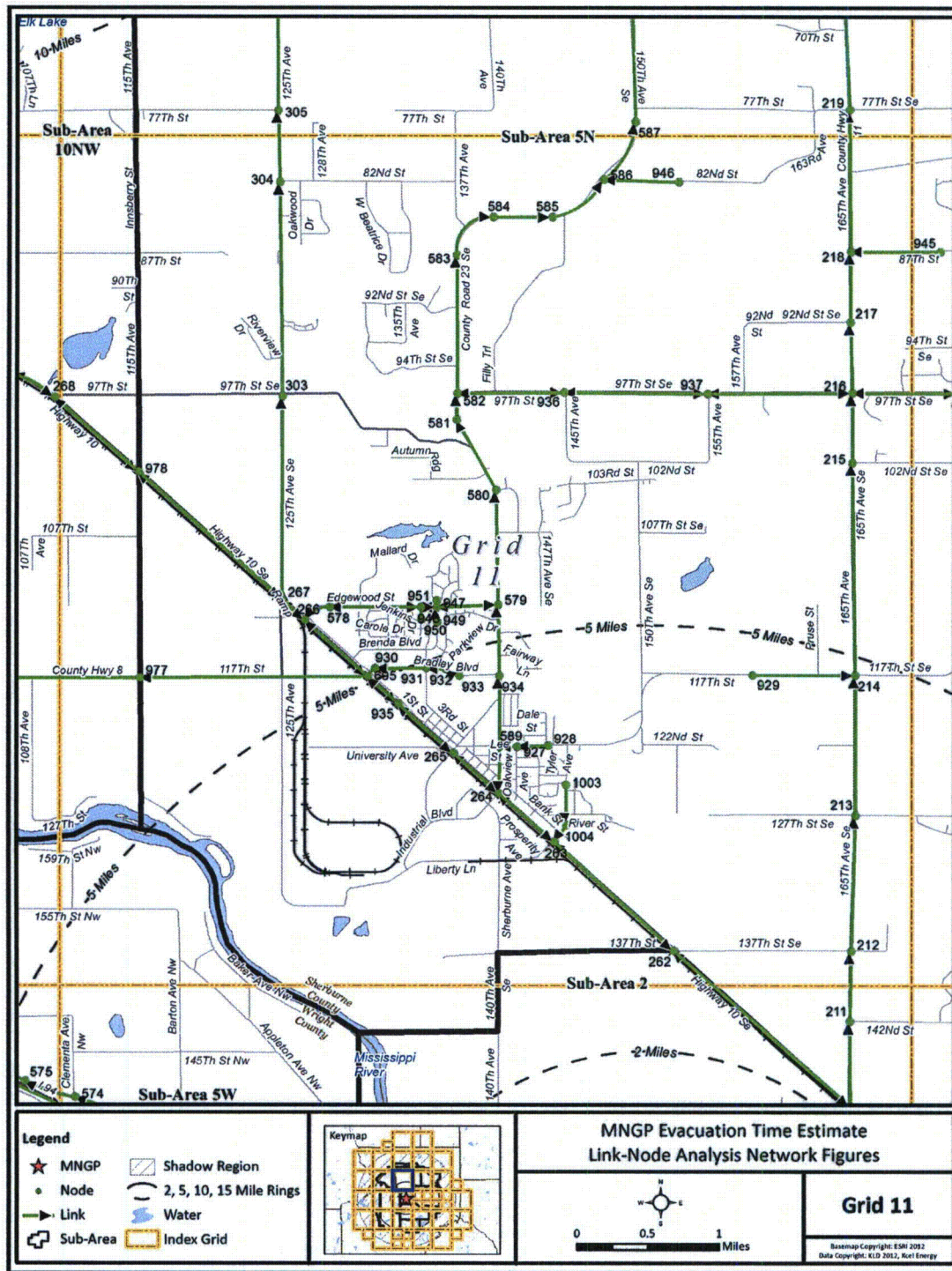


Figure K-12. Link-Node Analysis Network – Grid 11

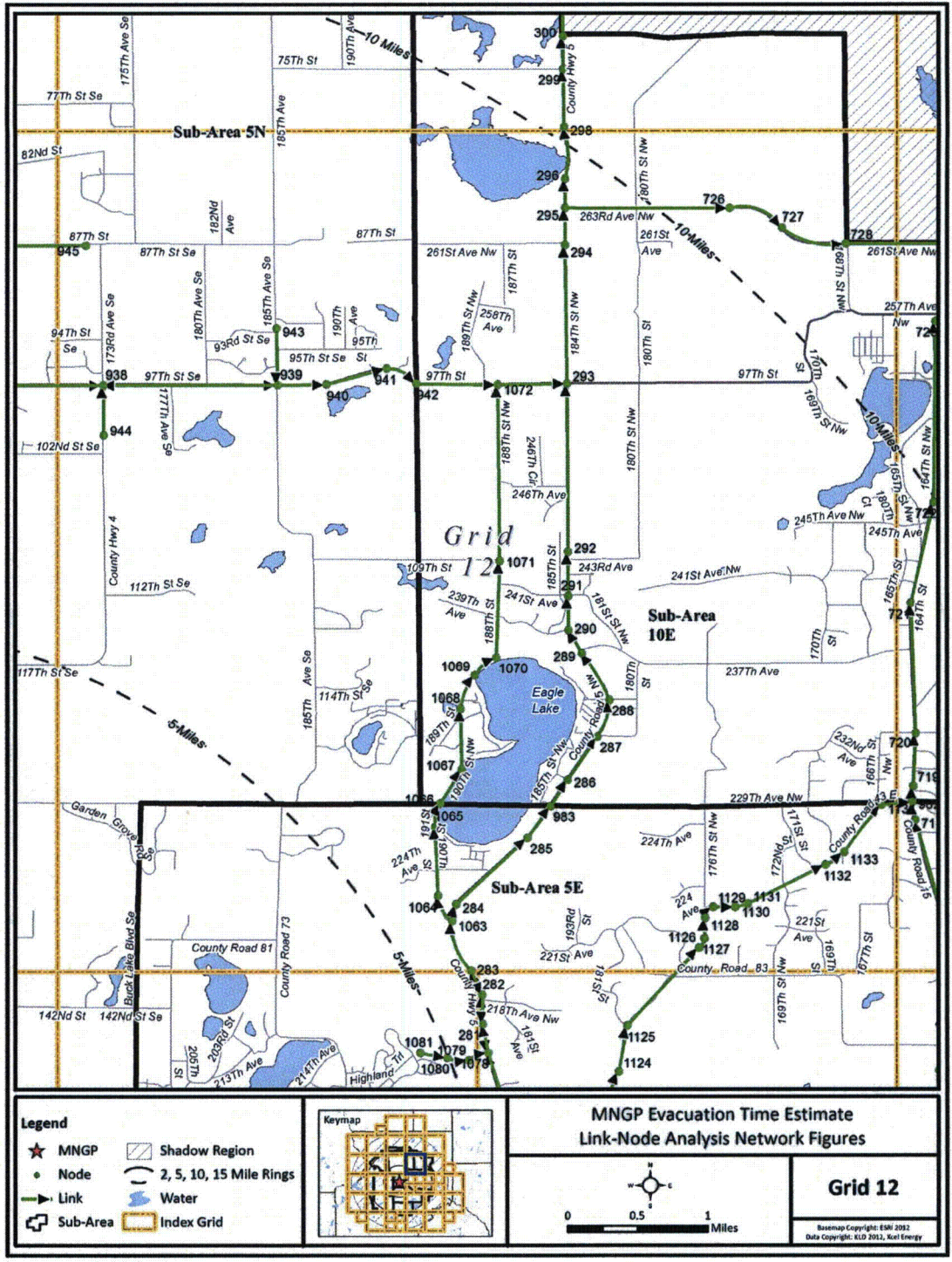


Figure K-13. Link-Node Analysis Network – Grid 12

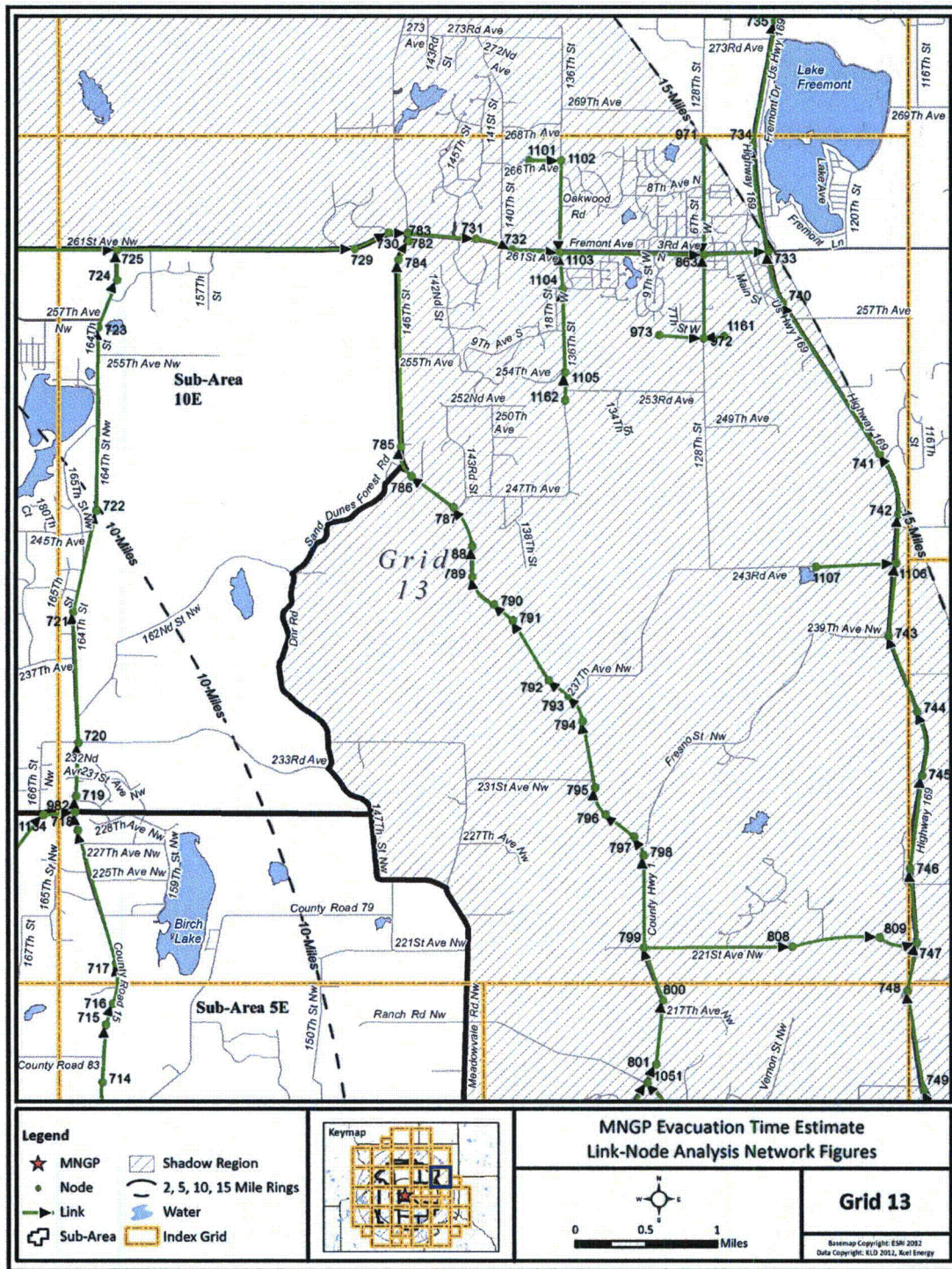


Figure K-14. Link-Node Analysis Network – Grid 13

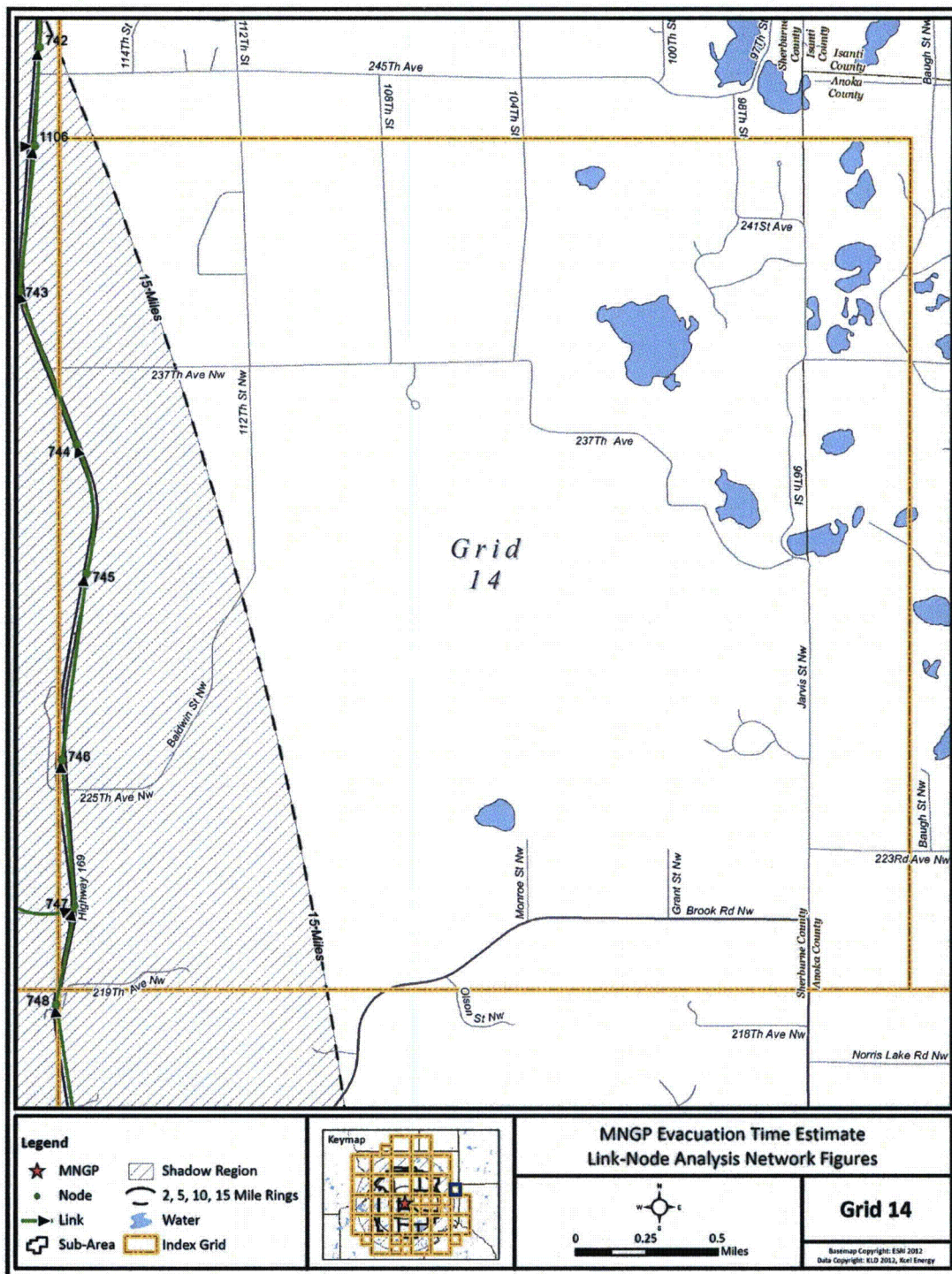


Figure K-15. Link-Node Analysis Network – Grid 14

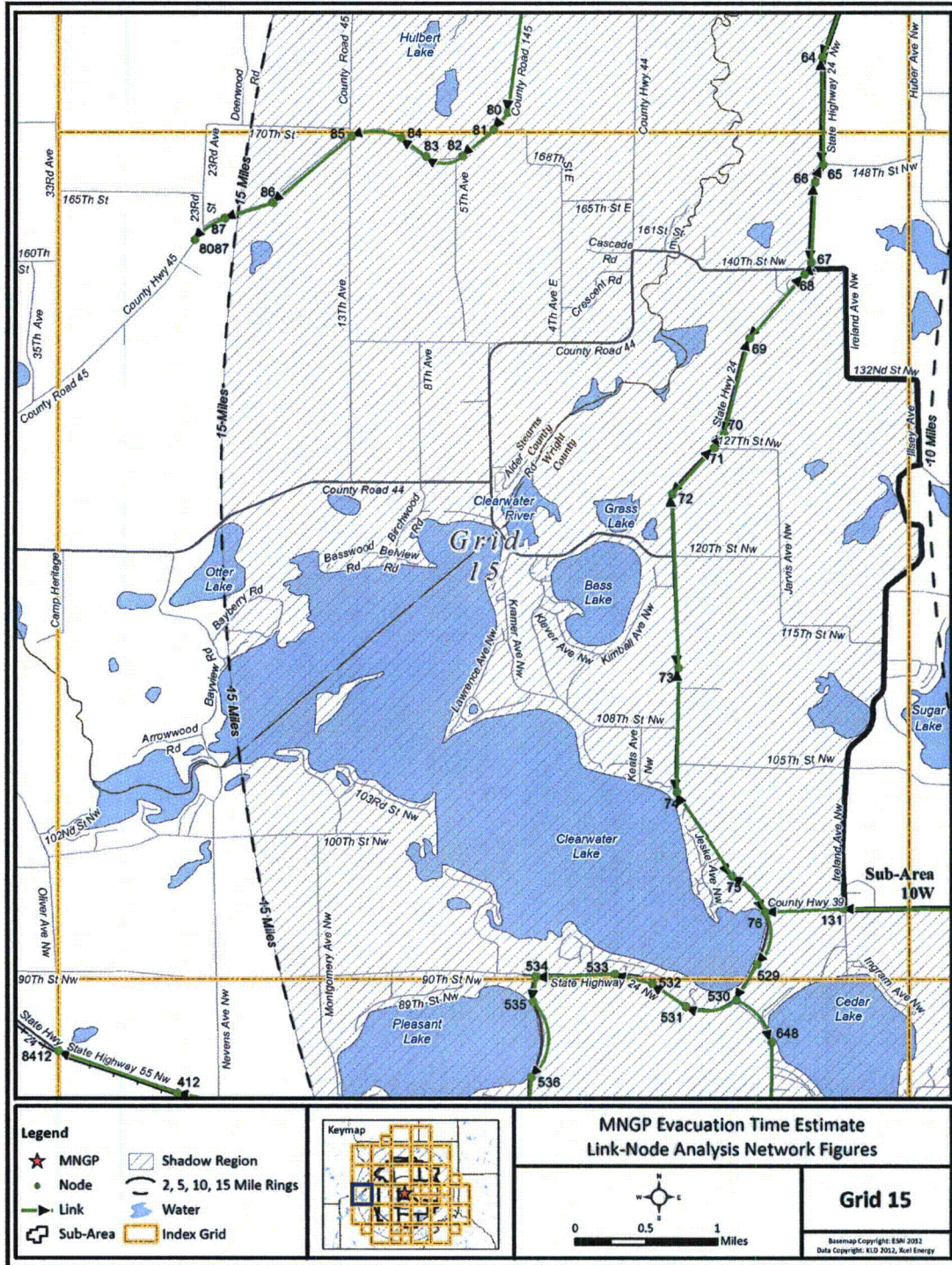


Figure K-16. Link-Node Analysis Network – Grid 15

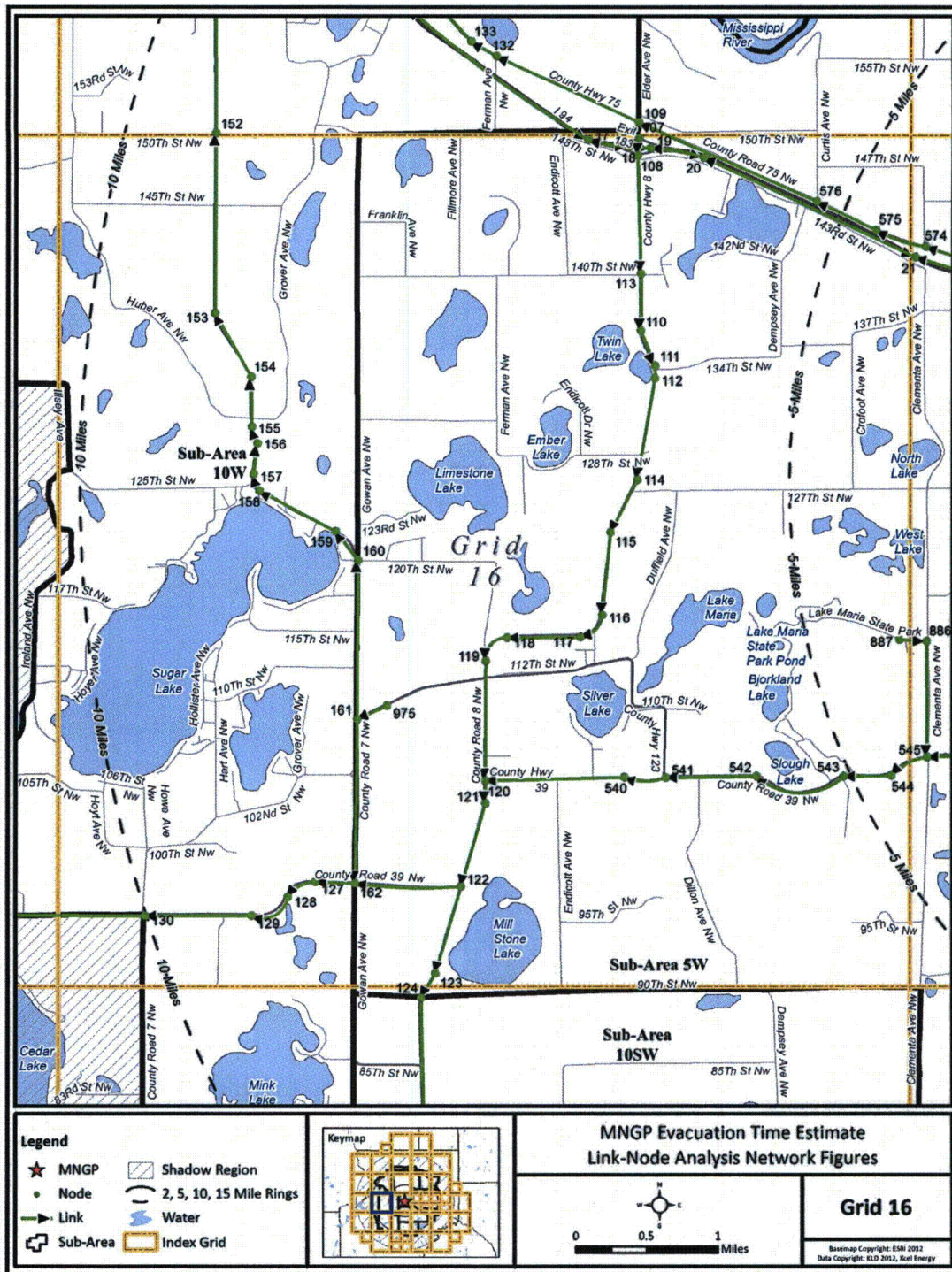


Figure K-17. Link-Node Analysis Network – Grid 16

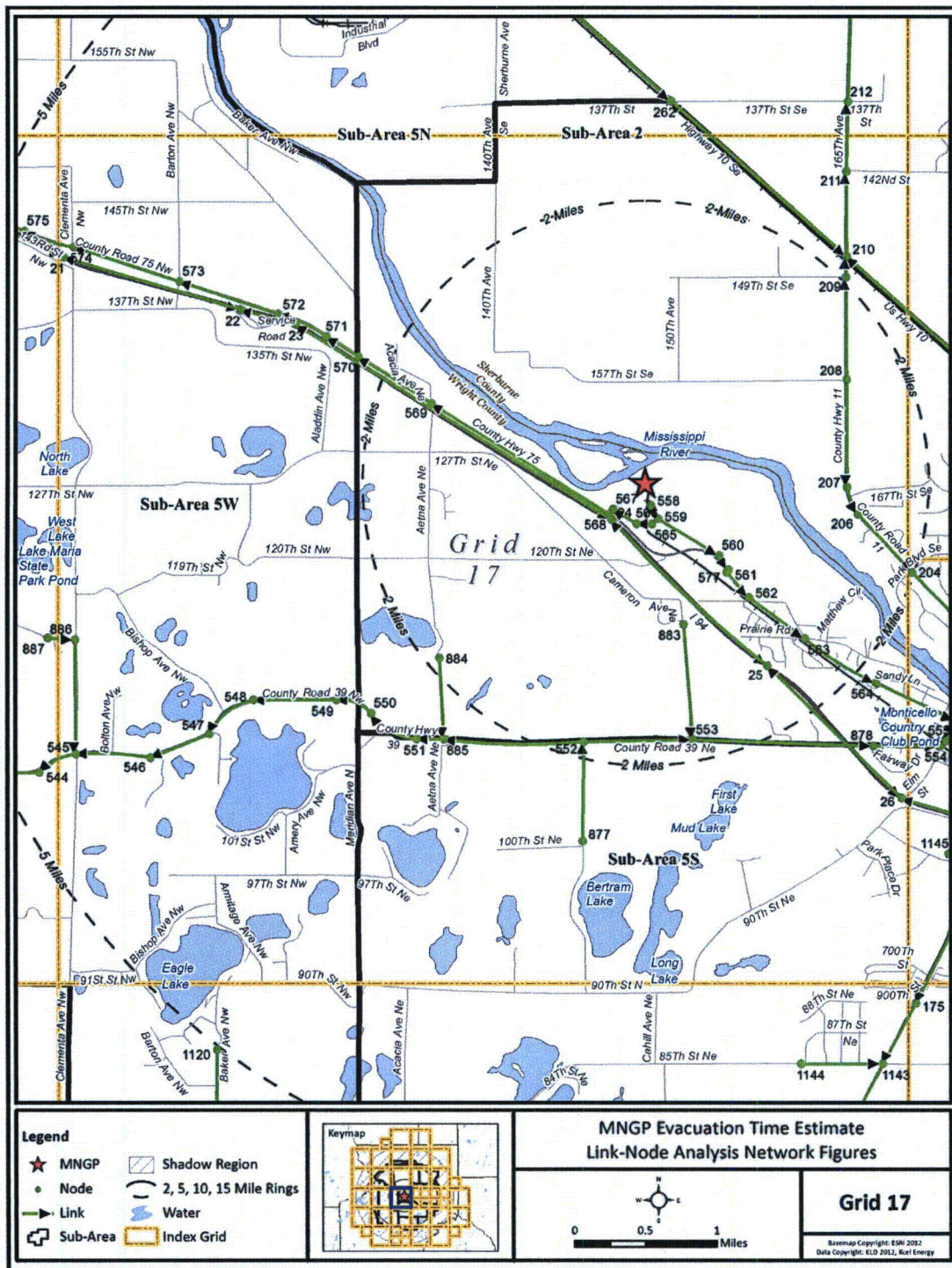


Figure K-18. Link-Node Analysis Network – Grid 17

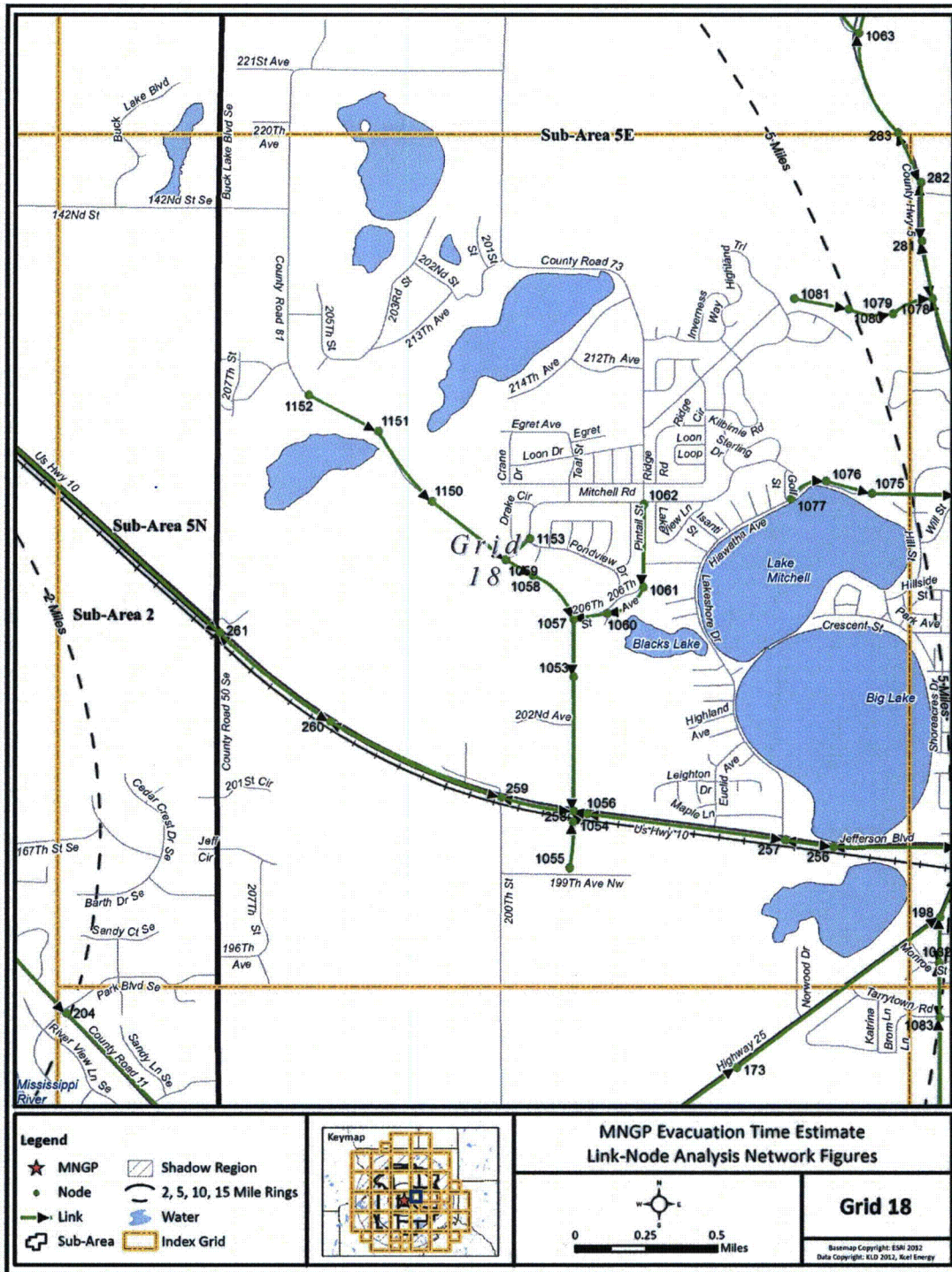


Figure K-19. Link-Node Analysis Network – Grid 18

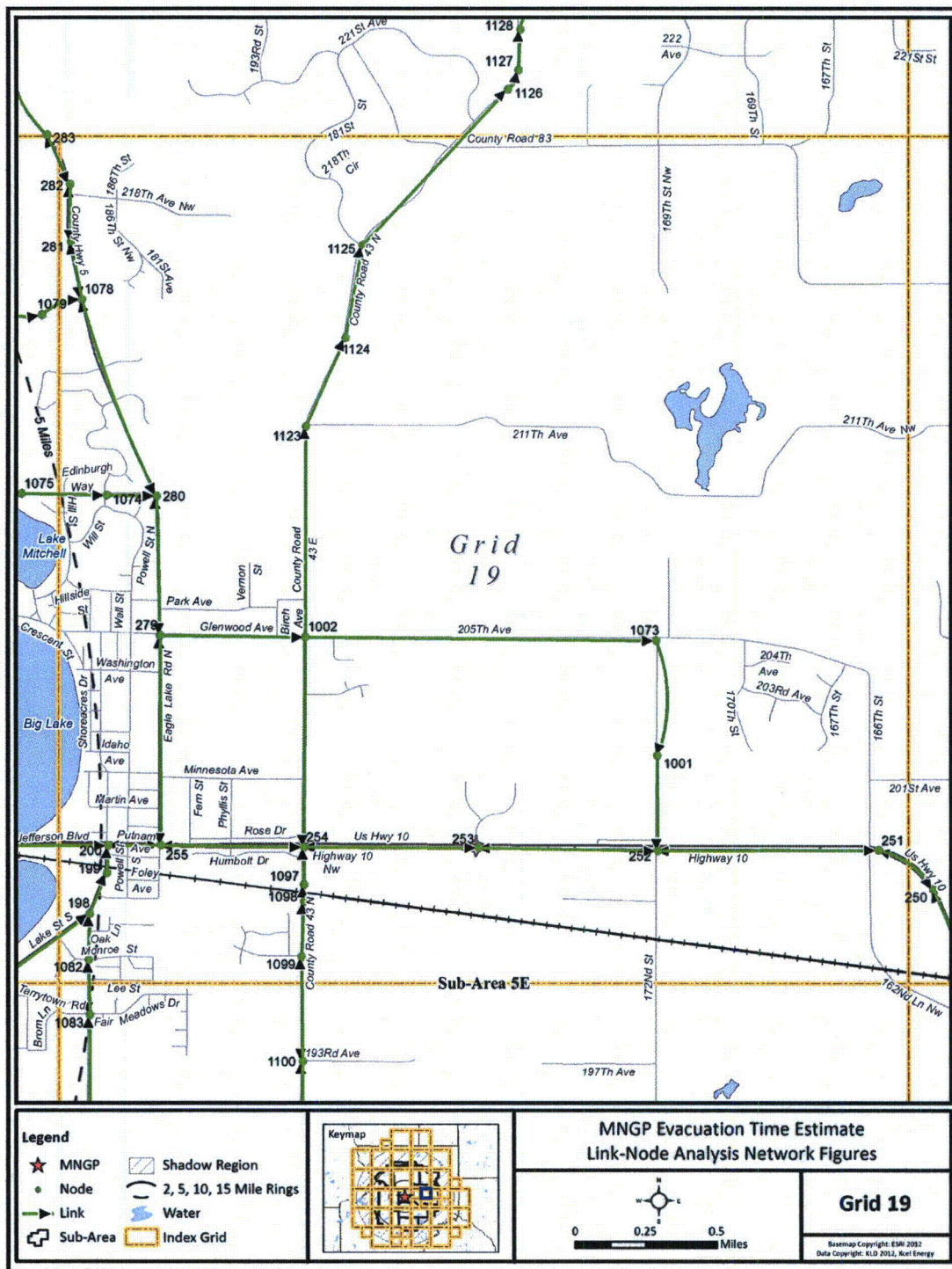


Figure K-20. Link-Node Analysis Network – Grid 19

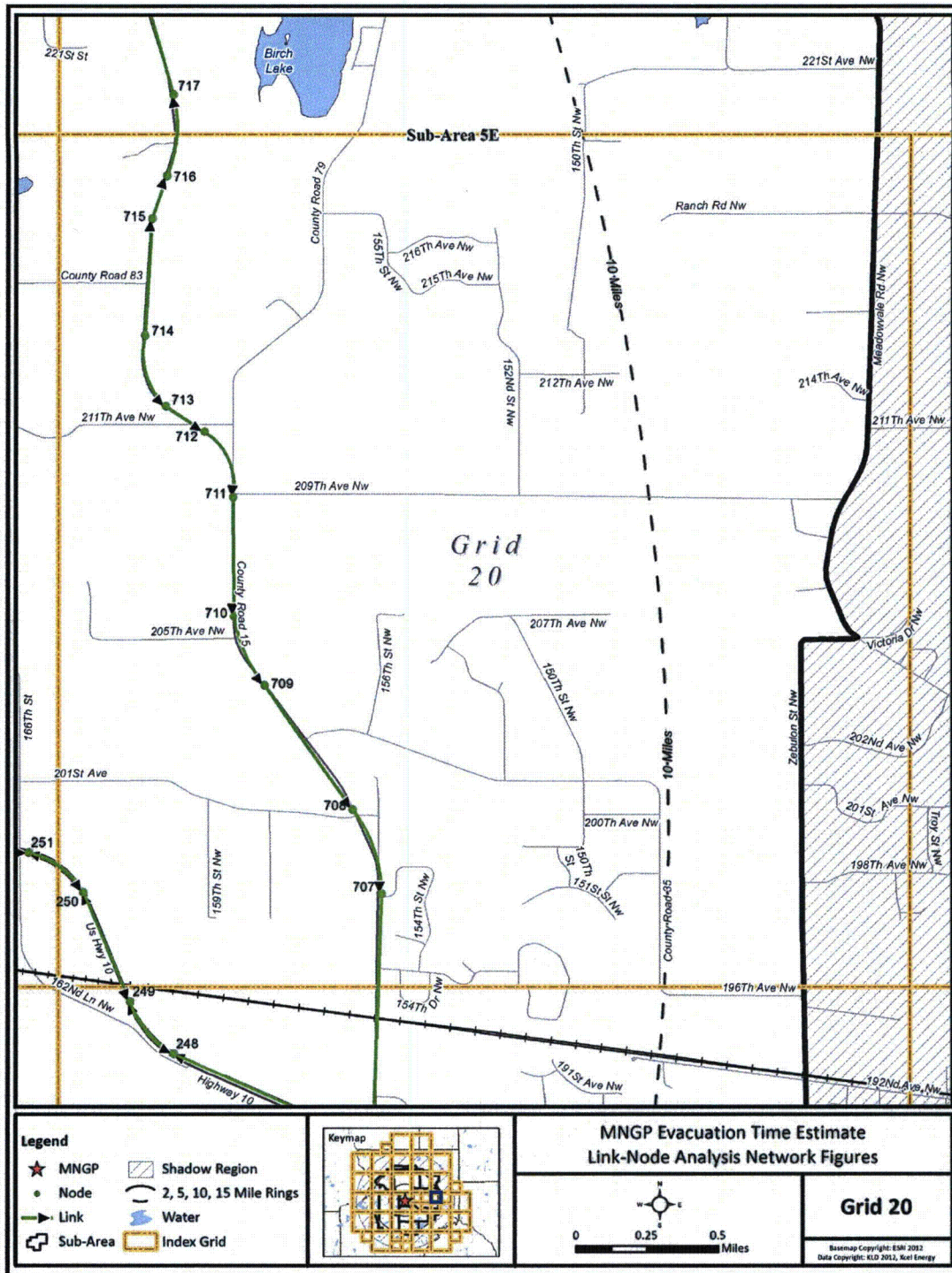


Figure K-21. Link-Node Analysis Network – Grid 20

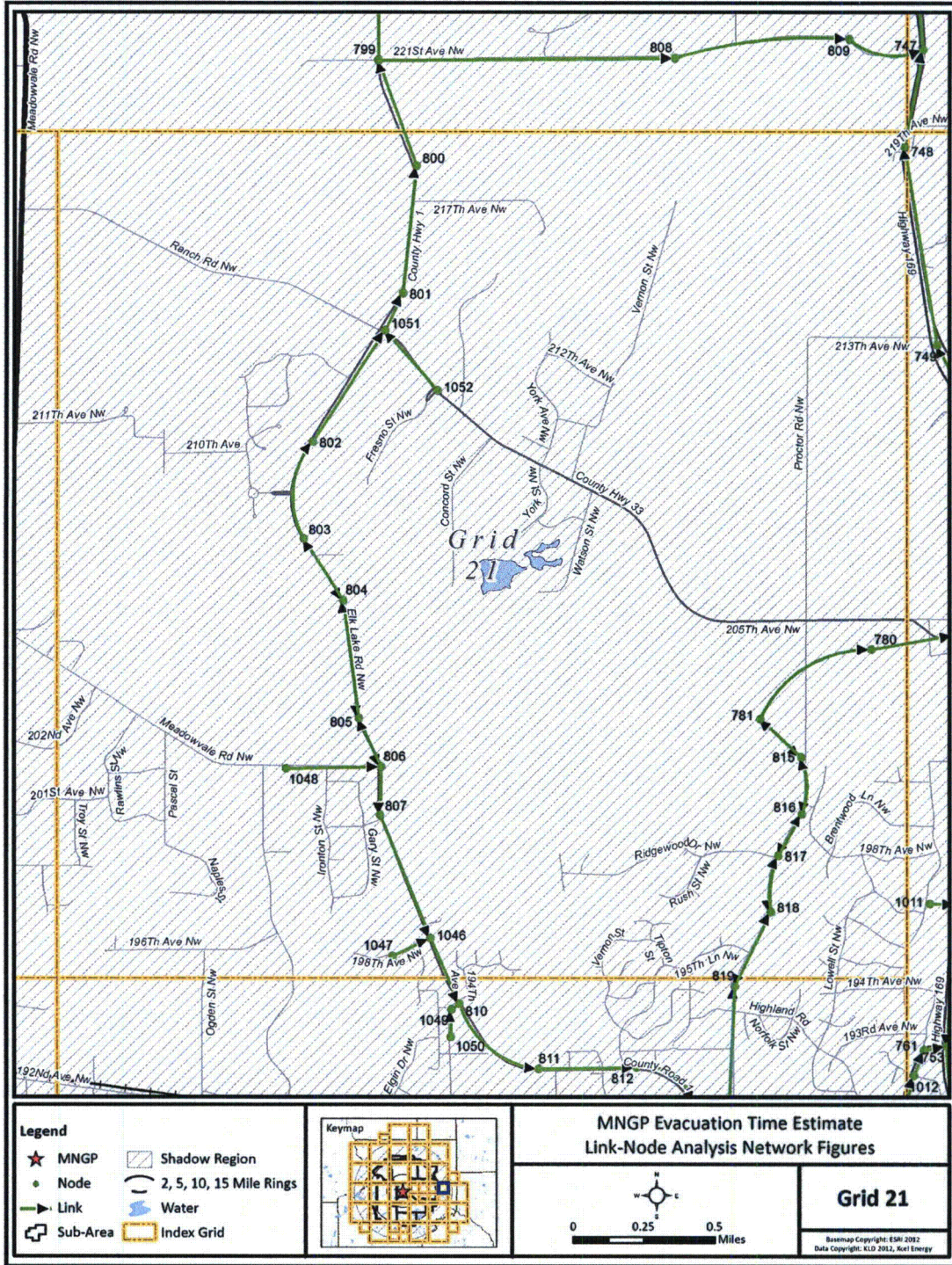


Figure K-22. Link-Node Analysis Network – Grid 21

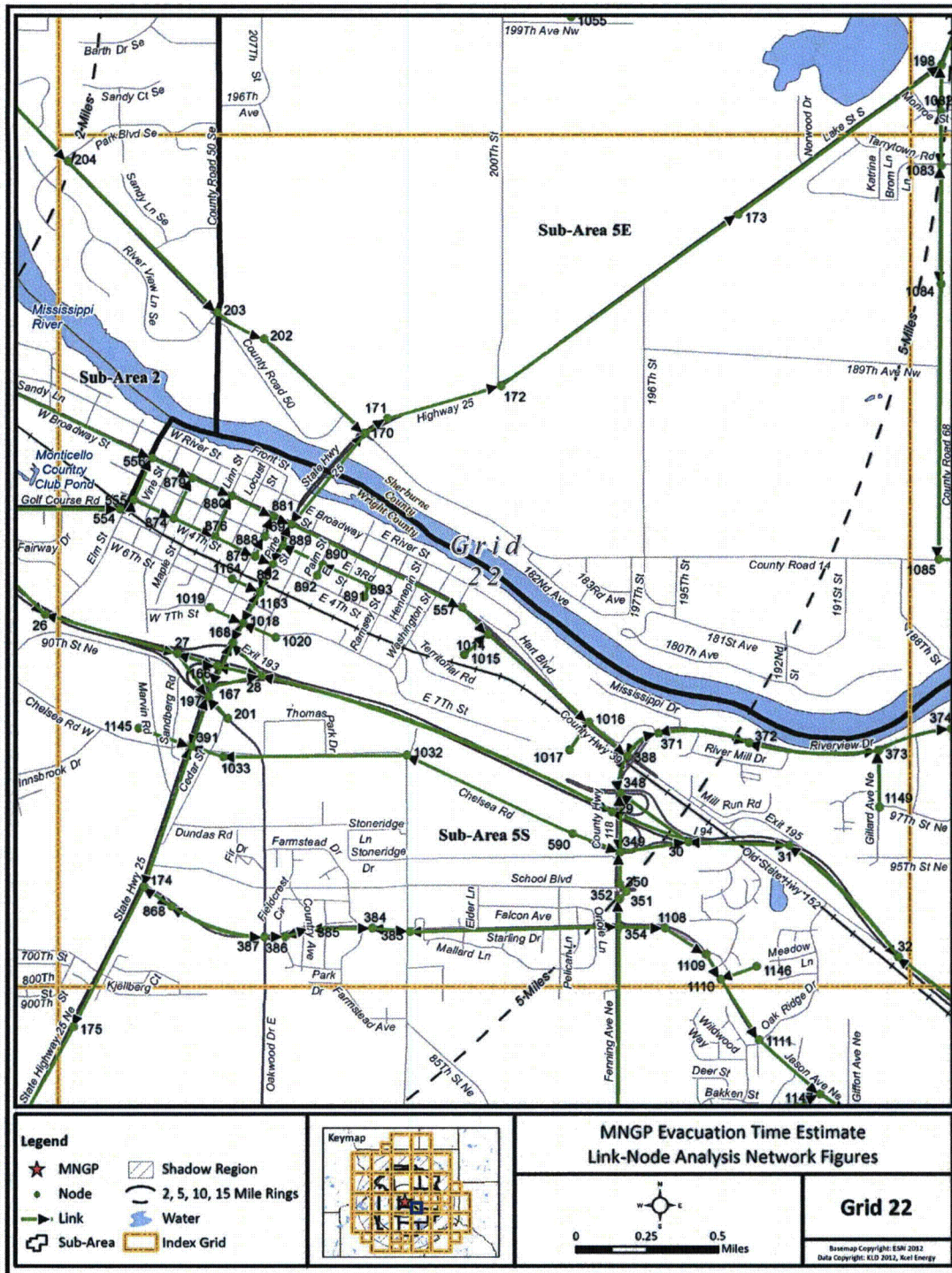


Figure K-23. Link-Node Analysis Network – Grid 22



Figure K-24. Link-Node Analysis Network – Grid 23



Figure K-25. Link-Node Analysis Network – Grid 24

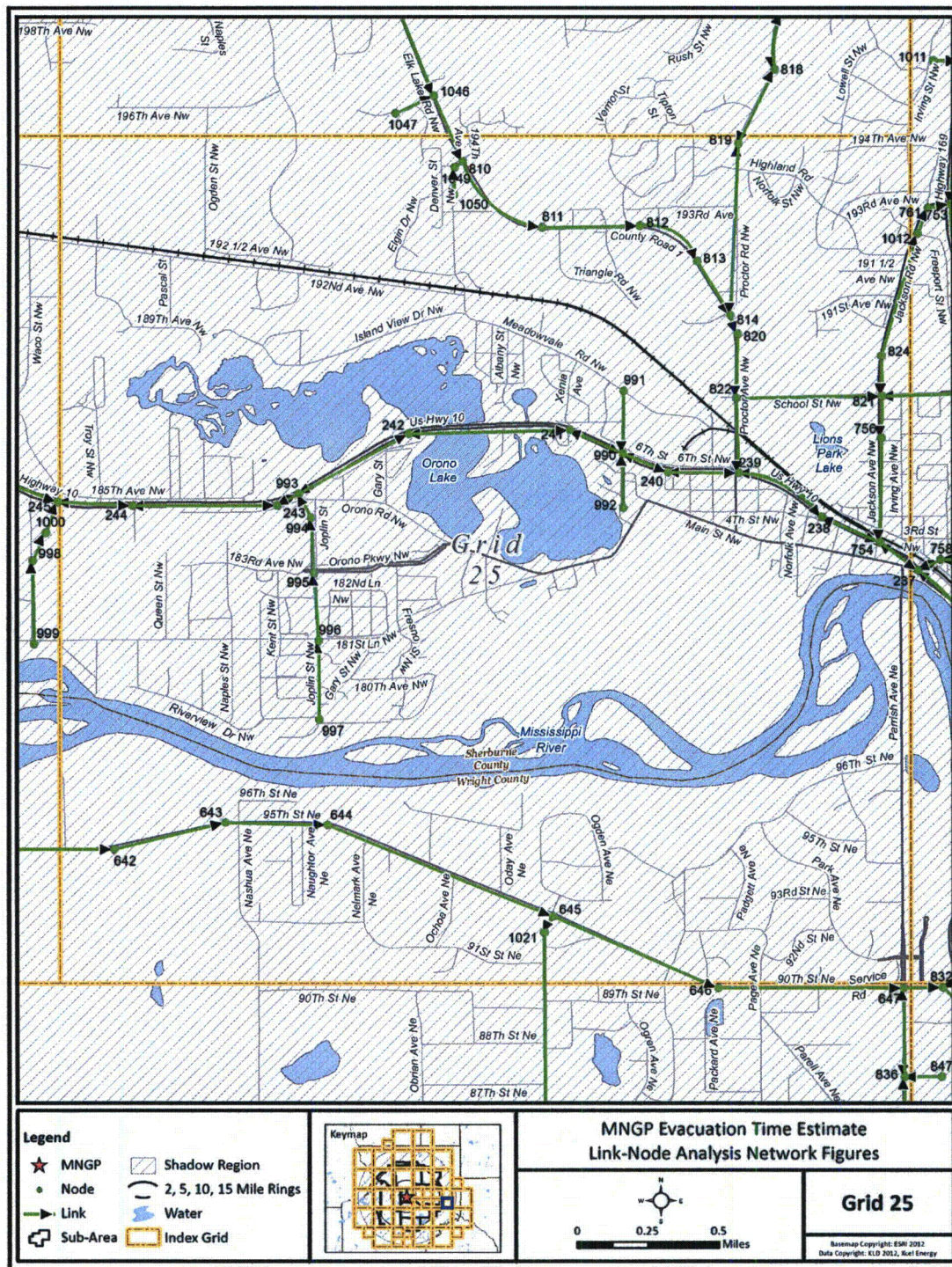


Figure K-26. Link-Node Analysis Network – Grid 25

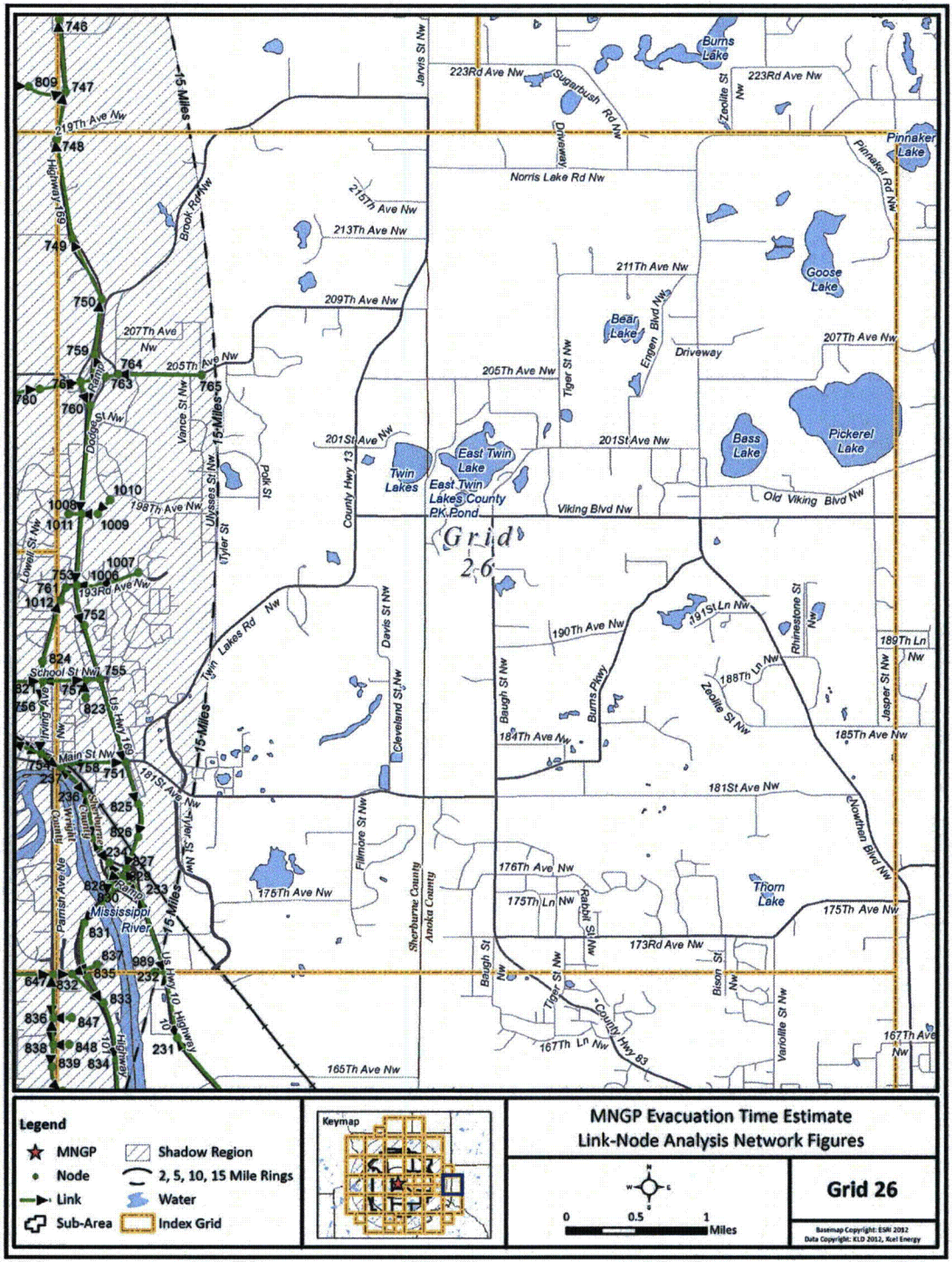


Figure K-27. Link-Node Analysis Network – Grid 26

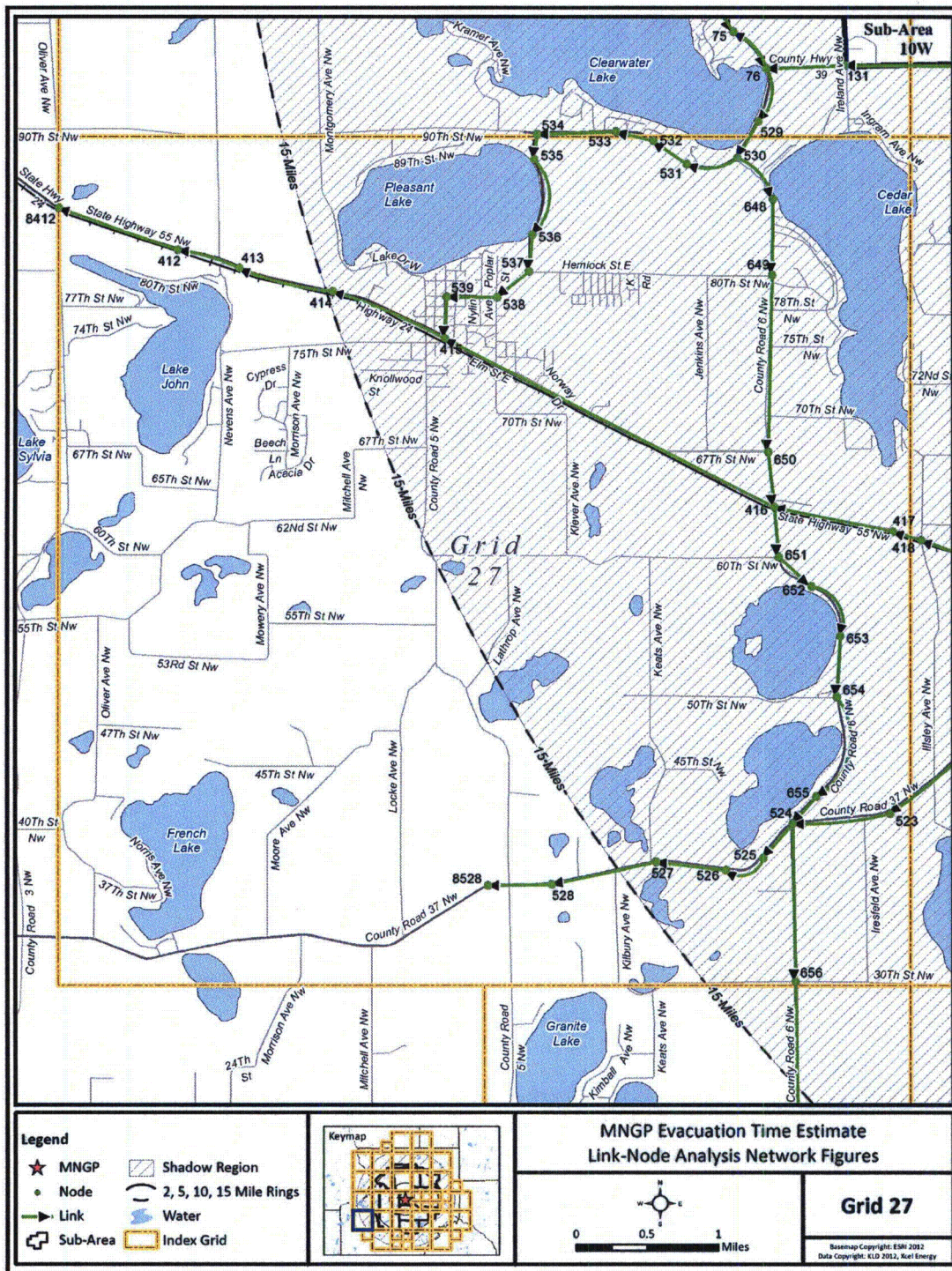


Figure K-28. Link-Node Analysis Network – Grid 27

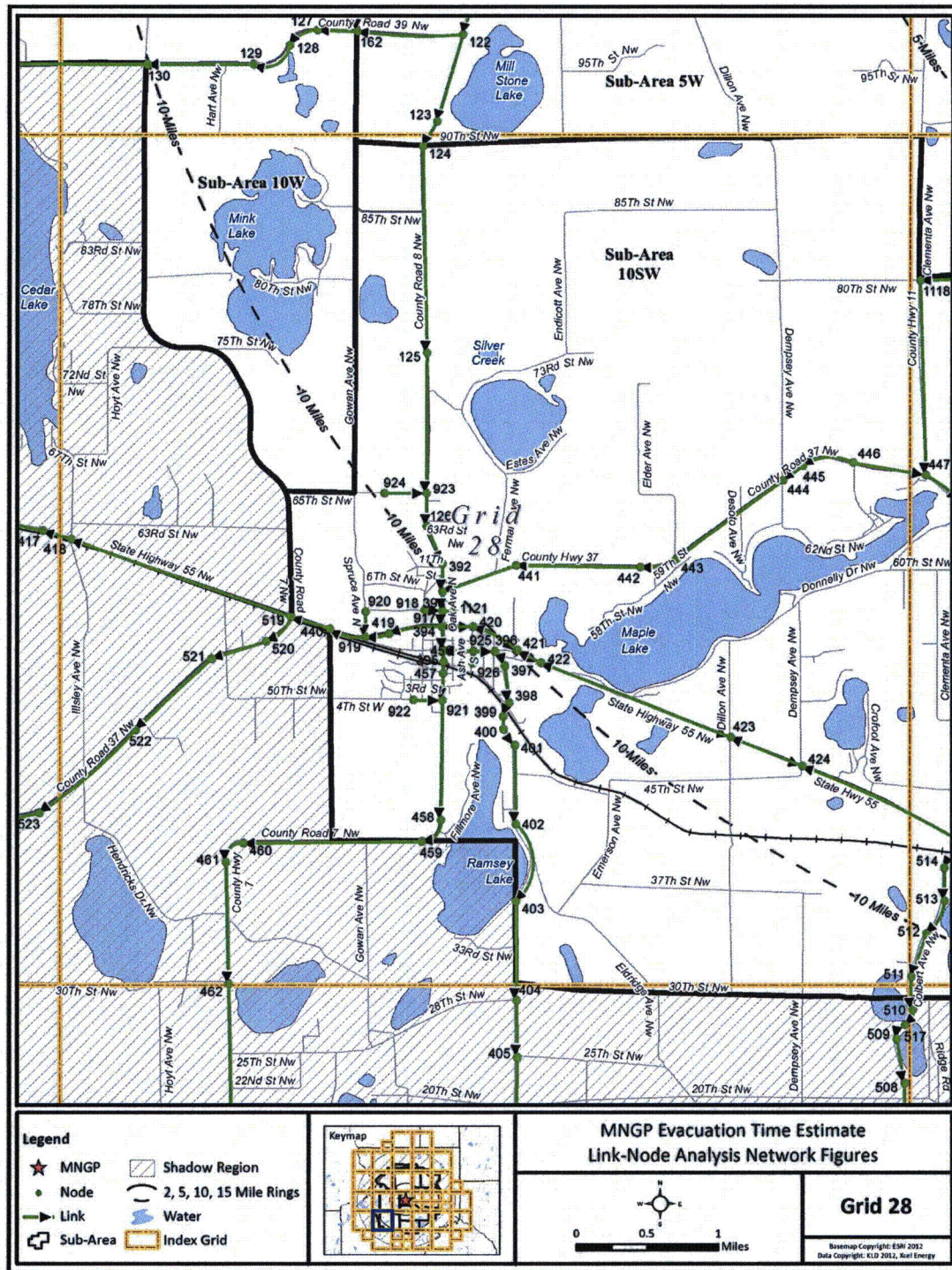


Figure K-29. Link-Node Analysis Network – Grid 28



Figure K-30. Link-Node Analysis Network – Grid 29

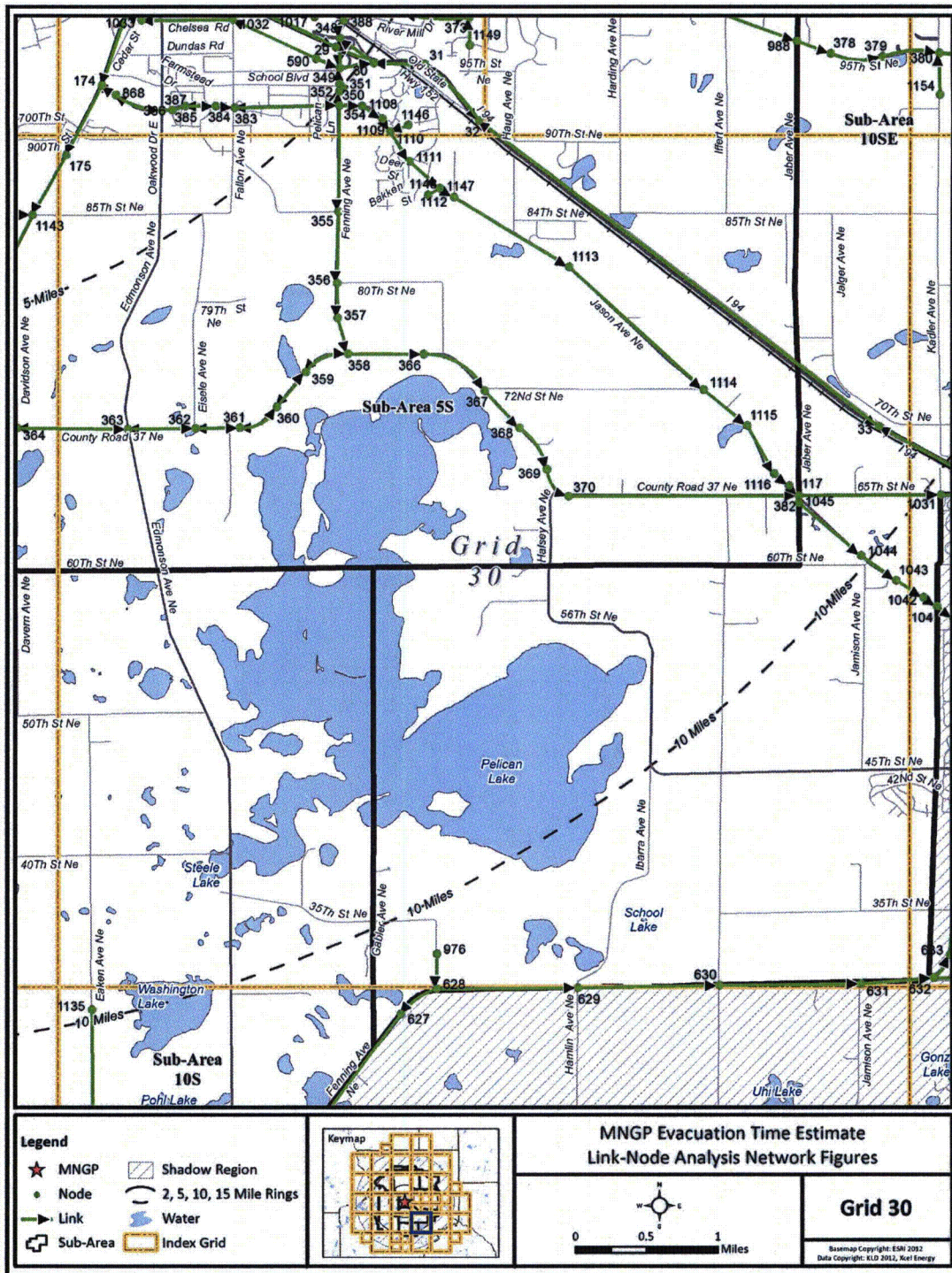


Figure K-31. Link-Node Analysis Network – Grid 30

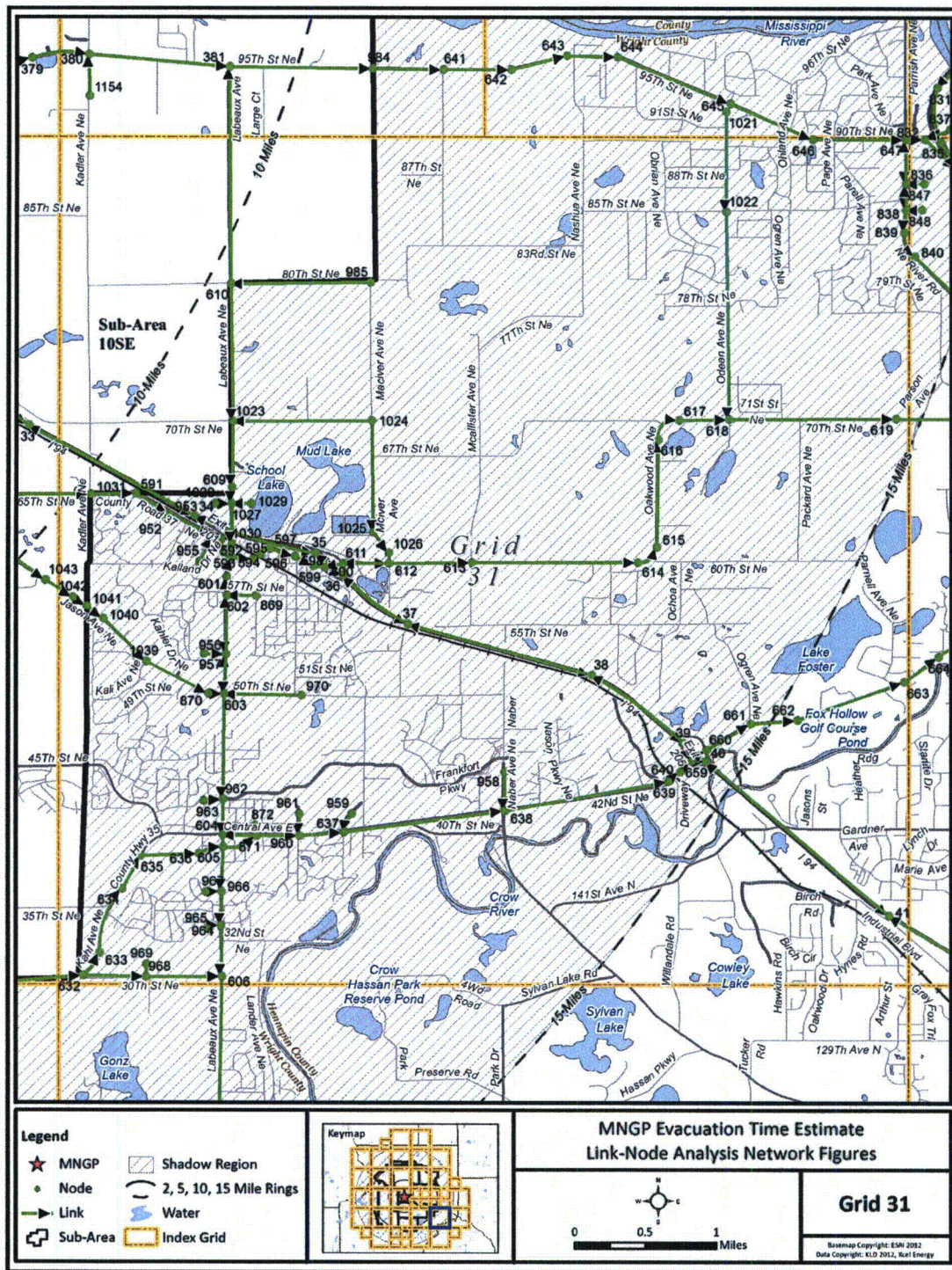


Figure K-32. Link-Node Analysis Network – Grid 31

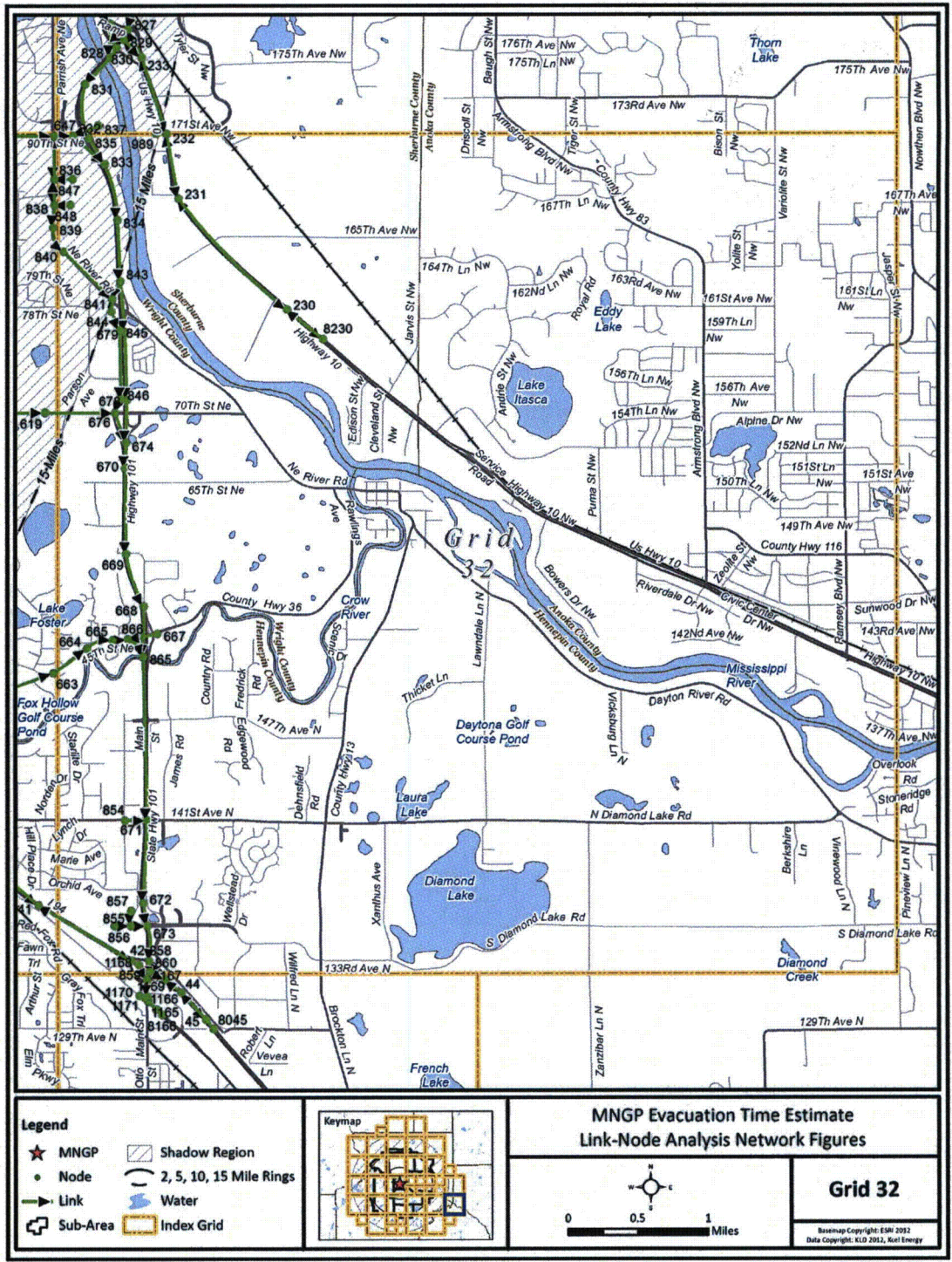


Figure K-33. Link-Node Analysis Network – Grid 32

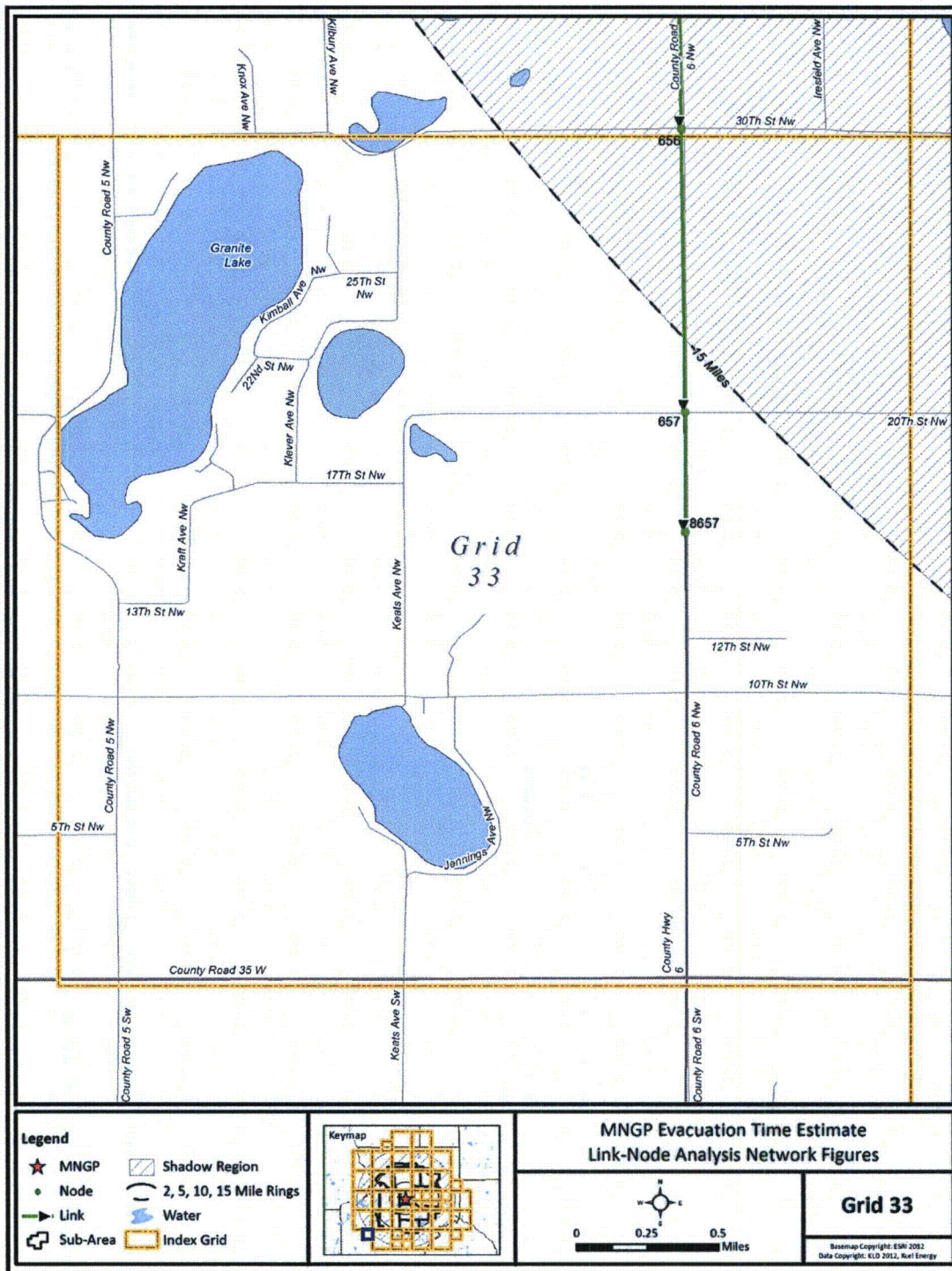


Figure K-34. Link-Node Analysis Network – Grid 33

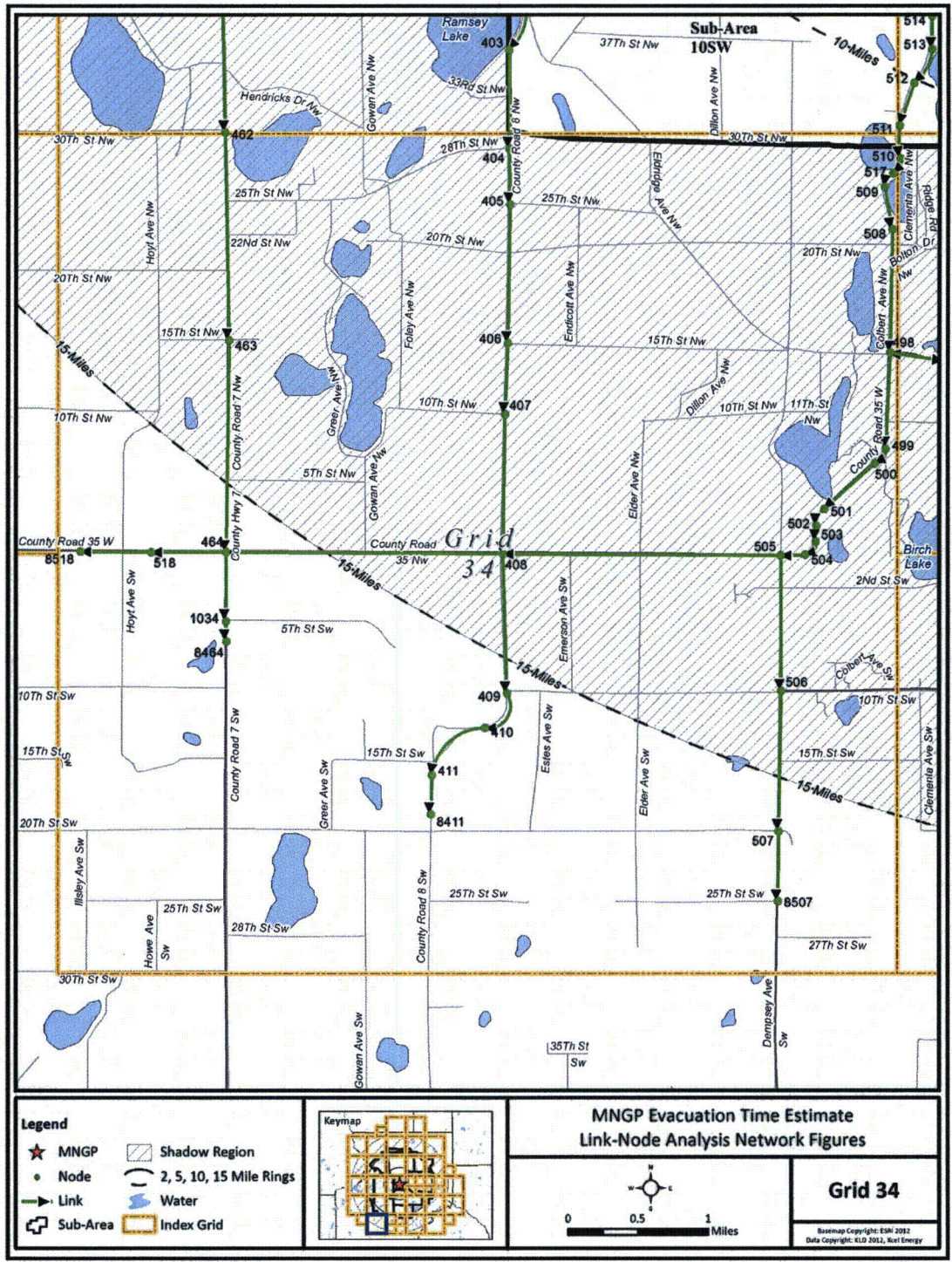


Figure K-35. Link-Node Analysis Network – Grid 34

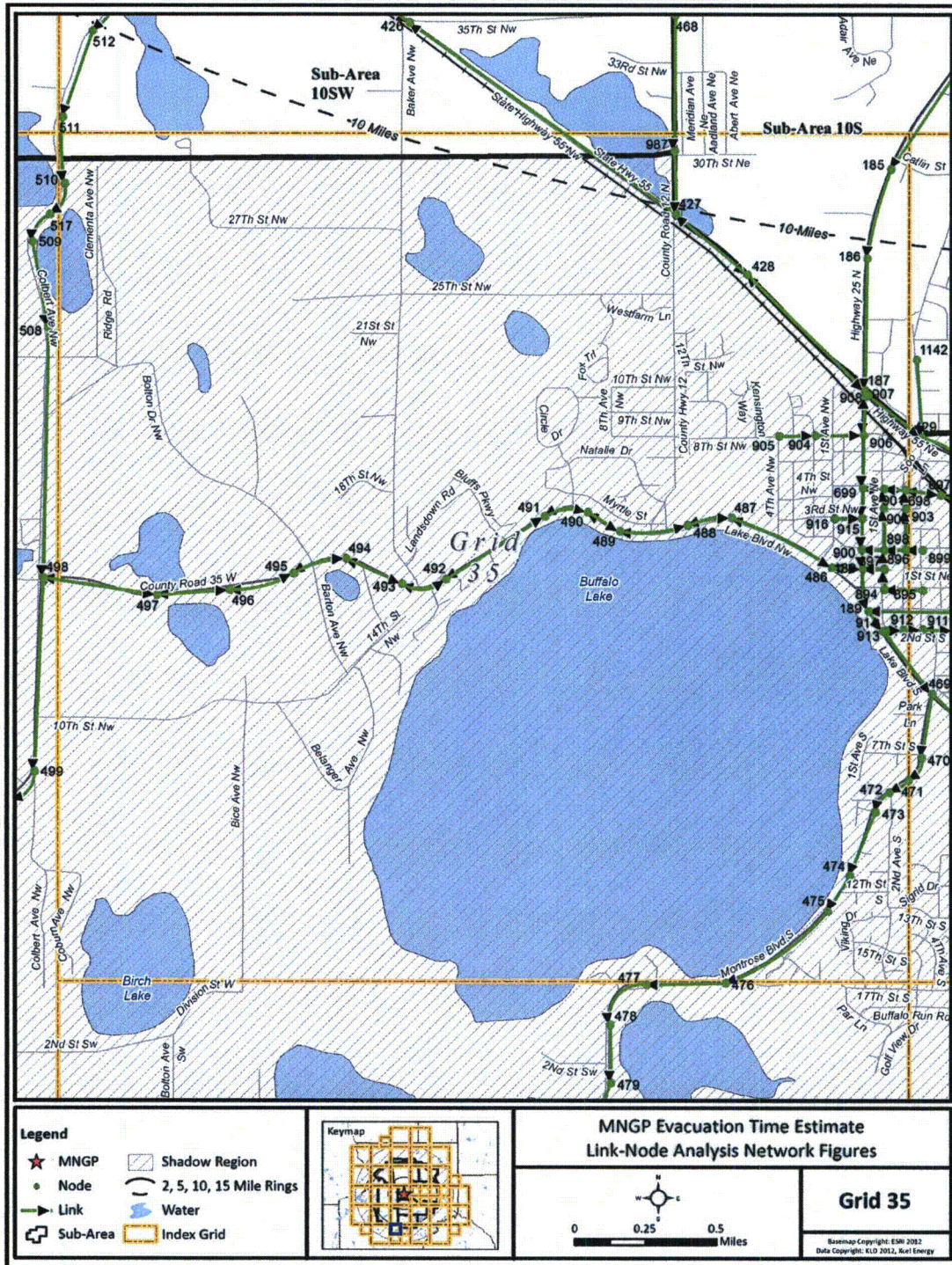


Figure K-36. Link-Node Analysis Network – Grid 35

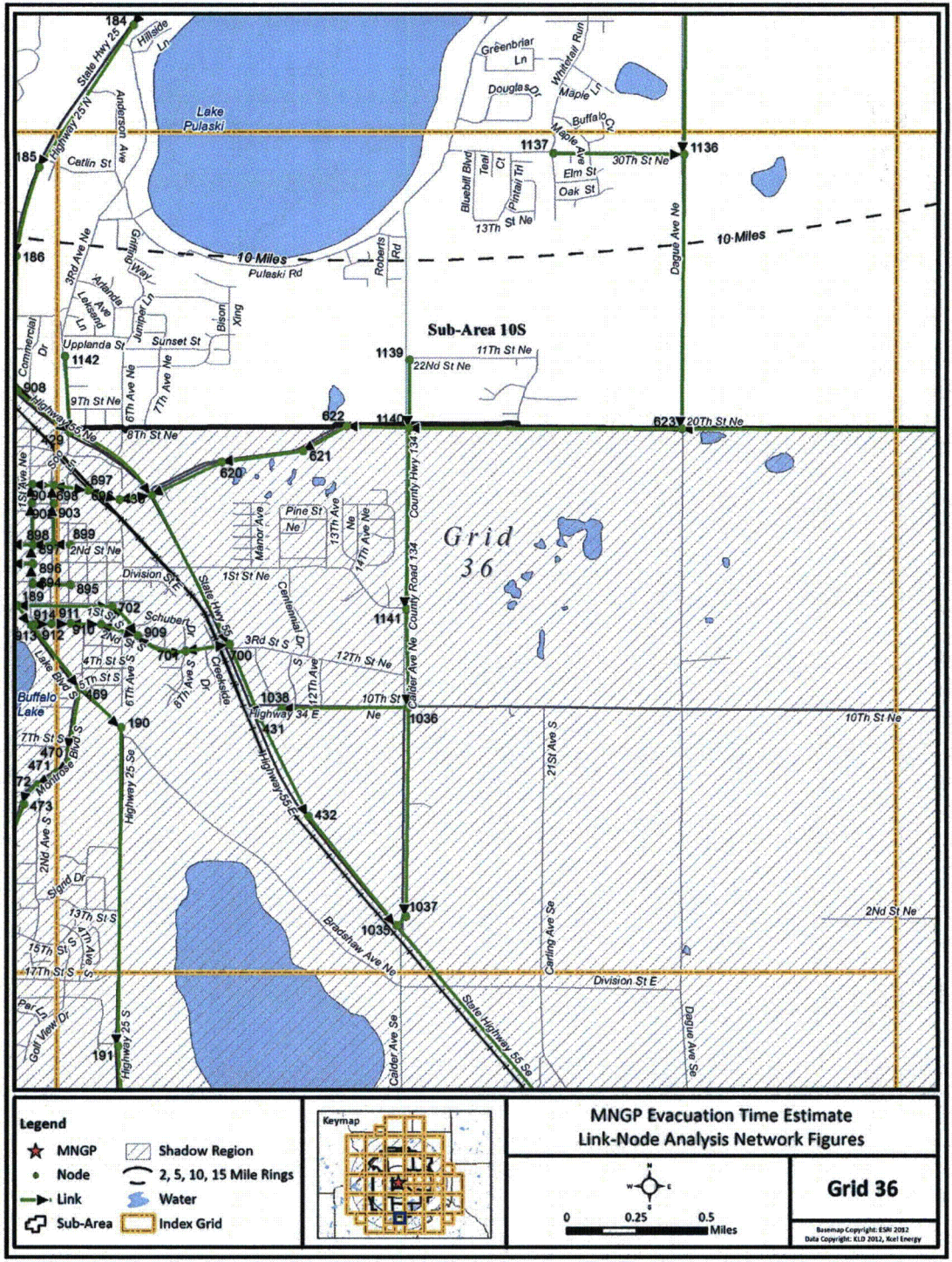


Figure K-37. Link-Node Analysis Network – Grid 36

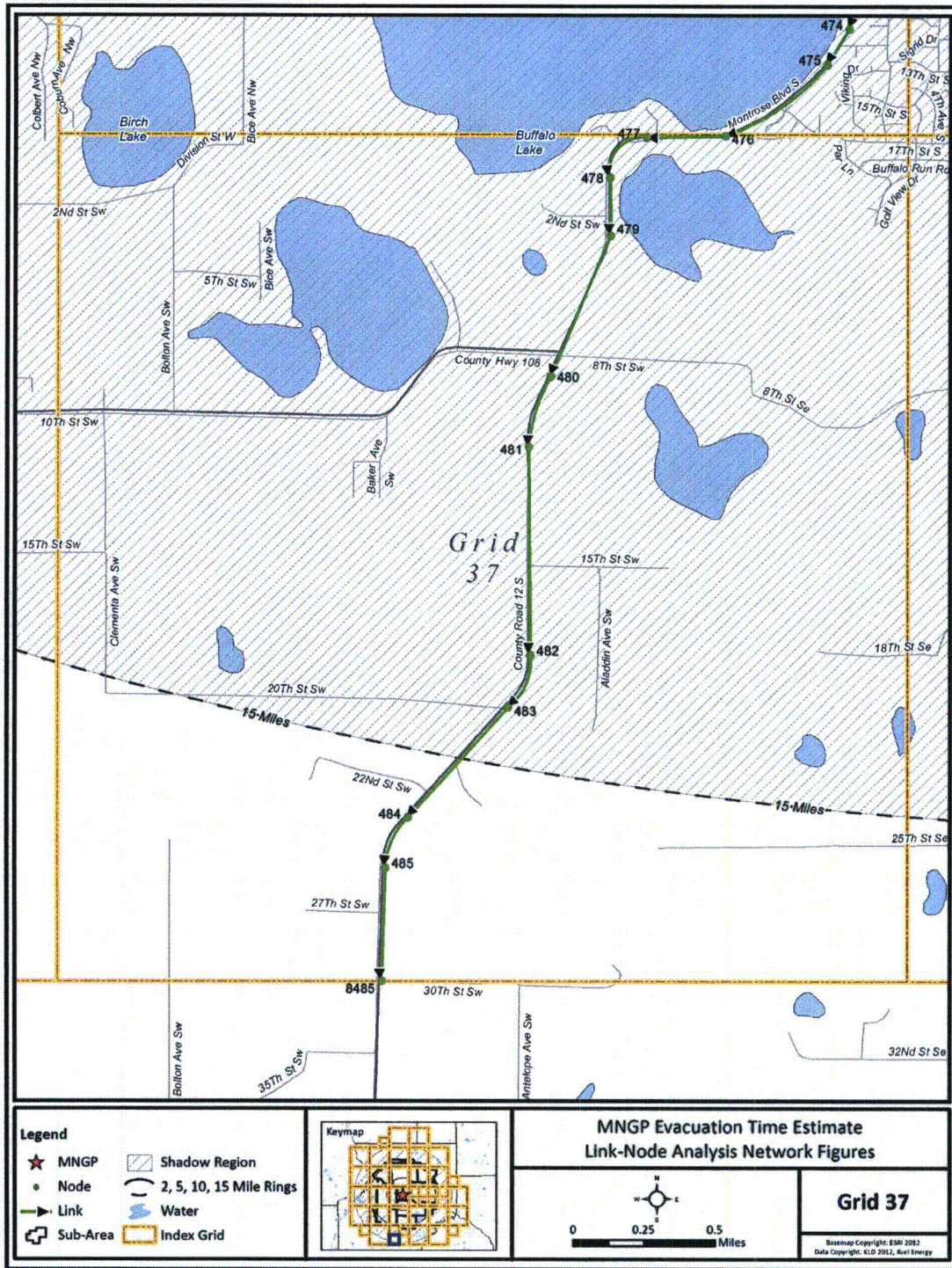


Figure K-38. Link-Node Analysis Network – Grid 37

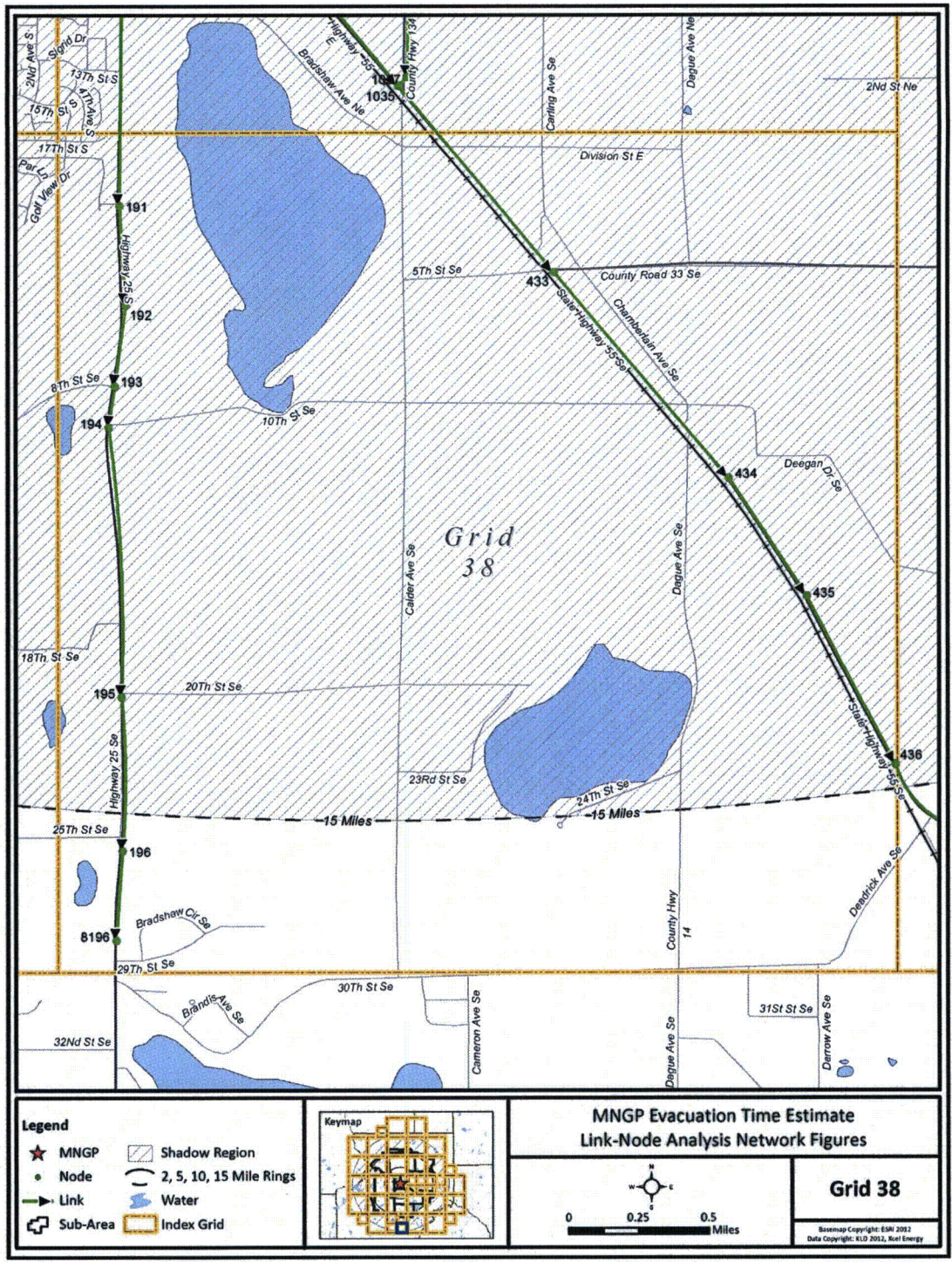


Figure K-39. Link-Node Analysis Network – Grid 38

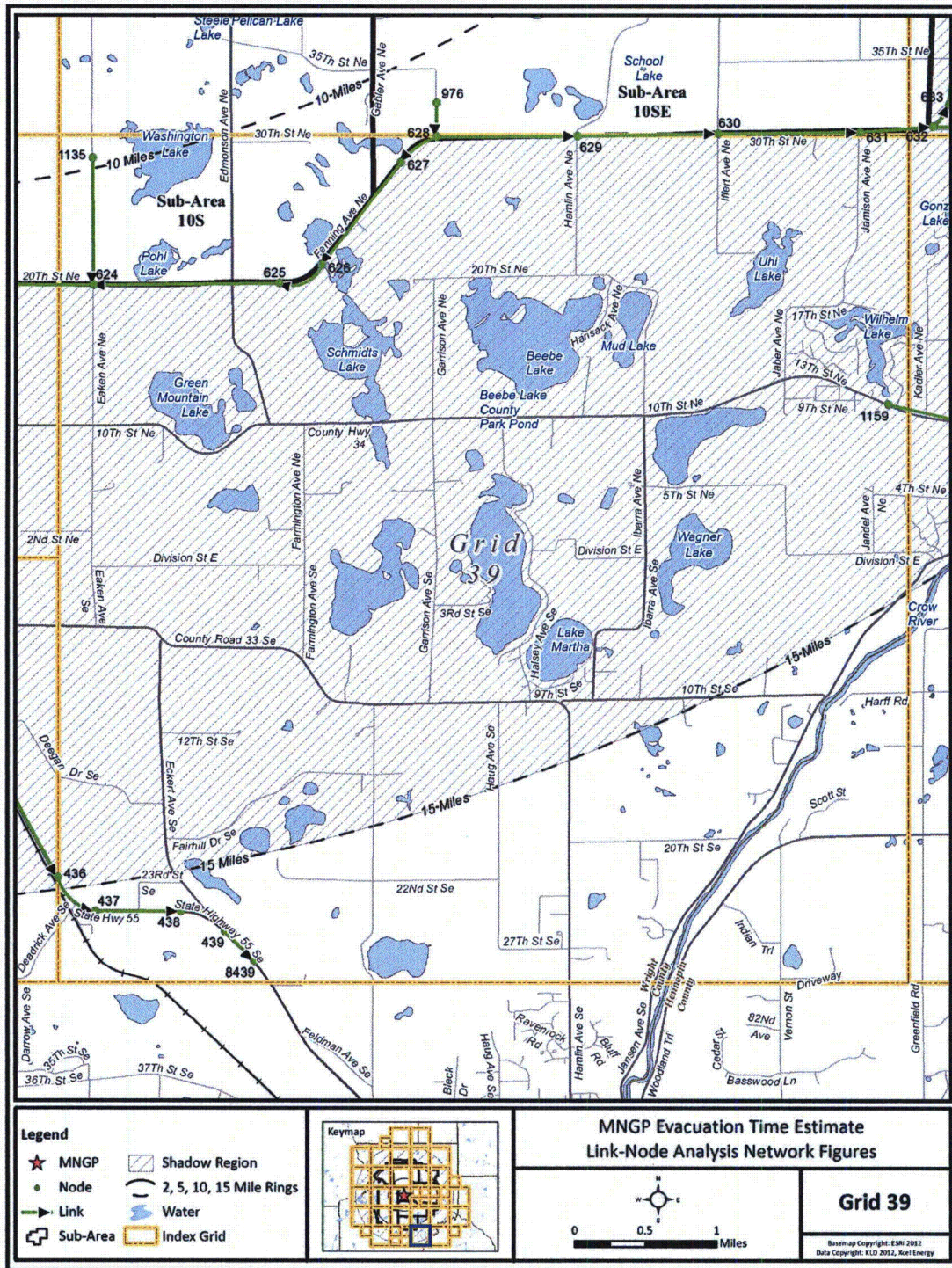


Figure K-40. Link-Node Analysis Network – Grid 39

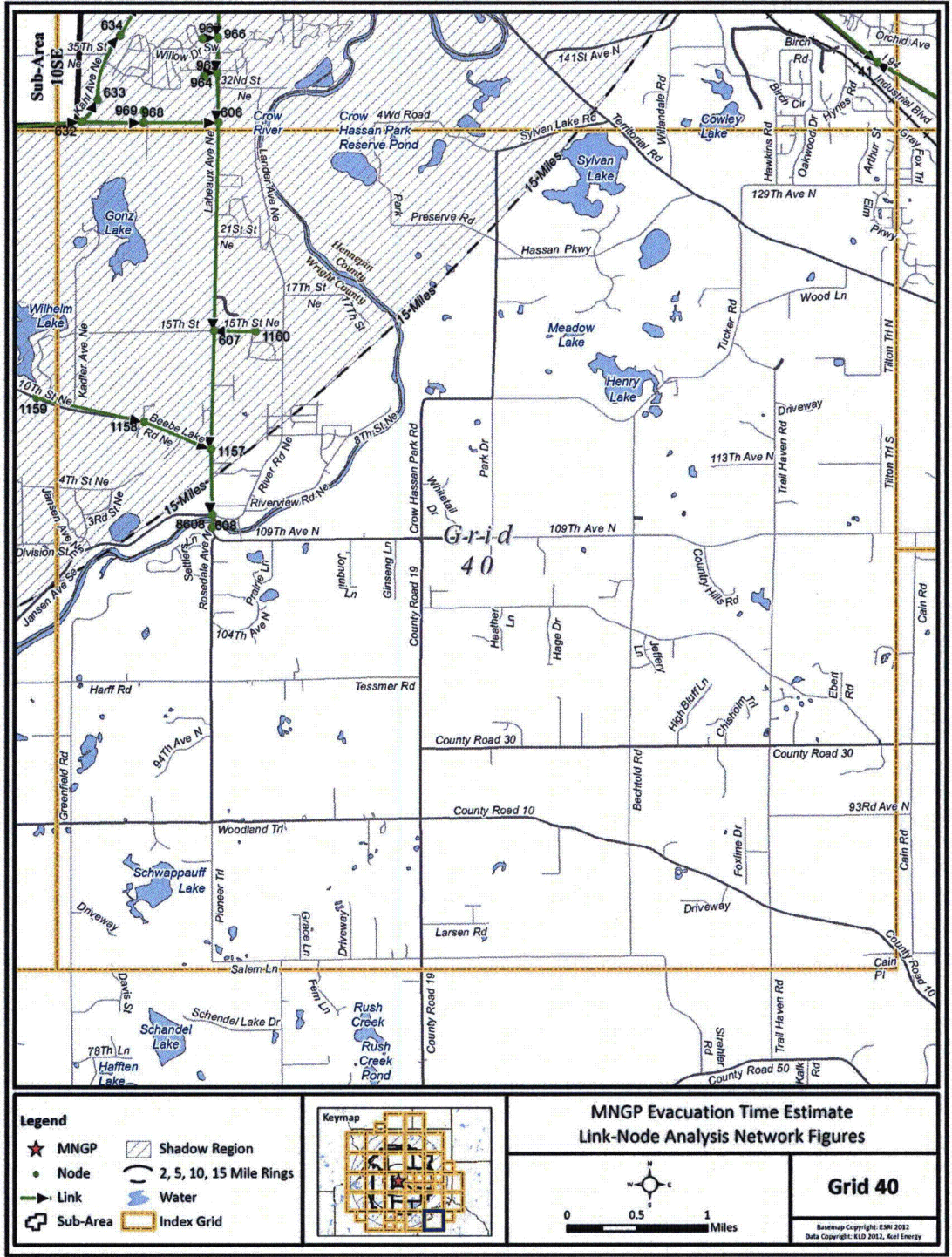


Figure K-41. Link-Node Analysis Network – Grid 40

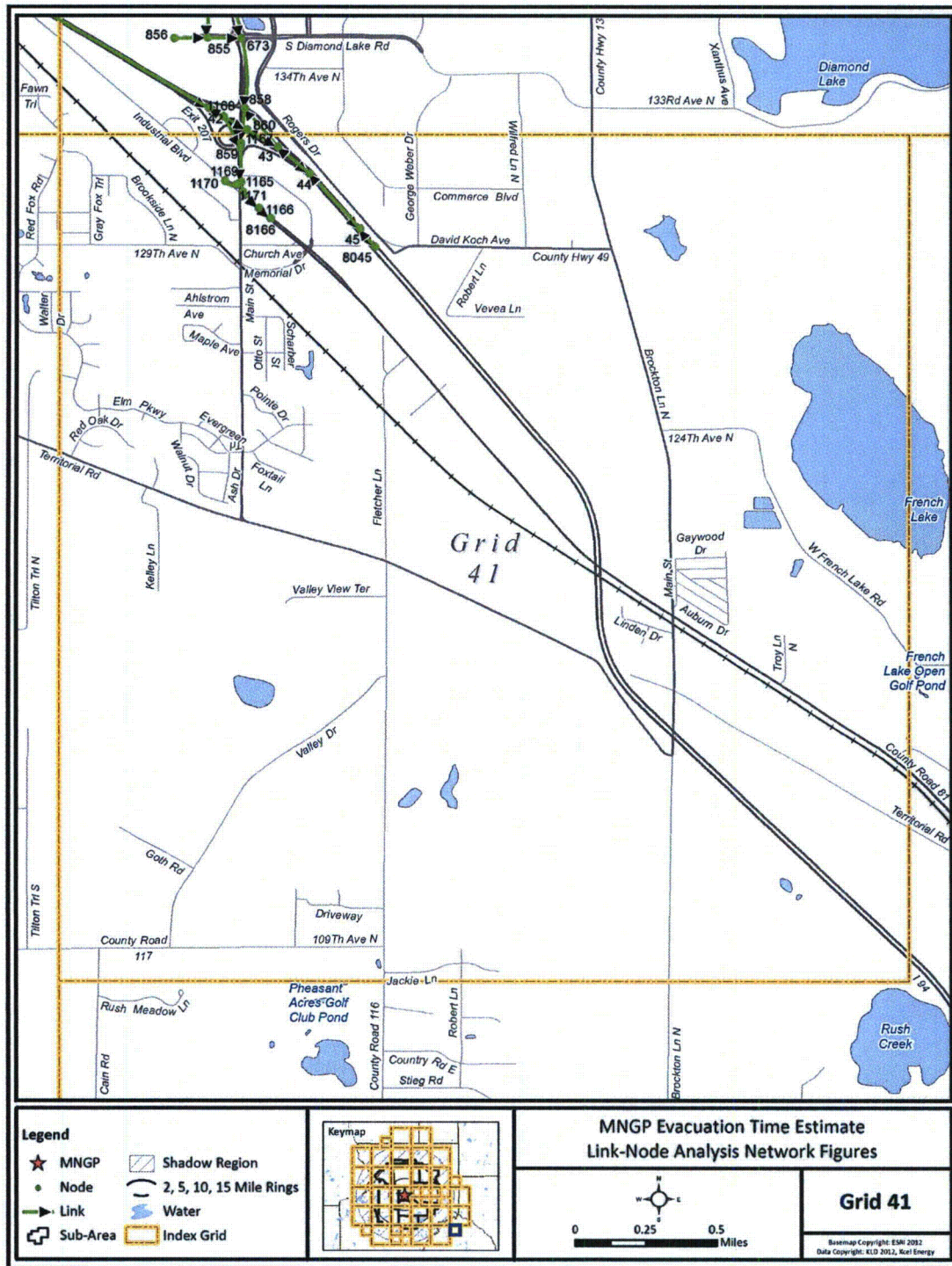


Figure K-42. Link-Node Analysis Network – Grid 41