2015

Saganashkee Slough - McMahon Woods Section 506 Great Lakes Fishery & Ecosystem Restoration Study

Appendix E – HTRW

USACE
Chicago District
August 2015

2 June 2015

CELRC-TS-DH

MEMORANDUM FOR FILE

SUBJECT: Supplemental HTRW Review for McMahon Fen Ecosystem Restoration Project Area

1. This memorandum discusses results of the HTRW review conducted for the McMahon Fen Section 506 GLFER project and supplements a previous HTRW and non-HTRW assessment. A HTRW assessment completed March 2013 for the Saganashkee Slough Section 506 project included both McMahon Fen and Saganashkee Slough within the study area. Due to high cost and lack of support to pursue the Saganashkee Slough project features, only the McMahon Fen portion of the study area will be restored under the current Section 506 GLFER project. Information collected to complete the previous HTRW assessment was reviewed to determine if there is a potential to encounter a recognized environmental conditions (REC) within the current project area; results of the limited HTRW assessment for the additional project area is documented in this memorandum.

2. The McMahon Fen study area was expanded in the planning stage of the project to include additional area adjacent to previously proposed areas for ecosystem restoration activities. See Figure 1 for a general location map of areas being considered for implementation under the current project. Ecosystem restoration activities are limited to vegetation management, including tree/shrub removal, herbaceous invasive control, and native plant installation, in the fen and along Crooked Creek to restore 30.1 acres of marsh, 405 acres of oak savanna, and 376 acres of mesic woodland. In addition, a small berm is proposed adjacent to Crooked Creek to prevent storm water overflow into the fen, installation of a larger box culvert under 107th Street, an installation of rock/cobble fill in the fen streamlets to prevent erosion in the headwater areas of the endangered Hine's Emerald dragonfly breeding habitat. See Figure 2 for project location map.

3. Review of environmental records provided in the EDR database search (Attachment A) suggests that there is one Resource Conservation and Recovery Information System (RCRIS) site within the recommended ASTM search distance to the additional project area (see Figure 3). The Resource Conservation and Recovery Information System (RCRIS) lists sites which generate, transport, store, and/or dispose of hazardous waste defined by the Resource Conservation and Recovery Act (RCRA). The Forest Preserve District of Cook County, EDR Site #1, located ½ to 1 mile to the northwest of McMahon Fen, was listed as a small quantity generator in 2002 and is no longer active. The generator does do not have any past violations; therefore, there is no reason to suspect that activities at this location have impacted the project area. Review of environmental records provided in the database search indicates no RECs on the property or in the surrounding areas that will impact use of the site.

4. Potential RECs can be identified through review of historical topographic maps and aerial photographs. Changes in topography, such as evidence of excavation and fill activity, observation of and changes in land use, and disturbances within the project and surrounding areas, including areas lacking vegetation, could be an indication of potential releases at a site. Historical topographic maps from 1901 through 1997 are included in Attachment B; historical aerial photographs are provided in Attachment C. Though the aerial photographs do not encompass the entire fen, topographic maps suggest project areas within McMahon Fen appear to be undeveloped from 1901 to date. Topographic maps suggest that the Cal-Sag Channel was constructed between 1901 and 1928 and material generated from construction of the channel may have been side cast to the north creating a berm north of the channel in southern portions of McMahon Fen; in addition, an extensive fill pile is also located in the southwest corner of McMahon Fen, just east and parallel to 104th Avenue (Willow Springs Road). The fill areas appear to be unvegetated in the 1938 aerial photograph. The fill areas are included in the limits of the project, though it is unlikely that these areas will be graded, or the fill removed from the site, due to extensive earthwork costs associated. Soil sampling conducted on the McMahon Fen fill pile, documented in the March 2013 HTRW investigation, suggests that, in general, fill materials consist of brown clay, gray and brown silt, and silty sand. Stockpiled soils do not contain VOCs, SVOCs, PCBs, pesticides and herbicides. Arsenic, beryllium, cadmium, chromium, copper lead, nickel, zinc and mercury were detected in most soils samples, but analytical results suggest that concentrations are near normal background of metals found in and/or State of Illinois Tiered Approach to Corrective Action Objectives (TACO) standards and are therefore not a REC. Review of current aerial photograph suggests that a small portion of the north east portion of the project adjacent to Crooked Creek appears to be vegetated differently than the surrounding forested area. PM-PL confirmed that this area is currently marsh.

5. Previous site visits suggest that the eastern portion of the fen contains very wet and ponded areas with vegetation. A large stockpile of fill material was confirmed on the southwest corner of the site, as previously discussed. The fill pile appears to be mostly large stone and cobble, consistent with the excavation of the Cal-Sag Channel through the native limestone, but is overgrown with vegetation. There are several places within the fen where significant erosion has occurred in the seeps and rivulets. In addition, there is a depressed area adjacent to Crooked Creek where it is believed that stormwater runoff overflows into the fen causing erosion. Various wildlife including frogs and birds were actively using the site on the day of the site visit, and there was evidence of mammals using the site. In general, besides the stockpiled fill in the fen, the project area is free of trash and debris and other RECs. Some general debris, such as plastics bags and other roadway garbage is scattered within the project area, especially at stormwater inlets to Crooked Creek east of Willow Springs Road. Active dumping is not apparent within the project area. Vegetation in the project area appeared to be in good condition; however, vegetation in the fen/prairie itself was not flourishing, likely due to time of year of site visit. No evidence of HTRW or non-HTRW conditions was observed.

6. No HTRW investigation can wholly eliminate uncertainty regarding the potential for encountering a REC associated with a project area. Performance of this investigation is

intended to reduce, but not eliminate, uncertainty regarding the potential for encountering a HTRW in connection with a project area. Questions regarding this investigation can be directed to Casey Pittman at (312) 846-5506.

JAY A. SEMMLER, P.E.
Chief, Hydraulics & Environmental Engineering Section

Attachments (3)

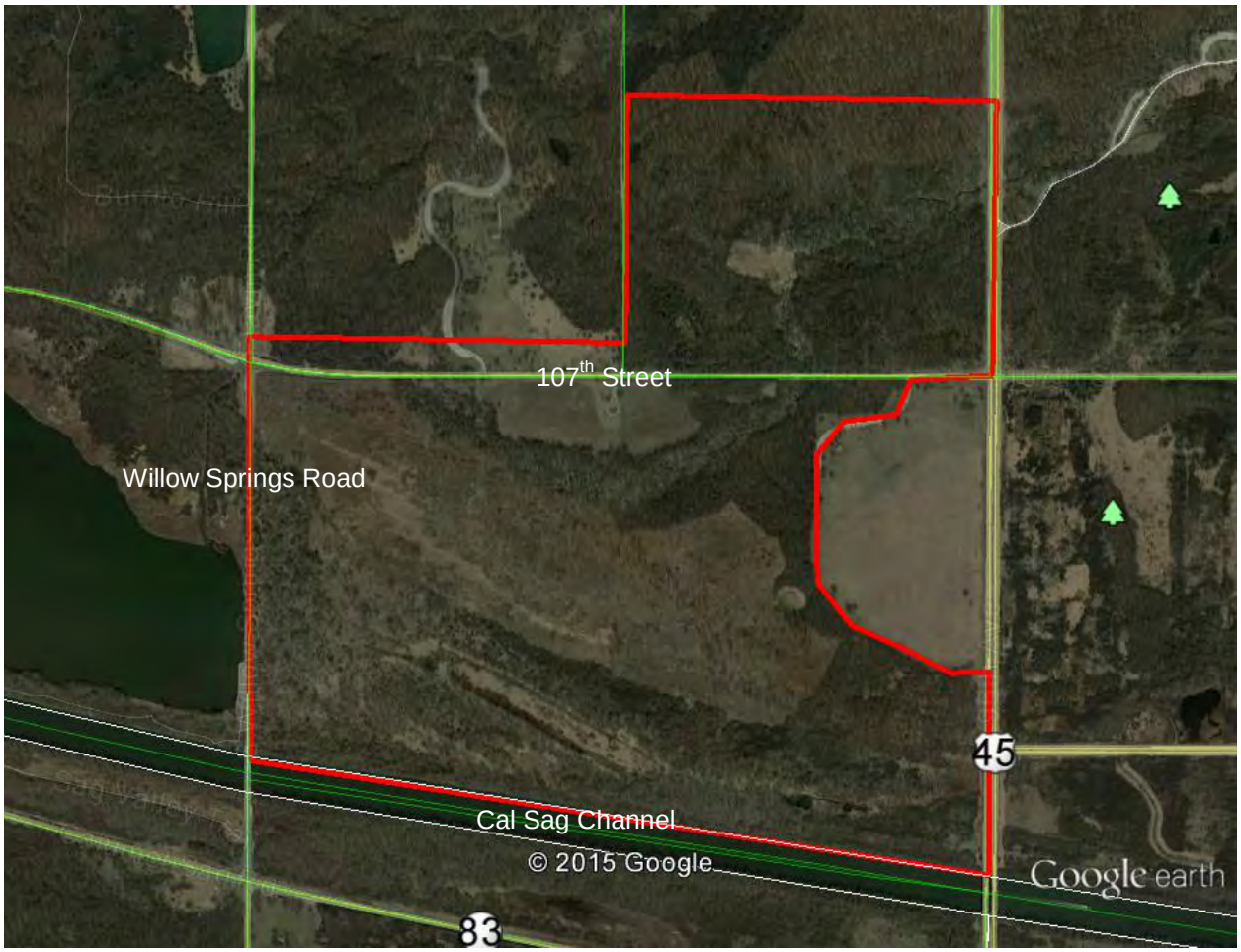
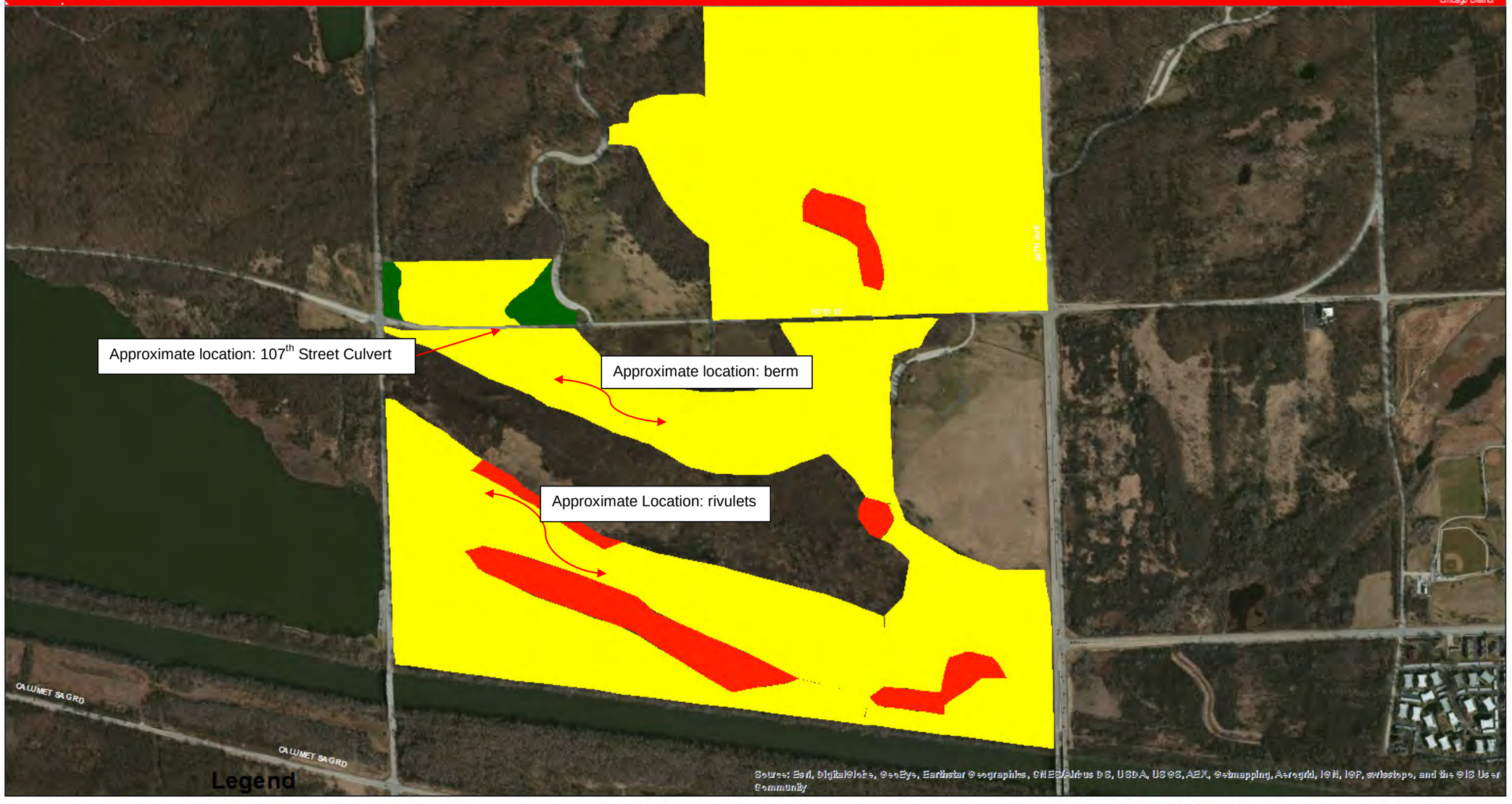


Figure 1: McMahon Fen General Project Area

U.S. Army Corps of Engineers ©

MacMahon Woods Habitat Map

Chicago District



Legend

<all other values>

Community

- Marsh (30.1-acres)
- Oak Savanna (4.5-acres)
- Wet Mesic Woodland (376-acres)

1 inch = 742 feet

0 187.5 375 750 1,125 1,500 Feet

N W E S

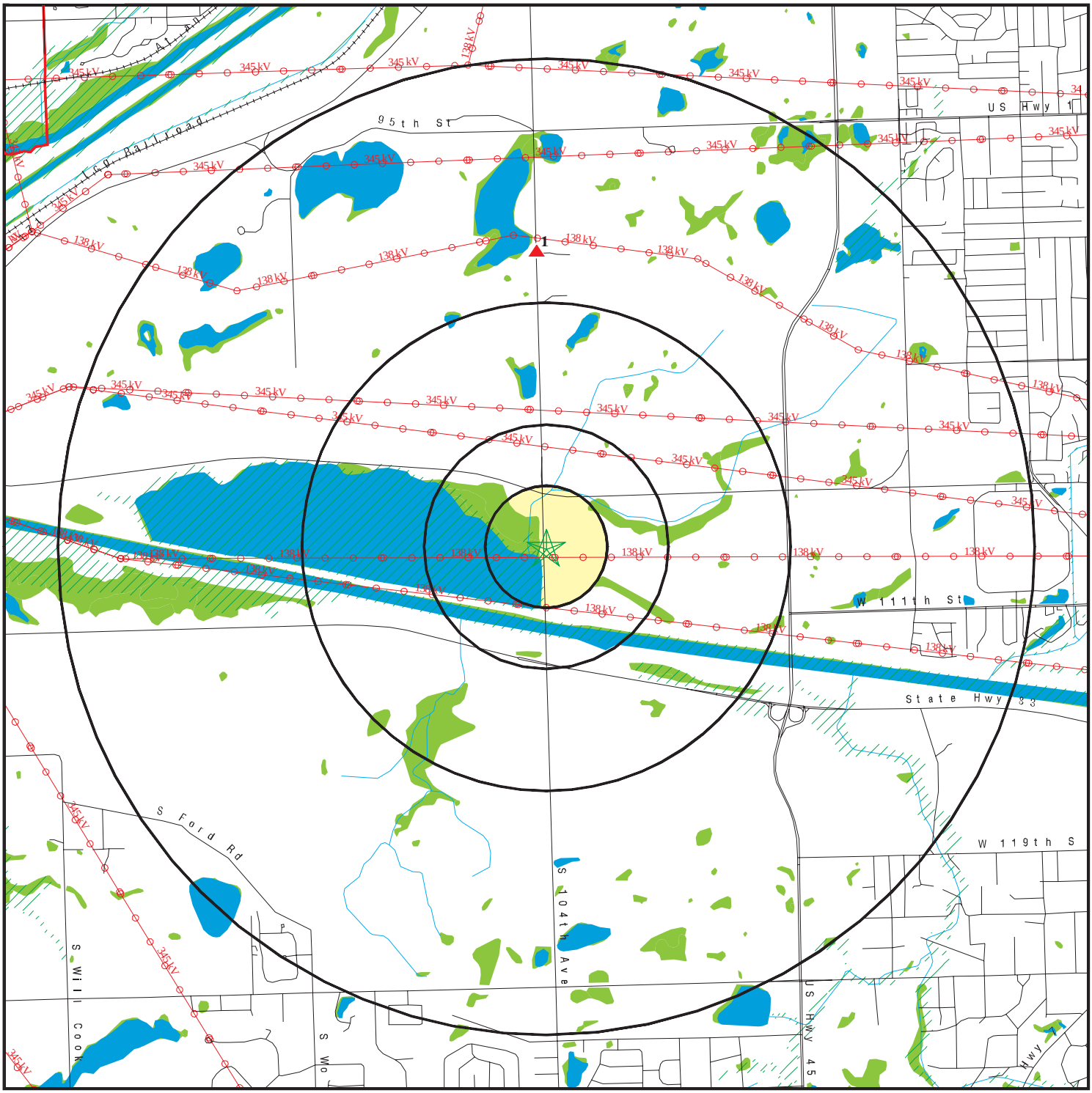
Habitat Map
East

For Official Use Only
May, 2015

Figure 2

Chicago District, U.S. Army Corps of Engineers

Figure 3 : EDR Radius Map **OVERVIEW MAP - 3477867.2s**



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Power transmission lines
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Saganashkee Slough	CLIENT: U.S. Army Corps of Engineers
ADDRESS: 104th/107th Willow Springs IL 60480	CONTACT: Casey Pittman INQUIRY #: 3477867.2s
LAT/LONG: 41.6926 / 87.8748	DATE: December 14, 2012 2:13 pm

Attachment A

Saganashkee Slough
104th/107th
Willow Springs, IL 60480

Inquiry Number: 3477867.2s
December 14, 2012

Attachment available digitally upon request

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

Attachment B

Saganashkee Slough
104th/107th
Willow Springs, IL 60480

Inquiry Number: 3477867.4
December 14, 2012

Attachment available digitally upon request

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Attachment C

Saganashkee Slough
104th/107th
Willow Springs, IL 60480

Inquiry Number: 3477867.5
December 17, 2012

Attachment available digitally upon request

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND NON-HTRW INVESTIGATION

Saganashkee Slough Section 506
Great Lakes Fisheries & Ecosystem Restoration Project

Hydraulic and Environmental Engineering Section (TS-DH)
U.S. Army Corps of Engineers, Chicago District

March 2013

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND NON-HTRW INVESTIGATION
Saganashkee Slough Section 506
Great Lakes Fisheries & Ecosystem Restoration Project

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INTRODUCTION

The purpose of this report is to discuss the hazardous, toxic, and radioactive waste (HTRW) investigation for the Saganashkee Slough Section 506, Great Lakes Fisheries & Ecosystem Restoration Project. This report identifies both HTRW and non-HTRW environmental issues, and presents appropriate measures to resolve these issues. The methods used in performing the investigation are described in detail. Conclusions and recommendations regarding potential impacts due to HTRW, non-HTRW, and recognized environmental conditions (RECs) associated with the project site are provided.

AUTHORITY

Engineer Regulation (ER) 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works projects, requires that a site investigation be conducted as early as possible to identify and evaluate potential HTRW problems. According to ER 1165-2-132, non-HTRW issues that do not comply with the federal, state, and local regulations should be discussed in the HTRW investigation along with HTRW issues. Therefore, HTRW and non-HTRW issues identified are discussed in this report.

The HTRW investigation presented in this report was conducted during the feasibility phase of the project. This report was performed at the level of detail required for a Reconnaissance Phase investigation and relies on existing information, observations made through database research, a site visit, and a historical aerial photograph and topographic map review. As stated in the ER-1165-2-132, an initial assessment as appropriate for a Reconnaissance Study should be conducted as a first priority for projects with no prior HTRW consideration. If the initial assessment indicated the potential for HTRW, testing, as warranted, and analysis similar to a Feasibility Study should be conducted prior to proceeding with the project design.

No HTRW investigation can wholly eliminate uncertainty regarding the potential for HTRW associated with a project area. Performance of the HTRW investigation is intended to reduce, but not eliminate, uncertainty regarding the potential for HTRW in connection with a project area, and this practice recognizes time and cost constraints.

GUIDANCE

Supplemental guidance was provided by the Standard Practice for Environmental Assessments: Phase I Environmental Site Assessment Process (Designation: E 1527-00) prepared by the American Society for Testing of Materials (ASTM). These standards include a records review, site visit, interviews, and report preparation. This report followed many of the ASTM E 1527-00 guidelines but not to the same level of detail described by the ASTM E 1527-00 guidance.

Hazardous, Toxic, and Radioactive Waste

The objective of ER 1165-2-132 is to outline procedures to facilitate early identification and appropriate consideration of HTRW problems. This investigation, therefore, identifies potential HTRW problems and discusses resolutions and/or provides recommendations regarding the HTRW problems identified.

Non-Hazardous, Toxic, and Radioactive Waste

According to ER 165-2-132, non-HTRW environmental issues that do not comply with federal, state, and local regulations should be discussed in the HTRW investigation along with HTRW issues. For example, solid waste is a non-HTRW issue considered, in addition to petroleum releases from Leaking Underground Storage Tanks (LUSTs), because of the potential to impose environmental hazards. Non-HTRW and RECs identified during the investigation are also discussed in this report, along with resolutions and/or recommendations for resolving any open issues.

LAWS AND REGULATIONS

Federal

The definition of HTRW according to ER 1165-2-132, page 1, paragraph 4(a) is as follows: "Except for dredged material and sediments beneath navigable waters proposed for dredging, for purposes of this guidance, HTRW includes any material listed as a 'hazardous substance' under the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq (CERCLA). (See 42 U.S.C. 9601(14).) Hazardous substances regulated under CERCLA include 'hazardous wastes' under Sec. 3001 of the Resource Conservation and Recovery Act, 42 U.S.C. 6921 et seq; 'hazardous substances' identified under Section 311 of the Clean Air Act, 33 U.S.C. 1321, 'toxic pollutants' designated under Section 307 of the Clean Water Act, 33 U.S.C. 1317, 'hazardous air pollutants' designated under Section 112 of the Clean Air Act, 42 U.S.C. 7412; and 'imminently hazardous chemical substances or mixtures' on which EPA has taken action under Section 7 of the Toxic Substance Control Act, 15 U.S.C. 2606; these do not include petroleum or natural gas unless already included in the above categories. (See 42 U.S.C. 9601(14).)"

As stated in the definition of hazardous substance in the Environmental Statutes, 1988 Edition, the term does not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance under the definition. Underground Storage Tanks (USTs) are federally regulated under 40 CFR Part 280, which includes technical standards and corrective action requirements for owner and operators of USTs.

State

The State of Illinois regulates USTs under Illinois Administrative Code, Title 35, Subtitle G, Chapter I, Subchapter D, Part 731, Underground Storage Tanks. The definition of a regulated substance under this regulation is any "hazardous substance" or "petroleum." A hazardous substance UST is defined as an UST system that contains a "hazardous substance," or any mixture of "hazardous substances" and "petroleum" which is not a petroleum UST system. The petroleum UST means any UST system that contains petroleum or a mixture of petroleum with minimal quantities of other regulated substances. Owners and operators of petroleum or hazardous substance UST systems must comply with the requirements of Part 731, except for USTs excluded under Section 731.110(b), and UST systems subject to RCRA corrective action requirements under 35 Ill. Adm. Code 724.200, 724.296, 725.296 or 725 Subpart G.

SITE DESCRIPTION

The Saganashkee Slough study area is within the historic boundary of the Great Lakes basin and borders the Calumet-Saganashkee (Cal-Sag) Channel near Palos, Illinois (Figure 1). The proposed restoration project would be located within and near Saganashkee Slough and McMahon Fen. The proposed restoration footprint is approximately 809-acres of publicly protected lands within the Palos Preserves area of the Forest Preserve District of Cook County, IL. The site is bordered by the Cal-Sag channel to the south, 107th Street to the north, Archer Avenue to the far west, and LaGrange Road to the east; Saganashkee Slough and McMahon Fen are bisected by Willow Springs Road (Figure 2).

PROJECT DESCRIPTION

The Forest Preserve District of Cook County has requested that the Chicago District, U.S. Army Corps of Engineers (USACE) initiate a study under Section 506 Great Lakes Fishery and Ecosystem Restoration to ascertain the feasibility of restoration features to ensure the ecological integrity of the Saganashkee Slough and McMahon Fen. The scope of the study addresses the issues of habitat restoration for native plant community preservation, invasive species, connectivity, and native species richness. A Preliminary Restoration Plan (PRP) prepared by the U.S. Army Corps of Engineers (USACE) documented a cursory review of the potential restoration measures for returning natural hydrology and geomorphology to lacustrine, fen, spring and other wetland ecotypes to the Saganashkee Slough and Fen Restoration area (USACE 2011). Measures being considered for the restoration of Saganashkee Slough include: moving bottom sediment to create deep water habitat; creating littoral zone wetland shelves and islands to increase diversity of habitat that will help eliminate potential winter fish kills; creating submerged gravel bars, submerging trees and placing limestone shoals; treating remaining exposed sediment to prevent internal nutrient loading; eradicating non-native fish species and reintroduction native slough species to set in motion ecological diversity of these remnant

wetland ecosystems. Measures being considered for the restoration of McMahon Fen include removal of onsite fill (side cast from the excavation of the Cal-Sag channel) from spring and fen areas, resurgence of spring and fen hydrology, and measures to prevent Crooked Creek from overflowing into the fen during storm events. Projected habitats are shown in Figure 3. Significant grading, soil and unnatural fill excavation, and sediment management activities may be conducted to complete the proposed project.

GENERAL METHODS

The following sections contain information that was requested and gathered in accordance with ER 1165-2-132 for this assessment. The information was obtained from:

- Existing information review
- Database research
- Historical topographic map and aerial photograph review
- Site visit

This information was used to determine if the restoration measures for Saganashkee Slough and McMahon Fen will have an impact on any HTRW occurrences that may exist in the surrounding areas, and if HTRW problems will have an impact on the implementation of the project. The information gathered from the above list of sources is detailed in the following sections.

EXISTING INFORMATION REVIEW

Historical Information

The Saganashkee Slough is a remnant of the prehistoric outlet of early Lake Chicago. It was the first of four Forest Preserve District of Cook County impoundments constructed in Cook County with federal funds allocated to the Illinois Department of Conservation under the Dingell-Johnson Act. On the first map of Cook County issued in 1851, Saganashkee was the name of the swamp that extended from west of Willow Springs Road almost to Blue Island. In early documents, the area was known as "Ausagaunashkee" which meant "slush of the earth", presumably referring to the underlying peat. The Saganashkee Swamp, abundant with fish and wildlife, was largely destroyed by draining to provide feeder water for the Illinois and Michigan Canal and later for the Calumet-Sag Channel. The present water area was created in 1948-1949 by the construction of a dam at the east end of the remaining slough and also a levee at the west end of the same slough (IEPA 2010).

Saganashkee Slough Watershed Information

The Illinois Environmental Protection Agency developed a Total Maximum Daily Load (TMDL) for the Saganashkee Slough in March 2010 (IEPA 2010). A TMDL is a

quantitative assessment of water quality impairments, contributing sources, and pollutant reductions needed to attain water quality standards. The TMDL specifies the amount of pollutant or other stressor that needs to be reduced to meet water quality standards, allocates pollutant control or management responsibilities among sources in a watershed, and provides a scientific and policy basis for taking actions needed to restore a water body.

The Saganashkee Slough watershed (Figure 4) is located in northeastern Illinois, southwest of the city of Chicago. The watershed is approximately 3,658 acres in size and flow is generally directed south toward the lake. Elevation in the Saganashkee Slough watershed ranges from 747 feet above sea level in the northern part of the watershed near Route 45 to 584 feet near the slough. Land use data for the Saganashkee Slough watershed was extracted from the Illinois Gap Analysis Project Land Cover data layer for development of the TMDL. Over half of the Saganashkee Slough watershed is covered by upland forest, while another 15 percent of the watershed is comprised of surface water and surrounding marshes, and 9 percent of the watershed is urban area. Table 1 summarizes the land cover and land use throughout the watershed.

Table 1: Land Use and Cover in the Saganashkee Slough Watershed

Land Cover Category	Area (Acres)	Percentage
Upland Forest	1,897.9	51.88
Surface Water	436.3	11.93
Partial Canopy/Savannah Upland	424.2	11.60
Rural Grassland	374.9	10.25
Low/Medium Density	245.8	6.72
Shallow Marsh/Wet Meadow	124.0	3.39
Floodplain Forest	73.6	2.01
Urban Open Space	57.2	1.56
High Density	11.8	0.32
Shallow Water	6.7	0.18
Soybeans	2.8	0.08
Barren & Exposed Land	1.5	0.04
Corn	0.9	0.02
Deep Marsh	0.4	0.01
Total	**3,658.0**	**100.00**

According to the TMDL, Saganashkee Slough (surface water body designated as RHH by Illinois Environmental Protection Agency - IEPA) is listed on the state 303(d) list of the following impairments:

- Aesthetic quality due to the levels of phosphorus (total) and excessive sedimentation/siltation. The source of the impairment is runoff from forest/grassland/parkland/agriculture and urban runoff/storm sewers.

- Aquatic life due to the levels of phosphorus (total) and dissolved oxygen, excessive sedimentation/siltation, and aquatic algae. The source of the impairment is runoff from forest/grassland/parkland/agriculture and urban runoff/storm sewers.

- Aquatic life due to the levels of nickel and silver. The source of the impairment is contaminated sediments. Sediment quality is discussed further in this report. Though the TMDL concludes that the aquatic life is impaired due to the presence of contaminated sediments, none of the historic or current sediment sampling results exceed exotoxicological adverse effect threshold values or TACO residential values.

- Fish consumption due to levels of polychlorinated biphenyls (PCBs). The source of the impairment is unknown. Sediment sampling conducted in 2012, discussed further in this report, suggest that PCBs are not present in the sediment in Saganashkee Slough.

Saganashkee Slough Water and Sediment Quality

IEPA 2010 TMDL

Historic sediment and surface water quality data obtained from the TMDL and USEPAs STORET site collected by the IEPA are summarized in Tables 2 and 3. Sediment sampling results are compared to the State of Illinois Tiered Approach to Corrective Action Tier I residential standards (TACO), established background concentrations of metals in soils found in metropolitan statistical areas (MSAs), and the Calumet Open Space Reserve Ecological Threshold (NOAEL) and Benchmark (LOAEL) sediment ecological threshold values (referred to herein as ecotox values). Water quality sampling results are compared to the State of Illinois General Use Water Quality Standards and the ecotox values for surface water. Samples locations are shown on Figure 5. In general, analysis of surficial sediment samples suggest that levels of cadmium, nickel and silver are above the established background concentrations of metals, but below the TACO standards and the ecotox benchmark values; concentration of chromium in one sample exceed the established background concentrations of metals in MSAs, but is below the TACO standards and ecotox benchmark value. Because the sediment samples were surficial grab samples, any atmospheric deposition or stormwater impacts would be magnified, and would tend to bias the results compared to the overall sediment quality. Values of phosphorus found in Saganashkee Slough exceed that state total phosphorus standard (0.05 mg/L) and levels of ammonia in the water exceed the ecotox benchmark value.

Table 2: IEPA 2001 Sediment Sampling Results Saganashkee Slough

Parameter	Measured Concentration RHH-1 (mg/kg)	Measured Concentration RHH-3 (mg/kg)	IEPA TACO Residential (mg/kg)	Background (Counties Within MSAs) (mg/kg)[(i)]	ECOtox Threshold Sediment NOAEL (mg/kg)	ECOtox Benchmark Sediment LOAEL (mg/kg)
Arsenic	12	11	13.0	13.0	9.79	33
Barium	120	88	5500	110	NA	NA
Cadmium	**1**	**0.81**	78	0.6	0.99	4.98
Lead	37	29	400	36	35.8	128
Manganese	520	350	1600	636	460	1100
Mercury	ND	ND	10	0.06	0.18	1.06
Nickel	**43**	**30**	1600	18.0	22.7	48.6
Silver	**2.9**	**2**	390	0.55	1	3.7
Zinc	130	78	23000	95.0	121	459
Chromium	**28**	19	230	16.2	43.4	111
Copper	47	36	2900	19.6	31.6	149
Iron	30,000	19,000	ND	15,900	21200	43766
Potassium	2,100	1,400	ND	1,268		
Kjeldahl nitrogen	7,940	5,130				
Solids	15.3 - 18 %	17.7 - 30.7 %				
Phosphate-phosphorus as P	580	429				
TOC	2.8 %	4.8 %				

(i)Section 742.Appendix A, Table G Concentrations of Inorganic Chemicals in Background Soils
CCDD = clean construction and demolition debris
***BOLD** = exceedance of TACO, ecotox, or established background concentration*
NA = not available
ND = not detected

Table 3: IEPA 2001 Surface Water Quality Sampling Results

Parameter	Minimum Measured	Maximum Measured	Average	IEPA Water Quality Standard	ECOtox Threshold Sediment NOAEL (ug/L)	ECOtox Benchmark Sediment LOAEL (ug/L)
pH	7.3	8.96	8.3	6.5 – 9.0		
Alkalinity, carbonate as $CaCO_3$ (µg/L)	0	15,000	5,000			
Specific Conductance (µS/cm)	504	586	555			
Depth, bottom (in)	36	84	56			
Ammonia as NH_3 (µg/L)	**ND**	**670**	**210**	4,700 (acute)	25	140
TKN (µg/L)	1,170	3,500	2200		10 (mg/L)	
Inorganic Nitrogen (nitrate and nitrite) as N (µg/L)	ND	200	81			
Secchi Depth (in)	4	19	11			
TSS (µg/L)	21,000	80,000	46000			
Turbidity (NTU)	24	87	48			
Phosphate-Phosphorus as P (µg/L)	**20**	**219**	**110**	50	7	
Phosphate-Phosphorus as P (µg/L)	14	227	48		7	
TVS (µg/L)	12,000	23,000	15,000			
Alkalinity, total (µg/L)	105,000	195,000	151,000			
Chlorophyll (µg/L)	53	300	157			
Chorophyll-a (µg/L)	5.9	104	45			
Chlorohyll-b (µg/L)	1.59	29.7	8.1			
Chlorophyll-c (µg/L)	ND	9.21	4.0			
Pheophytin-a (µg/L)	ND	15.8	8			

***BOLD** = exceedance of water quality standard or ecotox*
ND = not detected

USACE Sampling 2012

The U.S. Army Corps of Engineers, Chicago District (USACE) retained FutureNet Group. Inc. (FNG) to provide sediment-sampling services in Saganashkee Slough in 2012. The objective of the sediment sampling was to collect sufficient sediment and water samples to accurately characterize the physical and chemical properties of the sediment and water in the study area. A total of nine composite sediment samples were collected from three management units of Saganashkee Slough to represent the quality of material that may be dredged. Four water samples were also collected (three background within Saganashkee Slough and one sample in Crooked Creek). One exploratory core sample was collected from each management unit from the top of the sediment surface to the depth of refusal. Sediment samples were analyzed for PCBs, SVOCs, pesticides, priority pollutant metals, nutrients, TOC, and a series of geotechnical parameters including grain size. Water samples were analyzed for nutrients, phenol, cyanide, pH, hardness, alkalinity, COD, DO, priority pollutant metals, TDS, TSS, oil & grease, TVS, BTEX, SVOCs, chloride, sulfate and fluoride. Sediment sampling logs and analytical results are included as Attachment A. Sample locations are shown on Figure 6. Sediment samples collected appear to be primarily fine silts/clays with a small fraction of fine sand.

Results of 2012 sampling are summarized in Tables 4 and 5. Sediment sampling results are compared to the TACO standards, established background concentrations of metals in soils found in metropolitan statistical areas (MSAs), and ecotox sediment values. Water quality sampling results are compared to the Illinois water quality standards and the ecotox values for surface water. In general, sediment sampling results suggest that concentrations of metals found in the sediment are below the established background concentrations of metals in MSAs, TACO standards, and the ecotox benchmark values. PCBs, SVOCs, and pesticides were not detected in sediment samples. Phosphorous concentrations in the Saganashkee Slough and Crooked Creek exceed the state water quality standard and the ecotox threshold value; ammonia concentrations found exceed ecotox threshold values. The concentrations of dissolved oxygen measured in Saganashkee Slough exceed the state standard (3.5 to 6.0 mg/L). Contaminants, such as SVOC, BTEX, and oil& grease, were not detected.

Table 4:Sediment Chemical Analytical Results Summary Table

Parameter	Management Unit		Management Unit #1			Management Unit #2			Management Unit #3			IEPA TACO Residential	Calumet Open Space Reserve			TACO Background Counties Within MSAs
	Sample ID		SagS-2012-MU1-C01	SagS-2012-MU1-C02	SagS-2012-MU1-C03	SagS-2012-MU2-C01	SagS-2012-MU2-C02	SagS-2012-MU2-C03	SagS-2012-MU3-C01	SagS-2012-MU3-C02	SagS-2012-MU3-C03		Sediment Background	Sediment Threshold	Sediment Benchmark	
	Lab ID		T12I138-06	T12I138-09	T12I138-08	T12I138-14	T12I138-15	T12I138-16	T12I138-10	T12I138-11	T12I138-12					
	Date Collected		09/11/12	09/12/12	09/12/12	09/12/12	09/13/12	09/13/12	09/12/12	09/12/12	09/12/12					
	Analysis Method	Units														
% Solids	% Calculation	% by Wt.	25	68	42	32	30	52	55	75	28	NA	NA	NA	NA	NA
Moisture, Percent	ASTM D2974-87	% by Wt.	75	32	58	68	70	48	45	25	72	NA	NA	NA	NA	NA
Specific Gravity	'ASTM D854-91		2.18	2.34	2.4	2.31	2.32	2.43	2.59	2.42	2.28	NA	NA	NA	NA	NA
Ammonia as N	EPA 350.1 Rev.	mg/kg dry	410	38	150	610	440	100	40	46	480	NA	NA	NA	NA	NA
Total Kjeldahl Nitrogen	EPA 351.2 Rev.	mg/kg dry	8900	**2200	4600	6600	6300	3600	2400	1300	9700	NA	NA	NA	NA	NA
Phosphorus, Total	EPA 6010B	mg/kg dry	150	**220	450	390	300	210	160	180	310	NA	NA	NA	NA	NA
Total Organic Carbon	WALKLEY	mg/kg dry	11000	<1000	50000	120000	110000	56000	31000	2200	86000	NA	NA	NA	NA	NA
Antimony	EPA 6020	mg/kg dry	<0.30	**<0.30	0.55	0.32	<0.30	<0.30	<0.30	<0.30	0.30	31	0.8	3.2	70	4
Arsenic	EPA 6020	mg/kg dry	2.4	**4.2	9.2	6.6	4.9	3.8	3.0	5.3	5.5	13	26.4	9.79	33	13
Beryllium	EPA 6020	mg/kg dry	<0.50	<0.50	0.55	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	160	1.5	NA	NA	0.59
Cadmium	EPA 6020	mg/kg dry	<0.20	<0.20	0.34	0.23	0.23	<0.20	<0.20	<0.20	0.24	78	3.7	0.99	4.98	0.6
Chromium	EPA 6020	mg/kg dry	8.3	9.3	15	13	14	15	8.8	14	13	230	69.9	43.4	111	16.2
Copper	EPA 6020	mg/kg dry	9.0	**9.0	16	14	11	9.7	9.9	11	13	2,900	99.9	31.6	149	19.6
Lead	EPA 6020	mg/kg dry	5.8	9.7	21	13	15	11	8.7	9.6	16	400	538	35.8	128	36
Mercury	EPA 7471A	mg/kg dry	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	10	0.47	0.18	1.06	0.06
Nickel	EPA 6020	mg/kg dry	7.8	**10	16	15	11	12	11	11	13	1,600	49.2	22.7	48.6	18
Selenium	EPA 6020	mg/kg dry	0.28	**0.34	0.48	0.48	0.22	<0.20	0.34	<0.20	0.32	390	5.03	4	4	0.48
Silver	EPA 6020	mg/kg dry	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	390	0.64	1	3.7	0.55
Thallium	EPA 6020	mg/kg dry	<0.50	<0.50	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.3	1.1	NA	NA	0.32
Zinc	EPA 6020	mg/kg dry	18	**28	46	34	38	29	23	32	41	23,000	761	121	459	95

"<" - Analysis is not detection

NA - Value currently not available

*The reporting limits were raised because the sample matrix caused interference which required that the sample be analyzed at a dilution to quantify the results. Due to higher reporting limits, some compounds had non-detect analytical results where the detection limits were higher than MAC or ecotox values

** The MS/MSD recovery was out of control low, resulting in an out of control RPD between the MS and the MSD. The result and reporting limit for this analyte, in the non-spiked version of the sample, must be considered estimated

Table 5: 2012 Water Chemical Analytical Results Summary

APPENDIX B

Parameter	Sample ID		Background water samples			Crook Creek	IEPA Water Quality Standards			Calumet Open Space Reserve		
			SagS-2012-MU1-W01	SagS-2012-MU2-W01	SagS-2012-MU3-W01	SagS-CCRK-W01	Acute Aquatic	Chronic Aquatic	Human Health	Surface Water Background	Surface Water Threshold	Surface Water Benchmark
	Date Collected		9/11/2012	9/11/2012	9/11/2012	9/11/2012						
	Analysis Method	Units										
Total Alkalinity	SM 2320 B-97	mg/L	140	140	150	190	NA	NA	NA	NA	NA	NA
Hardness as CaCO3	SM 2340B	mg/L	180	180	170	230	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	SM 2540 C-97	mg/L	430	420	430	660	NA	NA	NA	NA	NA	NA
Total Suspended Solids	SM 2540 D-97	mg/L	73	52	59	<10	NA	NA	NA	NA	NA	NA
Volatile Suspended Solids	EPA 160.4	mg/L	29	23	**<10	<10	NA	NA	NA	NA	NA	NA
PH	Field		7.5	7.82	7.79	7.5	6.5 - 9.0			NA	NA	NA
Dissolved Oxygen	**Field**	**mg/L**	**9.08**	**8.44**	**8.63**	6	**3.5 - 6.0**			NA	NA	NA
Temperature	Field	°C	23.6	22.9	23.7	22	NA	NA	NA	NA	NA	NA
Chloride	EPA 300.0 Rev. 2.1	mg/L	110	110	110	180	860	230	500	NA	NA	NA
Fluoride	EPA 300.0 Rev. 2.1	mg/L	0.32	0.33	0.34	0.33	NA	NA	1.4	NA	NA	NA
Nitrate	EPA 300.0 Rev. 2.1	mg/L	<0.10	<0.10	<0.10	0.26	NA	NA	NA	NA	NA	NA
Nitrite	EPA 300.0 Rev. 2.1	mg/L	<0.10	<0.10	<0.10	<0.10	NA	NA	NA	NA	NA	NA
Sulfate	EPA 300.0 Rev. 2.1	mg/L	32	31	31	57	2000			NA	NA	NA
Ammonia as N	**EPA 350.1 Rev. 2.0**	**mg/L**	**0.033**	**0.026**	****0.052**	**0.030**	4.7	0.75 - 1.5	NA	NA	**0.025**	0.14
Total Kjeldahl Nitrogen	EPA 351.2 Rev. 2.0	mg/L	2.0	1.8	1.2	<0.50	NA	NA	NA	NA	10	NA
Phosphorus, Total	**EPA 6010B**	**mg/L**	**0.29**	**0.24**	**0.27**	**0.13**	**0.05**			NA	**0.007**	NA
Chemical Oxygen Demand	EPA 410.4 Rev. 2.0	mg/L	55	57	56	26	NA	NA	NA	NA	NA	NA
Cyanide, Total	EPA 335.4 Rev. 1.0 / [illegible]	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.022	0.0052	NA	NA	NA	NA
Phenols, Total	'EPA 420.4	mg/L	0.010	0.016	<0.010	<0.010	NA	NA	0.1	NA	NA	NA
Antimony	EPA 6020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	NA	NA	NA	<0.008	0.03	0.088
Arsenic	EPA 6020	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.36	0.19	NA	0.0025	0.048	0.34
Beryllium	EPA 6020	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	NA	NA	NA	<0.004	NA	NA
Cadmium	EPA 6020	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0154	0.0016	NA	<0.002	0.0051	0.0143
Calcium	EPA 6010B	mg/L	42	42	39	52	NA	NA	NA	NA	NA	NA
Chromium	EPA 6020	mg/L	<0.010	<0.010	<0.010	<0.010	2.4205	0.2885	NA	<0.008	NA	NA
Copper	EPA 6020	mg/L	<0.0040	<0.0040	0.0041	<0.0040	0.26	0.0167	NA	0.0051	0.0232	0.0364
Lead	EPA 6020	mg/L	0.0053	0.0038	0.0040	<0.0030	0.1604	0.0336	NA	<0.002	0.0167	0.3182
Magnesium	EPA 6010B	mg/L	18	18	18	25	NA	NA	NA	NA	NA	NA
Mercury	EPA 7471A	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.0026	0.0013	0.000012	0.000017	0.0009	0.0017
Nickel	EPA 6020	mg/L	<0.020	<0.020	<0.020	<0.020	0.1163	0.007	NA	<0.02	0.1336	1.2028
Selenium	EPA 6020	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA	1	<0.002	0.005	0.01
Silver	EPA 6020	mg/L	<0.00020	<0.00020	**0.0015	<0.00020	NA	NA	5	<0.002	0.005	0.005
Thallium	EPA 6020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	NA	NA	NA	<0.002	0.01	0.02
Zinc	EPA 6020	mg/L	<0.15	<0.15	<0.15	<0.15	0.1723	0.1579	NA	0.012	0.3039	0.3014

"<" - Analysis is not detection

NA - Value currently not available

*The reporting limits were raised because the sample matrix caused interference which required that the sample be analyzed at a dilution to quantify the results. Due to higher reporting limits, some compounds had non-detect analytical results where the detection limits were higher than WQS or ecotox values

** The MS and MSD recoveries were out of control high. The result for this analyte, in non-spiked version of the sample, must be considered estimated

Soil Characteristics

General Area Soil Type

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining, and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information provided in the EDR database search (Attachment B) is based on Soil Conservation Service SSURGO data. The dominant soil type found in the project area is Rockton. Rockton soils are class B loamy soils with moderate infiltration rates. Soils are deep and moderately deep, moderately well and well drained soils with moderately coarse textures. Soils tend to have intermediate holding capacity and are well drained. The Rockton series are located on plane and convex slopes on summits and shoulder slopes on uplands, high structural benches, strath terraces, and lake plains. Parent material consists of 50 to 100 centimeters of loamy sediments with or without a thin paleosol over limestone bedrock.

Geology, Soil Types and Groundwater Information for McMahon Woods and Fen

McMahon Woods is the home of many uncommon flora and fauna, including the federally listed Hine's emerald dragonfly. McMahon Woods contains a 15-acre fen and sedge meadow complex with ephemeral rivulets, an environment that is suited to the Hine's needs. Concern about the health of the fen, including the encroachment of invasive plant species, the dwindling of native plant species, and the apparent erosion of the fen, prompted multiple investigations of the site in 2007.

A hydrologic investigation conducted by Graef, Anhalt, Schloemer & Associates, Inc. (GAS) in 2007 that suggests that the general regional ground water flow through McMahon Woods is locally northeast to southwest towards Cal-Sag Channel and Saganashkee Slough. Based on soil maps for the area, relatively more permeable soils dominate the northeastern portion of McMahon Woods and Fen while the less permeable soils in the southwest define the southern edge of the fen. As the water flows from northeast to southwest, the transition from more permeable to less permeable materials possibly slows down the ground water flow, creating upward ground water flow discharging to the surface functioning as the ground water source of McMahon Fen.

The geology of McMahon Woods consists of quaternary deposits underlain by Silurian dolomites. In the immediate vicinity of the fen, the quaternary geology of the project area has two stratigraphic units: the Mackinaw member and the Grayslake peat. The Mackinaw member is part of the Henry formation, "consists of sand, pebbly sand, and gravel" and is generally 30 up to 100 feet thick. The Grayslake peat has a thickness of less than 20 feet and "consists of peat, sandy and silty peat, muck rich in organic material, and a foot or two of silt at the top. The Silurian dolomite that underlies the quaternary deposits is generally only 300-400 feet in thickness. GAS found sandy clay loam, loam, sandy loam, and loamy sand just north of the fen, with loamy sand being the

most predominant texture. The soil had an increase in silt and clay traversing north to Crooked Creek. In the area just north and east of the fen, the soil was recorded as sandy gravel and continued to increase in depth to the northeast. Sandy deposits were observed east of the fen as a linear sand ridge, extending to a depth of greater than one foot (GAS 2008).

GAS monitored chloride concentrations in several well points established in the fen and Crooked Creek and found that the major contributing factor to elevated chloride concentrations in the center of McMahon Fen is likely overland flow from Crooked Creek. The maximum concentration of chloride measured during the investigation (520 mg/L) came from Crooked Creek in December 2007, with adjacent well points in the fen noting elevated concentrations of chloride.

Fill Quality McMahon Fen

TesTech of Lansing, Michigan was contracted through the U.S. Army Corps of Engineers to conduct a geotechnical investigation in McMahon Fen fill pile located on the southwest corner of the fen area adjacent to the Cal-Sag channel and 104th Avenue. The purpose of the investigation was to provide geotechnical data for the restoration design of lacustrine, fen, spring, and other wetland plant communities in Saganashkee Slough and McMahon Fen. TesTech advanced nine test pits on site designated as SB-1 though SB-9 (see Figure 7) on-site. Test pits were dug to at least four feet. Borings logs and analytical results are included in Attachment C. Three environmental samples were collected from SB-2, SB-5, and SB-8 and analyzed for priority pollutant metals, VOCs, SVOCs, pesticides, PCBs, and herbicides. In general, fill materials consisted of brown clay, gray and brown silt, and silty sand. Samples were non-detect for VOCs, SVOCs, PCBs, pesticides and herbicides. Arsenic, beryllium, cadmium, chromium, copper lead, nickel, zinc and mercury were found in most samples, but most results are within background and TACO standards (see Table 6).

Table 6: USACE 2012 Soil Quality McMahon Fen

Analyte	***Units***	***SB-2***	***SB-5***	***SB-8***	***IEPA TACO Background[(a)]***	***IEPA TACO Residential[(b)]***
Arsenic	mg/kg	**15.7***	11.5	11.4	13	13
Beryllium	mg/kg	0.34	0.39	0.3	0.59	160
Cadmium	mg/kg	0.57	0.52	0.28	0.6	78
Chromium	mg/kg	9.7	12.7	9.2	16.2	230
Copper	mg/kg	18.7	19.5	13.3	19.6	2900
Lead	mg/kg	14.4	12.9	4.7	36	400
Nickel	mg/kg	18.8	18.6	13.7	18	1600
Zinc	mg/kg	55.2	52.9	30.3	95	23000
Mercury	mg/kg	<	0.024	<	0.06	10

(a) 35 IAC Part 1100 Subpart F Maximum Allowable Concentrations of Allowable Chemical Constituents in Uncontaminated Soil Used as Fill Material
(b) 35 IAC Part 742.Appendix A. Table G: Concentrations of Inorganic Chemicals in Background Soils.

Wetlands

As data stewards, the United States Fish and Wildlife Service (FWS) is the principle Federal agency that provides wetland information to the public and other agencies. In 1986, the Emergency Wetlands Resources Act mandated that the FWS complete the mapping and digitizing of the Nation's wetlands. The result of this effort is the Wetlands Geospatial Data Layer. This data layer houses all of the Service digital geospatial wetlands data and forms the Wetlands Spatial Data Layer of the National Spatial Data Infrastructure (NSDI). The National Spatial Data Infrastructure (NSDI) is a way of enhancing the accessibility, communication, and use of geospatial data to support a wide variety of decisions at all levels of society. Review of information available online using the FWS wetland mapper suggests that there are wetlands in the project area as shown in Figure 8. In addition to the open water (lake) status of Saganashkee Slough, freshwater emergent and freshwater forested shrub wetlands are located within the USACE project area.

DATABASE SEARCH

A search of available environmental records was conducted utilizing Environmental Database Resources, Inc. (EDR) online. EDR searched federal and state databases using the minimum search distances issued in the ASTM E 1527-00 guidelines. Table 7 notes the recommended ASTM search distance for federal and state databases and the actual search distances used for the subject site. The standard search was extended at least 1 mile to accommodate the size of the project site. The EDR overview map displaying the project area and the search results are given in Figure 9. The comprehensive EDR database report is provided as Attachment B.

Table 7: Minimum Search Distance for Federal and State Database Searches

Database	Minimum Search Distance (mi)	Actual Search Distance (mi)
Federal NPL Site List	1.0	2.0
Federal CERCLIS List	0.5	1.5
Federal CERCLIS NFRAP site list	Property and Adjoining Properties	1.5
Federal RCRA CORRACTS Facilities List	1.0	2.0
Federal RCRA non-CORRACTS TSD Facilities List	0.5	1.5
Federal RCRA Generators List	Property and Adjoining Properties	1.5
Federal ERNS List	Property Only	1.0
State Equivalent CERCLIS	0.5	2.0

Database	Minimum Search Distance (mi)	Actual Search Distance (mi)
State Landfill/Solid Waste Disposal Site Lists	0.5	1.5
State LUST Lists	0.5	1.5
State registered UST List	Property and Adjoining Properties	1.5
Federal and State engineering and institutional controls	Property	1.5
State Voluntary Cleanup	0.5	1.5
State Brownfields	0.5	1.5

Results of the EDR database search are summarized below.

CERCLIS

The Comprehensive Environmental Response, Compensation, and Liability, Information System (CERCLIS) contains data on any potential hazardous waste site that has been reported by states, municipalities, private companies, or private persons pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The CERCLIS database indicates the stages of evaluation and remediation that have been completed for any given site. The CERCLIS database includes the National Priority List (NPL), which identifies over 1,200 sites for priority cleanup under the Superfund program, and the CERCLIS-No Further Remedial Action Planned (NFRAP) List, which includes a listing of sites that have been removed from CERCLIS, for various reasons.

The database search located no CERCLIS-NFRAP sites within the recommended search distance.

RCRA Info

The Resource Conservation and Recovery Information System (RCRIS) lists sites which generate, transport, store, and/or dispose of hazardous waste defined by the Resource Conservation and Recovery Act (RCRA). The RCRIS database includes RCRA Corrective Action Report (CORRACTS), which identify hazardous waste handlers with RCRA corrective action activity; RCRA treatment, storage, and disposal facilities (TSDFs), and RCRA conditionally exempt small quantity generators (CESQGs), RCRA small quantity generators (SQGs), and large quantity generators (LQGs) facilities.

The database search located one RCRA SQG within the search distance. The Forest Preserve District of Cook County, located ½ to 1 mile to the north, is listed as a small quantity generator and does do not have any current or past violations; therefore, there is no reason to suspect that activities at this location have impacted the project area.

ERNS

The Emergency Response Notification System (ERNS) database lists information on reported releases of oil and hazardous substances. The database search yielded no ERNS reports on the subject property.

SHWS

The State Hazardous Waste Sites (SHWS), or State Oversight List, are the state equivalent to CERCLIS and NPL. These sites may or may not have already been listed on the federal CERCLIS list. The database search located no state hazardous waste sites within the search distance.

SWF/LF

The Illinois Environmental Protection Agency (IEPA) records the states Solid Waste Facilities/Landfill sites (SWF/LF). These sites may be active or inactive facilities or open dumps that do not meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites. The database search located no SWF/LF sites within the search distance.

UST/LUST

The Illinois Environmental Protection Agency maintains a listing of registered USTs as required under Subtitle I of the Resource Conservation and Recovery Act (RCRA). There are no USTs within the recommended search distance.

Orphan sites

Orphan sites given in the EDR report were reviewed and no sites were identified as possible sites of concern.

SRP

The Site Remediation Program (SRP) database lists all voluntary remediation projects administered through the pre-notice site clean-up program (1989 to 1995) and the site remediation program (1996 to present). The database search located no SRP sites within the recommended search distance.

Others

Various other databases are searched by EDR that include additional information to supplement information provided in the above databases or contain other environmental related information that may be significant. These databases include, but are not limited to: CERCLA consent decrees, National Priority list deletions, Nuclear Regulatory Commission's database of sites possessing radioactive materials, Superfund Liens, PCB Activity Database, Department of Defense sites, Brownfields, Toxic Chemical Release

Inventory, FIFRA/TSCA tracking system, Department of Transportation Office of Pipeline Safety, Clandestine Drug Labs, DOD, FUDS, and Navy Land Use Control, open dump and mine inventory, electric transmission lines, sensitive receptors, flood zone data, state drycleaner facility lists, state voluntary remediation program lists and sites with restrictions, and the national wetlands inventory. These databases did not indicate any sites of significance.

HISTORICAL TOPOGRAPHIC MAP REVIEW

Indications of potential RECs can be determined by identifying the past land use and changes in topography in the project area and surrounding areas. Identifying industrial and residential areas and observing any evidence of excavation/fill activities, or other changes in topography, can indicate a potential REC. Historical topographic maps are from 1901 through 1997 are included in Attachment D. In 1901, the project are appears undeveloped. The "Calumet Feeder" located south of the project area appears to tie into the I&M Canal west of the project area. The Des Plaines River and Sanitary Ship Canal, 107th and 111th, and Wolf Roads, are also present in 1901. The area north of Saganashkee Slough and McMahon Fen is called Mount Forest and there are several connected wetland and lake areas surrounding the project site. The Wabash railroad is east of the project area. Between 1901 and 1928, the Calumet Sag Channel is constructed in the location of the Calumet Feeder. It appears that material may have been side cast to the north creating a berm north of the channel and south of the current location of Saganashkee Slough and McMahon Fen. An extensive fill pile is located within McMahon Fen, just east and parallel to 104th Avenue (Willow Springs Road). With the exception of adjacent roadway construction and community development, there are no significant topographic changes in the project area until 1953. Sometime between 1948 and 1953 the outlet structure for Saganashkee Slough was constructed and created open water and marsh areas (north) of the slough. Much of the surrounding area remains undeveloped and is noted as Argonne Forest Preserve to the north and Palos Hills Forest Preserve to the south. Crooked Creek first appears to outlet to Saganashkee Slough, McMahon Woods is noted, a berm is present of the western side of Saganashkee Slough, and access to the slough from 107th Street is constructed between 1953 and 1963. Sometime between 1978 and 1993 the northern marsh area was lost to open water and access to Saganashkee Slough is extended from 107th Street. There are no changes in topography between 1993 and 1997. There are no indications that that project area was used for residential, commercial, or industrial purposes between 1901 and 1997.

HISTORICAL AERIAL PHOTOGRAPH REVIEW

Reviewing documents such as aerial photographs and historical accounts can identify potential RECs. Indications of potential RECs can be determined by identifying the past land use and site activities at the project area and surrounding areas. Identifying industrial and residential areas, observing any evidence of dumping activities, and locating extensive areas that lack vegetation can determine indications of a potential

REC. Aerial photographs included in Attachment E do not encompass the entire slough area but provide adequate coverage of the fen. In 1938, the fill pile is present east of 104th avenue (Willow Springs Road) within the fen; fill (berm) and unvegetated areas lie north of the Cal-Sag Channel where material was likely side cast for construction of the Cal-Sag channel. Swales are visible on areas east of the fen. Some portions of the current slough area adjacent and west of Willow Springs Road appear to be unknown farming activity. Crooked Creek is a meandering stream that runs along the western side of Willow Springs Road. Between 1938 and 1951 Crooked Creek appears to be channelized and routed to outlet into Saganashkee Slough. The outlet structure of Saganashkee Slough was constructed and areas of open water and marsh are present. There are several small structures on the McMahon Fen property south of the fill pile, perhaps in advance of bridge reconstruction. Between 1951 and 1962, open water areas of the slough are extended and a trail is constructed around McMahon Woods. The 104th Avenue Bridge is removed. Between 1962 and 1967 the 104th Avenue Bridge is reconstructed, the structures within the fen appear to be removed, and a series of access roads are present in the southern portions of the fen. The fen fill pile vegetation is flourishing with tree growth. Between 1967 and 1974, open water areas of the slough are further extended. Vegetation is present in all areas of the project and very few changes beyond the limits of the open water areas of Saganashkee Slough extending north occur between 1974 and 2007.

SITE VISIT

An environmental engineering section staff member (C. Pittman) visited the project site on March 21, 2012 with the PDT. The purpose of the trip was to overview the current site conditions and to examine the area for evidence of potential HTRW and non-HTRW. Photographs documenting the site visit are included in Attachment F.

USACE personnel gained access to Saganashkee Slough from existing parking facilities north of the lake (107th Street) and the outlet structure on the southern side of the lake at a parking facility along Willow Springs Road. In general, the areas surrounding Saganashkee Slough and McMahon Fen are well-kept. Adjacent properties are undeveloped and consist of forest preserve and other natural areas. There are no adjacent residential, commercial, or industrial properties. On the day of the site visit, multiple people were using the lake, mostly for fishing at the publicly accessible areas north of the lake and at the outlet weir. The water in the lake was fairly turbid on the day of the site visit and was flowing over the weir. There are waste receptacles in areas where public access is provided to the lake.

In general, the eastern portion of the project area (fen) contains very wet and ponded areas with vegetation. A large stockpile of fill material is present on the southwest corner of the site, as previously discussed in other sections of this report. There are several places within the fen where significant erosion has occurred in the seeps and rivulets. In addition, there is a depressed area adjacent to Crooked Creek where it is believed that stormwater runoff overflows into the fen causing erosion. The fill pile appears to be

mostly large stone and cobble, but is overgrown with vegetation. Various wildlife including frogs and birds were actively using the site on the day of the site visit, and there was evidence of other mammals using the site.

In general, besides the stockpiled fill in the fen, the project area is free of trash and debris and other RECs. Some general debris, such as plastics bags and other roadway garbage is scattered within the project area, especially around the publicly accessible areas of Saganashkee Slough, along Willow Springs Road, and at stormwater inlets to Crooked Creek east of Willow Springs Road. Active dumping is not apparent within the project area. Vegetation in the project area appeared to be in good condition; however, vegetation in the fen/prairie itself was not flourishing, likely due to time of year of site visit. In addition, there were areas along the northern bank of Saganashkee Slough where wave action may be eroding the banks and impacting existing vegetation. No evidence of HTRW or non-HTRW conditions were observed.

FINDINGS AND CONCLUSIONS

This HTRW investigation was performed to determine if the selected measures for Saganashkee Slough project will have an impact on any HTRW occurrences that may exist in the surrounding areas, and if HTRW problems will have an impact on the implementation of the project. According to ER 1165-2-132, non-HTRW environmental issues that do not comply with federal, state, and local regulations should be discussed in the HTRW evaluation along with HTRW issues.

Review of existing information suggests that the Saganashkee Slough is a remnant of the prehistoric outlet of early Lake Chicago. On the first map of Cook County issued in 1851, Saganashkee was the name of the swamp that extended from west of Willow Springs Road to Blue Island. The Saganashkee Swamp was largely destroyed by draining to provide feeder water for the Illinois and Michigan Canal and later for the Calumet-Sag Channel. The present open water area was created in 1948-1949 by the construction of a dam at the east end of the remaining slough and also a levee at the west end of the same slough.

Review of information suggests that there are wetlands in the project area. In addition to the open water of Saganashkee Slough, freshwater emergent and freshwater forested shrub wetlands are located within the USACE project area.

Review of existing soil data suggest that the dominant soil type found in the project area is Rockton. Rockton soils are class B loamy soils with moderate infiltration rates. Soils are deep and moderately deep, moderately well and well drained soils with moderately coarse textures. Soils tend to have intermediate holding capacity and are well drained.

Review of existing water quality information suggests that Saganashkee Slough is listed on the state 303(d) list for the following impairments: 1) aesthetic quality due to the levels of phosphorus (total) and excessive sedimentation/siltation, 2) aquatic life due to the levels of phosphorus (total) and dissolved oxygen, excessive sedimentation/siltation,

and aquatic algae, 3) aquatic life due to the levels of nickel and silver in sediment, and 4) fish consumption due to levels of polychlorinated biphenyls (PCBs). Though the TMDL concludes that the aquatic life is impaired due to the presence of contaminated sediments, none of the historic or current sediment sampling results exceed exotoxicological adverse effect threshold values or TACO residential values. In addition, PCBs were not found in the sediments of Saganashkee Slough. The planning report should address the watershed/stormwater controls to confirm that sources of water quality impairments in the watershed are addressed to ensure the long-term success of the project.

Review of existing information suggests that the general regional ground water flow through McMahon Woods is locally northeast to southwest towards Cal-Sag Channel and Saganashkee Slough. Groundwater monitoring conducted in Crooked Creek/McMahon Woods system suggests that the major contributing factor to elevated chloride concentrations in the center of McMahon Fen is likely overland flow from Crooked Creek. The elevated chloride concentrations do not represent an HTRW issue.

Review of historic sediment and surface water quality suggest that levels of cadmium, nickel and silver in the sediment are above the established background concentrations of metals, but below the TACO standards and the ecotox benchmark values; concentration of chromium in one sample exceed the established background concentrations of metals, but is below TACO standards and the ecotox benchmark value. Because the historic sediment samples were surficial grab samples, it is felt that these are not generally representative of the sediment quality as a whole. Values of phosphorus found in water samples collected in Saganashkee Slough exceed the state total phosphorus standard (0.05 mg/L) and levels of ammonia in the water exceed the ecotox benchmark value.

Review of current sediment sampling results collected from Saganashkee Slough suggests that concentrations of metals found in sediment samples are below what was previously detected in sediment samples collected by IEPA. Because IEPA samples were collected from the surficial sediments only, they are not representative of sediment that may be dredged for the project, and the results should not be used for determining the suitability or impacts of dredging activity. Concentrations of metals found in the composite sediment samples collected in 2012 representative of potential dredge material (ranging from 4 to 9.5 feet of material) are below the established background concentrations of metals in MSAs, TACO standards, and the ecotox benchmark values; PCBs, SVOCs, and pesticides are not found in the sediment. Sediment samples contain a significant fraction of fines, ranging from 77 to 93%. Dredged material management, and associated water quality impacts, will be addressed in the 404(b)(1) report.

Current water sampling results collected from Saganashkee Slough corroborate historic sampling results produced by IEPA. Phosphorous concentrations in Saganashkee Slough and Crooked Creek exceed the state water quality standard and the ecotox threshold value; ammonia concentrations found exceed ecotox threshold values. The concentrations of dissolved oxygen measured in Saganashkee Slough exceed the state standard (3.5 to 6.0 mg/L). Contaminants, such as SVOC, BTEX, and oil& grease, were not detected in water samples. Water quality impacts associated with project

implementation will be addressed in the 404(b)(1) report. The planning report should address water quality impairments to ensure the long-term success of the project.

Review of current soil sampling results conducted on the McMahon Fen fill pile suggests that, in general, fill materials consist of brown clay, gray and brown silt, and silty sand. Stockpiled soils do not contain VOCs, SVOCs, PCBs, pesticides and herbicides. Arsenic, beryllium, cadmium, chromium, copper lead, nickel, zinc and mercury were found in most soils samples, but results are within background and IEPA TACO standards. Fill material removal, management, and placement restrictions, and associated water quality impacts, will be addressed in the 404(b)(1).

Review of information presented in the EDR database search report suggests that there is one regulated environmental facility within the recommended ASTM search distance. The Forest Preserve District of Cook County, located ½ to 1 mile to the north, is listed as a RCRA small quantity generator. The facility does not have any current or past violations and is not considered a REC.

Review of historical topographic maps and aerial photographs suggests that the project area was not used for residential, commercial, or industrial purposes between 1901 and 2012. The Calumet Sag Channel was constructed between 1901 and 1928, and it appears that material removed to create the channel may have been used to create a berm north of the channel (south of the Saganashkee Slough and McMahon Fen). In addition, an extensive fill pile was created within McMahon Fen, just east and parallel to 104th Avenue (Willow Springs Road) during this period. Sometime between 1948 and 1953 the outlet structure for Saganashkee Slough was constructed and created open water and marsh areas (north) of the slough. Aerial photographs suggest that some portions of the current slough area were farmed prior to the construction of the outlet weir. In addition, Crooked Creek was a meandering stream that was channelized between 1938 and 1951 and routed to outlet into Saganashkee Slough.

Results of the site investigation conducted on March 21, 2012 suggest that, in general, the project area is free of trash and debris. Some general debris, such as plastics bags and other roadway garbage is scattered within the project area, especially around the publicly accessible areas of Saganashkee Slough, along Willow Springs Road, and at stormwater inlets to Crooked Creek east of Willow Springs Road. Active dumping is not apparent within the project area. Vegetation in the project area appeared to be in good condition; however, vegetation in the fen/prairie itself was not flourishing, likely due to time of year of site visit. In addition, there were areas along the northern bank of Saganashkee Slough where wave action may be eroding the banks and impacting existing vegetation. Various wildlife including frogs and birds were actively using the site on the day of the site visit, and there was evidence of other mammals using the site. Fill material is present in McMahon Fen; however, review of environmental data collected suggests that this material is clean. No evidence of HTRW or non-HTRW conditions were observed.

No HTRW investigation can wholly eliminate uncertainty regarding the potential for HTRW associated with a project area. Performance of the HTRW investigation is

intended to reduce, but not eliminate, uncertainty regarding the potential for HTRW in connection with a project area.

REFERENCES

ER 1165-2-132. Department of the Army, U.S. Army Corps of Engineers. Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works Projects. June 1992.

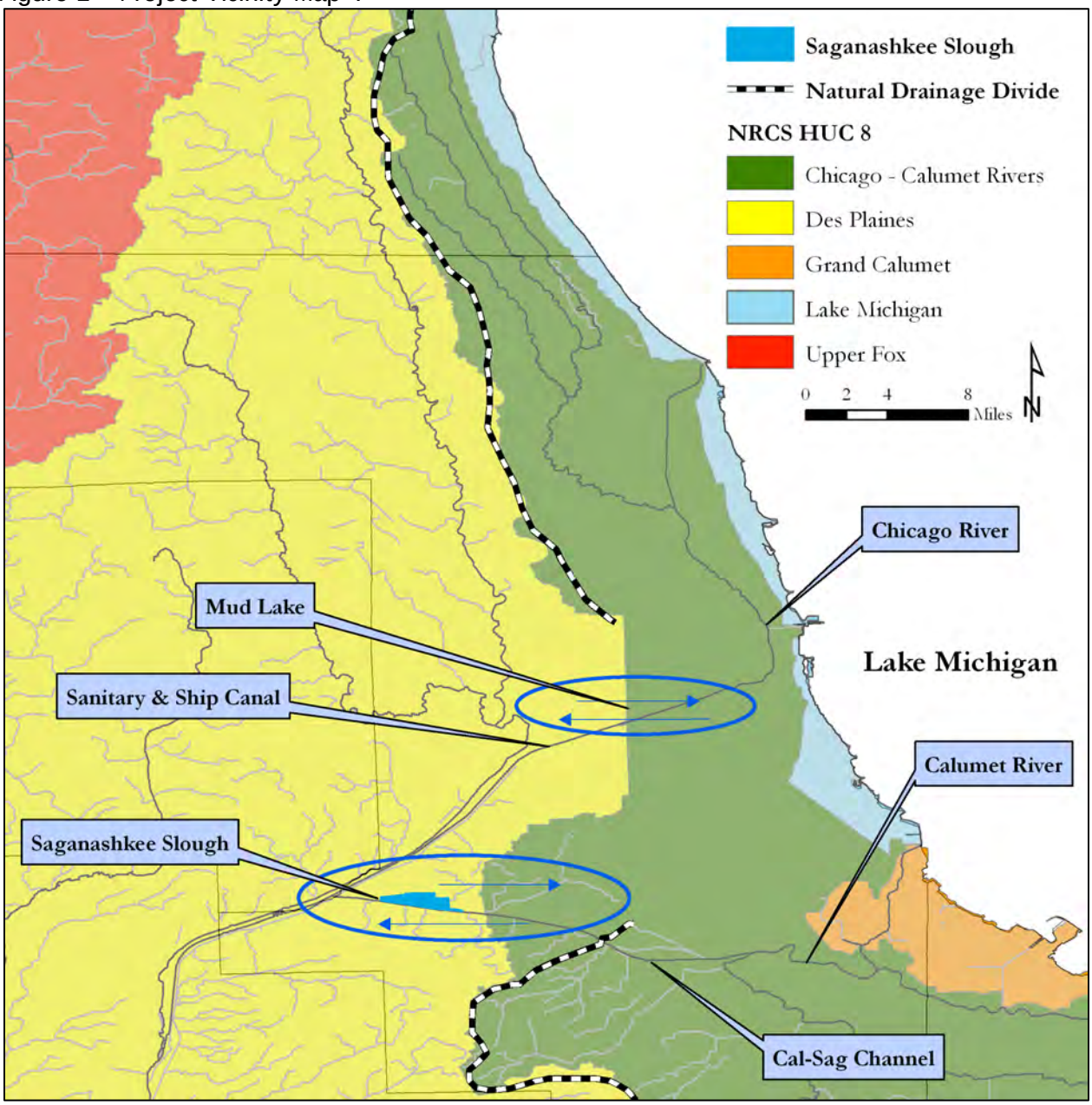
Graef, Anhalt, Schloemer & Associates, Inc. McMahon Woods Hydrologic Investigation Final Report. June 2008.

Illinois Environmental Protection Agency, Bureau of Water. Tampier Lake/Saganashkee Slough Watershed TMDL Report. Publication IEPA/BOW.10/001. March 2010.

Publication E 1527-00. American Society for Testing of Materials. Standard Practice for Environmental Assessments: Phase I Environmental Site Assessment Process.

U.S. Army Corps of Engineers. Saganashkee Slough and Fen Restoration Preliminary Restoration Plan. Great Lakes Fishery & Ecosystem Restoration (Section 506 WRDA 2000). August 2011.

Figure 1 – Project Vicinity Map*.



*Arrows show that flow would go either way depending on where precipitation would fall. These two areas were key biogeographically areas in terms of recolonizing the Great Lakes with fishes after the last glaciation had wiped them out. During large storms, the Cal-Sag flows into Lake Michigan.

Figure 2 – Project Area.

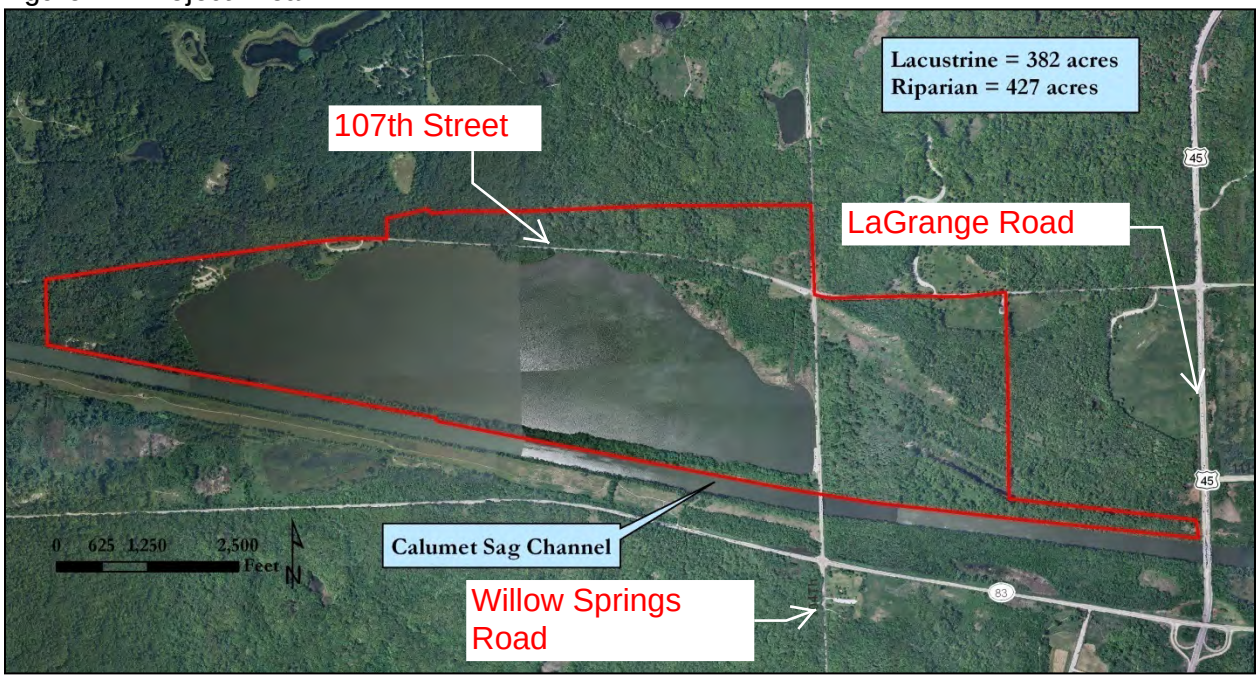
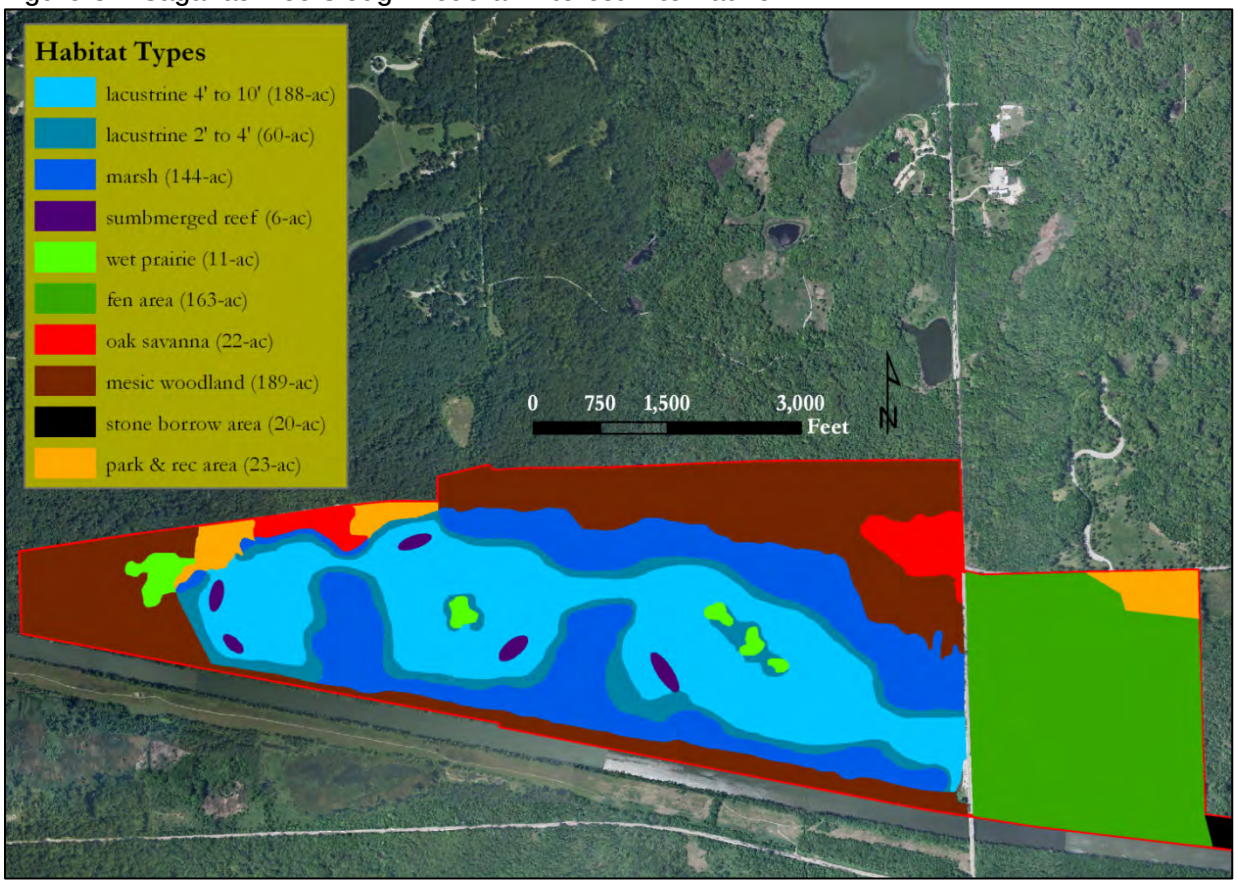
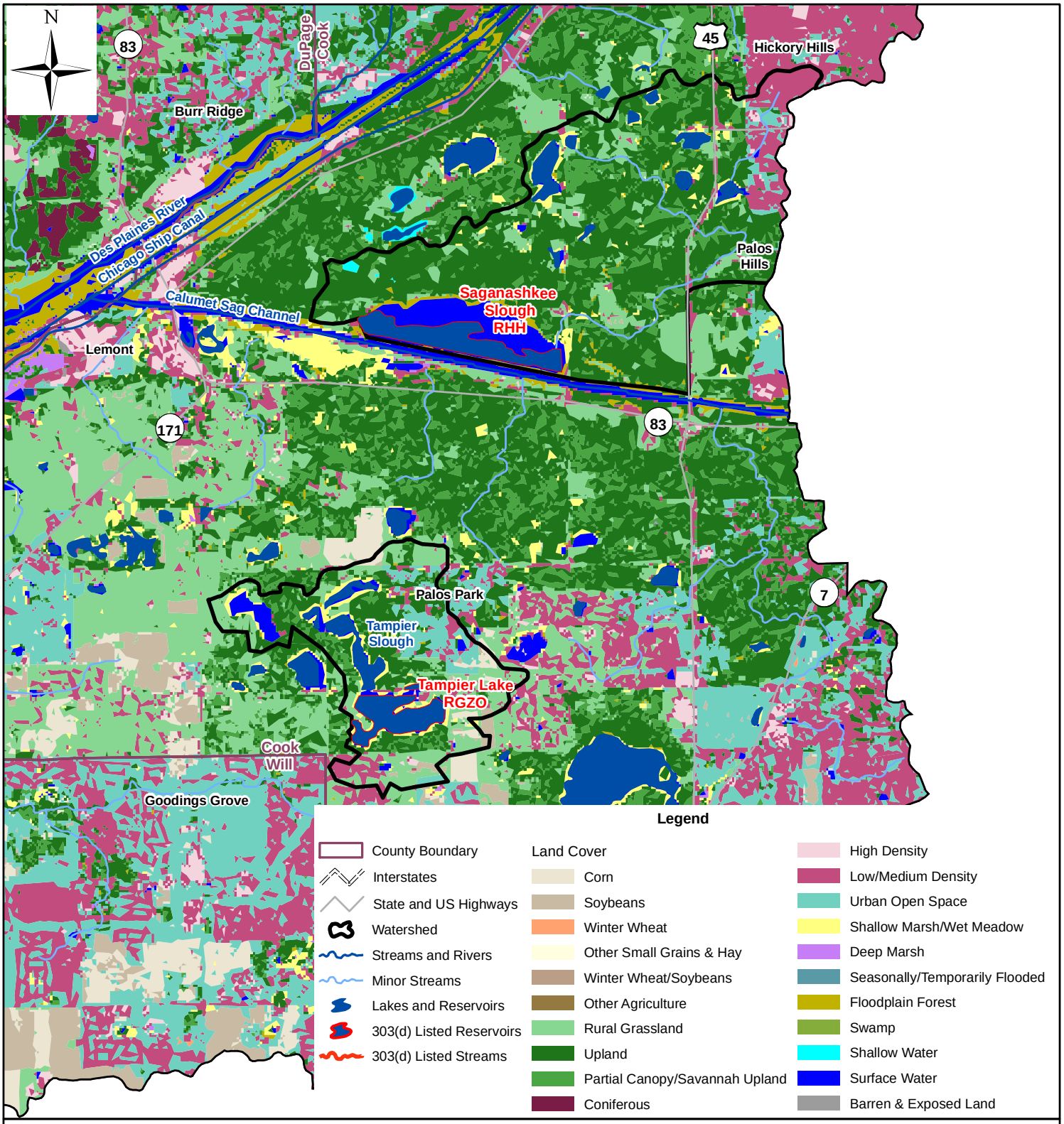


Figure 3 – Saganashkee Slough Federal Interest Alternative*.





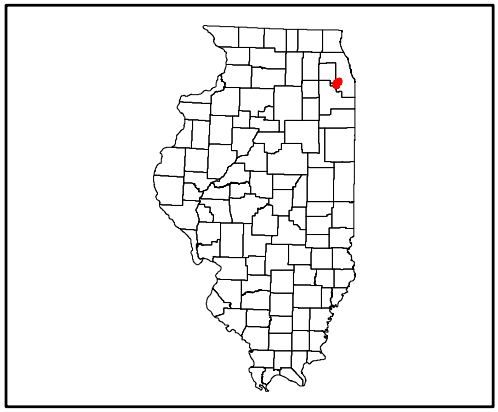


Figure 4: IEPA TMDL

Tampier Lake/Saganashkee Slough Watersheds Land Use

0 0.5 1 2 Miles

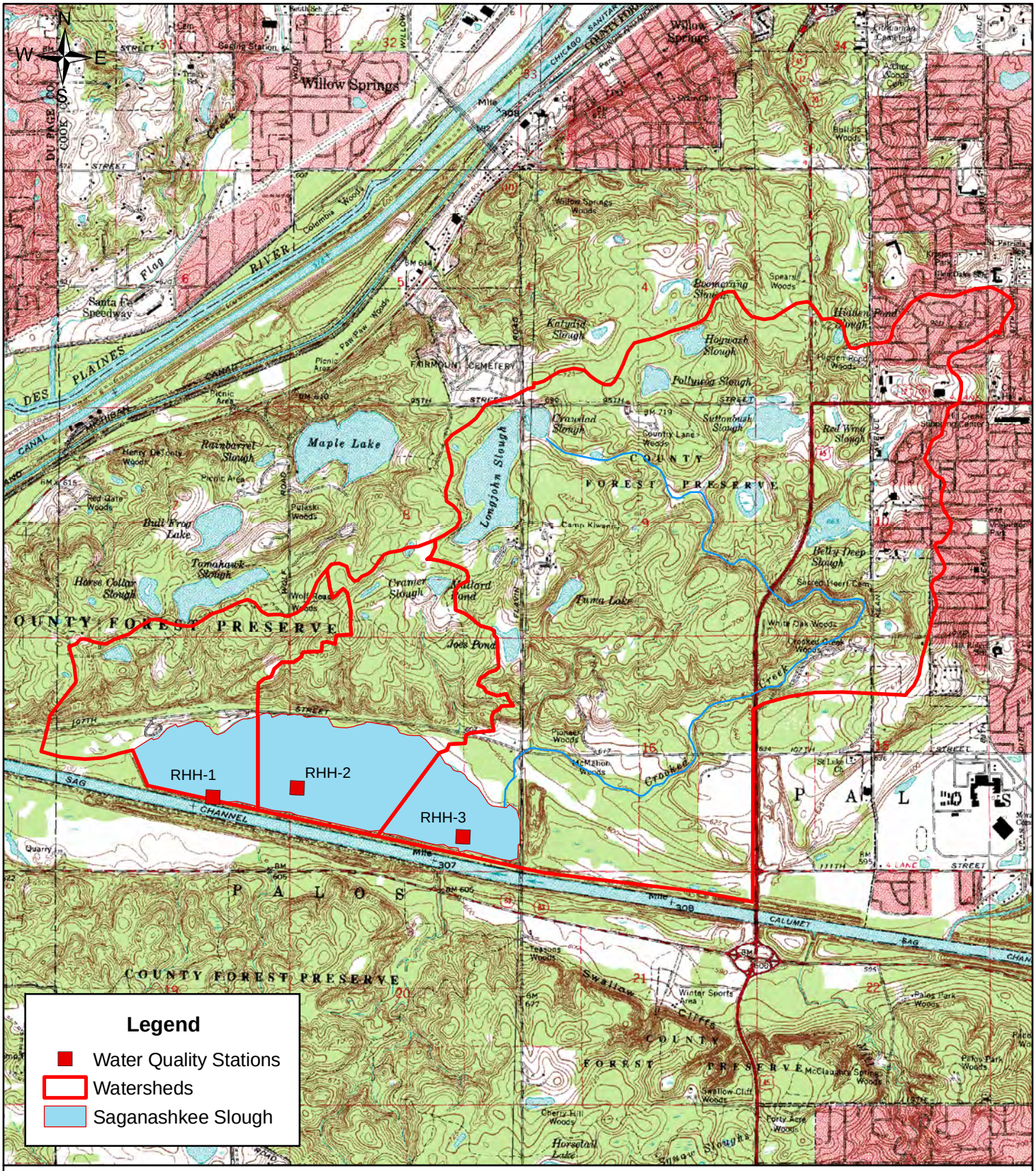


Figure 5: IEPA TMDL Sample Locations
Saganashkee Slough Watershed

Figure 6: Aerial Photograph – Saganashkee Slough, Illinois Sampling Locations

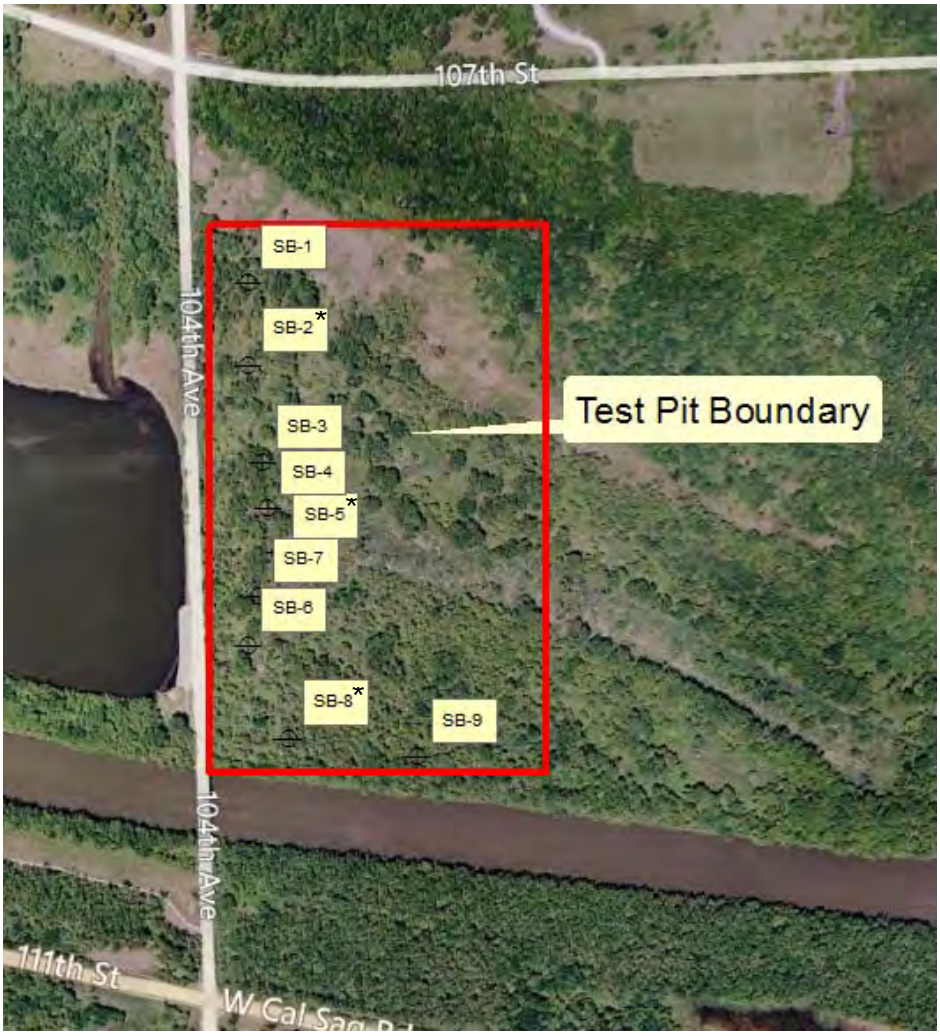


Figure 7: McMahon Fen Fill Stockpile Sampling Locations
(* denotes environmental sample location)

Figure 8 - Ntional Wetlands Inventory Map

U.S. Fish and Wildlife Service

National Wetlands Inventory

Saganashkee Slough Wetlands

Feb 7, 2013

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

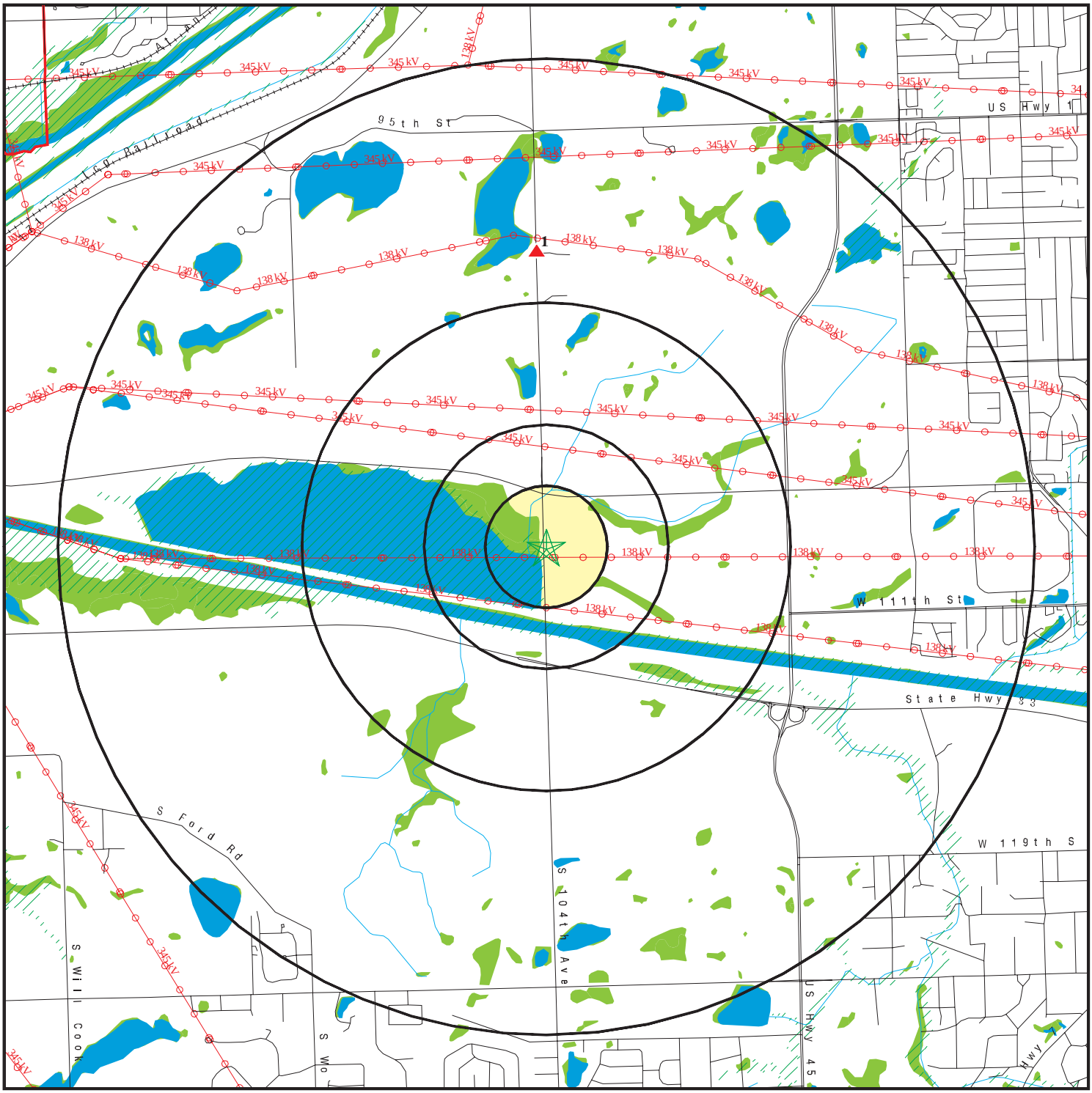
Status

- Digital
- Scan
- Non-Digital
- No Data

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

Figure 9: EDR Radius Map **OVERVIEW MAP - 3477867.2s**



0 1/2 1 2 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Power transmission lines
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Saganashkee Slough	CLIENT: U.S. Army Corps of Engineers
ADDRESS: 104th/107th Willow Springs IL 60480	CONTACT: Casey Pittman
LAT/LONG: 41.6926 / 87.8748	INQUIRY #: 3477867.2s DATE: December 14, 2012 2:13 pm

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND NON-HTRW INVESTIGATION
Saganashkee Slough Section 506
Great Lakes Fisheries & Ecosystem Restoration Project

All Attachments available digitally upon request