INTERAGENCY MEMORANDUM

TO: Doug Cain, Project Manager, WisDOT
Linda Mathews, Southeast Region Environmental Coordinator, WisDOT
Allison Bussler, Director of Public Works, Waukesha County
Gary Evans, P.E., Highway Engineering Division Manager, Waukesha County

FROM: Kenneth R. Yunker, P.E., Executive Director, SEWRPC
Michael G. Hahn, P.E., P.H., Deputy Director, SEWRPC
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Christopher J. Jors, Senior Specialist-Biologist, SEWRPC

DATE: November 22, 2016

SUBJECT: WAUKESHA WEST BYPASS SECONDARY SEDGE FEN IMPACTS & POTENTIAL FEN RESTORATION AREA

The purpose of this memorandum is to address two issues related to the Waukesha West Bypass project which were identified in a November 17, 2016, email message from Doug Cain, Project Manager, WisDOT. Mr. Cain has requested the Commission's input on these issues so the Commission's comments can be included in a WisDOT memorandum to the regulatory agencies related to impacted sedge fens along the bypass route.

The Commission staff has addressed each issue in the email as follows:

1. As noted in Mr. Cain's email: "Don Reed stated that if the land bridges are adjusted to avoid physical impacts with the fen that the essential function of maintaining the groundwater should be perpetuated and that the shading impacts may affect plant species but that the fen would continue to exist."

   This statement summarizes what Dr. Reed stated in the interagency meeting on November 15th. Since fens are driven largely by groundwater discharge, the primary concern with maintaining a fen is to avoid disruption of the groundwater flow. WisDOT has addressed the groundwater flow issue by proposing land bridges over the areas of significant groundwater discharge southeast of the intersection of Hawthorne Hollow Drive and Hazelwood Place. In addition, the Commission staff has staked the outer boundary of the two sedge fens in that area. A WisDOT survey crew has surveyed the fen boundary markers set by the Commission. The staked and surveyed sedge fen areas are shown on the attached map. It is the Commission staff's understanding that WisDOT is considering a land bridge design where abutments will be constructed to avoid direct impacts such as filling in the sedge fen areas. This design would avoid obstructing the significant groundwater discharge areas.

   Another concern with building land bridge structures in that area relates to secondary impacts to the sedge fens. It is the Commission staff's understanding from a conversation with Mr. Cain that the bridges will be built at a height of approximately five to six feet above the ground surface. At this height, the ground surface directly

below the bridges will be shaded. The sedge fen plant communities that will be below the bridges are currently dominated by Tussock sedge (*Carex stricta),* a shade-intolerant species. Over time the sedges will die back. Due to the shade cast directly under the bridges it is likely that there will be areas where vegetation simply will not grow or struggles to survive. Near the outer edges of the bridges where more sunlight reaches, sedges will give way to more shade-tolerant species. These may include species such as Skunk cabbage (*Symplocarpus foetidus),* Marsh marigold (*Caltha palustris),* and Jewelweed (*Impatiens capensis),* all of which are currently present in the wetland.

2. Also noted in Mr. Cain's email: "Don Reed also mentioned a potential fen restoration site currently within a mowed area on the property acquired at the end of Hawthorne Hollow. Don thought that if the lawn was removed/tilled under and seeded that this area would revert to a fen."

   Dr. Reed visited the potential fen restoration site on November 17, 2016, and determined that the subject site would be an appropriate restoration site. The southwestern extent of the restoration area was staked in the field by Dr. Reed and subsequently surveyed by WisDOT surveyors. The northern and southeastern extent of the restoration area is defined by the wetland boundary which is approximately near the edge of the mowed lawn (see attached map).

   Techniques for restoration of the site include removing the turf grass and upper layer of soil until the groundwater discharge zone is reached (approximately 5"-10" below the surface). Consistent groundwater discharge is an important component of a fen and it will be critical for the restoration to be successful.

   Another important component of sedge fens is the soil substrate. Soils in sedge fens tend to be organic, consisting of muck and/or peat. Sample Site Number 8, recorded in 2011, is located at the north edge of the restoration area. The soil profile at Sample 8 is entirely mineral consisting of a layer of silty-clay-loam from the surface to a depth of 4.5 inches, a clay-loam from 4.5-15 inches, a clay-loam from 15-18 inches, and a clay from 18-26 inches. The two upper layers (from 0 to 15 inches deep) were identified to be fill material with a buried horizon (original soil surface) at 15 inches. Additional soil "probing" conducted by Dr. Reed during the recent visit in other parts of the proposed restoration area indicated that an organic (muck and peaty-muck) layer occurs between 5 and 10 inches below the surface. In parts of the proposed restoration area where the soil profile is similar to what was found at Sample Site 8 (mineral soil), it may be necessary to bring in a layer of organic soil to lay over the mineral soils. Otherwise if an organic layer of soil is exposed during excavation, as was found during the recent probing, it should not be necessary to add organic soil.

   Once an appropriate hydrologic regime and soil substrate is achieved, the next issue will be establishing a native plant community at the restoration site. Aggressive, non-native, species including Reed canary grass (*Phalaris arundinacea)* are present nearby and can present serious challenges to establishing a native plant community at the restoration site. It will be important to establish tussock sedge, the dominant species found in sedge fens, as quickly as possible on the exposed soil. Tussock sedge seed is known to have a short shelf-life. "The probability of establishing *Carex* spp. from seed in created

and restored wetlands in the Upper Midwest would be maximized by using fresh seed, preferably seed produced earlier in the same growing season" (van der Valk, 1999). In addition, the article quoted above notes the importance of using soils with high levels of organic matter for optimum growth of tussock sedge. Once tussock sedge is established, other species can be added by seeding or using plant plugs, depending on availability. Other herbaceous species which could be used in the restoration include:

Angelica atropurpurea—Angelica (C)
Bromus ciliatus—Cilated brome (B+)
Calamagrostis canadensis—Canada blue-joint grass (A)
Caltha palustris—Marsh marigold (C)
Cardamine bulbosa—Spring cress (C)
Carex leptalea—Slender sedge (B+)
Elymus trachycaulis—Slender wheatgrass (B)
Eupatorium perfoliatum—Boneset (A)
Eutrochium maculatum—Spotted Joe-Pye weed (A)
Geum aleppicum—Yellow avens (B)
Glyceria striata—Fowl manna grass (B)
Lathyrus palustris – Marsh vetchling (B)
Lycopus uniflorus—Northern bugleweed (B)
Lythrum alatum—Winged loosestrife (B)
Micranthes pennsylvanica—Swamp saxifrage (B)
Pilea fontana—Black-fruited clearweed (C)
Pycnanthemum virginianum—Mountain mint (B)
Scirpus atrovirens—Black bulrush (B)
Symphyotrichum firmum—Shining aster (A)
Symphyotrichum lanceolatum—Panicled aster (B)
Symplocarpus foetidus—Skunk cabbage(C)
Thelypteris palustris—Marsh fern (B)
Viola nephrophylla – Northern bog violet (B+)

A = typical upright sedge-fen co-dominant species, B = fen associate, B+ fen indicators from Carpenter (1995), C = groundwater associate

References:

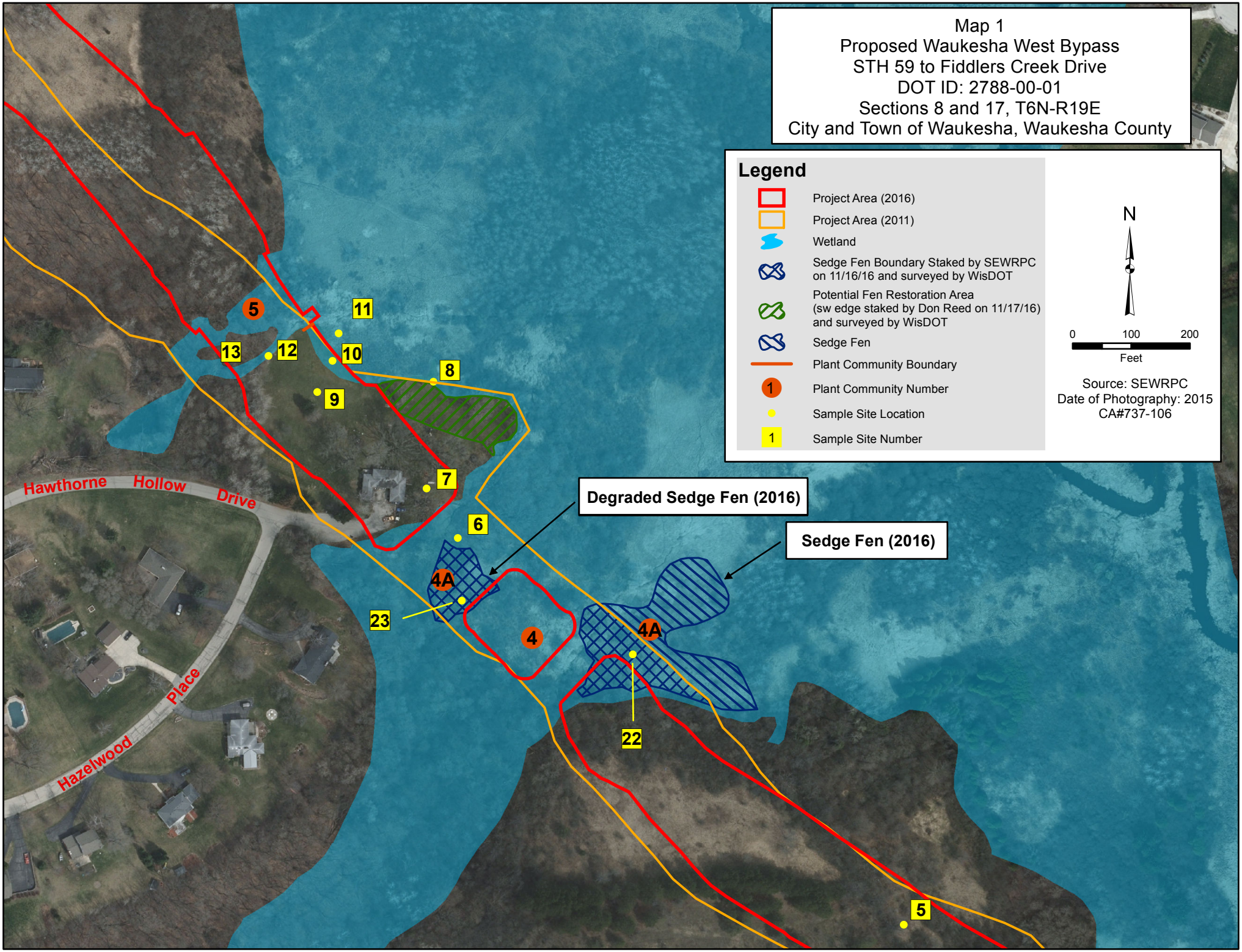
Carpenter, Q. J. 1995. Toward a new definition of calcareous fen for Wisconsin (USA). Ph.D. Dissertation. University of Wisconsin–Madison, Madison.

Eggers, Steve D. and Donald M. Reed 2015. Wetland Plants and Plant Communities of Minnesota and Wisconsin, Version 3.2, U.S. Army Corps of Engineers, St. Paul District, 478 pages.

Reed, Donald M. 2002. Environmental Correlates of Vegetation Types in Southeastern Wiscosin Fens. Ph.D. Dissertation. University of Wisconsin-Milwaukee, Milwaukee.

Reed, Donald M. 1985. Composition and Distribution of Calcareous Fens in Relation to Environmental Conditions in Southeastern Wisconsin. M.S. Thesis. University of Wisconsin – Milwaukee.

van der Valk, A.G., Bremholm, T.L. & Gordon, E. Wetlands (1999) 19: 756. doi: 10.1007/BF03161782


Map 1
Proposed Waukesha West Bypass
STH 59 to Fiddlers Creek Drive
DOT ID: 2788-00-01
Sections 8 and 17, T6N-R19E
City and Town of Waukesha, Waukesha County
Legend
Project Area (2016)
Project Area (2011)
Wetland
Sedge Fen Boundary Staked by SEWRPC on 11/16/16 and surveyed by WisDOT
Potential Fen Restoration Area (sw edge staked by Don Reed on 11/17/16) and surveyed by WisDOT
Sedge Fen
Plant Community Boundary
Plant Community Number
Sample Site Location
Sample Site Number
N
0
100
200
Feet
Source: SEWRPC
Date of Photography: 2015
CA#737-106
Hawthorne Hollow Drive
Hazelwood Place
Degraded Sedge Fen (2016)
Sedge Fen (2016)
5
11
13
12
10
8
9
7
6
4A
23
4
4A
22
5