

Table UP-8A-ESC: Escanaba Area Preliminary Solution Sets – Summary

Solution Set	Map Item #	Solutions Description	In Service Year	Estimated Cost (\$M)	Strategic Flexibility Future (Planning Needs N-1 @ Peak)						Asset Mgmt. Needs
					Robust Economy Future Solutions Group	High Retirements Future Solutions Group	High Environmental Future Solutions Group	Slow Growth Future Solutions Group	DOE 20% Wind Future Solutions Group	Fuel & Investment Limitations Future Solutions Group	Asset Renewal Needs
A	C-AR3 C-AR4 C2a	Minimum Asset Renewal projects on Chandler 69 kV line Minimum Asset Renewal projects on 69 kV line 6910 Uprate Escanaba Loop 69 kV lines to 167°/200° F	2009-2018	\$ 2.0	Not Adequate	Not Adequate	Not Adequate	Adequate	Not Adequate	Adequate	Addressed
B	C-AR3 C-AR4 C2a C3a C21 C22	Minimum Asset Renewal projects on Chandler 69 kV line Minimum Asset Renewal projects on 69 kV line 6910 Uprate Escanaba Loop 69 kV lines to 167°/200° F Add a 2 nd Chandler 138/69 kV transformer New Arnold 345 kV SS + 345/138 kV 500 MVA transformer New Escanaba 69 kV substation (non-ATC)	2009-2018	\$ 20.0	Adequate	Not Adequate	Not Adequate	More Robust Than Needed	Not Adequate	More Robust Than Needed	Addressed
C	C-AR3 C-AR4 C2a C3a C1 C22	Minimum Asset Renewal projects on Chandler 69 kV line Minimum Asset Renewal projects on 69 kV line 6910 Uprate Escanaba Loop 69 kV lines to 167°/200° F Add a 2 nd Chandler 138/69 kV transformer New Lakehead-RR 138/69 kV SS + 138/69 kV transformer New Escanaba 69 kV substation (non-ATC)	2009-2018	\$ 18.0	More Robust Than Needed	Not Adequate	Adequate	More Robust Than Needed	Not Adequate	More Robust Than Needed	Addressed
D	C-AR3 C-AR4 C5 C6 C8 C2a C3 C21 C22 C25,C26	Minimum Asset Renewal projects on Chandler 69 kV line Minimum Asset Renewal projects on 69 kV line 6910 New Page 138/69 kV SS + 2 138/69 kV 150 MVA Xfmrs New Page 2x8.16 MVA 138 kV capacitor banks Chandler-New Page double-ckt. 138 kV lines (6 mi.) Uprate Escanaba Loop 69 kV lines to 167°/200° F Uprate the Chandler 138/69 kV transformer to 150 MVA New Arnold 345 kV SS + 345/138 kV 500 MVA transformer New Escanaba 69 kV substation (non-ATC) Uprate Delta-Escanaba 69 kV lines #1/#2 to 55 MVA (non-ATC)	2009-2018	\$ 39.0	More Robust Than Needed	Adequate	More Robust Than Needed	More Robust Than Needed	Adequate	More Robust Than Needed	Addressed

Note: Lower cost projects in the Escanaba area (C2a, C-AR3) are scheduled for completion in 2009 and 2010, the remainder of the listed projects in later years.

Four possible solution sets to serve all futures' needs:

Solution Set A – can serve “today’s system” or Slow Growth/Fuel & Investment Limitations futures, with 30 MW non-firm to New Page

Solution Set B – solution for Robust Economy future, Escanaba stokers and all New Page generation on-line, but very high load growth and point load additions

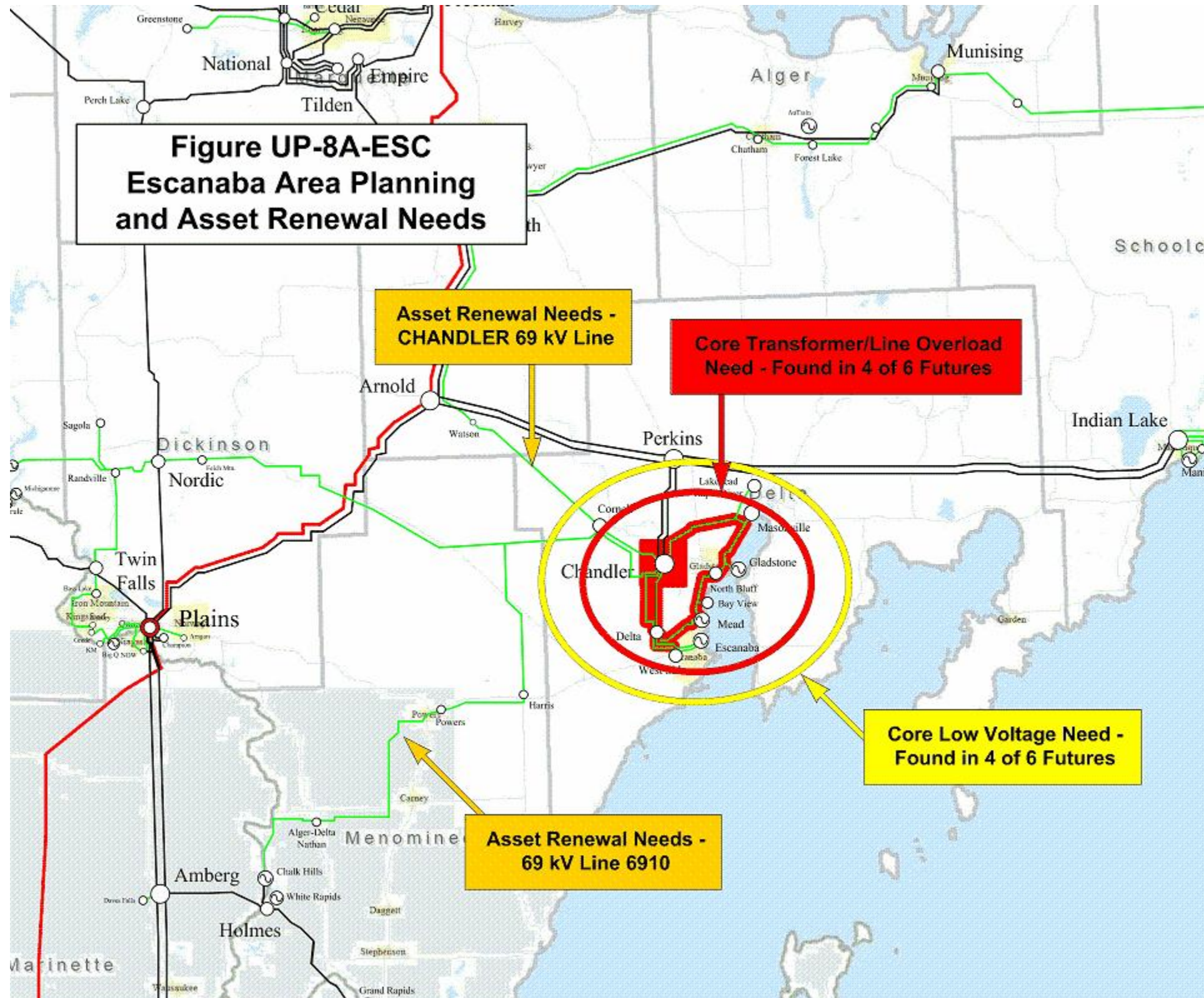
Solution Set C – solution for High Environmental future, Escanaba stokers on-line but 38 MW New Page import at peak

Solution Set D – solution for High Retirements and DOE 20% Wind futures, Escanaba stokers off-line/retired, and 55 MW of New Page import at peak

Table UP-8B-ESC: Escanaba Area Preliminary Solution Sets – Address System Operations Needs

					Escanaba Area System Operations Needs				
Solution Set	Map Item #	Solutions Description	In Service Year	Estimated Cost (\$M)	High Loadings/Low Voltages – Potential Network Service Load	Availability of Local Generation	N-1-1 (Maintenance, etc.) Plains-Arnold-Forsyth-Empire 138	N-1-1 (Maintenance, etc.) Chandler 138/69 kV Xfmr	N-1-1 (Maintenance, etc.) Escanaba-Area 69 Lines
East Ops	E3_40 E8 E32	2 138 kV 40° PAR (phase-shifters) at Straits New Indian Lake-Hiawatha 138 kV line Shunt reactors at Straits	2012	\$ 20.6- \$ 24.6	Slightly Improved	Not Adequate	Improved	Not Adequate	Not Adequate
A	C-AR3 C-AR4 C2a	Minimum Asset Renewal projects on Chandler 69 kV line Minimum Asset Renewal projects on 69 kV line 6910 Uprate Escanaba Loop 69 kV lines to 167°/200° F	2009-2018	\$ 2.0	Slightly Improved	Slightly Improved	Not Adequate	Not Adequate	Improved
B	C-AR3 C-AR4 C2a C3a C21 C22	Minimum Asset Renewal projects on Chandler 69 kV line Minimum Asset Renewal projects on 69 kV line 6910 Uprate Escanaba Loop 69 kV lines to 167°/200° F Add a 2 nd Chandler 138/69 kV transformer New Arnold 345 kV SS + 345/138 kV 500 MVA transformer New Escanaba 69 kV substation (non-ATC)	2009-2018	\$ 20.0	Improved	Improved	Adequate	Adequate	Improved
C	C-AR3 C-AR4 C2a C3a C1 C22	Minimum Asset Renewal projects on Chandler 69 kV line Minimum Asset Renewal projects on 69 kV line 6910 Uprate Escanaba Loop 69 kV lines to 167°/200° F Add a 2 nd Chandler 138/69 kV transformer New Lakehead-RR 138/69 kV SS + 138/69 kV transformer New Escanaba 69 kV substation (non-ATC)	2009-2018	\$ 18.0	Improved	Improved	Not Adequate	Nearly Adequate	Nearly Adequate
D	C-AR3 C-AR4 C5 C6 C8 C2a C3 C21 C22 C25,C26	Minimum Asset Renewal projects on Chandler 69 kV line Minimum Asset Renewal projects on 69 kV line 6910 New Page 138/69 kV SS + 2 138/69 kV 150 MVA Xfmrs New Page 2x8.16 MVA 138 kV capacitor banks Chandler-New Page double-ckt. 138 kV lines (6 mi.) Uprate Escanaba Loop 69 kV lines to 167°/200° F Uprate the Chandler 138/69 kV transformer to 150 MVA New Arnold 345 kV SS + 345/138 kV 500 MVA transformer New Escanaba 69 kV substation (non-ATC) Uprate Delta-Escanaba 69 kV lines #1/#2 to 55 MVA (non-ATC)	2009-2018	\$ 39.0	Adequate	Adequate	Adequate	Adequate	Adequate

Note: Lower cost projects in the Escanaba area (C2a, C-AR3) are scheduled for completion in 2009 and 2010, the remainder of the listed projects in later years.



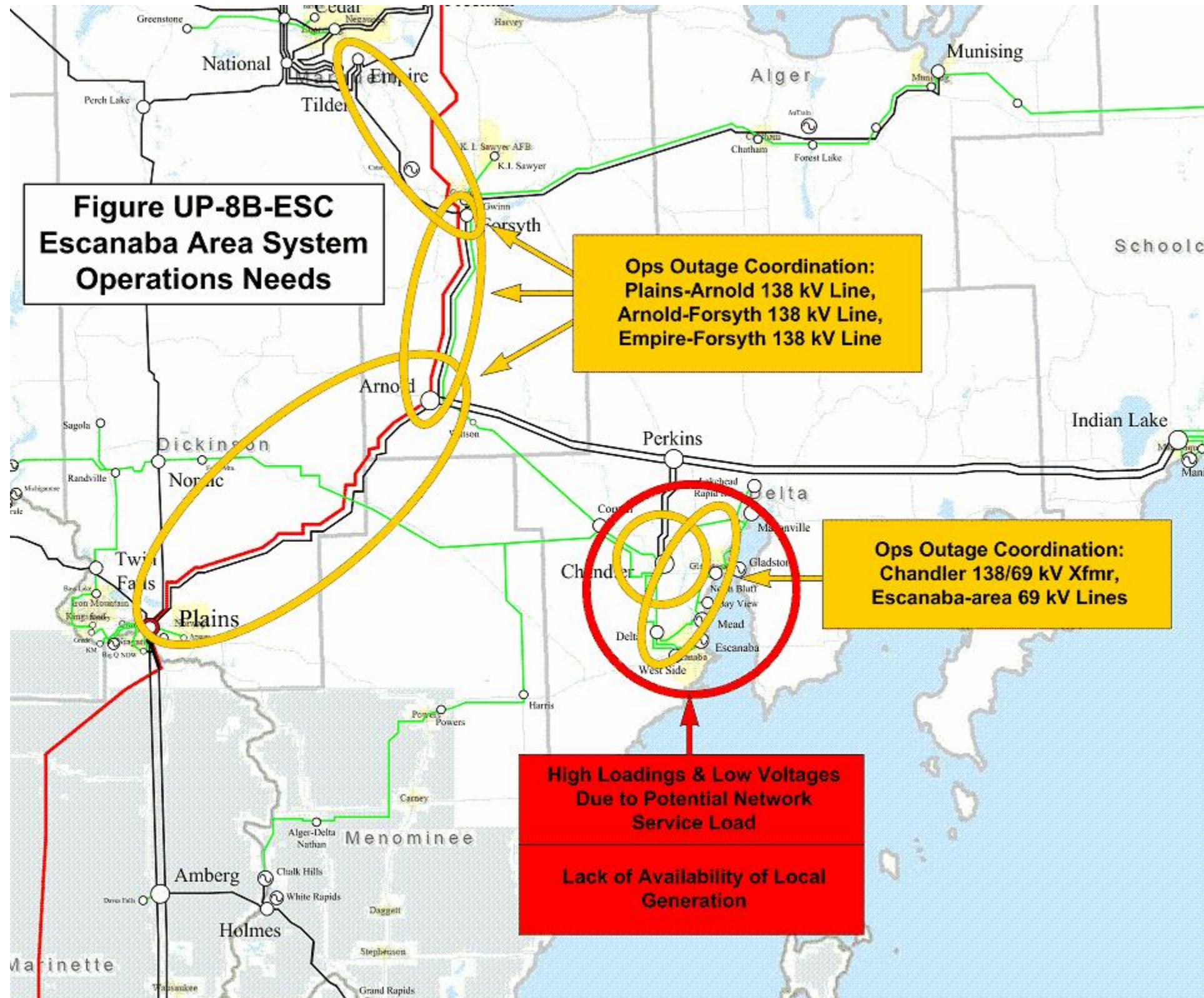


Figure UP-8C-ESC: Escanaba Area Core Transmission Solution Sets Considered

