# APPENDIX G

# WETLAND ASSESSMENT METHODOLOGY

- **Wetland Assessment Methodology**
- **Figure G-1: NLX Project Area and Project Site Locations**

## Wetland Assessment Methodology

### *Pre-Field Prepwork*

An 11 X 17 flip book with match lines covering the entire rail line from Coon Rapids Junction (North Metro) to Boylston Junction (Wisconsin) was prepared. Information depicted was color aerial imagery, National Wetland Inventory (NWI) mapping, Wisconsin Wetland Inventory (WWI) mapping, hydric soils mapping (where available), roads, digitized location of existing railroad track, and 100-foot buffers to the west and east of the railroad tracks. Each page of the flip book covered an area of approximately 1 mile by ½ mile. The scale of each page of the flip book was about 1" = 440'. The resolution of the aerial imagery was approximately 1-meter per pixel.

### *Field Methodology*

Prior to field work, SRF Wetland Scientists drafted an abbreviated field methodology for estimating wetland extent along either sides of the tracks from the southern terminus to the northern terminus of proposed double track area, approximately 126 miles of trackage. This methodology was found to be a reasonable approach after review by Tim Fell, U.S. Army Corps of Engineers (Army Corps). The methodology was intended to:

- Provide wetland data of sufficient resolution to compare the estimated wetland impacts of a scenario of "build to the east" or "build to the west" of the existing trackage. (Field work was conducted during project development to inform improvement location decisions.)
- Provide wetland data of sufficient resolution for the Route 9 technical memorandum.
- Guide decisions concerning opportunities for wetland impact avoidance and minimization.

The methodology is not intended to provide a permitting level of wetland delineation and wetland impact calculation. An abbreviated field delineation will be completed during final design based on a method agreed to by the Army Corps and members of the Technical Evaluation Panel (TEP) per the Minnesota Wetland Conservation Act (WCA).

The NWI and hydric soils mapping are useful as a guide to where wetlands may be; however, each effort has intrinsic inaccuracies. The field methodology for this project was designed to focus on landscapes in the Route 9 area where the NWI tends to fail frequently. Specifically, such landscapes are forested areas adjacent to waterways and partially drained agricultural land. In wetlands with abundant hydrology the NWI tends to be reasonably accurate because the wetness signatures are quite well defined. Wetlands on the drier side of the hydrology spectrum tend to have weak wetness signatures and are frequently overlooked by the NWI. The NWI generally doesn't distinguish wetland forest from upland forest with much acuity in areas along streams and rivers, thus, it tends to overmap wetlands in this situation. In partially drained agricultural landscapes, the NWI may map a temporarily flooded wetland, e.g. PEMA, where one does not exist, or may not map one where it does exist.

Our field methodology pre-selected 48 study sites along the entire project area that were:

- Relatively well distributed throughout the Route 9 area (including east of and west of the existing tracks).
- Focused on forested and drained agricultural landscapes (scrub-shrub and shallow emergent marshes were well-represented in the sample).
- Focused on potential wetlands with drier hydrological regimes.
- Reasonably close to public road crossings of the tracks.

*Fieldwork and Post-Field Data Processing*

Fieldwork along the proposed rail improvements was conducted by two SRF Wetland Scientists on October 4-6, 2010. Cursory data collected at each Study Site included wetland type classification per Circular 39, Cowardin, and Eggers and Reed; predominant plant species observed, and a qualitative listing of the major wetland functions that each wetland expresses.

Wetland boundaries at each Study Site were estimated through a combination of sketching boundaries in the aerial imagery flip book and GPSing the edges of depressional areas dominated with hydrophytic vegetation. Sketched wetland boundaries were based on observed landscape characteristics and imagery phototones. Wetland edges sketched in the field were digitized as a shapefile. Sub-foot accurate Trimble GeoXH handheld GPS was used to record estimated edges of wetlands. GPSed points were uploaded and converted to shapefiles.

Figure G-1 shows a general map of the Route 9 area and locations of the 48 Study Sites throughout the length of the rail improvements. Table G-1 presents a summary of field data collected at each Study Site.

The wetland acreage mapped by NWI and WWI and the field-assessed acreage were tallied across all Study Sites. A ratio of the cumulative NWI and WWI-mapped wetland acreage to the cumulative field-assessed acreage was calculated, with a cumulative ratio of <1 indicating that the remotely-sensed efforts undermap actual wetlands and a cumulative ratio of >1 indicates that the remotely-sensed methods overmap actual wetlands.

The analysis indicated that the NWI/ WWI undermaps the extent of wetlands compared to field assessed wetlands. An analysis of all data (Minnesota and Wisconsin), including those Study Sites found in the field to be "Wetlands" and those found to be "Areas", i.e. non-wetlands showed the NWI/ WWI to map approximately 55 % of actual wetlands on the east side of the tracks and about 74% of actual wetlands on the west side of the tracks. It should be noted that the wetlands we assessed in the field were generally those with a hydrologic modifier (per Cowardin) on the drier end of the wetness regime (e.g. modifiers of "A", "B", and "C"). The NWI is more likely to mis-map wetlands with drier hydrology modifiers than those with very wet modifiers (e.g. "F", "G", and "H") because wetlands with relatively permanent surface waters generally have a strong aerial photography wetness signature and are more easily identifiable with a remote-sensing effort.

Based on this analysis, it was determined that actual wetland impacts might inflate NWI/WWI-based impacts by a factor of ~ 1.3. This is the factor used to produce the estimated impacts reported in the EA.

The GIS-based location of the existing railroad tracks was digitized at a relatively coarse scale. As such, in places the digitized track was some meters west of or east of the actual track. We measured and quantified this discrepancy using GIS techniques to determine whether the digital track depiction was consistently to the east or west of the actual track. If the digital depiction of the track was consistently skewed to one side of the actual track, then wetland impact estimates might also be skewed - falsely favoring a "build to the east or west" scenario.

Our GIS measurement, described in detail in the "Technical Memorandum: Northern Lights Express (Northern Twin Cities metro to Duluth/ Superior); Preliminary Analysis of Wetland Impacts East and West of the Existing Trackage - December 30, 2010", found that on average, the digital track depiction is coincident with the actual track location, i.e. off kilter to the east as much as to the west over the entire length of trackage. It was concluded that the discrepancy between digitally mapped track and actual track location would not contribute significantly to a skewed wetland impact analysis comparing impacts associated with “build to the west” or “build to the east”. Nor would the discrepancy likely be of an order of magnitude so as to lead to different conclusions under the federal environmental process.

Detailed results of the above-referenced analyses are presented in a “TECHNICAL MEMORANDUM: NORTHERN LIGHTS EXPRESS (NORTHERN TWIN CITIES METRO TO DULUTH/ SUPERIOR); PRELIMINARY ANALYSIS OF WETLAND IMPACTS EAST AND WEST OF THE EXISTING TRACKAGE - DECEMBER 30, 2010”.

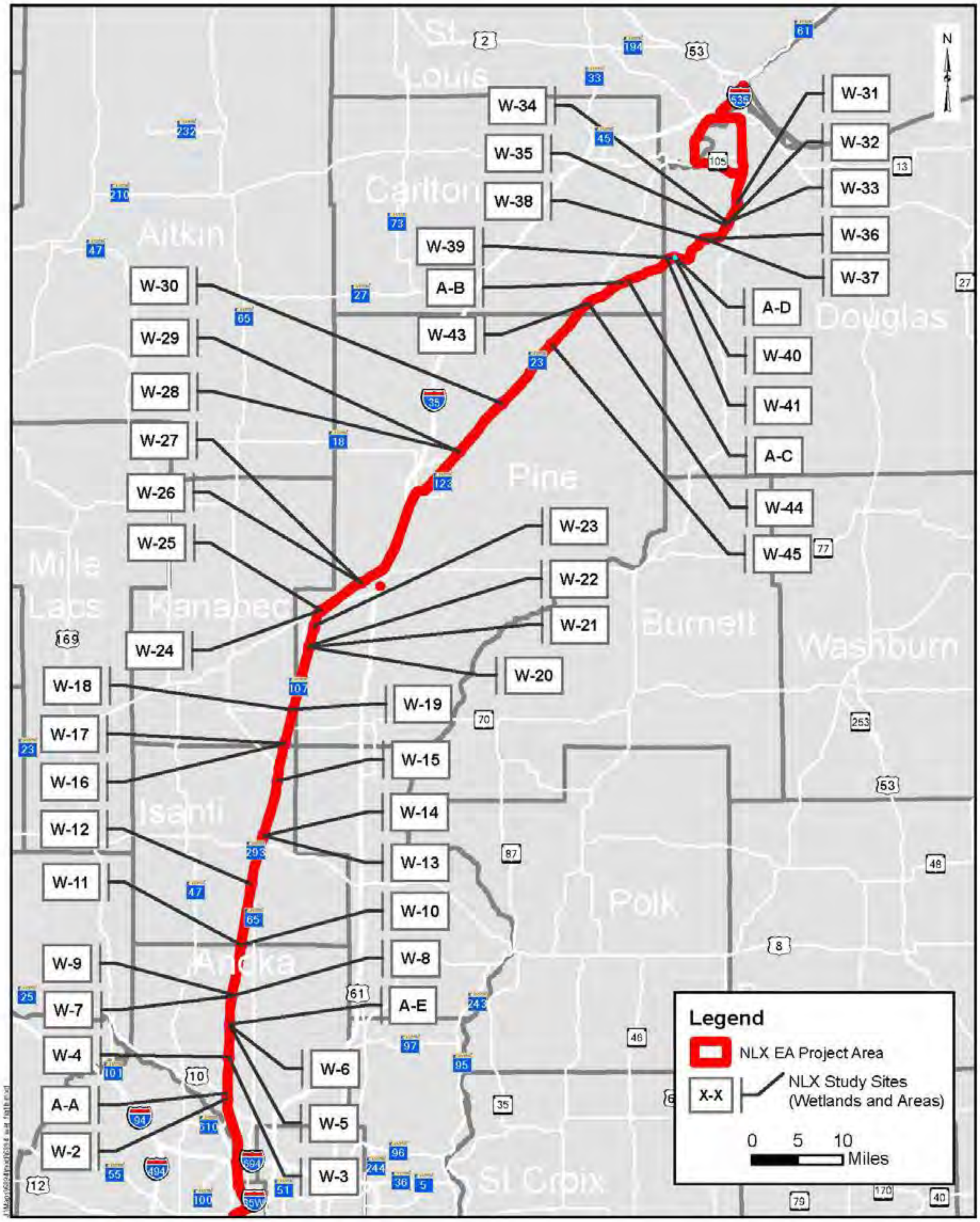
**Table G-1. Summary of Field Data**

| Study Sites | Actual In-Field Cowardin Classification | NWI mapping per Cowardin Classification | Dominant Vegetation | Mapbook Sheet, County, Twp, Rng, Sec | Main Functions |
|---|---|---|---|---|---|
| W-2 | PFO/PEM/PSS | PFO1B | *Phalaris arundinacea, Acer negundo, Urtica dioica, Cornus stolonifera* | 23, Anoka, 31N, 24W, 14 | Flood Storage, wildlife |
| W-3 | PEM/PSS | PEMCd | *Phalaris arundinacea, Urtica dioica, Cannabis sativa* | 29, Anoka, 32N, 24W, 26 | Flood Storage, wildlife |
| W-4 | PEM | PEMCd | *Phalaris arundinacea, Urtica dioica* | 29, Anoka, 32N, 24W, 26 | Flood Storage, wildlife |
| W-5 | PEM/PSS | PEMCd | *Phalaris arundinacea* | 35, Anoka, 32N, 24W, 2 | Wildlife |
| W-6 | PEM | PEMC | *Typha sp.* | 35, Anoka, 32N, 24W, 2 | Flood storage, wildlife, nutrient filtration |
| W-7 | PEM/PSS | PEMC | *Phalaris arundinacea, Typha sp.* | 40, Anoka, 33N, 24W, 24 | Flood Storage, wildlife |
| W-8 | PEM/PSS | PEMCd | *Phalaris arundinacea, Typha sp., Phragmites australis, Salix interior* | 40, Anoka, 33N, 24W, 24 | Flood Storage, wildlife |
| W-9 | PEM | PEMC | *Typha sp., Carex lacustris, Larix laricina, Carex stricta* | 40, Anoka, 33N, 24W, 24 | Wildlife |
| W-10 | PEM/PSS/PFO | PEMC/PFO1B | *Phalaris arundinacea, Typha sp., Populus tremuloides* | 48, Anoka, 34N, 23W, 30 | Wildlife |
| W-11 | PEM/PFO | PEM/SS1C | *Phalaris arundinacea, Typha sp., Populus tremuloides* | 48, Anoka, 34N, 23W, 30 | Minimal functional value |
| W-12 | PEM/PSS | PEMC | *Phalaris arundinacea, Populus tremuloides* | 58, Isanti, 35N, 23W, 20 | Minimal functional value |
| W-13 | PSS | PEM/SS1B | *Cornus stolonifera* | 67, Isanti, 36N, 23, 21 | Wildlife |
| W-14 | PEM | Not Mapped | *Typha sp.* | 67, Isanti, 36N, 23, 21 | Ditch conveyance |
| W-15 | PEM/PSS | Not Mapped (PSS1/EMBgd is adjacent). | *Phalaris arundinacea, Acer negundo, Calamagrostis canadensis* | 76, Isanti, 37N, 23W, 22 | Flood Storage, wildlife |
| W-16 | PEM/PSS/PFO2 | PSS1/EMBg and PFO2Bg | *Phalaris arundinacea, Larix laricina* | 83, Kanabec, 38N, 23W, 35 | Flood Storage, wildlife |

| Study Sites | Actual In-Field Cowardin Classification | NWI mapping per Cowardin Classification | Dominant Vegetation | Mapbook Sheet, County, Twp, Rng, Sec | Main Functions |
|---|---|---|---|---|---|
| W-17 | PEM/PSS | PSS1/EMBgd | *Phalaris arundinacea, Typha sp.* | 83, Kanabec, 38N, 23W, 35 | Ditch conveyance |
| W-18 | PEMA | R2UBGH | *Phalaris arundinacea, Typha sp., Potamogeton natans* | 88, Kanabec, 38N, 23W, 12 | Minimal flood storage |
| W-19 | PEM (Fringe to River) | R2UBH | *Phalaris arundinacea, Spartina pectinata* | 88, Kanabec, 38N, 23W, 13 | Flood Storage, wildlife, recreation, fish habitat |
| W-20 | PEM/PSS | PEMB | *Phalaris arundinacea, Salix sp., Populus deltoides* | 99, Pine, 39N, 22W, 8 | Wildlife |
| W-21 | PEM | PEMB | *Salix interior, Typha sp.* | 99, Pine, 39N, 22W, 8 | Wildlife |
| W-22 | PEM | PEMB | *Phalaris arundinacea, Populus deltoides* | 99, Pine, 39N, 22W, 5 | Wildlife |
| *W- | PEM/PSS | PEMBgd | *Phalaris arundinacea, Salix sp., Phragmites australis* | 103, Pine, 40N, 22W, 28 | Flood Storage, wildlife |
| W-24 | PEM/PFO | PEMB | *Phalaris arundinacea, Typha sp., Populus deltoides* | 106, Pine, 40N, 22W, 21 &22 | Minimal functional value |
| W-25 | PEM/PFO (Some upland inclusions) | PEMB | *Phalaris arundinacea, Carex lacustris, Populus deltoides* | 106, Pine, 40N, 22W, 21 &22 | Wildlife |
| W-26 | PEM/PSS | PEMBg | *Phalaris arundinacea, Typha sp., Salix sp.* | 114, Pine, 41N, 21W, 34 | Wildlife |
| W-27 | PEM | PEMBg | *Carex lacustris, Typha sp.* | 114, Pine, 41N, 21W, 34 | Wildlife |
| W-28 | PEM | Not Mapped | *Phalaris arundinacea* | 142, Pine, 43N, 19W, 20 | Minimal functional value |
| W-29 | PEM/PSS | PSS1C | *Phalaris arundinacea, Carex lacustris* | 142, Pine, 43N, 19W, 20 | Wildlife |
| W-30 | PEM/PSS | PEMCd | *Phalaris arundinacea, Salix sp.* | 153, Pine, 44N, 18W, 19 | Wildlife |
| W-31 | PEM/PFO | T3/W0H | *Phalaris arundinacea, Acer saccharinum* | 207, Douglas, 48N, 14W, 33 | Flood Storage, wildlife |
| W-32 | PEM/PSS | T3/S3K | *Calamagrostis Canadensis, Populus grandidentata, Epilobium coloratum* | 204, Douglas, 47N, 14W, 8 | Wildlife |
| W-33 | PEM | T3/S3K | *Calamagrostis Canadensis, Populus grandidentata, Epilobium coloratum* | 204, Douglas, 47N, 14W, 8 | Wildlife |
| W-34 | PEM/PSS | T3/S3K | *Typha sp.* | 204, Douglas, 47N, 14W, 17 | Wildlife |
| *W- | PEM/PSS | T3K | -- | 203, Douglas, 47N, 14W, 17 | Flood Storage, wildlife |
| W-36 | PEM/PSS/PFO | S3KR and | *Phalaris arundinacea,* | 198, Douglas, 47N, | Wildlife |

| Study Sites | Actual In-Field Cowardin Classification | NWI mapping per Cowardin Classification | Dominant Vegetation | Mapbook Sheet, County, Twp, Rng, Sec | Main Functions |
|---|---|---|---|---|---|
| | | T3/S3KR | *Salix sp., Populus sp.* | 15W, 24 | |
| W-37 | PEM | U | *Phalaris arundinacea* | 198, Douglas, 47N, 15W, 24 | Minimal functional value |
| W-38 | PEM | U | *Phalaris arundinacea* | 198, Douglas, 47N, 15W, 24 | Wildlife |
| W-39 | PEM | U | *Carex lacustris* | 192, Douglas, 47N, 15W, 33 | Minimal functional value |
| W-40 | PSS | U | *Salix sp.,* | 192, Douglas, 47N, 15W, 32 | Wildlife |
| W-41 | PSS | U | *Salix sp.* | 190, Douglas, 46N, 15W, 6 | Minimal functional value |
| W-43 | PEM/PSS | Not Mapped | *Carex lacustris, Phalaris arundinacea, Salix sp., Cornus stolonifera, Calamagrostis Canadensis* | 175, Pine, 46N, 17W, 26 and 27 | Minimal functional value |
| *W- | PEM/PSS | PSS1C and PEMC | *Solidago sp.* | 175, Pine, 46N, 17W, 26 and 27 | Wildlife |
| W-45 | PEM/PSS | PSS1C | *Carex lacustria, Salix sp.* | 166, Pine, 45N, 17W, 19 and 45N, 18W, 24 | Flood Storage, wildlife |
| A-A | Upland | PFO1/EMB | -- | 23, Anoka, 31N, 24W, 14 | -- |
| A-B | Upland | Not Mapped | -- | 182, Pine, 46N, 16W, 16 and 17 | -- |
| A-C | Upland | Not Mapped | -- | 183, Pine, 46N, 16W, 16 | -- |
| A-D | Upland | T3/8Kr | -- | 192, Douglas, 47N, 15W, 33 | -- |
| A-E | Upland | PEMCd | -- | 35, Anoka, 32N, 24W, 2 | -- |

*Wetland observed from distance.




SRF

**Project Area and Study Site Locations**

Northern Lights Epress Environmental Assessment

NLX Passenger Rail Alliance

**Figure 1**