2013 Annual Mitigation Site Monitoring Report

prepared for

METROPOLITAN UTILITIES DISTRICT

Metropolitan Utilities District
Omaha, Nebraska

Project No. 60787

January 2014

2013 Annual Mitigation Site Monitoring Report

for the

Platte West Water Production Facilities Project

METROPOLITAN
UTILITIES DISTRICT

Prepared for:
Metropolitan Utilities District
Omaha, Nebraska

Prepared by:
Burns & McDonnell Engineering Company, Inc.
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Project Number: 60787

January 2014

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1.0 INTRODUCTION

The Metropolitan Utilities District (District), Omaha, Nebraska, received a Section 404 Individual Permit (Permit) on May 16, 2003, from the U.S. Army Corps of Engineers, Omaha District (Corps), for the Platte West Water Production Facilities Project (Project; U.S. Army Corps of Engineers 2003). The terms and conditions included in the Permit were based to a large degree on the impact analysis and the conceptual mitigation plan included in the Environmental Impact Statement (EIS) completed by the District in 2002 (Burns & McDonnell 2002a and 2002b). As part of the terms and conditions included with the Section 404 Permit, the District has agreed to provide mitigation for both direct and indirect impacts to wetlands and watercourses that may result from the Project. Direct impacts result from the construction of the Project facilities; indirect impacts could occur due to groundwater drawdown during the operation of the Project.

The District, with concurrence from the Corps, decided to pursue wetland mitigation in phases. At least three phases of wetland mitigation were originally planned. Phase I of the mitigation effort provided measures to compensate for upfront construction impacts (direct impacts). Phase II provided mitigation for anticipated indirect impacts to wetlands in the two well fields due to groundwater drawdown. As currently planned, Phase III mitigation will address any impacts or alterations to wetlands that may occur as a result of drawdown outside of the two well fields in the projected Project cones of depression. Groundwater modeling in the 2002 EIS estimated that a drawdown in the groundwater levels of one foot or more would impact most wetlands. Therefore, the potential cones of depression are the areas predicted to experience a one-foot-or-greater drawdown of the local water table as a result of Project operation. The anticipated boundaries of the potential cones of depression are shown in Figure 1-1.

In the 2002 EIS, wetland impacts in the well fields due to construction and operation of Project facilities were predicted to total 14.6 acres. Approximately 0.3 acre of wetlands would be impacted due to construction, while Project operation was estimated to impact 14.3 acres of wetlands in the two well fields. These 14.6 acres included both direct and indirect impacts that would occur in the well fields (Phases I and II). According to the Section 404 permit conditions, the 14.6 acres predicted to be impacted were to be mitigated at a ratio of 1.5:1.0 (wetlands created to wetlands impacted); this amounts to a total of 21.9 acres of replacement wetlands required. In addition, another 141.6 acres of wetland alteration (conversion to a drier wetland type by drawdown of the water table) were estimated to potentially occur in the cones of depression at some time in the future due to Project operation. Since the issuance of the 2002 EIS, a Mitigation Site Selection Study was prepared and finalized (Burns & McDonnell 2007a). This site selection study evaluated a total of 16 separate potential wetland mitigation sites that

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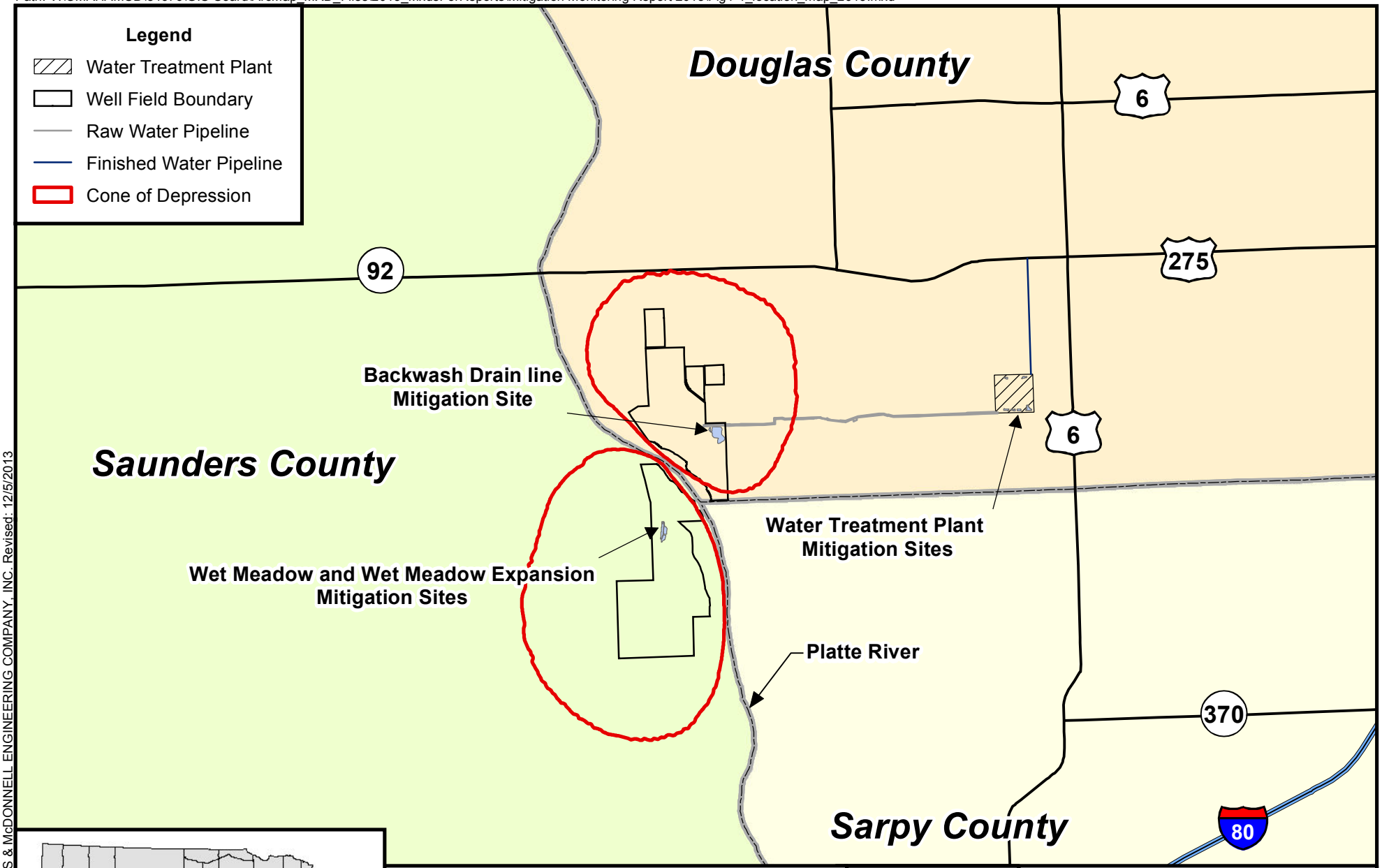

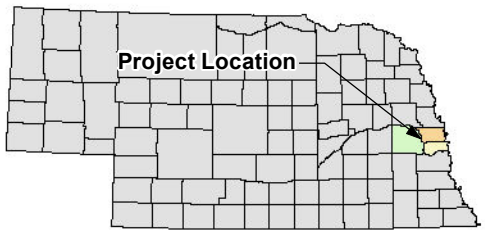

Key Map - Nebraska

0 1 2 3 4 Miles

N

Source: US Census Bureau, TIGER Data.

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Figure 1-1
Location Map of the Phase I and II Mitigation Sites
Platte West Water Production Facilities Project
Metropolitan Utilities District

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could be pursued by the District to provide wetland mitigation to compensate for impacts as a result of Project construction and operation.

1.1 MITIGATION SITES

Phase I and Phase II mitigation have been implemented as described above. Phase I mitigation for direct impacts to wetlands was accomplished in two separate locations – the Wet Meadow Mitigation Site (WM-1) and the Water Treatment Plant Mitigation Sites (WM-4 through WM-9) (Figure 1-1). The *Mitigation Plan for Phase I Impacts* (Phase I Mitigation Plan; Burns & McDonnell 2005c) was approved in 2005 and provides details of the Phase I mitigation efforts.

Phase II mitigation for indirect impacts to wetlands in the well fields was accomplished at two separate locations – the Wet Meadow Expansion Mitigation Site (WM-2) and the Douglas County Backwash Drain Line Mitigation Site (WM-3) (Figure 1-1). As stated above, Phase II mitigation has been implemented to address potential indirect impacts which may occur within the well fields as the result of Project operation. Details of the Phase II mitigation efforts are provided in the *Mitigation Plan for Wetland Impacts* – Phase II (Phase II Mitigation Plan; Burns & McDonnell 2007b), which was approved in 2007.

1.1.1 Wet Meadow Mitigation Site

Phase I mitigation for construction-related impacts from all aspects of the Project, except for the new water treatment plant, was completed in the Saunders County well field near the 95-acre area known as the Wet Meadow (Wet Meadow Mitigation Site, WM-1). A total of 0.3 acre of wetlands was permanently impacted due to the construction of the facilities in the two well fields required for this Project. As described above, these impacts were mitigated at a 1.5:1.0 (created wetlands to impacted wetlands) ratio. As a result, approximately 0.45 acre of wetland was required as mitigation for up-front Project construction-related impacts in the well fields.

In 2005, WM-1 was constructed on approximately 22 acres of cropland owned by the District (Figure 1-2). WM-1 is an approximately 3.6-acre emergent wetland constructed in a formerly farmed wetland. The surrounding upland area was seeded with native vegetation to create an upland buffer. WM-1 provided wetland mitigation in excess of what is required for Phase I construction-related impacts. This excess wetland acreage created was applied to Phase II mitigation for indirect impacts that would occur during Project operation. As mentioned above, construction of WM-1 began late in the summer of 2005; grading of the created wetland and seeding with native vegetation was completed in December 2005. The

As-Built Report for the Wet Meadow Mitigation Site documents the construction of the mitigation site (Burns & McDonnell 2007c).

1.1.2 Wet Meadow Expansion Mitigation Site

The Wet Meadow Expansion Mitigation Site (WM-2) was constructed in the winter of 2007-2008 east of existing WM-1 in the upland buffer area (Figure 1-2). The two wet meadow mitigation sites (WM-1 and WM-2) are hydrologically connected at the north and south ends, but are otherwise separated by a narrow upland buffer. WM-2 consists of an approximately 4.7-acre emergent wetland divided into two separate wetland cells (Figure 1, Section B-1, Appendix I). Upon the completion of the construction of WM-2, approximately 13.7 acres of upland buffer area have been created surrounding the two wet meadow mitigation sites. The *As-Built Report for Phase II Wetland Mitigation Sites* documents the construction of the mitigation site (Burns & McDonnell 2008a).

1.1.3 Douglas County Backwash Drain Line Mitigation Site

The Backwash Drain Line Mitigation Site (WM-3) was constructed in the Douglas County well field as part of the Phase II mitigation effort in the winter of 2007-2008. WM-3 is located at the outlet of the backwash drain line west of the Elkhorn River (Figure 1-3). The drain line outlet was configured to discharge water into the mitigation site. The backwash water is of suitable quality for discharge into the Elkhorn River; therefore, the quality of water is also suitable for the creation and establishment of an emergent wetland for mitigation. WM-3 is located in an 80-acre former crop field in the southeastern portion of the Douglas County well field (Figure 1-3). Based on the as-built survey, 15.42 acres of emergent wetland were created at WM-3. In addition, 2.78 acres of drainage swales at the site are developing into wetland swales and an additional 58.04 acres of upland buffer were developed. The *As-Built Report for Phase II Wetland Mitigation Sites* documents the construction of the mitigation site (Burns & McDonnell 2008a). Modifications occurred at WM-3 in July of 2011. The mitigation site was re-graded to lower the elevation in the center of the site and to improve hydrological connections throughout the site in an effort to increase the wetland acreage. Much of the central portion of the site was lowered one to two feet from existing elevations; then a native wetland seed mix was hand-broadcast over the graded areas.

1.1.4 Water Treatment Plant Mitigation Sites

The mitigation for impacts resulting from construction of the District's new water treatment plant in Douglas County has been accomplished on-site at six wetland cells located at the water treatment plant site (Water Treatment Plant mitigation sites, WM-4 through WM-9, Figure 1-4). A total of 3.91 acres of wetlands and 175 feet of intermittent stream were created. Construction of the wetlands and intermittent

stream was completed in May 2009. The *As-Built Report for the Phase I Water Treatment Plant Wetland Mitigation Site* was prepared after construction and planting was completed (Burns & McDonnell 2009).

1.2 MONITORING GOALS

The goal of the wetland mitigation monitoring program is to measure the establishment of the wetland mitigation sites and to observe whether the mitigation sites develop similar functions and values as those wetlands and waters of the United States affected by Project construction and operation. According to the EIS, a total of 21.9 acres of wetland mitigation are necessary as a result of direct and indirect Project impacts. Mitigation efforts will be considered successful at a given site if the following criteria occur:

1. Eighty percent cover of native wetland vegetation will be established in the created emergent wetlands and along the banks of the created stream channel.

2. Positive indicators of hydric soils such as low chroma dominant colors, redoximorphic features, or oxidized rhizospheres are found in the created emergent wetlands.

3. Positive indicators of wetland hydrology such as inundation, saturation in the upper 12 inches of the soil, watermarks, and drift lines are found in the created emergent wetlands.

This report summarizes the 2013 monitoring efforts conducted at the Phase I and Phase II mitigation sites. Monitoring of Phase I mitigation site WM-1 was initiated in September 2006 and completed in 2012. Monitoring at Phase II mitigation sites WM-2 and WM-3 first took place in the fall of 2008. Finally, monitoring at the Phase I Water Treatment Plant mitigation sites (WM-4 through WM-9) began during the fall sampling period in 2009. Monitoring efforts at the mitigation sites will be conducted twice per year for a period of five years from the initial monitoring effort or until mitigation goals have been met. No Phase III mitigation sites have been developed to date or are planned for development without mutual agreement between the Corps and the District.

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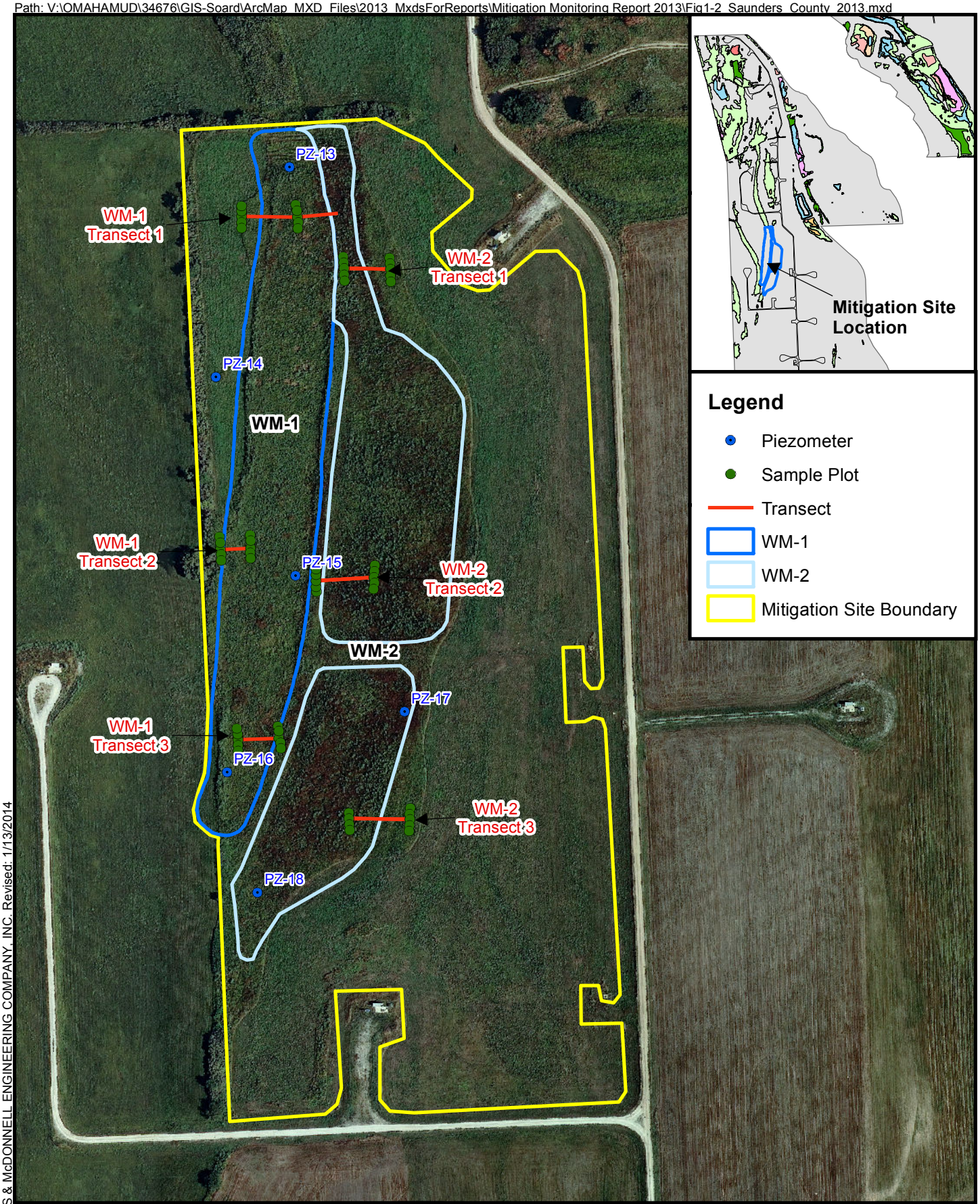

Figure 1-2
Location Map for
WM-1 and WM-2
Saunders County Well Field
Metropolitan Utilities District

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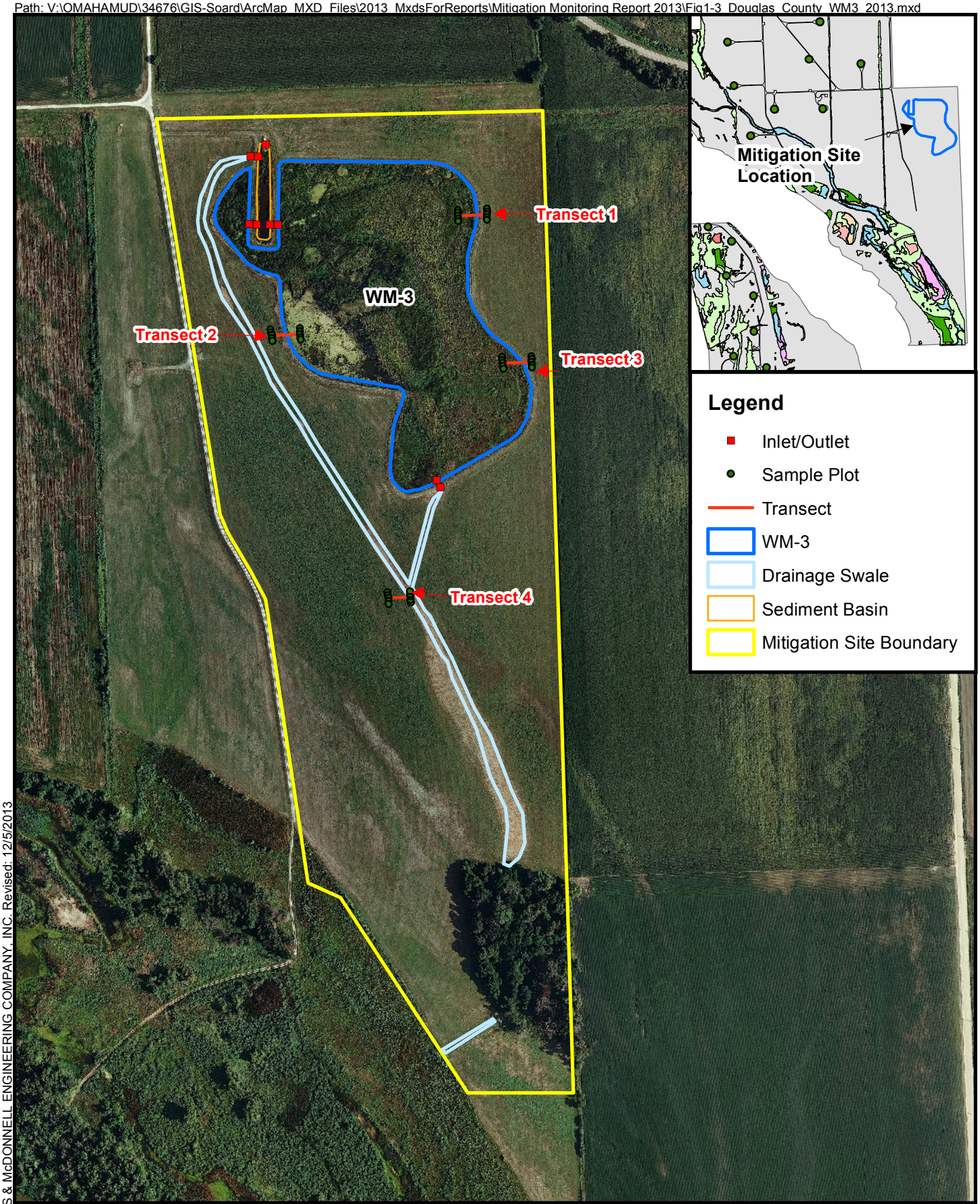

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0 200 400 600 800 Feet

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Source: Wilson & Company 2013 Aerial Photography

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Figure 1-3
Location Map for
WM-3
Douglas County Well Field
Metropolitan Utilities District

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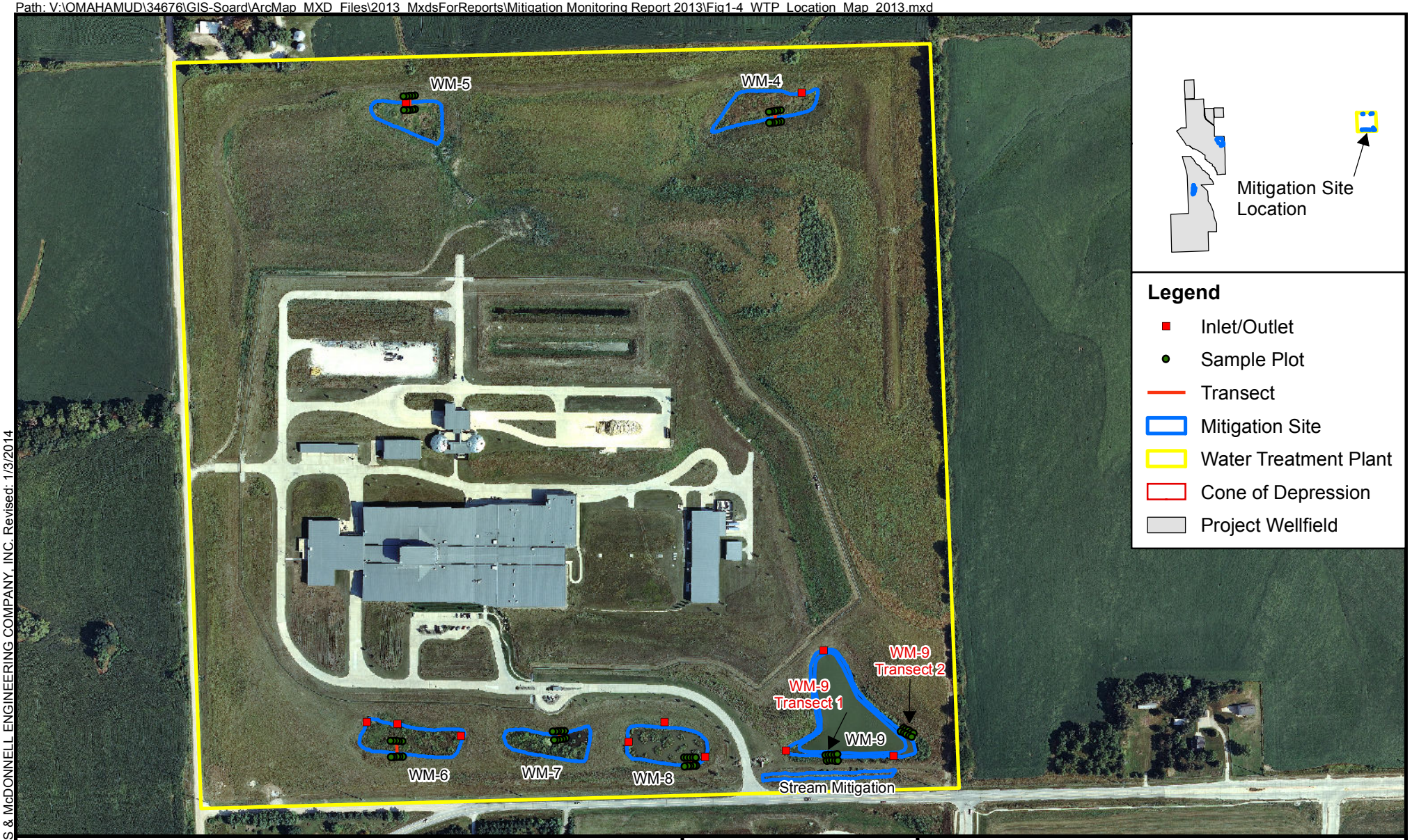

Source: Wilson & Company 2013 Aerial Photography

Figure 1-4
Location Map of the
Water Treatment Plant Mitigation Sites
Douglas County
Metropolitan Utilities District

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Figure 1-4: Location Map of the Water Treatment Plant Mitigation Sites

2.0 SAMPLING METHODOLOGY

A wetland monitoring approach consisting of a systematic, multi-tiered, vegetation sampling procedure has been developed and implemented based on the methodology outlined in the Phase I Mitigation Plan. In developing this vegetation sampling procedure, numerous literature sources and references were reviewed. Several discussions with personnel from the Corps and the District occurred during the preparation of this plan and the synthesis of the approach. Some of the references and sources used included:

- 1987 Corps and 1989 Federal wetland delineation manuals (Environmental Laboratory 1987 and Federal Interagency Committee for Wetland Delineation 1989)
- performance standards for wetland creation and restoration found in Streever 1999 and Environmental Law Institute 2004
- vegetation sampling methodologies found in U.S. Environmental Protection Agency 2002 and Tiner 1999
- wetland mitigation guidelines found in Taylor and Krueger 1997

Phase I wetland monitoring, as stated above and described in the following paragraphs, began in 2006 at WM-1. In 2008, two Phase II wetland mitigation sites were completed and monitored (WM-2 and WM-3). In 2009, monitoring began at the six wetland mitigation sites located at the water treatment plant (WM-4 through WM-9) as well as the stream mitigation site. Wetland monitoring will continue at these sites for a period of five years from the initial monitoring season or until mitigation goals are met.

2.1 VEGETATION SAMPLING

Herbaceous plant species at the mitigation sites are sampled using gradient-oriented transects, or "gradsects". A gradsect is defined as a transect that is placed perpendicular to the baseline transect along the ecotone gradient. The ecotone is the distinct area where one plant community changes or intergrades into another separate, distinct plant community. Sampling units are located in the center of each vegetation community and at each ecotone. The sampling unit consists of five, three-foot diameter circular sample plots placed along the gradsect.

During the first sampling period at each mitigation site, the placement of each permanent transect, gradsect, and sample plot was established and recorded using a global positioning system (GPS; Trimble® Pro XRS sub-meter GPS unit). The beginning and end of each transect and gradsect were permanently marked using two-foot sections of 3/8- or 1/2-inch rebar, painted orange and flagged. These permanent

markers also serve as photograph stations. A photographic record is maintained for each sampling period at each gradsect and transect. This photographic documentation provides a repetitive visual record that corresponds to the wetland vegetation monitoring during seasons and over years.

Vegetation and plant species data that were collected during the annual wetland vegetation monitoring effort include the identification, to species when possible, of each plant located within the three-foot-diameter sample plot. In 2012, the Corps issued an update to the National Wetland Plant List (NWPL; Lichvar and Kartesz 2009) which resulted in changes to some of the wetland indicator statuses and nomenclature. For consistency and because this is at least the third full year of monitoring at the mitigation sites, nomenclature and plant characteristics were again obtained from the USDA PLANTS Database (USDA NRCS 2013). Though the data calculations used for analysis in this report were made using the USDA PLANTS Database wetland indicator statuses, comparisons are included in the Results section of each mitigation site using the updated NWPL statuses to note potential differences in wetness based on these modifications. The percent cover for each plant species occurring in a sample plot was estimated using a modified Daubenmire cover-class method. In this methodology, percent canopy cover is visually estimated for each plant species either rooted within or extending into each three-foot diameter plot. The plant species is placed into one of a series of cover classes using the estimated percent canopy cover. These classes are based on the mid-point of canopy coverage per the modified Daubenmire canopy cover method shown in Table 2-1 (Daubenmire 1959; Bailey and Poulton 1968).

Table 2-1: Modified Daubenmire Cover Class Scale

Cover Class	1	2	3	4	5	6	7
Range (%)	0-1	1-5	5-25	25-50	50-75	75-95	95-100
Midpoint (%)	0.5	3.0	15.0	37.5	62.5	85.0	97.5

A cover class was also estimated for the non-vegetated area in the three-foot-diameter plot because sample plots are often not completely vegetated. Non-vegetated areas can include bare soil, rocky surface, open water, or litter. Quantifying the bare areas allows for the determination of the total percent cover of vegetation in the plot by subtracting the percent bare area from 100 percent, the maximum surface area possible in the plot. Even with bare areas in a plot, the total cover of vegetation may be greater than 100 percent, because plants often overlap in a plot. If standing water was present, the water depth was recorded in the center of each plot along a given gradsect.

2.2 HYDROLOGICAL MONITORING

The following sections detail the various types of hydrological data that were collected as part of the monitoring effort.

2.2.1 Piezometers

Four piezometers were installed in the Wet Meadow mitigation site (WM-1) as described in the Phase I Mitigation Plan. The locations of the installed piezometers have been recorded using GPS (Figure 1, Section A-1, Appendix I). Two additional piezometers were installed in WM-2 in 2009. The locations of these piezometers are included in Figure 1, Section B-1, Appendix I.

Each installed piezometer is monitored on a monthly basis during the growing season to assess the seasonal and annual fluctuation in the shallow water table, and the variation between years. For additional information on the installation and monitoring of the piezometers, please refer to the Phase I and Phase II Mitigation Plans.

2.2.2 Other Hydrological Data

Additional hydrological data is also being collected during the annual monitoring effort each year. This additional data includes monthly total precipitation, monthly average ambient air temperature, and stream gauge data for the Platte and Elkhorn rivers.

2.3 SOIL SAMPLING

The presence of hydric soils in the created wetlands is one of the monitoring goals to document the success of the mitigation sites. Mitigation sites that have been monitored for the required five years or that are meeting the other monitoring goals will be investigated to determine if hydric soil characteristics are present. Sample plots will be established along each transect in the mitigation site near the central or third plot on the wetland gradsect. The soils will be sampled in accordance with the 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region* (Regional Supplement). Hydric soils indicators and as well as indicators of hydrology will be recorded on Wetland Determination Data Forms from the Regional Supplement (Appendix A, Sections A and B).

3.0 DATA ANALYSIS AND RESULTS

The following sections provide a brief discussion of the data analysis and the results of the 2013 annual wetland monitoring efforts at the mitigation sites.

3.1 VEGETATION SAMPLING DATA ANALYSIS

Vegetation monitoring of the mitigation sites was conducted in June and September 2013 to characterize major wetland and upland plant communities and the variation between them. Vegetation sampling took place in sample plots established along permanent transects and gradsects. Data obtained during the 2013 sampling efforts have been analyzed and the results are discussed below and included in Appendix I.

All of the vegetation data obtained for the sites were input into a Microsoft Access database that has been designed specifically to accommodate seasons and years of data. The database was also designed for the rapid comparative assessment of selected vegetative characteristics. The vegetative characteristics that were analyzed are described below.

During the data collection process in the field, the percent cover for each plant species observed in each sample plot is estimated. As explained in the following paragraphs, this collected vegetative data is used to calculate a mean weighted average (WA_M) for each sampling unit in addition to calculating the percent native species; percent invasive species; the percentage of perennial, biennial, and annual species; species richness; species diversity; the mean coefficient of conservatism (c-value); and the Floristic Quality Index (FQI).

3.1.1 Average Percent Cover

The average percent cover for a given herbaceous species in a given sampling unit (wetland, transect, gradsect, sample plot) equals the sum of the midpoint values (Table 2-1) of that species for that particular sampling unit divided by the total number of wetland sample plots in that sampling unit. The total number of sample plots is used instead of the count of the cover values. The number of sample plots is a constant at the wetland level. There are additional upland sample plots adjacent to the emergent wetlands; however, the data from these plots has not been included in this analysis. It is available should further investigations into the wetland system be necessary.

3.1.2 Percent Native Species

The percent native species value is the count, or number, of all species listed as “native” or “native and introduced” in that wetland during that sampling effort divided by the total count of species recorded in that wetland during that same sampling effort.

3.1.3 Percent Invasive Species

The percent invasive species value is the count of species listed as "invasive" in that wetland during that sampling effort divided by the total count of species recorded in that wetland during that same sampling effort.

3.1.4 Frequency

Frequency is defined as the total number of plots in which a given species occurs for a given sampling effort. The frequency will be a whole number greater than zero.

3.1.5 Species Richness

Species richness is the count of different herbaceous, shrub, and tree species identified in a given community for a given sampling effort. The species richness will be a whole number greater than zero.

3.1.6 Species Diversity (D)

Species diversity is the number of different species in an area (i.e.: species richness) weighted by a measure of abundance. For this analysis, the frequency is the measure of abundance. In general, species diversity increases with increasing heterogeneity; therefore, the higher the species diversity value, the more diverse the plant community.

The methodology for calculating the species diversity is included below. The formula for species diversity follows Simpson (1949):

$$Species\ Diversity\,(D) = \frac{N(N-1)}{\sum n(n-1)}$$

where N = total number of occurrences for all species in all plots.

n = number of occurrences (or frequency) for each individual species. This value combines data from all strata (herbaceous, shrubs, and trees) of the same species into a single value for that species.

3.1.7 Floristic Quality Assessment (FQA)

A Floristic Quality Analysis (FQA) for each mitigation site is also conducted annually. The FQA is comprised of two different calculations: the mean c-value and the Floristic Quality Index (FQI). The mean c-value is the average of the c-values from the plant species identified in the sampling unit. The mean c-value provides a measure of the botanical quality of a site that can be compared from year to year. However, it does not take into account the size of the site or the quality of the surrounding area.

Therefore, the FQI is calculated to combine the mean c-value with the total number of species identified in the sampling unit.

Higher mean c-values and FQI numbers correspond to more natural sites that have a higher quality and species diversity. Lower mean c-values and FQI numbers imply a more disturbed or lower quality site.

FQI is calculated using the following formula:

$$Floristic\,Quality\,Index\,(FQI) = \bar{c}\sqrt{n}$$

where $\bar{c}$ = mean or average c-value.

n = count or number of native species in a given area.

3.1.8 Mean Weighted Average (WA_M)

The mean weighted average (WA_M) provides an indication of the wetness of an area and can be used to determine if that area has the hydrophytic vegetation necessary to qualify as a wetland. The calculated WA_M will be a value between zero and five. It should be equal to or less than 3.0 in order for a specific site to meet the criteria for wetland vegetation. In transitional areas, a WA_M may approach 3.5, depending on landscape position, hydrology, and other related features. A WA_M greater than 3.5 is likely an upland area.

The WA_M is calculated using the following formula:

$$\text{Mean Weighted Average}\,(WA_M) = \frac{\sum I\,E}{\sum I}$$

where I = the importance value for the species – for this Project, the importance value is the percent cover for the species in the sample plot.

E = the ecological index for the species – for this Project, the ecological index is a value between one and five that corresponds to the wetland indicator status for the given species. (An ecological index value of one corresponds to an obligate or wetland plant and a value of five corresponds to an upland plant.)

3.2 SAMPLING RESULTS

The following sections provide a discussion of the data analysis results for the wetland mitigation sites that were sampled during the 2013 monitoring efforts. The complete set of data (figures, summary tables, ground photographs, and raw data sheets) is contained in Appendices I and II.

3.2.1 Wet Meadow Mitigation Site (WM-1)

The Wet Meadow mitigation site, when combined with the adjacent WM-2, consists of approximately 22 acres of former cropland located in the District's Saunders County well field (Figure 1, Appendix I-A). Within the 22 acres, 3.6 acres have been restored to emergent wetland WM-1; 4.7 acres have been converted to emergent wetland WM-2; and the remaining 13.7 acres have been converted to a native prairie upland buffer.

Monitoring requirements at WM-1 were completed in 2012. A completion letter summarizing the data collected during the six full years of monitoring at WM-1 was prepared by Burns & McDonnell and submitted to the District and the Corps on June 4, 2013. As a result, no monitoring took place at WM-1 in 2013.

3.2.2 Wet Meadow Expansion Mitigation Site (WM-2)

The Wet Meadow Expansion mitigation site (WM-2) is an approximately 4.7-acre PEM wetland created adjacent to WM-1 in the District's Saunders County well field (Figure 1, Appendix I-A). A 13.7-acre upland buffer has been established around WM-2 and WM-1. The vegetation in WM-2 was sampled using a total of 3 transects, 6 gradsects, and 30 sample plots. Soil sampling and characterization of hydrology was also completed in 2013 to determine if the mitigation site is meeting all three wetland criteria (vegetation, soils, and hydrology).

3.2.2.1 Vegetation Results

The dominant species in this wetland in 2013 were Kentucky bluegrass (*Poa pratensis*) and Canada goldenrod (*Solidago canadensis*). The dominant species in the upland buffer adjacent to WM-2 were big bluestem (*Andropogon gerardii*), Illinois bundleflower (*Desmanthus illinoensis*), Kentucky bluegrass, and sawtooth sunflower (*Helianthus grosseserratus*).

WM-2 (excluding the upland gradsects) had a WA_M of 3.47 in the spring and 3.53 in the fall (Table 3-1); these values indicate that the mitigation site is supporting facultative and upland vegetation in 2013. For comparison, using the NWPL wetland indicator statuses issued in 2012, the recalculated WA_M values would be 3.26 in the spring in 3.12 in the fall, indicating a more facultative vegetation community. This wetland also contained an average of 75.5 percent native species and 39.5 percent invasive species. The average FQI for this wetland in 2013 was 12.68, continuing a decline over the last two sampling seasons. The mean c-value at WM-2 was 2.50 in the spring and 3.19 in the fall. The average percent cover of native wetland vegetation at WM-2 in 2012 was 60.1. The variation in the mean percent cover of native wetland vegetation for WM-2 was graphed over time and is included as Figure 2 in Appendix I-B.

Table 3-1: Data Analysis Summary for WM-2 in 2013		
	Spring 2013	**Fall 2013**
Mean Weighted Average (WA_M)	3.47	3.53
Species Richness	28	25
Species Diversity (D)	16.61	12.27
Floristic Quality Index (FQI)	11.46	13.89
Mean c-value	2.50	3.19
Percent Cover of Native Wetland Vegetation	65.34	54.87

The vegetation community at WM-2 continues to struggle to meet hydrophytic vegetation criteria. The most dominant species recorded in 2013 at WM-2 was again Kentucky bluegrass which has a wetland indicator status that was changed from FACU to FAC upon the issuance of the latest NWPL. This is the biggest factor influencing the difference in WA_M values described in the paragraph above bringing the values closer to the 3.0 threshold. In 2011, experimental test plots were established in an attempt to determine a more preferable seed mix and pre-treatment method to improve the prominence of hydrophytic vegetation at the site. After discussion in early 2012 with the Corps and the District, it was decided that further monitoring of the test plots would be suspended; therefore, no monitoring at these plots took place in 2012 or 2013. WM-2 has now been monitored for five full years without meeting the success criteria for native wetland vegetation cover or wetness.

No invasive species control occurred in 2013 at WM-2. However, following the fall 2013 monitoring effort, the site was mowed in an attempt to control the pervasive population of eastern cottonwood (*Populus deltoides*) saplings. Invasive species will continue to be monitored, however, and controlled as necessary in future years, assuming the site is still a viable mitigation option. Tables 1 and 2 in Appendix I-A contain a summary of the monitoring data and the complete species list from the 2013 monitoring effort.

3.2.2.2 Soils and Hydrology Results

Three sample plots were established and analyzed in 2012 to assess the soil characteristics at WM-2. One sample plot was established at each transect near the central plot on the wetland gradsect (WM2-1-2-3, WM2-2-2-3, and WM2-3-2-3. The soils sampled at each of the sample plots demonstrated hydric soil characteristics. Matrix colors were typically low chroma (10YR 3/1 and 10YR 3/2) with prominent, distinct mottling (10YR 5/3, 10YR 4/6). Each sample plot met hydric soil indicator F6 Redox Dark Surface as indicated in the Regional Supplement (Appendix A, Section A). Indicators of wetland hydrology at the sample plots in WM-2 were limited to geomorphic position.

3.2.3 Backwash Drain Line Mitigation Site (WM-3)

The Backwash Drain Line mitigation site (WM-3) is located on approximately 80 acres of former cropland in the District's Douglas County well field (Figure 1, Appendix I-B). Of the 80 acres, 15.4 acres have been converted to emergent wetland and 64.6 acres to upland buffer. Within the upland buffer, a series of drainage swales were developed to direct water around the wetland when necessary. Due to the regularity of water being diverted around WM-3, these drainage swales are developing into wetland swales. If this development of additional wetland acreage appears permanent, these drainage swales will be delineated and their acreage added to the total mitigation acres created.

In an effort to create additional wetland acreage within the original WM-3 boundary and more closely reflect the original design of 15.4 acres of wetland at the site, modifications occurred to WM-3 in July of 2011. The mitigation site was re-graded to lower the elevation in the center of the site and to improve hydrological connections throughout the site in an effort to increase the wetland acreage. Much of the central portion of the site was lowered one- to two-feet from existing elevations. A native wetland seed mix was hand-broadcast following grading.

3.2.3.1 Vegetation Results

The vegetation in WM-3 was sampled using a total of 4 transects, 8 gradsects, and 40 sample plots. The dominant species in this wetland were broadleaf cattail (*Typha latifolia*) and flatstem spikerush (*Eleocharis compressa*). The dominant species in the upland buffer adjacent to WM-3 were Kentucky bluegrass and tall fescue (*Festuca arundinacea*).

WM-3 (excluding the upland gradsects) had a WA_M of 1.80 in the spring and 1.76 in the fall of 2013 (Table 3-2). For comparison, using the NWPL wetland indicator statuses issued in 2012, the recalculated WA_M values would be 2.06 in the spring in 1.83 in the fall. This wetland contained an average of 89.5 percent native species and 21 percent invasive species. The average FQI for this wetland in 2012 had a value of 19.03 continuing an upward trend compared to previous years. The mean c-value at WM-3 was 3.41 in the spring and 4.04 in the fall. The mean percent cover of native wetland vegetation in WM-3 in 2011 was 98 percent. The variation in the mean percent cover of native wetland vegetation for WM-3 was graphed over time and is included as Figure 2 in Appendix I-B.

No invasive species control took place at WM-3 in 2013. Invasive species will continue to be monitored and controlled as necessary at WM-3 in future years. Tables 1 and 2 in Appendix I-B contain a summary of the monitoring data and the complete species list from the 2013 monitoring effort.

Table 3-2: Data Analysis Summary for WM-3 in 2013

	Spring 2013	Fall 2013
Mean Weighted Average (WA_M)	1.80	1.76
Species Richness	29	29
Species Diversity (D)	22.73	30.00
Floristic Quality Index (FQI)	17.05	21.00
Mean c-value	3.41	4.04
Percent Cover of Native Wetland Vegetation	90.2	105.9

3.2.3.2 Soils and Hydrology Results

Soil samples were not obtained in 2013. Because of the modifications made to WM-3 in July of 2011, monitoring is expected to continue beyond the normal five year period. Currently, it is anticipated that soil samples will be obtained in 2014. In 2013, hydrology indicators at the four central plots of the wetland gradsects (WM3-1-3, WM3-2-3, WM3-3-3, and WM3-4-3) included inundation up to 16 inches, inundation and saturation visible on aerial photography, geomorphic position, and drainage patterns.

3.2.4 Water Treatment Plant Mitigation Sites

The District completed the construction of the Water Treatment Plant mitigation sites in May of 2009. The Water Treatment Plant mitigation sites consist of six emergent wetland areas that total 3.78 acres of wetlands. At the time of the development of the Water Treatment Plant mitigation site, the District also created 175 linear feet of stream mitigation to compensate for the 38 feet of ephemeral stream impacts resulting from construction of the water treatment plant. This will allow for additional stream mitigation beyond what is required for known stream impacts at this point.

Monitoring efforts at the Water Treatment Plant mitigation sites began in fall 2009; 2013 marked the fourth year with two sampling seasons. No soils data were recorded during the 2013 monitoring effort at any of the Water Treatment Plant mitigation sites, but this data will be obtained in 2014 as the sites reach the five-year monitoring threshold. Hydrology noted at wetland sample plots in 2013 at the Water Treatment Plant sites included surface water, high water table, saturation, Inundation visible on aerial photography, drainage patterns, and geomorphic position. A discussion of the 2013 monitoring effort at each wetland mitigation site is included in the following sections.

3.2.4.1 Water Treatment Plant Mitigation Site WM-4

Wetland mitigation site WM-4 is located near the northeast corner of the water treatment plant property (Figure 1, Appendix I-C). The constructed area of WM-4 was measured using GPS in June of 2009 and

calculated to be 0.69 acre. The vegetation in WM-4 was sampled using a total of 1 transect, 2 gradsects, and 10 sample plots. The dominant species in this wetland were cattail and Kentucky bluegrass. The dominant species in the upland buffer adjacent to WM-4 were big bluestem, tall fescue, and red clover (*Trifolium pretense*).

WM-4 (excluding the upland gradsect) had a WA_M of 2.81 in the spring and 2.40 in the fall (Table 3-3). For comparison, using the NWPL wetland indicator statuses issued in 2012, the recalculated WA_M values would be 2.73 in the spring in 2.33 in the fall. This wetland contained an average of 79.5 percent native species and 49 percent invasive species. The average FQI for this wetland in 2013 was 11.9, a slight decrease from the 2012 FQI. The mean c-value at WM-4 was 2.75 in the spring and 3.58 in the fall. The mean percent cover of native wetland vegetation in WM-4 in 2013 was 70.5 percent. The variation in the mean percent cover of native wetland vegetation for WM-4 was graphed over time and is included as Figure 2 in Appendix I-C.

Table 3-3: Data Analysis Summary for WM-4 in 2013

	Spring 2013	Fall 2013
Mean Weighted Average (WA_M)	2.81	2.40
Species Richness	20	16
Species Diversity (D)	38.75	28.11
Floristic Quality Index (FQI)	9.92	13.88
Mean c-value	2.75	3.58
Percent Cover of Native Wetland Vegetation	82.5	58.5

No invasive species control took place at WM-4 in 2013. Invasive species at the site will continue to be monitored and controlled as necessary at WM-4 in future years. Tables 1 and 2 in Appendix I-C contain a summary of the monitoring data and the complete species list from the 2013 monitoring effort.

3.2.4.2 Water Treatment Plant Mitigation Site WM-5

Wetland mitigation site WM-5 is located in the north-central portion of the water treatment plant property (Figure 1, Appendix I-D). The constructed area of WM-5 was measured using GPS in June of 2009 and calculated to be 0.57 acre. The vegetation in WM-5 was sampled using a total of 1 transect, 2 gradsects, and 10 sample plots. The dominant species in this wetland was fox sedge (*Carex vulpinoidea*). The dominant species in the upland buffer adjacent to WM-5 were tall fescue and alfalfa (*Medicago sativa*).

WM-5 (excluding the upland gradsect) had a WA_M of 2.30 in the spring and 2.05 in the fall (Table 3-4). For comparison, using the NWPL wetland indicator statuses issued in 2012, the recalculated WA_M values

would be 2.55 in the spring in 2.25 in the fall. This wetland contained an average of 71 percent native species and 54.5 percent invasive species. The average FQI for this wetland in 2013 was 10.52, down from the 2011 and 2012 values. The mean c-value at WM-5 was 2.85 in the spring and 3.17 in the fall. The mean percent cover of native wetland vegetation in WM-5 in 2013 was 133.5 percent. The variation in the mean percent cover of native wetland vegetation for WM-5 was graphed over time and is included as Figure 2 in Appendix I-D.

Table 3-4: Data Analysis Summary for WM-5 in 2013

	Spring 2013	Fall 2013
Mean Weighted Average (WA_M)	2.30	2.05
Species Richness	21	14
Species Diversity (D)	30.57	19.12
Floristic Quality Index (FQI)	11.02	10.01
Mean c-value	2.85	3.17
Percent Cover of Native Wetland Vegetation	157	110

No invasive species control took place at WM-5 in 2013. Invasive species at the site will continue to be monitored and controlled as necessary at WM-5 in future years. Tables 1 and 2 in Appendix I-D contain a summary of the monitoring data and the complete species list from the 2013 monitoring effort.

3.2.4.3 Water Treatment Plant Mitigation Site WM-6

Wetland mitigation site WM-6 is located in the southwest corner of the water treatment plant property (Figure 1, Appendix I-E). The constructed area of WM-6 was measured using GPS in June of 2009 and calculated to be 0.78 acre. The vegetation in WM-6 was sampled using a total of 1 transect, 2 gradsects, and 10 sample plots. The dominant species in this wetland were tall fescue and Jerusalem artichoke (*Helianthus tuberosus*). The dominant species in the upland buffer adjacent to WM-6 were Kentucky bluegrass and smooth brome (*Bromus inermis*).

WM-6 (excluding the upland gradsect) had a WA_M of 2.59 in the spring and 2.88 in the fall (Table 3-5). For comparison, using the NWPL wetland indicator statuses issued in 2012, the recalculated WA_M values would be 3.02 in the spring in 2.70 in the fall. This wetland contained an average of 82.5 percent native species and 55 percent invasive species. The average FQI for this wetland in 2013 was 12.64, staying nearly the same compared to the 2012 value. The mean c-value at WM-6 was 3.14 in the spring and 3.08 in the fall. The mean percent cover of native wetland vegetation in WM-6 in 2013 was 64.35 percent. The

variation in the mean percent cover of native wetland vegetation for WM-6 was graphed over time and is included as Figure 2 in Appendix I-E.

Table 3-5 Data Analysis Summary for WM-6 in 2013

	Spring 2013	Fall 2013
Mean Weighted Average (WA_M)	2.59	2.88
Species Richness	20	20
Species Diversity (D)	23.16	37.71
Floristic Quality Index (FQI)	12.96	12.31
Mean c-value	3.14	3.08
Percent Cover of Native Wetland Vegetation	76.2	52.5

No invasive species control took place at WM-6 in 2013; however, invasive species will continue to be monitored and controlled as necessary in future years. Tables 1 and 2 in Appendix I-E contain a summary of the monitoring data and the complete species list from the 2013 monitoring effort.

3.2.4.4 Water Treatment Plant Mitigation Site WM-7

Wetland mitigation site WM-7 is located in the southwest portion of the water treatment plant property, immediately east of WM-6 (Figure 1, Appendix I-F). The constructed area of WM-7 was measured using GPS in June of 2009 and calculated to be 0.58 acre. The vegetation in WM-7 was sampled using 1 transect, 2 gradsects, and 10 sample plots. The dominant species in the wetland included barnyard grass (*Echinochloa crus-galli*), cattail, shortbeak sedge (*Carex brevior*), hop sedge (*Carex lupulina*), and fox sedge. The dominant species in the upland buffer adjacent to WM-7 were Kentucky bluegrass and smooth brome.

WM-7 (excluding the upland gradsect) had a WA_M of 1.70 in the spring and 1.39 in the fall (Table 3-6). For comparison, using the NWPL wetland indicator statuses issued in 2012, the recalculated WA_M values would still be 1.70 in the spring and 1.40 in the fall. This wetland contained an average of 96 percent native species and 17 percent invasive species. The average FQI for this wetland in 2013 was 15.70, continuing an upward trend from the previous years of monitoring. The mean c-value at WM-7 was 5.56 in the spring and 4.25 in the fall. The mean percent cover of native wetland vegetation in WM-7 in 2013 was 116.25 percent. The variation in the mean percent cover of native wetland vegetation for WM-7 has been graphed over time and is included as Figure 2 in Appendix I-F.

Table 3-6: Data Analysis Summary for WM-7 in 2013

	Spring 2013	Fall 2013
Mean Weighted Average (WA_M)	1.70	1.39
Species Richness	9	13
Species Diversity (D)	15.17	23.33
Floristic Quality Index (FQI)	15.17	14.72
Mean c-value	5.56	4.25
Percent Cover of Native Wetland Vegetation	95	137.5

No invasive species control took place at WM-7 in 2013; however, invasive species will continue to be monitored and controlled as necessary in future years. Tables 1 and 2 in Appendix I-F contain a summary of the monitoring data and the complete species list from the 2013 monitoring effort.

3.2.4.5 Water Treatment Plant Mitigation Site WM-8

Wetland mitigation site WM-8 is located in the south-central portion of the water treatment plant property, immediately east of WM-7 (Figure 1, Appendix I-G). The constructed area of WM-8 was measured using GPS in June of 2009 and calculated to be 0.74 acre. The vegetation in WM-8 was sampled using 1 transect, 2 gradsects, and 10 sample plots. The dominant species in this wetland was Virginia wildrye (*Elymus virginicus*). Other dominant species observed at WM-8 included Kentucky bluegrass and leafy pondweed (*Potamogeton foliosus*). The dominant species in the upland buffer adjacent to WM-8 were Kentucky bluegrass, tall fescue, and Jerusalem artichoke.

WM-8 (excluding the upland gradsects) had a WA_M of 2.27 in the spring and 2.63 in the fall (Table 3-7). For comparison, using the newly wetland indicator statuses issued in 2012, the recalculated WA_M values would be 2.41 in the spring in 2.52 in the fall. This wetland contained an average of 85.5 percent native species and 34 percent invasive species. The average FQI for this wetland in 2012 was 19.23, continuing an upward trend from the previous years of monitoring. The mean c-value at WM-8 was 5.07 in the spring and 4.13 in the fall. The mean percent cover of native wetland vegetation in WM-8 in 2013 was 100.5 percent. The variation in the mean percent cover of native wetland vegetation for WM-8 was graphed over time and is included as Figure 2 in Appendix I-G.

Table 3-7: Data Analysis Summary for WM-8 in 2013		
	Spring 2013	**Fall 2013**
Mean Weighted Average (WA_M)	2.27	2.63
Species Richness	21	20
Species Diversity (D)	39.55	50.00
Floristic Quality Index (FQI)	20.91	17.54
Mean c-value	5.07	4.13
Percent Cover of Native Wetland Vegetation	122	79

No invasive species control took place at WM-8 in 2013; however, invasive species will continue to be monitored and controlled as necessary in future years. Tables 1 and 2 in Appendix I-G contain a summary of the monitoring data and the complete species list from the 2013 monitoring effort.

3.2.4.6 Water Treatment Plant Mitigation Site WM-9

Wetland mitigation site WM-9 is located in the southeast corner of the water treatment plant property (Figure 1, Appendix H-I). The constructed area of WM-9 was measured using GPS in June of 2009 and calculated to be 1.90 acres. Of the 1.90 acres, 1.48 acres are open water habitat while 0.42 acre was constructed as emergent wetland and was included in the total acreage of the Water Treatment Plant mitigation sites. The vegetation in WM-9 was sampled using a total of 2 transects, 4 gradsects, and 20 sample plots. The dominant species in this wetland were prairie cordgrass (*Spartina pectinata*), sandbar willow (*Salix interior*), and smooth brome. The dominant species in the upland buffer adjacent to WM-9 were smooth brome and tall fescue.

WM-9 (excluding the upland gradsects) had a WA_M of 2.74 in the spring and 2.37 in the fall (Table 3-8). For comparison, using the NWPL wetland indicator statuses issued in 2012, the recalculated WA_M values would be 2.71 in the spring in 2.39 in the fall. This wetland contained an average of 81 percent native species and 41 percent invasive species. The average FQI for this wetland in 2012 was 13.6, an increase from the 2012 average of 11.22. The mean c-value at WM-9 was 3.89 in the spring and 3.69 in the fall. The mean percent cover of native wetland vegetation in WM-9 in 2013 was 45 percent. The variation in the mean percent cover of native wetland vegetation for WM-9 was graphed over time and is included as Figure 2 in Appendix H-I.

Table 3-8: Data Analysis Summary for WM-9 in 2013		
	Spring 2013	**Fall 2013**
Mean Weighted Average (WA_M)	2.74	2.37
Species Richness	14	18
Species Diversity (D)	19.71	11.27
Floristic Quality Index (FQI)	12.90	14.30
Mean c-value	3.89	3.69
Percent Cover of Native Wetland Vegetation	34	56

No invasive species control took place at WM-9 in 2013; however, invasive species will continue to be monitored and controlled as necessary in future years. Although not invasive, thick, woody vegetation had become abundant lining the northeastern and eastern perimeter of WM-9. As a result, this area dominated by peachleaf willow (*Salix amygdaloides*), sandbar willow, and eastern cottonwood was thinned out in 2013 by hand clearing; cutting stumps at or near ground level leaving the root structure in place. Tables 1 and 2 in Appendix H-I contain a summary of the monitoring data and the complete species list from the 2013 monitoring effort.

3.2.4.7 Water Treatment Plant Stream Mitigation Site

As mentioned above, approximately 175 feet of stream mitigation was created as part of the Water Treatment Plant mitigation sites. The stream mitigation site is located in the southeast corner of the water treatment plant property, immediately south of WM-9. No quantitative monitoring efforts are conducted at the stream mitigation site. However, natural color photographs were taken during the spring and fall 2013 monitoring efforts and are provided in Appendix I, Section I. Hydrology at the stream mitigation site is provided by connection with WM-9 via a culvert as well as via surface water runoff from portions of the property. Shrubs consisting of dogwood (*Cornus* sp.) and pussy willow (*Salix discolor*) were planted on the northern bank of the stream channel during 2009.

3.3 HYDROLOGICAL MONITORING

Several different types of hydrological data were collected as part of the 2013 monitoring effort. These collected data have been analyzed; the results are discussed below and included in Appendix II.

3.3.1 Piezometers

Four piezometers were installed in WM-1 in the Saunders County well field in October 2005. The elevation of the local water table at each piezometer was graphed over time to allow for comparison amongst the piezometers and with other monitoring data. Two additional piezometers were installed in

WM-2 in May 2009. The piezometer data from the 2013 monitoring effort is included as Figure 1, Appendix II.

3.3.2 Other Hydrological Data

Additional hydrological data collected as part of the 2013 monitoring effort includes monthly total precipitation, monthly average ambient air temperature, and stream gauge data. The 2013 monthly total precipitation and monthly average ambient air temperature are both obtained from the weather station at Fremont Municipal Airport in Fremont, Nebraska located approximately 20 miles northwest of the well fields. The 2013 precipitation and temperature data and the historical average monthly precipitation and temperature were graphed over time; the graphs are included as Figures 2 and 3, respectively in Appendix II.

Stream gauge data is obtained from the USGS stream gauge stations on the Platte and Elkhorn Rivers. Platte River data is obtained approximately three miles upstream of the well fields from the stream gauge near Venice, Nebraska (USGS Stream Gauge No. 06796550). The installation of this stream gauge took place at the request of, and through funding by, the District. Data collected from this stream gauge is presented in Figure 4, Appendix II. The Elkhorn River data is obtained approximately seven miles upstream of the well fields at the stream gauge near Waterloo, Nebraska (USGS Stream Gauge No. 06800500). Data collected from this stream gauge is presented in Figure 5, Appendix II.

Project operation of the production wells in the well fields occurred throughout 2013, the fifth full year of operation. As in past years, pumping was well below regulated capacity. The rate of pumping during March 2013 was considerably higher than previous years (80 percent higher) due to a planned plant outage at one of the District's other production facilities.

Due to concerns from the lingering drought of 2012, the District planned self-imposed pumping restrictions during the months of April, May, June, August, and September. No restrictions were planned for July. The planned restrictions were a 25 percent reduction from average monthly flows (2009 through 2012) for all months except May which was a planned 33 percent reduction. The District achieved the planned target flows for April, May, and June averaging approximately 24.2 MGD (million gallons per day) of pumpage for this three-month period as compared to a 2009-2012 average of 36.9 MGD. Due to nearly normal river flows in August the self-imposed restrictions were lifted for August and September. Annual production in 2013 (January through November) declined to 11,048 million gallons (MG) from the 2012 production of 11,891 MG. Both 2012 and 2013 included several months of self-imposed

pumping restriction and were both significantly below the record high production year of 2011 (12,448 MG – January through November).

4.0 DISCUSSION AND RECOMMENDATIONS

The goal of the monitoring program is to document the establishment of the wetland mitigation sites and to observe whether the mitigation sites develop similar functions and values as those wetlands and waters of the United States affected by Project construction and operation. While most of the mitigation sites are developing as anticipated, a few recommendations for improvement are included below.

4.1 MAINTENANCE EFFORTS

The following sections provide the details of any maintenance activities that were performed or analyze in 2013 or are recommended for 2014.

4.1.1 Wet Meadow Mitigation Site (WM-1)

In 2012, WM-1 satisfied all success criteria and no further routine monitoring was required. Therefore, no maintenance efforts were conducted at WM-1 in 2013. This wetland will be periodically evaluated and if any maintenance is needed, it will be recommended.

4.1.2 Wet Meadow Expansion Mitigation Site (WM-2)

Although hydric soils are evident, the establishment of native wetland vegetation in WM-2 continues to be problematic. A series of experimental test plots were established at WM-2 in 2011 in an attempt to identify a wetland seed mix and pre-treatment method that would result in the successful establishment of native wetland vegetation. After discussion in early 2012 with the Corps and the District, it was decided that further monitoring of the test plots would be suspended; therefore, no monitoring at these plots took place in 2012 or 2013. WM-2 has now been monitored for five full years without meeting the success criteria for native wetland vegetation cover or wetness. An analysis of soils at the site in 2012 and 2013 has indicated soils have hydric characteristics, however. Indicators of wetland hydrology noted in 2013 included only geomorphic position. Additional indicators of wetland hydrology and hydrophytic vegetation would be needed to classify the sample plot as being located within a wetland.

The annual meeting with the District and the Corps in early 2014 should include a discussion to determine a plan for monitoring or maintenance activities at WM-2 in 2014 and future years.

4.1.3 Backwash Drain Line Mitigation Site (WM-3)

As discussed in previous reports, alterations to WM-3 were completed in July of 2011 to lower the elevation in the center of the site and to improve hydrological connections in an effort to improve water flow across the site and increase the wetland acreage. Much of the central portion of the site was lowered one- to two-feet from existing elevations.

Monitoring at WM-3 in 2013 took place as in previous years using the four transects established during the initial monitoring in the fall of 2008. These transects and their respective wetland gradsects still appear to provide a representative sample of vegetation in the wetland and upland portions of WM-3. Extending the transects and/or establishing new transects was discussed, but has not been deemed necessary to-date. Photographic documentation of the site was accomplished in 2013 to produce a visual record of the continued reestablishment of the wetland over time.

Although five full years of monitoring have been completed at WM-3, it is anticipated that additional monitoring will be necessary in 2014 following the grading improvements made in July 2011. Although the reestablishment of vegetation at the site appears to be taking place as desired, future monitoring efforts will continue to assess the vegetative cover and composition as well as determine the actual wetland acreage at WM-3.

4.1.4 Water Treatment Plant Mitigation Sites

As mentioned in the above, dense woody vegetation had become abundant in the northeastern portion of WM-9. As a result, this area dominated by peachleaf willow, sandbar willow, and eastern cottonwood (*Populous deltoides*) was thinned out in 2013 by hand clearing; stumps were cut at or near ground level, leaving the root structure in place. If necessary, this area will continue to be thinned out, but slope stability will be maintained.

4.2 INVASIVE SPECIES CONTROL

No invasive species control took place in 2013. The drought conditions experienced in 2012 tempered the establishment of invasive species typically treated in past years (i.e. purple loosestrife (*Lythrum salicaria*) and cattail) although cattail will need to be continually monitored, particularly at WM-4. The reestablishment and proliferation of all invasive species will continue to be monitored closely in 2014 and control measures will be implemented as needed.

4.3 MONITORING GOALS ACCOMPLISHED

As outlined in the Mitigation Plans, mitigation efforts will be considered successful at a given mitigation site if the following criteria occur:

1. Eighty percent cover of native wetland vegetation will be established in the created emergent wetlands and along the banks of the created stream channel.

2. Positive indicators of hydric soils such as low chroma dominant colors, redoximorphic features, or oxidized rhizospheres are found in the created emergent wetlands.

3. Positive indicators of wetland hydrology such as inundation, saturation in the upper 12 inches of the soil, watermarks, and drift lines are found in the created emergent wetlands.

At this time, WM-2 has been monitored for the requisite five years, but is not meeting all of the success criteria. Although hydric soils were noted at each of the three established transects, the average percent cover of native hydrophytic vegetation at the site is 60.1 percent and sufficient indicators of wetland hydrology were also lacking. Additionally, the prevalence index values calculated at each of the three sample plots was above a value of 3.0 indicating an area dominated by upland vegetation. Future monitoring efforts at WM-2 will be discussed at the annual meeting with the District and the Corps in early 2014.

2013 represented the fifth full year of monitoring at WM-3 in Douglas County as well. However, because a significant portion of the site was re-graded in July 2011, it is anticipated that additional monitoring will be necessary following that impact. 2013 represents the second full year of monitoring at WM-3 following the July 2011 alterations. Soil samples and a delineation of the wetland will need to occur in the near future to determine if all success criteria are being met as well as to document and quantify the final wetland acreage at the site.

Following the 2014 monitoring efforts, each of the wetland mitigation sites at the water treatment plant will have completed five full years of monitoring. Soil samples and notes of hydrological indicators will be collected in 2014. Additionally, periodic reviews will also be conducted to determine if maintenance activities should be considered to compensate for a site that may not be meeting one or more goals.

As previously stated, approximately 0.3 acre of wetlands were impacted due to construction and Project operation was estimated to impact 14.3 acres of wetlands in the two well fields. These 14.6 acres of anticipated impact included both direct and indirect impacts that would occur in the well fields (Phases I and II). According to the Section 404 permit conditions, impacts require mitigation at a ratio of 1.5:1.0 (wetlands created to wetlands impacted); this amounts to a total of 21.9 acres of wetland mitigation required. Table 4-1 provides a summary of the current status of each mitigation site. Design of the various mitigation wetlands included an excess of just over eight acres over the required 21.9 acres. This excess of mitigation was intended to compensate for any wetlands that do not meet the design acreage or for any impacts in excess of the EIS estimate.

Table 4-1: 2013 Mitigation Site Summary						
Wetland	**Design Acreage**	**Delineated Acreage**	**Success Criteria Met (Y/N)**			**Monitoring Completed**
			Vegetation	**Soils**	**Hydrology**	
WM-1	3.6	3.3	Y	Y	Y	2012
WM-2	4.7	NA	N	Y	N	N
WM-3	15.4	NA	Y	NA	Y	N
WM-4	0.69	NA	N	NA	Y	N
WM-5	0.57	NA	Y	NA	Y	N
WM-6	0.78	NA	N	NA	Y	N
WM-7	0.58	NA	Y	NA	Y	N
WM-8	0.74	NA	Y	NA	Y	N
WM-9	1.9	NA	N	NA	Y	N
Total:	**28.96**					

4.4 2014 MONITORING

The 2014 monitoring efforts at the mitigation sites are targeted to take place in June and September. Since the monitoring methods, as implemented during the 2006 monitoring effort, continue to yield what is considered to be good, usable data, the methods described in this report will be repeated during the 2014 monitoring effort. No changes to the monitoring methodology are recommended at this time. 2014 will mark the fifth year of monitoring at the water treatment plant sites (WM-4 through WM-9) and the third full year of monitoring following the modifications at WM-3. Analysis of soils and hydrology will be made at each of the wetlands in 2014 and requests for completion of monitoring at sites will be made to the Corps as appropriate.

As in past years, the growth of invasive species such as cattail, purple loosestrife, and thistle will continue to be closely monitored during 2014 and control measures will be continued as necessary.

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APPENDIX I

WETLAND MONITORING DATA FOR THE MITIGATION SITES
(FIGURES, TABLES, PHOTOGRAPHS, DATA SHEETS)

APPENDIX I - SECTION A

WET MEADOW EXPANSION MITIGATION SITE (WM-2) MONITORING DATA

TABLE OF CONTENTS

SECTION A-1

FIGURES

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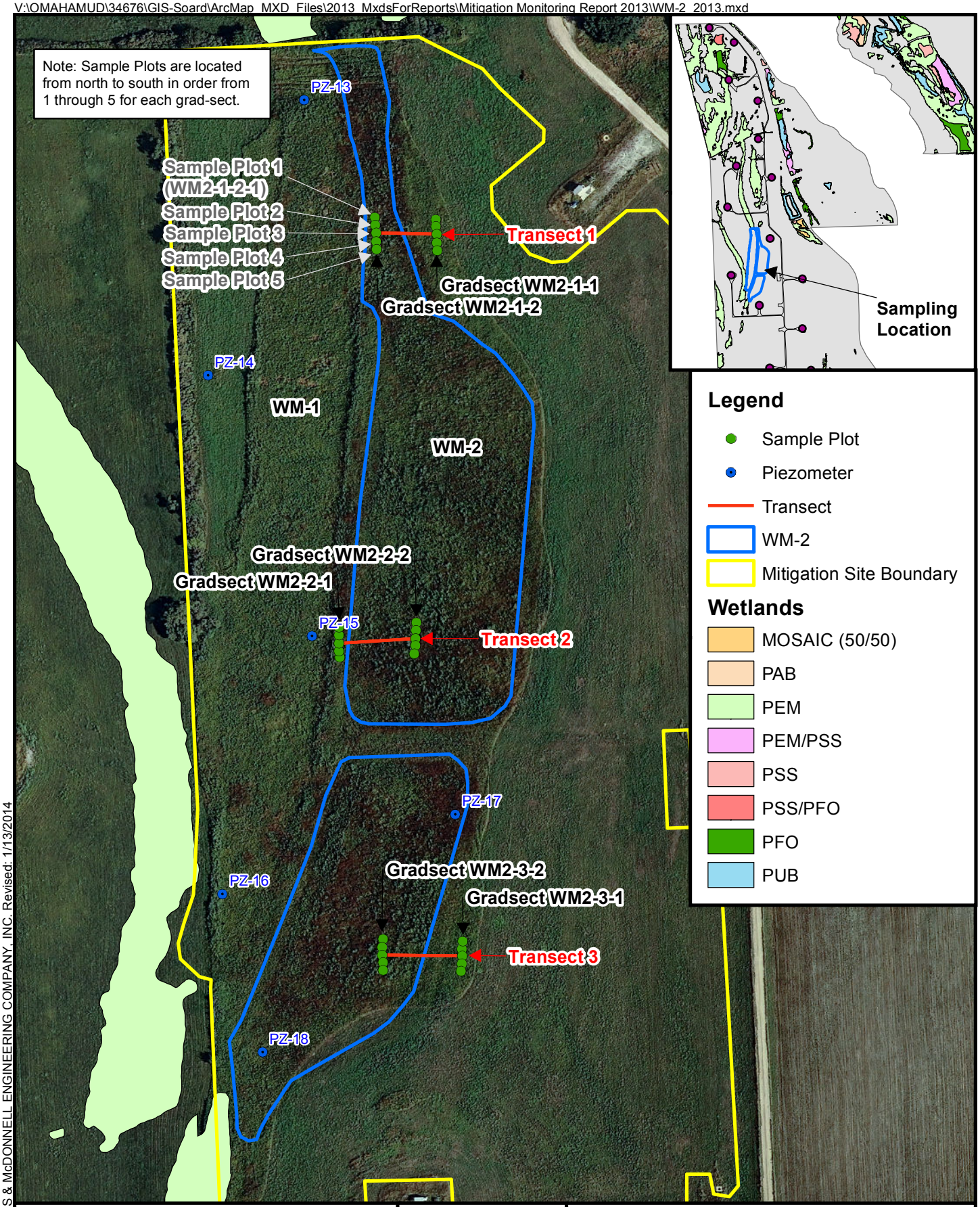

Source: Wilson & Company 2013 Aerial Photography

Figure 1
Location Map for
Wetland Mitigation 2
Saunders County Wellfield
Metropolitan Utilities District

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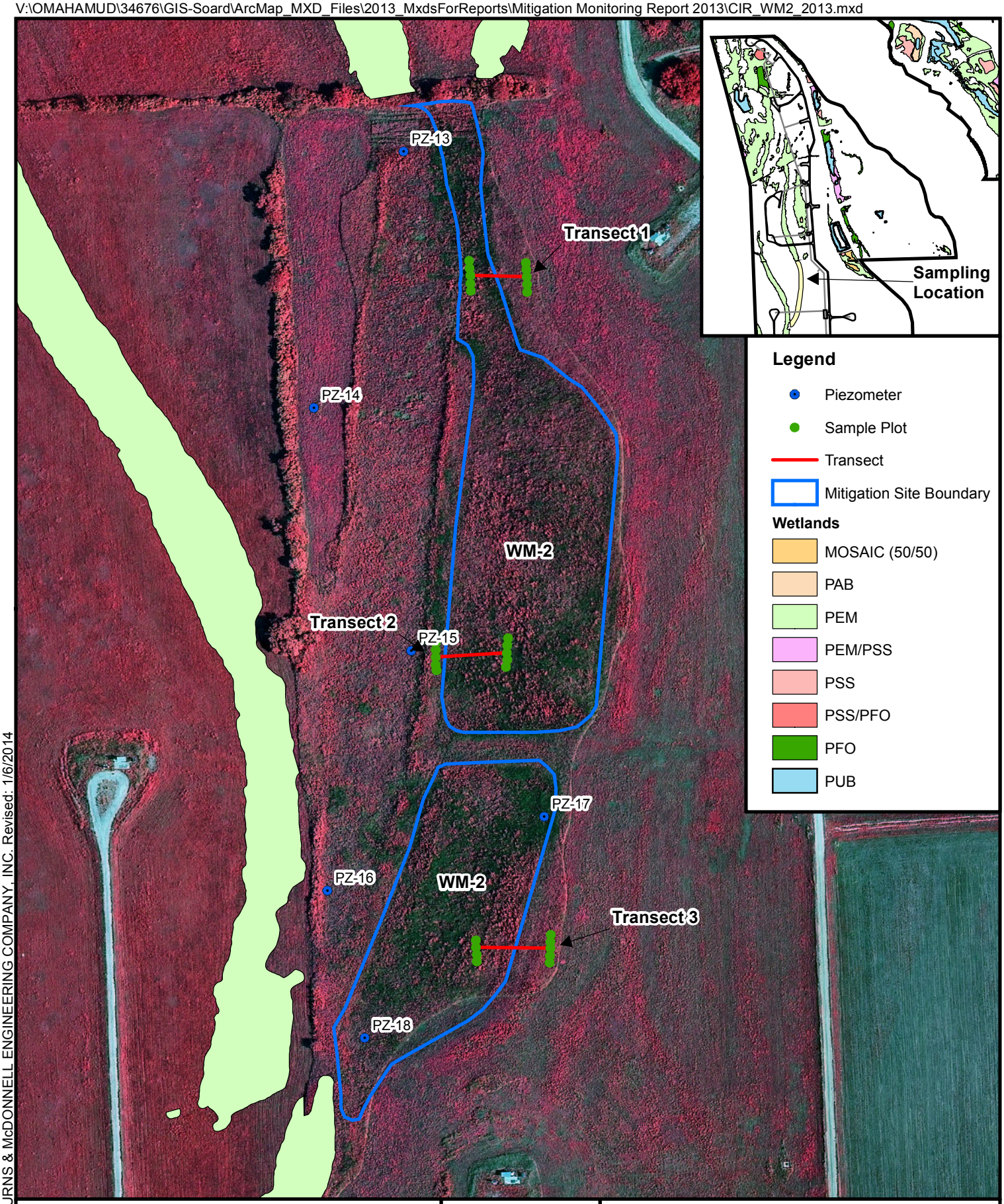

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Source: Wilson & Company 2013 Aerial Photography

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Figure 2
2013 CIR Aerial Photograph for
Wetland Mitigation 2
Saunders County Well Field
Metropolitan Utilities District

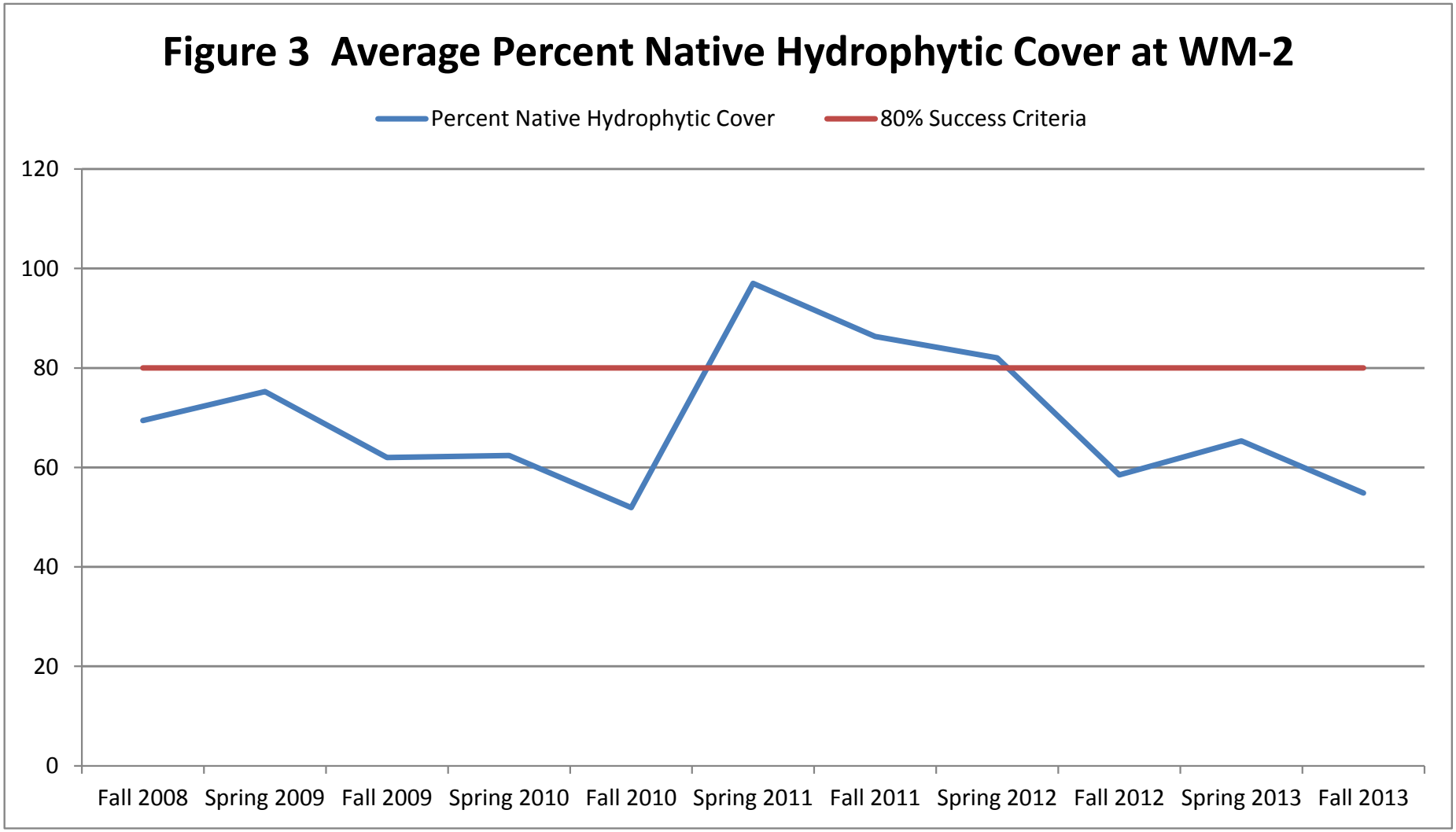


Figure 3 Average Percent Native Hydrophytic Cover at WM-2
Percent Native Hydrophytic Cover
80% Success Criteria
120
100
80
60
40
20
0
Fall 2008
Spring 2009
Fall 2009
Spring 2010
Fall 2010
Spring 2011
Fall 2011
Spring 2012
Fall 2012
Spring 2013
Fall 2013

SECTION A-2

TABLES

Table 1 Summary of Wetland Monitoring Data for WM-2

Wetland Name: **WM-2**
Wetland Type: **PEM**
County: **Saunders**

Number of Transects/Macroplots: **3**
Number of Gradsects: **6**
Number of Sample Plots: **30**
Number of Wetland Sample Plots: **15**

Sampling Effort: **2013 Fall**

Weighted Average: **3.53**
Species Richness: **25**
Species Diversity: **12.27**
FQI: **13.89**

Percent Native Species: **76**
Percent Invasive Species: **40**
Percent Perennial/Biennial/Annual Species: **88 / 12 / 24**
Mean C-Value: **3.19**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Panicum virgatum	Switchgrass	FAC	10.67
Poa pratensis	Kentucky bluegrass	FACU	90.17
Solidago canadensis	Canada goldenrod	FACU	37.83
Spartina pectinata	Prairie cordgrass	FACW	24.33
Symphyotrichum pilosum	Hairy white oldfield as	FACU	11.67

Sampling Effort: **2013 Spring**

Weighted Average: **3.47**
Species Richness: **28**
Species Diversity: **16.61**
FQI: **11.46**

Percent Native Species: **75**
Percent Invasive Species: **39**
Percent Perennial/Biennial/Annual Species: **82 / 14 / 25**
Mean C-Value: **2.50**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Anemone canadensis	Canadian anemone	FACW	17.33
Melilotus officinalis	Yellow sweetclover	FACU	45.83
Poa pratensis	Kentucky bluegrass	FACU	75
Solidago canadensis	Canada goldenrod	FACU	26

Table 2 Species List and Vegetative Characteristics for WM-2

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Fall**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Amaranthus retroflexus	Redroot amaranth	FACU	4		Native	☑	1	1.00
Anemone canadensis	Canadian anemone	FACW	2	4	Native	☐	6	6.53
Conyza canadensis	Canadian horseweed	FACU-	4	0	Native	☑	1	1.00
Cornus drummondii	Roughleaf dogwood	FAC	3	3	Native	☐	1	1.00
Desmanthus illinoensis	Illinois bundleflower	FACU	4	5	Native	☐	6	9.00
Dichanthelium acuminatum	Tapered rosette grass	FAC	3	6	Native	☐	1	1.00
Medicago lupulina	Black medick	FAC	3		Introduced	☑	1	0.17
Melilotus officinalis	Yellow sweetclover	FACU	4		Introduced	☑	1	0.17
Morus alba	White mulberry	FAC	3		Introduced	☐	1	0.17
Muhlenbergia asperifolia	Scratchgrass	FACW	2	5	Native	☐	2	6.67
Panicum virgatum	Switchgrass	FAC	3	4	Native	☐	6	10.67
Physalis heterophylla	Clammy groundcherry	NL	3	4	Native	☑	1	1.00
Physalis longifolia	Longleaf groundcherry	NL	3	0	Native	☐	3	3.00
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	15	90.17
Populus deltoides	Eastern cottonwood	FAC	3	3	Native	☐	2	2.00
Setaria pumila ssp. pumila	Yellow foxtail	FAC	3		Introduced	☑	1	1.00
Solidago canadensis	Canada goldenrod	FACU	4	2	Native	☐	14	37.83
Solidago gigantea	Giant goldenrod	FACW	2	3	Native	☐	2	2.67

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-2

Report generated:
Thursday, January 02, 2014

Sorghastrum nutans	Indiangrass	FACU	4	5	Native	☐	1	1.00
Spartina pectinata	Prairie cordgrass	FACW	2	5	Native	☐	9	24.33
Symphyotrichum pilosum	Hairy white oldfield aster	FACU	4	0	Native	☐	7	11.67
Taraxacum officinale	Common dandelion	FACU	4		Native & Introduced	☑	1	0.17
Trifolium pratense	Red clover	FACU	4		Introduced	☐	1	0.17
Trifolium repens	White clover	FACU	4		Introduced	☑	2	3.50
Verbena stricta	Hoary verbena	NL	3	2	Native	☑	1	1.00

Sampling Effort: **2013 Spring**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Ambrosia artemisiifolia	Annual ragweed	FACU	4	0	Native	☑	1	1.00
Andropogon gerardii	Big bluestem	FAC-	3	5	Native	☐	3	6.00
Anemone canadensis	Canadian anemone	FACW	2	4	Native	☐	9	17.33
Bromus arvensis	Field brome	NL	3		Introduced	☐	3	6.00
Calystegia sepium	Hedge false bindweed	FAC	3	1	Native & Introduced	☑	1	0.17
Conyza canadensis	Canadian horseweed	FACU-	4	0	Native	☑	2	1.17
Cornus drummondii	Roughleaf dogwood	FAC	3	3	Native	☐	1	0.17
Desmanthus illinoensis	Illinois bundleflower	FACU	4	5	Native	☐	6	5.17
Dichanthelium acuminatum	Tapered rosette grass	FAC	3	6	Native	☐	3	2.17
Elymus virginicus	Virginia wildrye	FAC	3	4	Native	☐	3	7.50

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-2

Report generated:
Thursday, January 02, 2014

Erigeron strigosus	Prairie fleabane	FAC	3	2	Native	☑	2	2.00
Fraxinus pennsylvanica	Green ash	FACW	2	2	Native	☐	1	1.00
Hordeum jubatum	Foxtail barley	FACW	2	1	Native	☑	3	9.17
Medicago lupulina	Black medick	FAC	3		Introduced	☑	6	10.37
Melilotus officinalis	Yellow sweetclover	FACU	4		Introduced	☑	13	45.83
Panicum virgatum	Switchgrass	FAC	3	4	Native	☐	4	7.00
Physalis longifolia	Longleaf groundcherry	NL	3	0	Native	☐	4	3.17
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	15	75.00
Populus deltoides	Eastern cottonwood	FAC	3	3	Native	☐	4	4.00
Solidago canadensis	Canada goldenrod	FACU	4	2	Native	☐	13	26.00
Solidago gigantea	Giant goldenrod	FACW	2	3	Native	☐	1	1.00
Spartina pectinata	Prairie cordgrass	FACW	2	5	Native	☐	6	13.83
Symphyotrichum pilosum	Hairy white oldfield aster	FACU	4	0	Native	☐	3	3.00
Taraxacum officinale	Common dandelion	FACU	4		Native & Introduced	☑	1	1.00
Thlaspi arvense	Field Pennycress	FACU	4	0	Introduced	☑	1	1.00
Trifolium pratense	Red clover	FACU	4		Introduced	☐	1	2.50
Trifolium repens	White clover	FACU	4		Introduced	☑	2	0.33
Unknown 1	Unknown seedling	--	3		--	☐	1	0.03

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

SECTION A-3

MITIGATION SITE WM-2 GROUND PHOTOGRAPHS

Photo 1: View west of Transect 1 at WM-2 (June 2013).

Photo 2: View north of Gradsect 1 on Transect 1 at WM-2 (June 2013).

Photo 3: View north of Gradsect 2 on Transect 1 at WM-2 (June 2013).

Photo 4: View east of Transect 2 at WM-2 (June 2013).

Photo 5: View north of Gradsect 1 on Transect 2 at WM-2 (June 2013).

Photo 6: View north of Gradsect 2 on Transect 2 at WM-2 (June 2013).

Photo 7: View west of Transect 3 at WM-2 (June 2013).

Photo 8: View north of Gradsect 1 on Transect 3 at WM-2 (June 2013).

Photo 9: View north of Gradsect 2 on Transect 3 at WM-2 (June 2013).

Photo 10: View west of Transect 1 at WM-2 (September 2013).

Photo 11: View north of Gradsect 1 on Transect 1 at WM-2 (September 2013).

Photo 12: View north of Gradsect 2 on Transect 1 at WM-2 (September 2013).

Photo 13: View east of Transect 2 at WM-2 (September 2013).

Photo 14: View north of Gradsect 1 on Transect 2 at WM-2 (September 2013).

Photo 15: View north of Gradsect 2 on Transect 2 at WM-2 (September 2013).

Photo 16: View west of Transect 3 at WM-2 (September 2013).

Photo 17: View north of Gradsect 1 on Transect 3 at WM-2 (September 2013).

Photo 18: View north of Gradsect 2 on Transect 3 at WM-2 (September 2013).

SECTION A-4

WETLAND VEGETATION COVER AND WATER DEPTH RAW DATA SHEETS

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-1-1

Sampling Date: 6/13/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	5	6
Andropogon gerardii			5	6	6
Bromus arvensis	4				3
Dalea purpurea			3		
Desmanthus illinoensis	3	4	3	3	3
Erigeron strigosus		2			
Helianthus grosseserratus	4	5	4	5	4
Melilotus officinalis	3	3	3		
Panicum virgatum	5	4	4	3	
Poa pratensis	4	5	4	5	4
Spartina pectinata	4	4	3	3	4
Thlaspi arvense	2				

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-1-2

Sampling Date: 6/13/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Ambrosia artemisiifolia		3			
Andropogon gerardii	4				
Anemone canadensis	3			3	4
Bromus arvensis		4		3	4
Calystegia sepium			2		
Conyza canadensis	2				3
Cornus drummondii	2				
Desmanthus illinoensis	3	3	2	3	3
Dichanthelium acuminatum					3
Elymus virginicus			4	4	
Erigeron strigosus			3		3
Hordeum jubatum	5	4	4		
Medicago lupulina	6	3			
Melilotus officinalis		5	6	5	5
Panicum virgatum	4	3			4
Poa pratensis	4	6	5	5	4
Populus deltoides	3				
Solidago canadensis		3	4	5	4
Spartina pectinata		3	3		
Symphyotrichum pilosum					3
Taraxacum officinale					3
Thlaspi arvense	3				
Unknown 1	1				

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-2-1

Sampling Date: 6/13/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	5
Ambrosia artemisiifolia					3
Andropogon gerardii	3	5	4	6	5
Bromus arvensis		4	5		
Conyza canadensis	3				
Desmanthus illinoensis	3	3	3	4	3
Helianthus grosseserratus	3	4	3	2	3
Melilotus officinalis	6	6	6	4	4
Panicum virgatum	3		4	4	5
Poa pratensis	6	5	5	4	5
Rudbeckia hirta					2
Solidago canadensis				3	3
Symphyotrichum pilosum				3	
Taraxacum officinale		3		2	3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-2-2

Sampling Date: 6/13/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	5	5
Andropogon gerardii			4		
Anemone canadensis	4	4	5	4	2
Desmanthus illinoensis	3				
Elymus virginicus			4		
Medicago lupulina			3		
Melilotus officinalis	6	6	5		6
Panicum virgatum	3				
Poa pratensis	6	6	5	7	6
Populus deltoides		3			
Solidago canadensis	3	4	4	3	
Solidago gigantea				3	
Spartina pectinata			5	3	
Symphyotrichum pilosum			3		
Trifolium pratense				4	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-3-1

Sampling Date: 6/13/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	7	6	6	6	6
Andropogon gerardii	4	5	6	5	4
Bromus arvensis			3	4	
Cannabis sativa	2				
Elymus virginicus	3	3			
Galium aparine		3	2	2	
Galium obtusum					2
Helianthus grosseserratus	6	5	3	3	4
Medicago lupulina				2	
Panicum virgatum				3	
Physalis heterophylla				4	
Poa pratensis			4	4	6
Rumex crispus	3			2	
Solidago canadensis			4	3	5
Spartina pectinata	3	3	4		
Thlaspi arvense				3	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-3-2

Sampling Date: 6/13/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Andropogon gerardii					3
Anemone canadensis			3		
Dichanthelium acuminatum	3			2	
Fraxinus pennsylvanica					3
Medicago lupulina			4	1	2
Melilotus officinalis	4	3	3	3	3
Physalis longifolia	2	3	3	3	
Poa pratensis	6	6	6	6	6
Populus deltoides		3			3
Solidago canadensis	2	5	3	3	4
Spartina pectinata	4	5			
Symphyotrichum pilosum					3
Trifolium repens		2	2		

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-1-1

Sampling Date: 9/19/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	7	7	6	5	6
Andropogon gerardii	3	4	5	4	6
Bromus arvensis	3				
Carex vulpinoidea	5	5	6	6	
Desmanthus illinoensis	4	5	3	4	
Elymus virginicus		3			
Helianthus maximiliani	5	6	4	5	4
Panicum virgatum	5	5	3	4	
Poa pratensis			6	5	4
Solidago gigantea				3	
Spartina pectinata	3			5	4

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-1-2

Sampling Date: 9/19/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	7
Amaranthus retroflexus	3				
Anemone canadensis				3	3
Conyza canadensis					3
Desmanthus illinoensis	3	3	4	3	4
Muhlenbergia asperifolia	4		5		
Panicum virgatum				3	3
Poa pratensis	6	6	6	6	5
Populus deltoides	3				
Solidago canadensis	4	5	3	5	5
Solidago gigantea			2		4
Spartina pectinata	3		4		3
Symphyotrichum pilosum	3	4	5	3	3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-2-1

Sampling Date: 9/19/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	7	6	6	6	
Ambrosia artemisiifolia					2
Andropogon gerardii	4	5	5	6	6
Desmanthus illinoensis	3	3	3	3	4
Helianthus maximiliani	2	4	3		4
Panicum virgatum		3	4	4	4
Poa pratensis	5	4	4	4	5
Solidago canadensis	3	3	4	3	3
Solidago gigantea					3
Spartina pectinata	4				
Symphyotrichum pilosum	3	3		3	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-2-2

Sampling Date: 9/19/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	5	6	6	5
Anemone canadensis	3	1		3	
Desmanthus illinoensis	3				
Morus alba					2
Panicum virgatum	4			3	
Poa pratensis	6	7	7	7	7
Populus deltoides				3	
Solidago canadensis	4	4	4	4	2
Sorghastrum nutans		3			
Spartina pectinata	3		4	4	4
Symphyotrichum pilosum			3		
Taraxacum officinale	2				
Trifolium pratense				2	
Verbena stricta					3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-3-1

Sampling Date: 9/19/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Andropogon gerardii		5	5	5	3
Carex vulpinoidea	6	4	4	3	4
Desmanthus illinoensis					3
Helianthus maximiliani	5	5	3	4	3
Panicum virgatum	4	4	4	6	4
Physalis heterophylla				6	
Poa pratensis			3		5
Solidago canadensis			5		6
Solidago gigantea	4				
Spartina pectinata		4	4		

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 2

Wetland Name: **WM-2**

Wetland Transect/Gradsect #: WM2-3-2

Sampling Date: 9/19/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	5	6	5	6
Anemone canadensis			4		
Cornus drummondii			3		
Dichanthelium acuminatum	3				
Medicago lupulina				2	
Melilotus officinalis			2		
Panicum virgatum				5	3
Physalis heterophylla			3		
Physalis longifolia		3	3	3	
Poa pratensis	7	6	7	7	7
Setaria pumila ssp. pumila		3			
Solidago canadensis		5	4	4	4
Spartina pectinata	6	6			
Symphyotrichum pilosum					3
Trifolium repens		4	3		

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

SECTION A-5

WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Platte West Water Production Facility City/County: Saunders County Sampling Date: 9/19/2013
Applicant/Owner: Metropolitan Utilities District State: NE Sampling Point: SP-4
Investigator(s): Bailey Section, Township, Range: S18, T14N, R10E
Landform (hillslope, terrace, etc.) depression Local relief (concave, convex, none): concave Slope (%): 1 %
Subregion (LRR): M Lat: 41.185908 Long: -96.336653 Datum: NAD 83
Soil Map Unit Name: Obert silty clay loam, frequently fooded NWI Classification: UPL (WM-2)
Are climate/hydrologic conditions on the site typical for this time of year? ☒ Yes ☐ No (If no, explain in Remarks)

	Vegetation	Soil	Hydrology
Significantly Disturbed?	☐	☐	☐
Naturally Problematic?	☐	☐	☐

Are "Normal Circumstances" present? ☒ Yes ☐ No
(If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	☐	☒
Hydric Soil Present?	☒	☐
Wetland Hydrology Present?	☐	☒
Is the Sampled Area within a Wetland?	☐	☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
	0 %	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
	0 %	= Total Cover	
Herb Stratum (Plot size: 5')			
1. *Desmanthus illinoensis*	38 %	N	FACU
2. *Muhlenbergia asperfolia*	63 %	Y	FACW
3. *Poa pratensis*	85 %	Y	FACU
4. *Solidago canadensis*	15 %	N	FACU
5. *Spartina pectinata*	38 %	N	FACW
6. *Symphyotrichum pilosum*	63 %	Y	FACU
7. *Solidago gigantea*	3 %	N	FACW
8.	%		
9.	%		
10.	%		
	305 %	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	%		
2.	%		
	0 %	= Total Cover	

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0 %	x 1 =	0
FACW species	104 %	x 2 =	208
FAC species	0 %	x 3 =	0
FACU species	201 %	x 4 =	804
UPL species	0 %	x 5 =	0
Column Totals:	305 %	(A)	1012 (B)

Prevalence Index = B/A = 3.32

Hydrophytic Vegetation Indicators:

☐ Rapid Test for Hydrophytic Vegetation
☐ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Remarks (Include photo numbers here or on a separate sheet): Midpoint values from the cover class used as described in the body of the report and in accordance with Daubenmire. However, if the NWPL wetland indicator statuses are used, Poa pratensis becomes FAC and the dominance test is met; 67%. The PI value becomes 3.04.

SOIL Sampling Point: SP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 3/2	90	10YR 4/6	10	C	M	Clay loam	
15-24	10YR 6/2						Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____ Depth (inches): _____

Hydric Soil Present? ☐ Yes ☐ No

Remarks:Hydric soil indicator F6 is met.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☒ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

Field Observations:	Yes	No	Depth (inches)
Surface Water present?	☐	☐	
Water Table present?	☐	☐	
Saturation Present? (includes capillary fringe)	☐	☐	
Wetland Hydrology Present?	☐	☐	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections, etc.), if available:

Remarks: Wetland hydrology indicator D2 is present.

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Platte West Water Production Facility City/County: Saunders County Sampling Date: 9/19/2013

Applicant/Owner: Metropolitan Utilities District State: NE Sampling Point: SP-5

Investigator(s): Bailey Section, Township, Range: S18, T14N, R10E

Landform (hillslope, terrace, etc.) depression Local relief (concave, convex, none): concave Slope (%): 1 %

Subregion (LRR): M Lat: 41.184629 Long: -96.337277 Datum: NAD 83

Soil Map Unit Name: Wann fine sandy loam, occasionally fooded NWI Classification: UPL (WM-2)

Are climate/hydrologic conditions on the site typical for this time of year? ☒ Yes ☐ No (If no, explain in Remarks)

	Vegetation	Soil	Hydrology
Significantly Disturbed?	☐	☐	☐
Naturally Problematic?	☐	☐	☐

Are "Normal Circumstances" present? ☒ Yes ☐ No

(If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	☐	☒
Hydric Soil Present?	☒	☐
Wetland Hydrology Present?	☐	☒
Is the Sampled Area within a Wetland?	☐	☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
	0 %	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
	0 %	= Total Cover	
Herb Stratum (Plot size: 5')			
1. *Poa pratensis*	98 %	Y	FACU
2. *Solidago canadensis*	38 %	Y	FACU
3. *Spartina pectinata*	38 %	Y	FACW
4. *Symphyotrichum pilosum*	15 %	N	FACU
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
	189 %	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	%		
2.	%		
	0 %	= Total Cover	

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0 %	x 1 =	0
FACW species	38 %	x 2 =	76
FAC species	0 %	x 3 =	0
FACU species	151 %	x 4 =	604
UPL species	0 %	x 5 =	0
Column Totals:	189 %	(A)	680 (B)

Prevalence Index = B/A = 3.6

Hydrophytic Vegetation Indicators:

☐ Rapid Test for Hydrophytic Vegetation

☐ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? ☐ Yes ☐ No

Remarks (Include photo numbers here or on a separate sheet): Midpoint values from the cover class used as described in the body of the report and in accordance with Daubenmire. However, if the NWPL wetland indicator statuses are used, Poa pratensis becomes FAC and the dominance test is met 67%. The PI value becomes 3.08.

SOIL Sampling Point: SP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/2	95	10YR 5/3	5	C	M	Clay loam	
18-24	10YR 4/3	90	10YR7/3	10	C	M	Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____ Depth (inches): _____

Hydric Soil Present?

☐ Yes ☐ No

Remarks:Hydric soil indicator F6 is met.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☒ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

Field Observations:	Yes	No	Depth (inches)
Surface Water present?	☐	☒	
Water Table present?	☐	☒	
Saturation Present? (includes capillary fringe)	☐	☒	
Wetland Hydrology Present?	☐	☒	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections, etc.), if available:

Remarks: Wetland hydrology indicator D2 is present.

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Platte West Water Production Facility City/County: Saunders County Sampling Date: 9/19/2013
Applicant/Owner: Metropolitan Utilities District State: NE Sampling Point: SP-6
Investigator(s): Bailey Section, Township, Range: S18, T14N, R10E
Landform (hillslope, terrace, etc.) depression Local relief (concave, convex, none): concave Slope (%): 1 %
Subregion (LRR): M Lat: 41.183366 Long: -96.336728 Datum: NAD 83
Soil Map Unit Name: Wann fine sandy loam, occasionally fooded NWI Classification: UPL (WM-2)
Are climate/hydrologic conditions on the site typical for this time of year? ☒ Yes ☒ No (If no, explain in Remarks)

	Vegetation	Soil	Hydrology
Significantly Disturbed?	☐	☐	☐
Naturally Problematic?	☐	☐	☐

Are "Normal Circumstances" present? ☒ Yes ☐ No
(If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	☐	☒
Hydric Soil Present?	☐	☐
Wetland Hydrology Present?	☐	☒
Is the Sampled Area within a Wetland?	☐	☒

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
	0 %	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
	0 %	= Total Cover	
Herb Stratum (Plot size: 5')			
1. *Anemone canadensis*	38 %	N	FACW
2. *Cornus drummondii*	15 %	N	FAC
3. *Melilotus officinalis*	3 %	N	FACU
4. *Physalis longifolia*	15 %	N	NI
5. *Poa pratensis*	98 %	Y	FACU
6. *Solidago candensis*	38 %	N	FACU
7. *Trifolium repens*	25 %	N	FACU
8. *Physalis heterophylla*	15 %	N	NI
9.	%		
10.	%		
	247 %	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	%		
2.	%		
	0 %	= Total Cover	

Dominance Test Worksheet:

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0 %	x 1 =	0
FACW species	38 %	x 2 =	76
FAC species	15 %	x 3 =	45
FACU species	164 %	x 4 =	656
UPL species	%	x 5 =	0
Column Totals:	217 %	(A)	777 (B)

Prevalence Index = B/A = 3.58

Hydrophytic Vegetation Indicators:

☐ Rapid Test for Hydrophytic Vegetation
☐ Dominance Test is >50%
☐ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Remarks (Include photo numbers here or on a separate sheet): Midpoint values from the cover class used as described in the body of the report and in accordance with Daubenmire. However, if the NWPL wetland indicator statuses are used, Poa pratensis becomes FAC and the dominance test is met; 100%. The PI value becomes 3.13.

SOIL Sampling Point: SP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/1	95	10YR 5/3	5	C	M	clay loam	
20-24	10YR 7/2						clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 5 cm Mucky Peat or Peat (S3)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ Coast Prairie Redox (A16)
- ☐ Dark Surface (S7)
- ☐ Iron-Manganese Masses (F12)
- ☐ Very Shallow Dark Surface (TF 12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____ Depth (inches): _____

Hydric Soil Present? ☒ Yes ☐ No

Remarks:Hydric soil indicator F6 is met.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Gauge or Well Data (D9)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☒ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water present?	☐	☐	
Water Table present?	☐	☐	
Saturation Present? (includes capillary fringe)	☐	☐	
Wetland Hydrology Present?	☐	☒	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections, etc.), if available:

Remarks: Wetland hydrology indicator D2 is present.

APPENDIX I - SECTION B

DOUGLAS COUNTY BACKWASH DRAIN LINE MITIGATION SITE

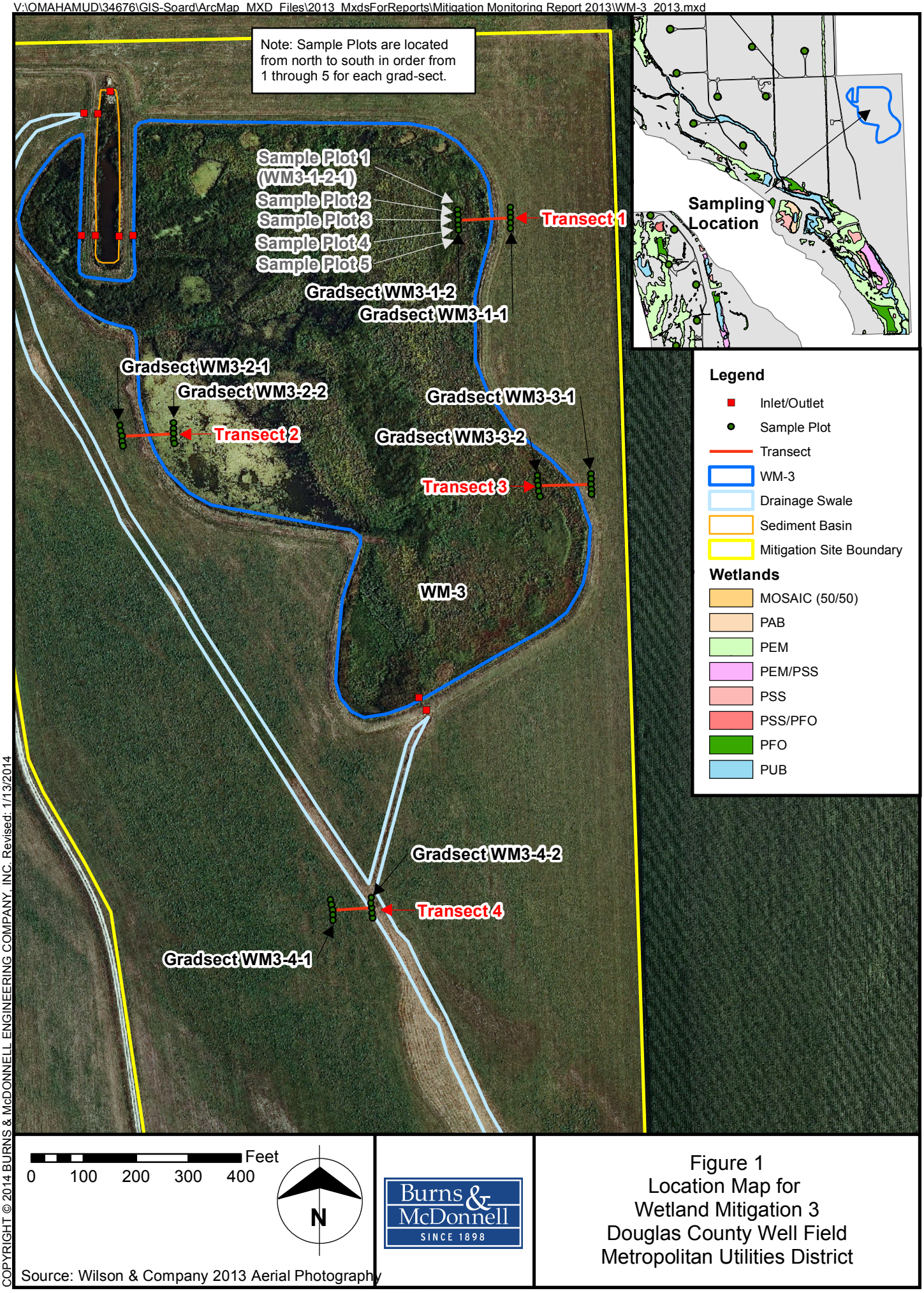
(WM-3) MONITORING DATA

TABLE OF CONTENTS

SECTION B-1

FIGURES

V:\OMAHAMUD\34676\GIS-Soard\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013\WM-3_2013.mxd



Source: Wilson & Company 2013 Aerial Photography

Figure 1
Location Map for
Wetland Mitigation 3
Douglas County Well Field
Metropolitan Utilities District

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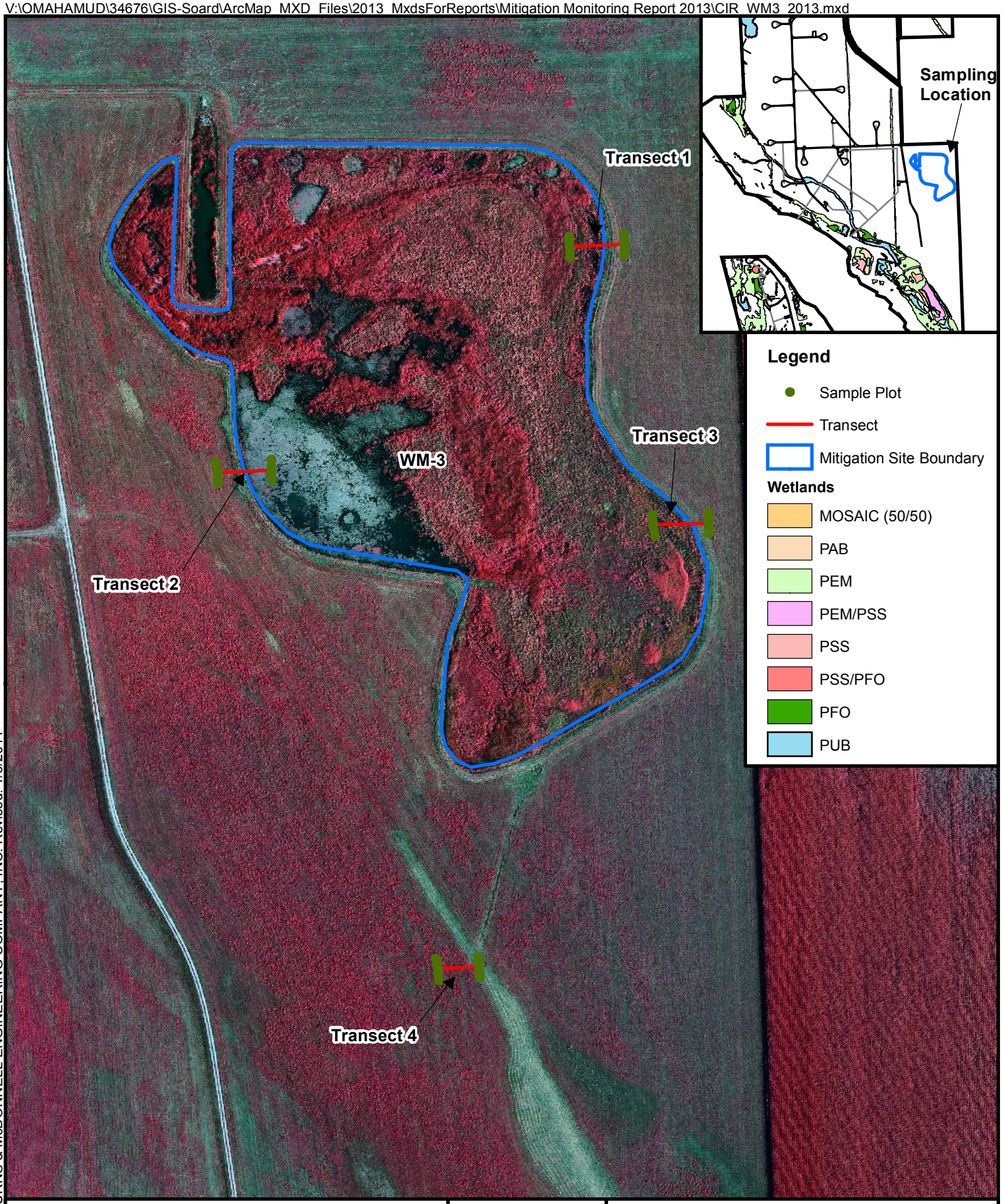
V:\OMAHAMUD\34676\GIS-Soard\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013\CIR_WM3_2013.mxd



0 200 400 Feet

N

Source: Wilson & Company 2013 Aerial Photography

Burns & McDonnell SINCE 1898

Figure 2
2013 CIR Aerial Photograph for
Wetland Mitigation 3
Douglas County Well Field
Metropolitan Utilities District

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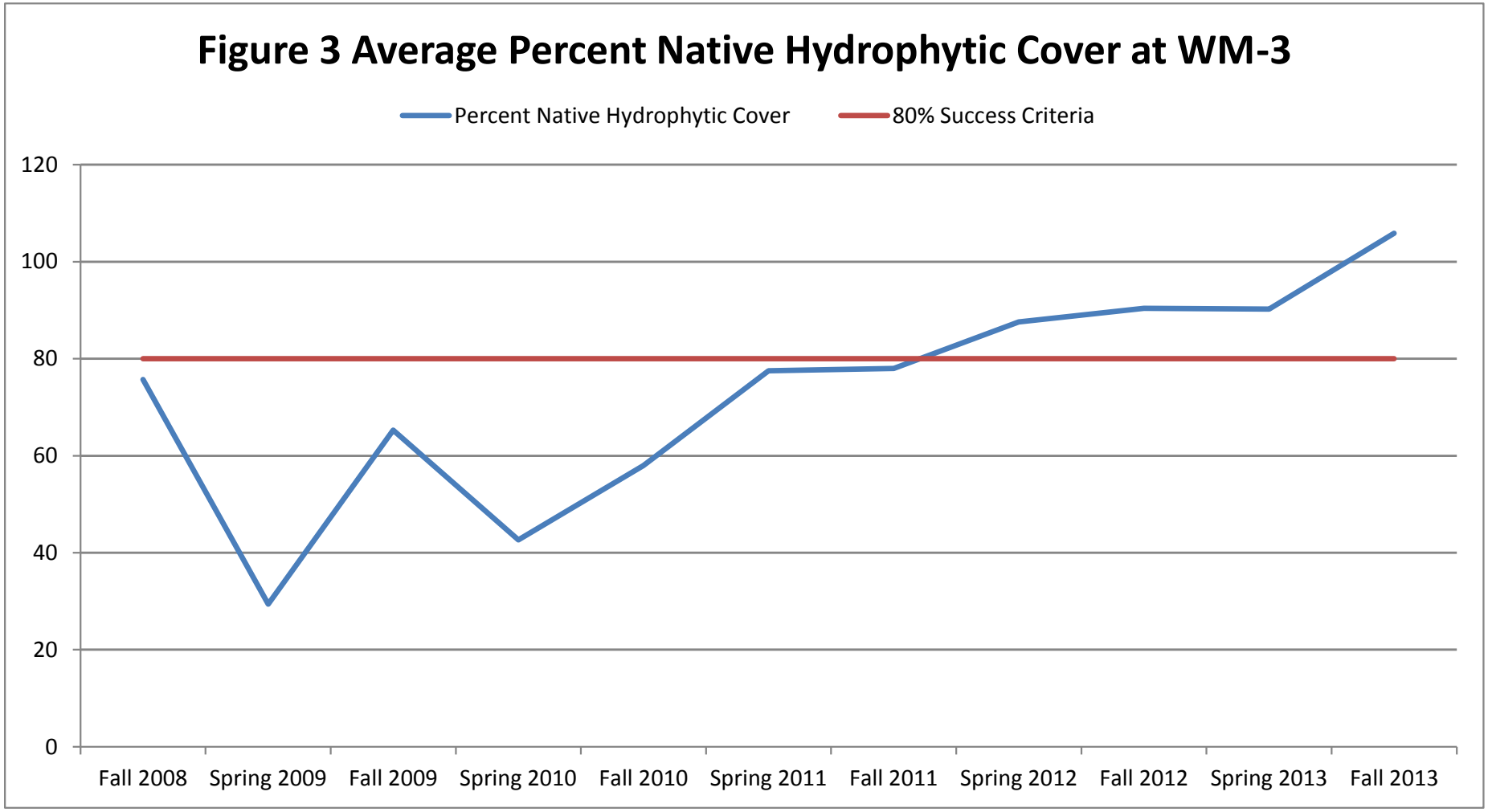
Figure 3 Average Percent Native Hydrophytic Cover at WM-3
Percent Native Hydrophytic Cover
80% Success Criteria
120
100
80
60
40
20
0
Fall 2008
Spring 2009
Fall 2009
Spring 2010
Fall 2010
Spring 2011
Fall 2011
Spring 2012
Fall 2012
Spring 2013
Fall 2013

SECTION B-2

TABLES

Table 1 Summary of Wetland Monitoring Data for WM-3

Wetland Name: **WM-3**
Wetland Type: **PEM**
County: **Douglas**

Number of Transects/Macroplots: **4**
Number of Gradsects: **8**
Number of Sample Plots: **40**
Number of Wetland Sample Plots: **20**

Sampling Effort: **2013 Fall**

Weighted Average: **1.76**
Species Richness: **29**
Species Diversity: **30.00**
FQI: **21.00**

Percent Native Species: **93**
Percent Invasive Species: **21**
Percent Perennial/Biennial/Annual Species: **79 / 7 / 28**
Mean C-Value: **4.04**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Agalinis tenuifolia	Slenderleaf false foxg	FACW	13.12
Echinochloa crus-galli	Barnyardgrass	FACW	15.38
Eleocharis compressa	Flatstem spikerush	FACW	11.88
Potamogeton foliosus	Leafy pondweed	OBL	20.12
Typha latifolia	Broadleaf cattail	OBL	23.25

Sampling Effort: **2013 Spring**

Weighted Average: **1.80**
Species Richness: **29**
Species Diversity: **22.73**
FQI: **17.05**

Percent Native Species: **86**
Percent Invasive Species: **21**
Percent Perennial/Biennial/Annual Species: **90 / 10 / 21**
Mean C-Value: **3.41**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Boltonia asteroides	White Doll's Daisy	FACW	13.75
Eleocharis compressa	Flatstem spikerush	FACW	10.38
Schoenoplectus tabernaemontani	Softstem bulrush	OBL	8.25
Typha latifolia	Broadleaf cattail	OBL	25

Table 2 Species List and Vegetative Characteristics for WM-3

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Fall**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Agalinis tenuifolia	Slenderleaf false foxglove	FACW	2	5	Native	☐	5	13.12
Bidens aristosa	Bearded beggartick	NI	3		Native	☐	5	6.12
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	3	4.50
Carex comosa	Longhair sedge	OBL	1	5	Native	☐	2	2.62
Carex lupulina	Hop sedge	FACW+	2	8	Native	☐	3	3.38
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	3	6.88
Chamaecrista fasciculata	Partridge pea	NL	3	1	Native	☐	3	3.38
Echinochloa crus-galli	Barnyardgrass	FACW	2		Introduced	☑	5	15.38
Eleocharis compressa	Flatstem spikerush	FACW	2	6	Native	☐	5	11.88
Eleocharis erythropoda	Bald spikerush	OBL	1	5	Native	☐	2	3.88
Elymus canadensis	Canada wildrye	FACU	4	5	Native	☐	1	0.75
Erigeron strigosus	Prairie fleabane	FAC	3	2	Native	☑	4	5.88
Juncus torreyi	Torrey's rush	FACW	2	4	Native	☐	1	0.75
Lemna minor	Common duckweed	OBL	1	0	Native	☐	4	1.12
Panicum dichtomiflorum	Fall panicgrass	FAC	3	0	Native	☑	1	0.12
Panicum virgatum	Switchgrass	FAC	3	4	Native	☐	3	1.62
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	1	0.75
Polygonum caespitosum	Oriental lady's thumb	NI	3		Introduced	☐	2	3.75

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-3

Report generated:
Thursday, January 02, 2014

Populus deltoides	Eastern cottonwood	FAC	3	3	Native	☐	4	1.75
Potamogeton amplifolius	Largeleaf pondweed	OBL	1	10	Native	☐	2	2.62
Potamogeton foliosus	Leafy pondweed	OBL	1	5	Native	☐	5	20.12
Rudbeckia hirta	Blackeyed susan	FACU	4	4	Native	☐	1	0.12
Sagittaria latifolia	Broadleaf arrowhead	OBL	1	5	Native	☐	1	1.88
Salix amygdaloides	Peachleaf willow	FACW	2	4	Native	☐	1	0.75
Schoenoplectus tabernaemont	Softstem bulrush	OBL	1	5	Native	☐	3	2.25
Scirpus atrovirens	Green bulrush	OBL	1	5	Native	☐	1	1.88
Symphyotrichum lanceolatum	White panicle aster	NI	3	2	Native	☐	3	2.25
Typha latifolia	Broadleaf cattail	OBL	1	1	Native	☑	6	23.25
Verbesina alternifolia	Wingstem	FAC	3	4	Native	☐	1	0.12

Sampling Effort: **2013 Spring**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Agrostis gigantea	Redtop	NI	3	0	Introduced	☐	1	0.12
Andropogon gerardii	Big bluestem	FAC-	3	5	Native	☐	1	0.12
Bidens aristosa	Bearded beggartick	NI	3		Native	☐	5	3.00
Boltonia asteroides	White Doll's Daisy	FACW	2	3	Native	☐	5	13.75
Bromus arvensis	Field brome	NL	3		Introduced	☐	1	0.12
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	1	0.75

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-3

Report generated:
Thursday, January 02, 2014

Carex comosa	Longhair sedge	OBL	1	5	Native	☐	1	0.75
Carex lupulina	Hop sedge	FACW+	2	8	Native	☐	4	5.25
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	4	7.75
Conyza canadensis	Canadian horseweed	FACU-	4	0	Native	☑	4	2.38
Cyperus esculentus	Yellow nutsedge	FACW	2	0	Native & Introduced	☑	1	0.75
Desmanthus illinoensis	Illinois bundleflower	FACU	4	5	Native	☐	2	0.25
Eleocharis compressa	Flatstem spikerush	FACW	2	6	Native	☐	6	10.38
Eleocharis erythropoda	Bald spikerush	OBL	1	5	Native	☐	3	3.38
Elymus virginicus	Virginia wildrye	FAC	3	4	Native	☐	1	0.75
Erigeron strigosus	Prairie fleabane	FAC	3	2	Native	☑	1	0.75
Festuca arundinacea	Tall fescue	FACU	4		Introduced	☑	2	2.00
Lemna minor	Common duckweed	OBL	1	0	Native	☐	3	0.08
Panicum virgatum	Switchgrass	FAC	3	4	Native	☐	1	0.75
Pascopyrum smithii	Western wheatgrass	NL	3		Native	☐	1	0.75
Phleum pratense	Timothy	FACU	4		Introduced	☐	6	3.25
Polygonum punctatum	Dotted smartweed	OBL	1		Native	☐	2	3.88
Populus deltoides	Eastern cottonwood	FAC	3	3	Native	☐	4	5.38
Rudbeckia hirta	Blackeyed susan	FACU	4	4	Native	☐	1	0.75
Schoenoplectus tabernaemont	Softstem bulrush	OBL	1	5	Native	☐	5	8.25
Scirpus atrovirens	Green bulrush	OBL	1	5	Native	☐	2	2.62
Symphyotrichum lanceolatum	White panicle aster	NI	3	2	Native	☐	1	0.12

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-3

Report generated:
Thursday, January 02, 2014

Typha latifolia	Broadleaf cattail	OBL	1	1	Native	☑	10	25.00
Verbesina alternifolia	Wingstem	FAC	3	4	Native	☐	1	0.75

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

SECTION B-3

MITIGATION SITE WM-3 GROUND PHOTOGRAPHS

Photo 1: View west of Transect 1 in WM-3 (June 2013).

Photo 2: View north of Gradsect 1 on Transect 1 in WM-3 (June 2013).

Photo 3: View north of Gradsect 2 on Transect 1 in WM-3 (June 2013).

Photo 4: View east of Transect 2 in WM-3 (June 2013).

Photo 5: View north of Gradsect 1 on Transect 2 in WM-3 (June 2013).

Photo 6: View north of Gradsect 2 on Transect 2 in WM-3 (June 2013).

Photo 7: View west of Transect 3 in WM-3 (June 2013).

Photo 8: View north of Gradsect 1 on Transect 3 in WM-3 (June 2013).

Photo 9: View north of Gradsect 2 on Transect 3 in WM-3 (June 2013).

Photo 10: View east of Transect 4 in WM-3 (June 2013).

Photo 11: View north of Gradsect 1 on Transect 4 in WM-3 (June 2013).

Photo 12: View north of Gradsect 2 on Transect 4 in WM-3 (June 2013).

Photo 13: View west of Transect 1 in WM-3 (September 2013).

Photo 14: View north of Gradsect 1 on Transect 1 in WM-3 (September 2013).

Photo 15: View north of Gradsect 2 on Transect 1 in WM-3 (September 2013).

Photo 16: View east of Transect 2 in WM-3 (September 2013).

Photo 17: View north of Gradsect 1 on Transect 2 in WM-3 (September 2013).

Photo 18: View north of Gradsect 2 on Transect 2 in WM-3 (September 2013).

Photo 19: View west of Transect 3 in WM-3 (September 2013).

Photo 20: View north of Gradsect 1 on Transect 3 in WM-3 (September 2013).

Photo 21: View north of Gradsect 2 on Transect 3 in WM-3 (September 2013).

Photo 22: View east of Transect 4 in WM-3 (September 2013).

Photo 23: View north of Gradsect 1 on Transect 4 in WM-3 (September 2013).

Photo 24: View north of Gradsect 2 on Transect 4 in WM-3 (September 2013).

SECTION B-4

WETLAND VEGETATION COVER AND WATER DEPTH RAW DATA SHEETS

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-1-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	5	6
Andropogon gerardii	4		4	4	6
Bromus arvensis	5	6			
Bromus inermis	4	3	5	6	
Chenopodium album			3		
Eryngium yuccifolium var. yu	4	2			
Festuca arundinacea	5	4	6	4	5
Medicago lupulina	3				
Monarda fistulosa					3
Poa pratensis		4		4	5
Rudbeckia hirta			2	3	
Rudbeckia subtomentosa	4				
Solidago canadensis	3	4			
Spartina pectinata					3
Symphyotrichum lateriflorum			2		
Unknown 1				2	
Unknown 2	1				

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-1-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):	6	7	6	5.5	7
Open Water (in):	7	7	7	7	7
Bare Soil (in):	7	7	6	7	7
Carex comosa	3				
Carex lupulina	3	4	4		
Carex vulpinoidea	5		3	5	
Eleocharis compressa	6	5	3	3	3
Lemna minor	1	1	1		
Polygonum punctatum		5	3		
Populus deltoides				3	
Schoenoplectus tabernaemont	4	4	4	4	3
Scirpus atrovirens	3		4		
Symphyotrichum lanceolatum				2	
Typha latifolia	4	5	6	6	6

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-2-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	5	5	5	5
Bromus inermis	3	4		3	5
Eryngium yuccifolium var. yu			4		
Festuca arundinacea	4	6	6	3	
Hordeum jubatum		4			
Medicago lupulina	5				
Melilotus officinalis	3				
Panicum virgatum	4	5	4		
Poa pratensis	5	4	6	5	5
Populus deltoides		3			3
Symphyotrichum lanceolatum				4	
Trifolium repens	2			6	5

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-2-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Depth of Standing Water (in):	14	14	14	14	15
Open Water (in):	7	7	7	7	7
Bare Soil (in):	7	7	7	7	7

No Living Vegetation

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-3-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	5	5
Andropogon gerardii	3	5	5	4	3
Bromus inermis		4	3	5	4
Echinacea angustifolia		3			
Festuca arundinacea	6	4	4	5	7
Physalis heterophylla				2	
Poa pratensis	5	5	6	5	5
Rudbeckia hirta	2				
Solidago canadensis					3
Trifolium repens					2
Unknown 1				2	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-3-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Bidens aristosa	2	2	2	3	4
Boltonia asteroides	6	5	5	5	2
Bromus arvensis				2	
Bromus inermis					3
Carex lupulina		3			
Carex vulpinoidea		3			
Conyza canadensis	2		3	3	3
Cyperus esculentus					3
Desmanthus illinoensis				2	2
Eleocharis compressa		3			
Eleocharis erythropoda		4	3		
Elymus virginicus					3
Erigeron strigosus					3
Festuca arundinacea				2	4
Pascopyrum smithii					3
Phleum pratense	3	3	3	2	2
Populus deltoides	3		3	5	
Rudbeckia hirta					3
Verbesina alternifolia				3	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-4-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	5
Andropogon gerardii	6	5	4		4
Bromus inermis	3	6	6	6	5
Eryngium yuccifolium var. yu				4	3
Festuca arundinacea	4	4	3	5	3
Medicago sativa	3	4			
Melilotus officinalis					3
Monarda fistulosa		3	3	4	
Poa pratensis	6	5	4	4	5
Ratibida pinnata			3		
Schizachyrium scoparium					4
Taraxacum officinale	3				

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-4-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	7	7	7	7	7
Agrostis gigantea				2	
Andropogon gerardii					2
Eleocharis erythropoda			3		
Panicum virgatum					3
Phleum pratense					3
Typha latifolia	3	4	5	3	3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-1-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	6	5	5	6
Andropogon gerardii				4	5
Bidens aristosa	2	2		2	
Bromus inermis	3		4		
Conyza canadensis	2		3	3	
Eryngium yuccifolium var. yu	3	3			
Festuca arundinacea	5	4	5	4	3
Mentha arvensis			3		
Oligoneuron riddellii				3	
Panicum virgatum	4			4	
Poa pratensis	5	5	4	5	5
Rudbeckia hirta	2	3	3	2	2
Rudbeckia subtomentosa	3				
Rumex crispus					2
Solidago canadensis	2	3		2	
Symphyotrichum lateriflorum				3	
Symphyotrichum novae-angli				2	
Symphyotrichum pilosum					2
Taraxacum officinale		2			

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-1-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Depth of Standing Water (in):	8	6	9	8	7
Open Water (in):	7	7	7	7	7
Bare Soil (in):	6	7	7	6	6
Carex comosa				4	3
Carex lupulina			4		3
Carex vulpinoidea		4			5
Eleocharis compressa	4	3	3	6	6
Juncus torreyi					3
Lemna minor			2	3	2
Polygonum caespitosum			4	4	
Populus deltoides		2			
Schoenoplectus tabernaemont		3	3		3
Scirpus atrovirens			4		
Symphyotrichum lanceolatum	3	3			3
Typha latifolia	7	6	7	6	6

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-2-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	6	6	5	5
Abutilon theophrasti	2				
Andropogon gerardii	3				
Bidens aristosa		3			
Bromus inermis					5
Chamaecrista fasciculata				4	
Eryngium yuccifolium var. yu			4		
Festuca arundinacea	4	4	4	6	6
Medicago lupulina	3	3			
Panicum virgatum	4	4			3
Poa pratensis	6	4	6	4	6
Populus deltoides		3		3	
Schizachyrium scoparium	3				
Solidago gigantea				3	
Sorghastrum nutans		4			
Trifolium repens	4			3	3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-2-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):	15	16	16	16	15
Open Water (in):	7	7	7	7	7
Bare Soil (in):	7	7	7	7	7
Lemna minor		2			
Potamogeton amplifolius	3			4	
Potamogeton foliosus	6	5	6	6	6
Sagittaria latifolia	4				

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-3-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	6	6	5	5
Andropogon gerardii	4	4	5	5	4
Bromus inermis	5	4		4	4
Festuca arundinacea				4	4
Panicum virgatum		3	3	3	
Physalis longifolia				2	
Poa pratensis	5	5	5	4	5
Rudbeckia hirta	3	3		3	
Solidago gigantea					2
Symphyotrichum lateriflorum				2	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-3-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	7	7	7	7	6
Agalinis tenuifolia	4	3	6	5	5
Bidens aristosa	3	3	3	3	5
Bromus inermis					4
Carex lupulina		3			
Carex vulpinoidea		4			
Chamaecrista fasciculata			3	4	3
Elymus canadensis					3
Erigeron strigosus	5	4	3	2	
Panicum virgatum					3
Poa pratensis					3
Populus deltoides	2		3	3	
Rudbeckia hirta				2	
Verbesina alternifolia	2				

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-4-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	5	6
Andropogon gerardii	6	4	6	4	5
Bromus inermis	3	4			4
Eryngium yuccifolium var. yu				3	2
Festuca arundinacea		5		5	4
Medicago sativa	3	4	3		
Mentha arvensis		3		4	
Poa pratensis	4	5	4	5	
Ratibida pinnata			2		
Rudbeckia hirta					3
Rumex crispus	3				
Schizachyrium scoparium				5	
Taraxacum officinale					3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 3

Wetland Name: **WM-3**

Wetland Transect/Gradsect #: WM3-4-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	7	7	7	7	7
Bromus inermis	3				4
Echinochloa crus-galli	4	6	6	5	4
Eleocharis erythropoda		5			3
Panicum dichtomiflorum					2
Panicum virgatum	2				3
Salix amygdaloides					3
Typha latifolia			3		

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

APPENDIX I - SECTION C

WATER TREATMENT PLANT MITIGATION SITE WM-4 MONITORING DATA

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FIGURES

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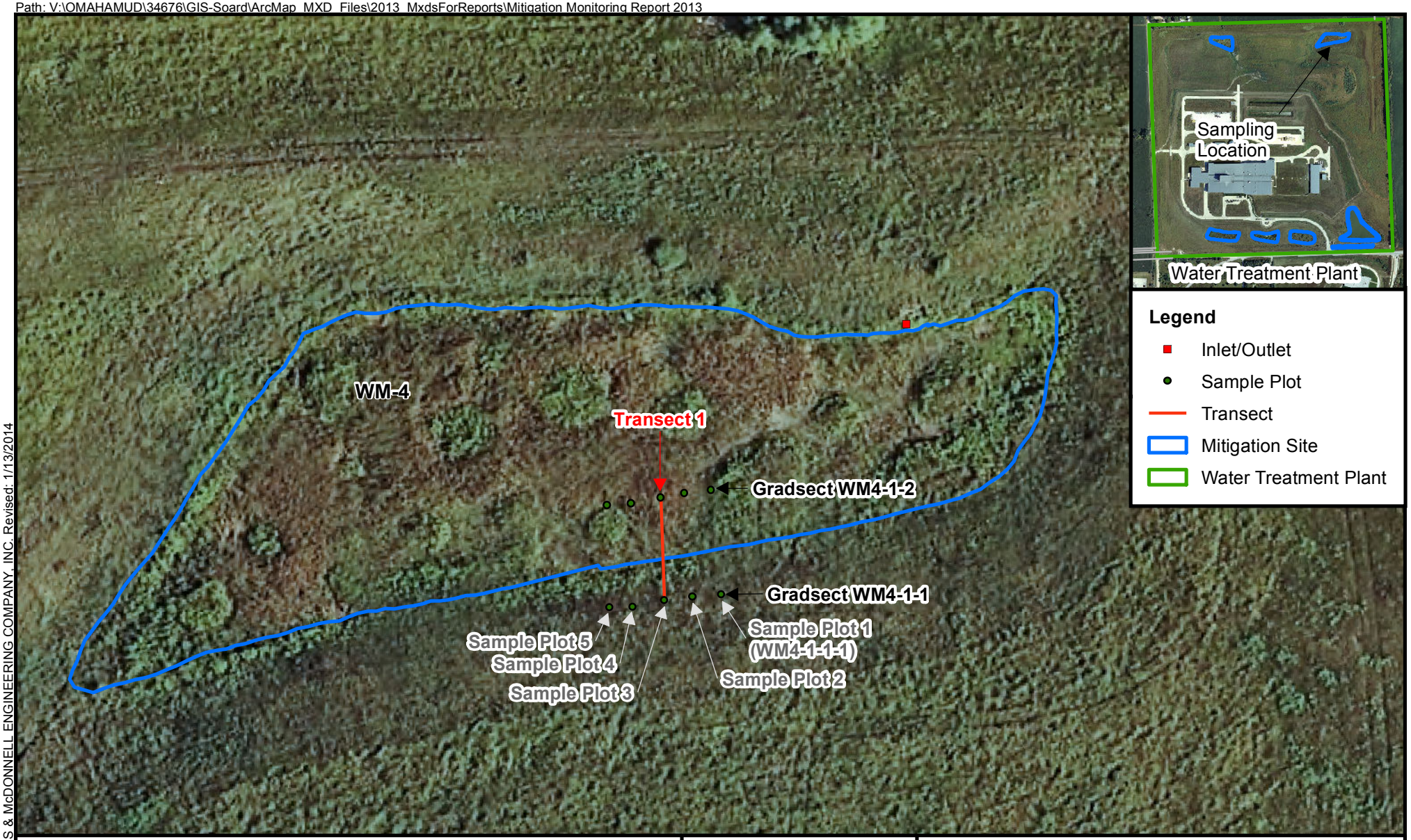

Source: Wilson & Company 2013 Aerial Photography

Figure 1
Sample Plot Location Map for
Wetland Mitigation 4
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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V:\OMAHAMUD\34676\GIS-Board\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013\CIR_WM4_2013.mxd

Feet
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N

Source: Wilson & Company 2013 Aerial Photography

Burns & McDonnell SINCE 1898

Figure 2
2013 CIR Aerial Photograph for
Wetland Mitigation 4
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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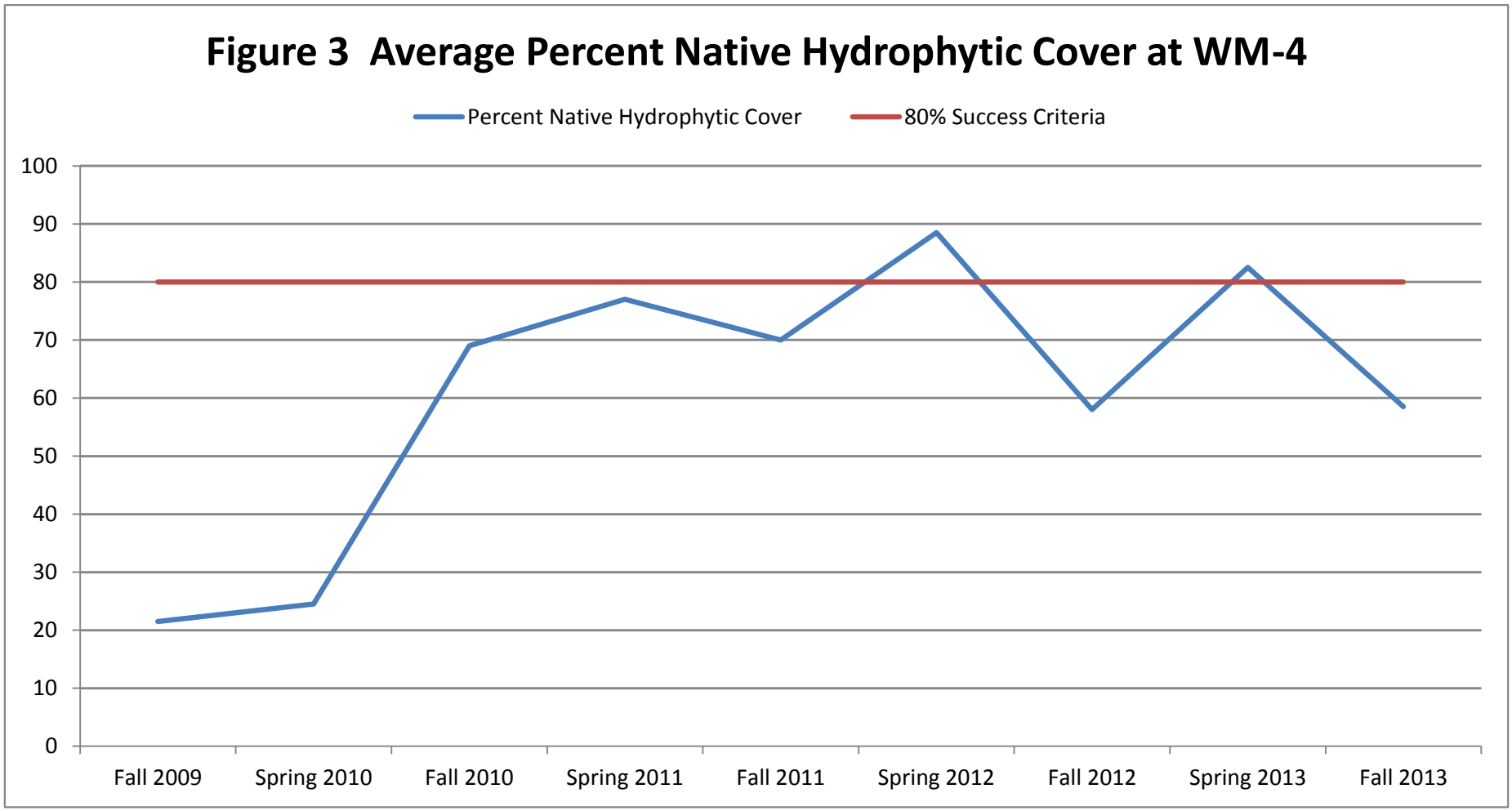
Figure 3 Average Percent Native Hydrophytic Cover at WM-4



SECTION C-2

TABLES

Table 1 Summary of Wetland Monitoring Data for WM-4

Wetland Name: **WM-4**
Wetland Type: **PEM**
County: **Douglas**

Number of Transects/Macroplots: **1**
Number of Gradsects: **2**
Number of Sample Plots: **10**
Number of Wetland Sample Plots: **5**

Sampling Effort: **2013 Fall**

Weighted Average: **2.40**
Species Richness: **16**
Species Diversity: **28.11**
FQI: **13.88**

Percent Native Species: **94**
Percent Invasive Species: **38**
Percent Perennial/Biennial/Annual Species: **88 / 0 / 13**
Mean C-Value: **3.58**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Echinochloa crus-galli	Barnyardgrass	FACW	42
Oligoneuron riddellii	Riddell's goldenrod	NI	25
Poa pratensis	Kentucky bluegrass	FACU	20
Typha latifolia	Broadleaf cattail	OBL	28

Sampling Effort: **2013 Spring**

Weighted Average: **2.81**
Species Richness: **20**
Species Diversity: **38.75**
FQI: **9.92**

Percent Native Species: **65**
Percent Invasive Species: **60**
Percent Perennial/Biennial/Annual Species: **80 / 15 / 30**
Mean C-Value: **2.75**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Poa pratensis	Kentucky bluegrass	FACU	29.5
Trifolium pratense	Red clover	FACU	15.5
Typha latifolia	Broadleaf cattail	OBL	37

Table 2 Species List and Vegetative Characteristics for WM-4

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Fall**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Boehmeria cylindrica	Smallspike false nettle	OBL	1	6	Native	☐	1	3.00
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	2	15.00
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	1	3.00
Cyperus esculentus	Yellow nutsedge	FACW	2	0	Native & Introduced	☑	1	7.50
Echinochloa crus-galli	Barnyardgrass	FACW	2		Introduced	☑	3	42.00
Eleocharis compressa	Flatstem spikerush	FACW	2	6	Native	☐	1	7.50
Elymus virginicus	Virginia wildrye	FAC	3	4	Native	☐	1	3.00
Juncus dudleyi	Dudley's rush	NL	3	5	Native	☐	1	3.00
Oligoneuron riddellii	Riddell's goldenrod	NI	3		Native	☐	2	25.00
Panicum virgatum	Switchgrass	FAC	3	4	Native	☐	1	3.00
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	2	20.00
Salix amygdaloides	Peachleaf willow	FACW	2	4	Native	☐	1	0.50
Salix interior	Sandbar willow	NL	3	3	Native	☐	1	3.00
Sorghastrum nutans	Indiangrass	FACU	4	5	Native	☐	1	3.00
Typha latifolia	Broadleaf cattail	OBL	1	1	Native	☑	3	28.00
Xanthium strumarium	Rough cocklebur	FAC	3	1	Native	☑	1	3.00

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-4

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Spring**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Ambrosia artemisiifolia	Annual ragweed	FACU	4	0	Native	☑	2	3.50
Asclepias incarnata	Swamp milkweed	OBL	1	4	Native	☑	1	3.00
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	2	15.00
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	1	7.50
Echinochloa crus-galli	Barnyardgrass	FACW	2		Introduced	☑	1	3.00
Erigeron strigosus	Prairie fleabane	FAC	3	2	Native	☑	2	15.00
Leersia virginica	White grass	FACW	2	4	Native	☐	1	7.50
Lythrum alatum	Winged lythrum	OBL	1	6	Native	☐	2	3.50
Medicago lupulina	Black medick	FAC	3		Introduced	☑	1	3.00
Melilotus officinalis	Yellow sweetclover	FACU	4		Introduced	☑	2	10.50
Parietaria pensylvanica	Pennsylvania pellitory	FAC	3	0	Native	☑	1	0.50
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	2	29.50
Populus deltoides	Eastern cottonwood	FAC	3	3	Native	☐	1	0.50
Salix interior	Sandbar willow	NL	3	3	Native	☐	1	3.00
Schedonorus arundinaceus	Tall Fescue	FACU	4	0	Introduced	☑	1	7.50
Trifolium pratense	Red clover	FACU	4		Introduced	☐	2	15.50
Trifolium repens	White clover	FACU	4		Introduced	☑	2	10.50
Typha latifolia	Broadleaf cattail	OBL	1	1	Native	☑	3	37.00

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-4

Report generated:
Thursday, January 02, 2014

Unknown 1	Unknown seedling	--	3		--	☐	1	0.50
Zizia aurea	Golden zizia	FAC	3	6	Native	☐	2	8.00

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

SECTION C-3

MITIGATION SITE WM-4 GROUND PHOTOGRAPHS

Photo 1: View north of Transect 1 in WM-4 (June 2013).

Photo 2: View east of Gradsect 1 on Transect 1 in WM-4 (June 2013).

Photo 3: View east of Gradsect 2 on Transect 1 in WM-4 (June 2013).

Photo 4: View north of Transect 1 in WM-4 (September 2013).

Photo 5: View east of Gradsect 1 on Transect 1 in WM-4 (September 2013).

Photo 6: View east of Gradsect 2 on Transect 1 in WM-4 (September 2013).

SECTION C-4

WETLAND VEGETATION COVER AND WATER DEPTH RAW DATA SHEETS

Wetland Vegetation Cover and Water Depth at Wetland 4

Wetland Name: **WM-4**

Wetland Transect/Gradsect #: WM4-1-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	5
Andropogon gerardii	3	4	4	5	4
Bromus inermis			3	3	
Chamaecrista fasciculata	5	4		3	3
Festuca arundinacea	5	4	4	5	4
Medicago lupulina					3
Melilotus officinalis		2			
Poa pratensis	5	6	5	6	6
Trifolium pratense	2	3	5	5	3
Trifolium repens					3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 4

Wetland Name: **WM-4**

Wetland Transect/Gradsect #: WM4-1-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):		2	5.5	5	
Open Water (in):		7	7	7	
Bare Soil (in):	5	7	7	7	6
Ambrosia artemisiifolia	2				3
Asclepias incarnata	3				
Bromus inermis	4				4
Carex vulpinoidea					4
Echinochloa crus-galli		3			
Erigeron strigosus	4				4
Leersia virginica	4				
Lythrum alatum		3	2		
Medicago lupulina					3
Melilotus officinalis	3				4
Parietaria pensylvanica					2
Poa pratensis	6				5
Populus deltoides	2				
Salix interior		3			
Schedonorus arundinaceus	4				
Trifolium pratense	5				3
Trifolium repens	3				4
Typha latifolia		4	6	5	
Unknown 1					2
Zizia aurea	2				4

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 4

Wetland Name: **WM-4**

Wetland Transect/Gradsect #: WM4-1-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	5	6	5	5
Andropogon gerardii			4	4	3
Bouteloua curtipendula		4		3	
Bromus inermis	4	4	4		
Festuca arundinacea	4	3			
Medicago sativa	4				
Melilotus officinalis		4		3	
Poa pratensis	6	5	6	6	7
Schizachyrium scoparium		4	4	4	4
Trifolium pratense	2		3	4	3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 4

Wetland Name: **WM-4**

Wetland Transect/Gradsect #: WM4-1-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Boehmeria cylindrica	3				
Bromus inermis	4				4
Carex vulpinoidea					3
Cyperus esculentus		4			
Echinochloa crus-galli		5	5	6	
Eleocharis compressa		4			
Elymus virginicus	3				
Juncus dudleyi					3
Oligoneuron riddellii	5				5
Panicum virgatum		3			
Poa pratensis	4				5
Salix amygdaloides					2
Salix interior		3			
Sorghastrum nutans	3				
Typha latifolia		3	5	5	
Xanthium strumarium			3		

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

APPENDIX I - SECTION D

WATER TREATMENT PLANT MITIGATION SITE WM-5 MONITORING DATA

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FIGURES

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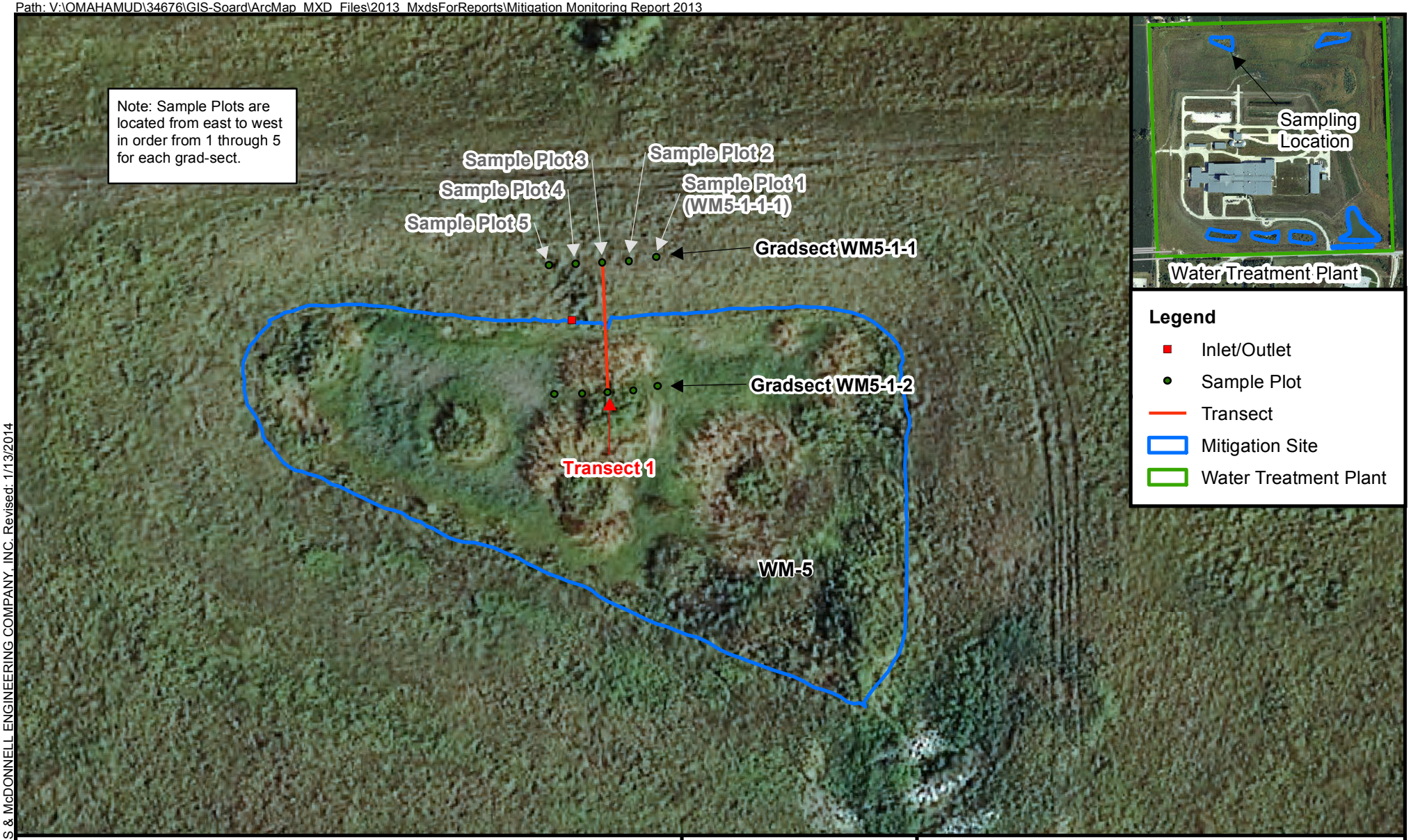

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N

Source: Wilson & Company 2013 Aerial Photography

Figure 1
Sample Plot Location Map for
Wetland Mitigation 5
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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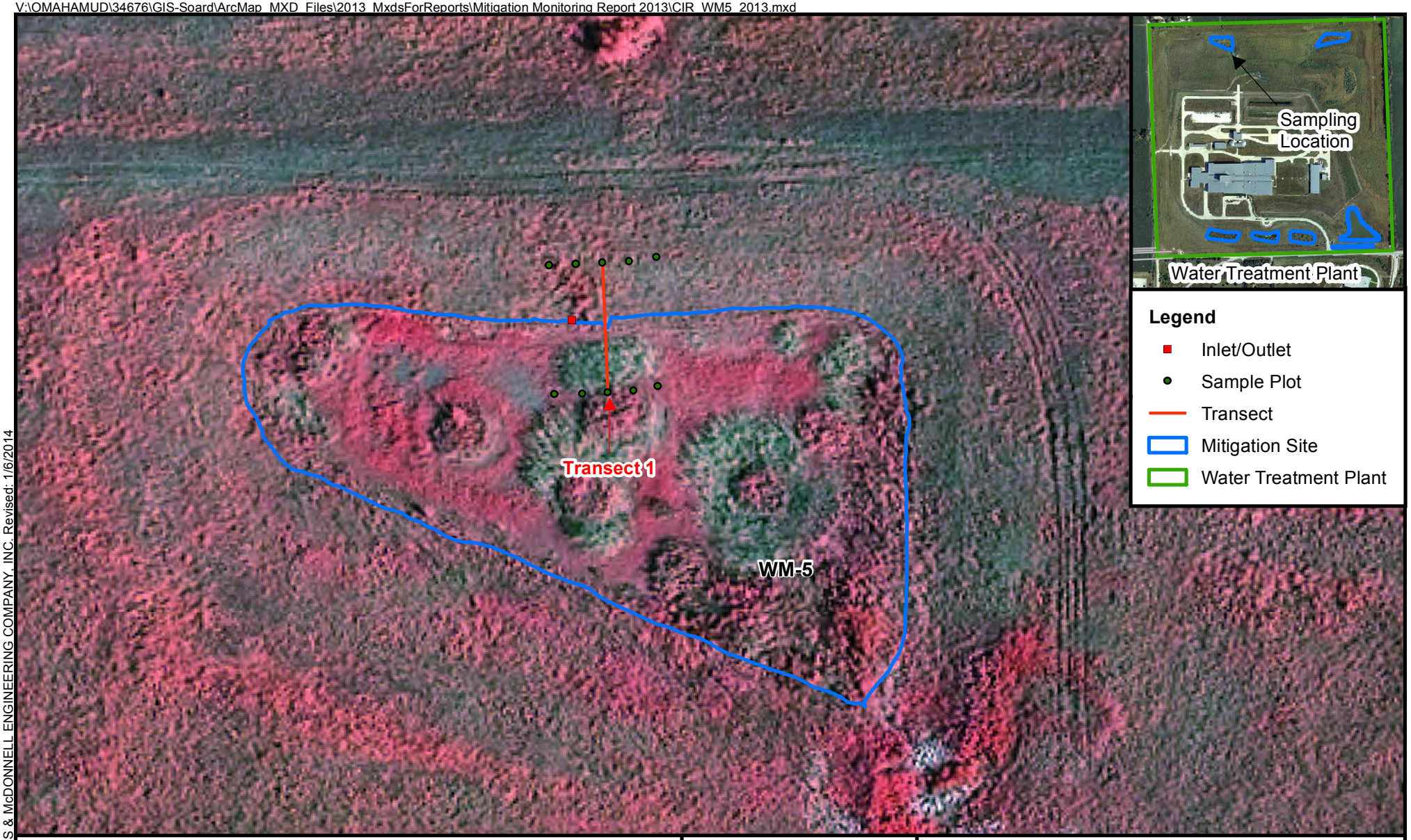

Source: Wilson & Company 2013 Aerial Photography

Figure 2
2013 CIR Aerial Photograph for
Wetland Mitigation 5
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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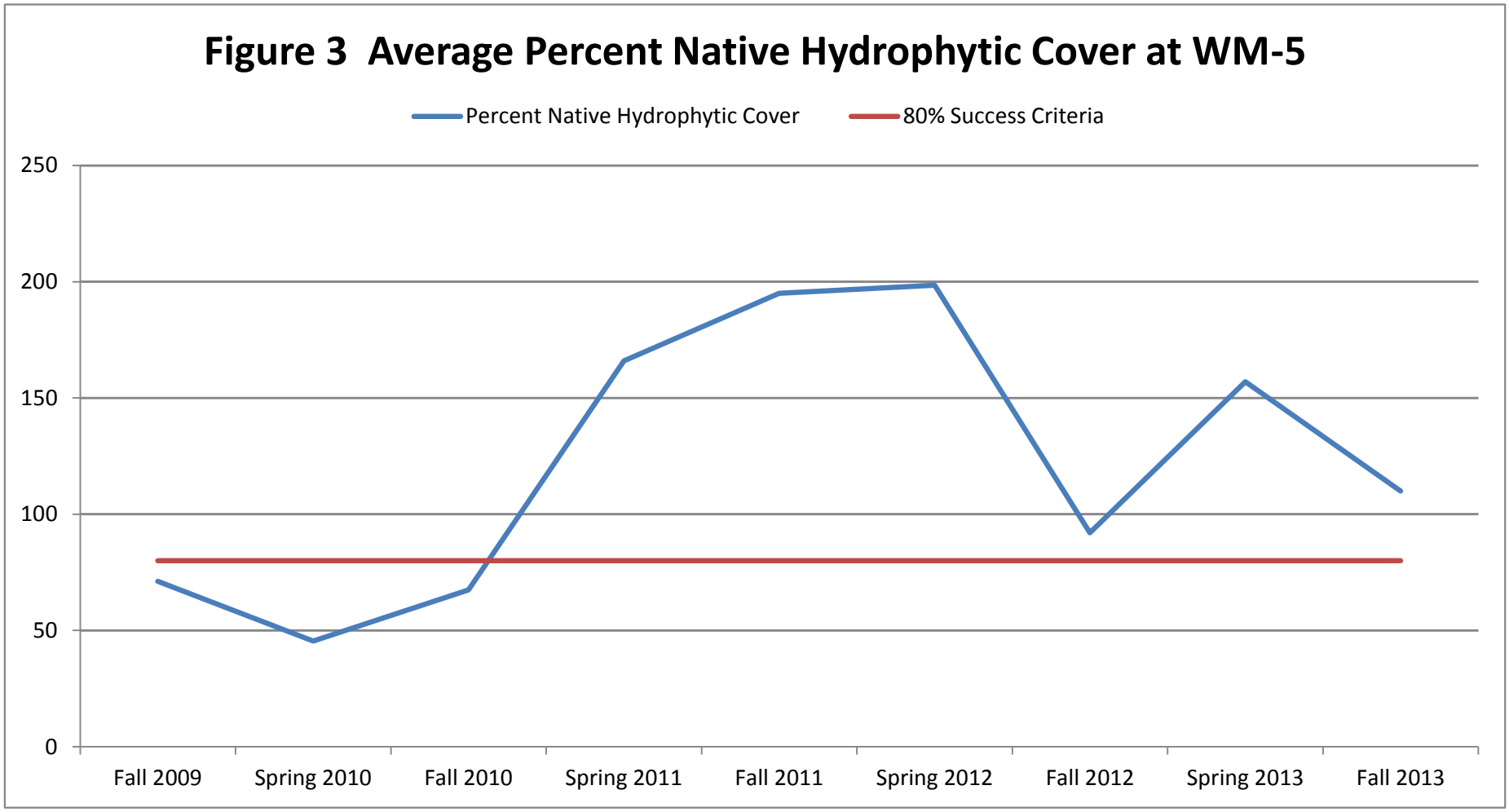
Figure 3 Average Percent Native Hydrophytic Cover at WM-5



SECTION D-2

TABLES

Table 1 Summary of Wetland Monitoring Data for WM-5

Wetland Name: **WM-5**
Wetland Type: **PEM**
County: **Douglas**

Number of Transects/Macroplots: **1**
Number of Gradsects: **2**
Number of Sample Plots: **10**
Number of Wetland Sample Plots: **5**

Sampling Effort: **2013 Fall**

Weighted Average: **2.05**
Species Richness: **14**
Species Diversity: **19.12**
FQI: **10.01**

Percent Native Species: **71**
Percent Invasive Species: **57**
Percent Perennial/Biennial/Annual Species: **64 / 7 / 36**
Mean C-Value: **3.17**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Ambrosia trifida	Great ragweed	FACW	18
Carex lupulina	Hop sedge	FACW+	20
Carex vulpinoidea	Fox sedge	OBL	37
Echinochloa crus-galli	Barnyardgrass	FACW	40

Sampling Effort: **2013 Spring**

Weighted Average: **2.30**
Species Richness: **21**
Species Diversity: **30.57**
FQI: **11.02**

Percent Native Species: **71**
Percent Invasive Species: **52**
Percent Perennial/Biennial/Annual Species: **76 / 10 / 24**
Mean C-Value: **2.85**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Bromus inermis	Smooth brome	NL	32.5
Carex vulpinoidea	Fox sedge	OBL	37
Juncus effusus	Common rush	OBL	24.5
Poa pratensis	Kentucky bluegrass	FACU	24.5

Table 2 Species List and Vegetative Characteristics for WM-5

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Fall**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Amaranthus retroflexus	Redroot amaranth	FACU	4		Native	☑	2	6.00
Ambrosia artemisiifolia	Annual ragweed	FACU	4	0	Native	☑	1	3.00
Ambrosia trifida	Great ragweed	FACW	2	0	Native	☑	3	18.00
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	2	15.50
Carex lupulina	Hop sedge	FACW+	2	8	Native	☐	2	20.00
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	3	37.00
Echinochloa crus-galli	Barnyardgrass	FACW	2		Introduced	☑	4	40.00
Hordeum jubatum	Foxtail barley	FACW	2	1	Native	☑	1	3.00
Juncus effusus	Common rush	OBL	1	6	Native	☐	1	17.00
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	1	17.00
Polygonum caespitosum	Oriental lady's thumb	NI	3		Introduced	☐	1	0.50
Rumex crispus	Curly dock	FACW	2		Introduced	☑	1	3.00
Schoenoplectus fluviatilis	River bulrush	OBL	1		Native	☐	2	15.00
Trifolium pratense	Red clover	FACU	4		Introduced	☐	2	6.00

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-5

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Spring**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Ambrosia artemisiifolia	Annual ragweed	FACU	4	0	Native	☑	1	0.50
Ambrosia trifida	Great ragweed	FACW	2	0	Native	☑	3	6.50
Asclepias incarnata	Swamp milkweed	OBL	1	4	Native	☑	1	3.00
Bromus arvensis	Field brome	NL	3		Introduced	☐	1	12.50
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	3	32.50
Carex brevior	Shortbeak sedge	FAC	3	4	Native	☐	3	23.00
Carex lupulina	Hop sedge	FACW+	2	8	Native	☐	2	20.00
Carex molesta	Troublesome sedge	FAC	3	3	Native	☐	1	7.50
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	3	37.00
Cyperus esculentus	Yellow nutsedge	FACW	2	0	Native & Introduced	☑	2	1.00
Eleocharis sp.	Spikerush	--	3		--	☐	1	0.50
Eupatorium perfoliatum	Common boneset	OBL	1	5	Native	☐	3	13.50
Hordeum jubatum	Foxtail barley	FACW	2	1	Native	☑	2	15.00
Iva annua	Annual marsh elder	FAC	3	1	Native	☐	1	3.00
Juncus effusus	Common rush	OBL	1	6	Native	☐	2	24.50
Melilotus officinalis	Yellow sweetclover	FACU	4		Introduced	☑	1	3.00
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	2	24.50
Rumex crispus	Curly dock	FACW	2		Introduced	☑	1	0.50

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-5

Report generated:
Thursday, January 02, 2014

Trifolium pratense	Red clover	FACU	4		Introduced	☐	1	0.50
Trifolium repens	White clover	FACU	4		Introduced	☑	3	9.00
Typha latifolia	Broadleaf cattail	OBL	1	1	Native	☑	1	3.00

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

SECTION D-3

MITIGATION SITE WM-5 GROUND PHOTOGRAPHS

Photo 1: View south of Transect 1 in WM-5 (June 2013).

Photo 2: View east of Gradsect 1 on Transect 1 in WM-5 (June 2013).

Photo 3: View east of Gradsect 2 on Transect 1 in WM-5 (June 2013).

Photo 4: View south of Transect 1 in WM-5 (September 2013).

Photo 5: View east of Gradsect 1 on Transect 1 in WM-5 (September 2013).

Photo 6: View east of Gradsect 2 on Transect 1 in WM-5 (September 2013).

SECTION D-4

WETLAND VEGETATION COVER AND WATER DEPTH RAW DATA SHEETS

Wetland Vegetation Cover and Water Depth at Wetland 5

Wetland Name: **WM-5**

Wetland Transect/Gradsect #: WM5-1-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Ambrosia trifida					3
Andropogon gerardii	5	4	5		
Apocynum cannabinum		2			
Bromus inermis		3			
Chenopodium album	1				
Cirsium altissimum		2			
Festuca arundinacea	6	6	6	6	6
Medicago sativa		2	2	6	7
Trifolium repens	2	3	2		

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 5

Wetland Name: **WM-5**

Wetland Transect/Gradsect #: WM5-1-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):	7			0	11
Open Water (in):	7			2	7
Bare Soil (in):	7	5	5	6	7
Ambrosia artemisiifolia		2			
Ambrosia trifida		2	3	3	
Asclepias incarnata		3			
Bromus arvensis			5		
Bromus inermis		3	6	5	
Carex brevior		4	3	5	
Carex lupulina		3		6	
Carex molesta			4		
Carex vulpinoidea		4	5	6	
Cyperus esculentus		2		2	
Eleocharis sp.				2	
Eupatorium perfoliatum		3	4	3	
Hordeum jubatum		4	4		
Iva annua		3			
Juncus effusus		6		4	
Melilotus officinalis			3		
No Living Vegetation					
Poa pratensis			6	4	
Rumex crispus		2			
Trifolium pratense		2			
Trifolium repens		3	3	3	
Typha latifolia				3	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 5

Wetland Name: **WM-5**

Wetland Transect/Gradsect #: WM5-1-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Ambrosia trifida			3	3	4
Andropogon gerardii			5		
Bouteloua curtipendula	3	3	4		
Bromus inermis		4			
Festuca arundinacea	7	6	6	6	6
Medicago sativa		3	4	6	4

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 5

Wetland Name: **WM-5**

Wetland Transect/Gradsect #: WM5-1-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	7	5	5	5	7
Amaranthus retroflexus	3				3
Ambrosia artemisiifolia				3	
Ambrosia trifida		3	4	4	
Bromus inermis		3	5		
Carex lupulina		4		5	
Carex vulpinoidea		4	5	6	
Echinochloa crus-galli	6	3		3	6
Hordeum jubatum		3			
Juncus effusus		6			
Poa pratensis			6		
Polygonum caespitosum		2			
Rumex crispus		3			
Schoenoplectus fluviatilis		4	4		
Trifolium pratense		3		3	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

APPENDIX I - SECTION E

WATER TREATMENT PLANT MITIGATION SITE WM-6 MONITORING DATA

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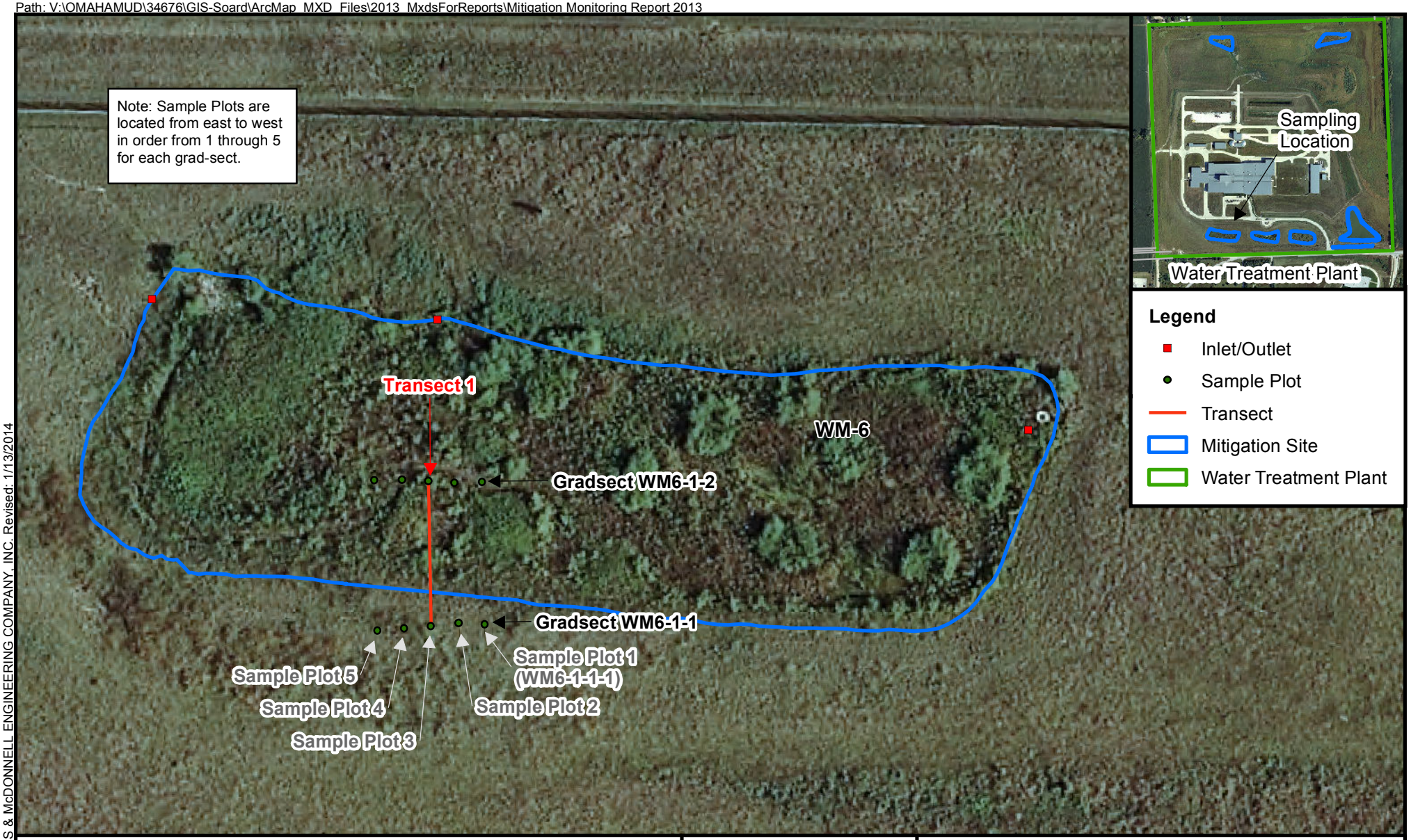
SECTION E-1

FIGURES

Path: V:\OMAHAMUD\34676\GIS-Soard\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013



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Source: Wilson & Company 2013 Aerial Photography

Figure 1
Sample Plot Location Map for
Wetland Mitigation 6
Water Treatment Plant - Douglas County
Metropolitan Utilities District

V:\OMAHAMUD\34676\GIS-Board\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013\CIR_WM6_2013.mxd

Feet
0 25 50 75 100

N

Source: Wilson & Company 2013 Aerial Photography

Burns & McDonnell SINCE 1898

Figure 2
2013 CIR Aerial Photograph for
Wetland Mitigation 6
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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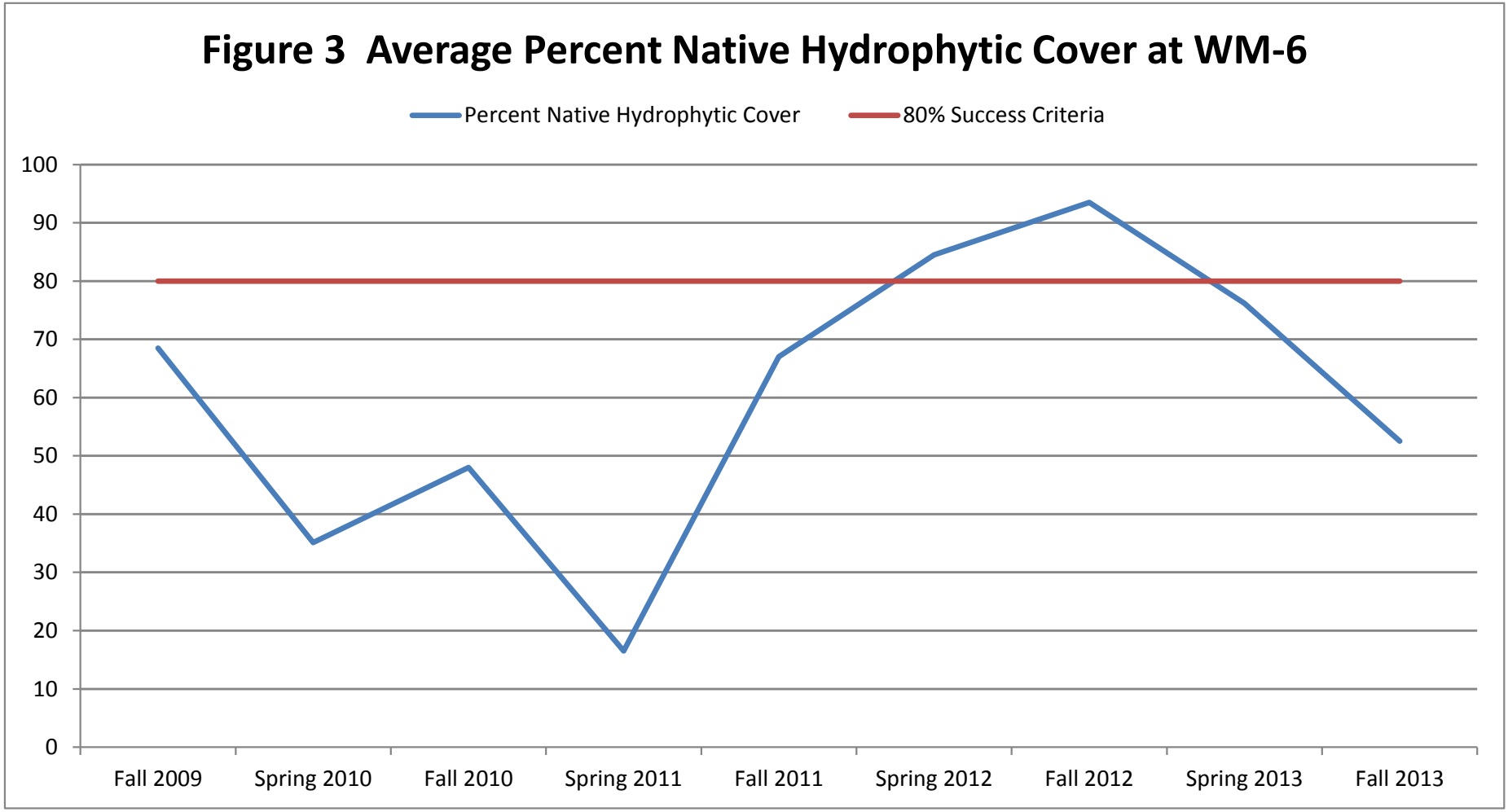
Figure 3 Average Percent Native Hydrophytic Cover at WM-6



SECTION E-2

TABLES

Table 1 Summary of Wetland Monitoring Data for WM-6

Wetland Name: **WM-6**
Wetland Type: **PEM**
County: **Douglas**

Number of Transects/Macroplots: **1**
Number of Gradsects: **2**
Number of Sample Plots: **10**
Number of Wetland Sample Plots: **5**

Sampling Effort: **2013 Fall**

Weighted Average: **2.88**
Species Richness: **20**
Species Diversity: **37.71**
FQI: **12.31**

Percent Native Species: **80**
Percent Invasive Species: **55**
Percent Perennial/Biennial/Annual Species: **90 / 10 / 20**
Mean C-Value: **3.08**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Festuca arundinacea	Tall fescue	FACU	8
Helianthus tuberosus	Jerusalem artichoke	FAC	20
Poa pratensis	Kentucky bluegrass	FACU	10.5

Sampling Effort: **2013 Spring**

Weighted Average: **2.59**
Species Richness: **20**
Species Diversity: **23.16**
FQI: **12.96**

Percent Native Species: **85**
Percent Invasive Species: **55**
Percent Perennial/Biennial/Annual Species: **80 / 5 / 25**
Mean C-Value: **3.14**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Elymus virginicus	Virginia wildrye	FAC	18
Festuca arundinacea	Tall fescue	FACU	20
Helianthus tuberosus	Jerusalem artichoke	FAC	15
Lythrum alatum	Winged lythrum	OBL	17

Table 2 Species List and Vegetative Characteristics for WM-6

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Fall**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Ambrosia trifida	Great ragweed	FACW	2	0	Native	☑	2	1.00
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	2	1.00
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	1	7.50
Cyperus esculentus	Yellow nutsedge	FACW	2	0	Native & Introduced	☑	2	3.50
Eleocharis erythropoda	Bald spikerush	OBL	1	5	Native	☐	2	3.50
Elymus virginicus	Virginia wildrye	FAC	3	4	Native	☐	2	6.00
Equisetum hyemale	Scouringrush horsetail	FACW	2	4	Native	☐	1	3.00
Erigeron strigosus	Prairie fleabane	FAC	3	2	Native	☑	1	0.50
Festuca arundinacea	Tall fescue	FACU	4		Introduced	☑	2	8.00
Helianthus tuberosus	Jerusalem artichoke	FAC	3	4	Native	☑	2	20.00
Lycopus americanus	American water horehound	OBL	1	4	Native	☑	2	3.50
Melilotus officinalis	Yellow sweetclover	FACU	4		Introduced	☑	3	6.50
Oligoneuron riddellii	Riddell's goldenrod	NI	3		Native	☐	2	1.00
Panicum virgatum	Switchgrass	FAC	3	4	Native	☐	1	0.50
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	2	10.50
Populus deltoides	Eastern cottonwood	FAC	3	3	Native	☐	1	0.50
Salix amygdaloides	Peachleaf willow	FACW	2	4	Native	☐	1	3.00
Setaria pumila ssp. pumila	Yellow foxtail	FAC	3		Introduced	☑	1	7.50

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-6

Report generated:
Thursday, January 02, 2014

Symphyotrichum lanceolatum	White panicle aster	NI	3	2	Native	☐	2	6.00
Trifolium repens	White clover	FACU	4		Introduced	☑	1	3.00

Sampling Effort: **2013 Spring**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Ambrosia artemisiifolia	Annual ragweed	FACU	4	0	Native	☑	1	0.50
Ambrosia trifida	Great ragweed	FACW	2	0	Native	☑	3	4.00
Andropogon gerardii	Big bluestem	FAC-	3	5	Native	☐	2	10.50
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	1	3.00
Carex sp. 1	Sedge	--	3		Native	☐	1	3.00
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	1	7.50
Cyperus esculentus	Yellow nutsedge	FACW	2	0	Native & Introduced	☑	3	4.00
Elymus virginicus	Virginia wildrye	FAC	3	4	Native	☐	3	18.00
Equisetum hyemale	Scouringrush horsetail	FACW	2	4	Native	☐	1	3.00
Erigeron strigosus	Prairie fleabane	FAC	3	2	Native	☑	2	1.00
Festuca arundinacea	Tall fescue	FACU	4		Introduced	☑	2	20.00
Helianthus tuberosus	Jerusalem artichoke	FAC	3	4	Native	☑	2	15.00
Juncus dudleyi	Dudley's rush	NL	3	5	Native	☐	1	0.50
Lycopus americanus	American water horehound	OBL	1	4	Native	☑	3	3.20
Lythrum alatum	Winged lythrum	OBL	1	6	Native	☐	5	17.00

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-6

Report generated:
Thursday, January 02, 2014

Medicago lupulina	Black medick	FAC	3		Introduced	☑	1	0.50
Polygonum pensylvanicum	Pennsylvania smartweed	FACW+	2		Native	☑	1	0.50
Symphyotrichum lanceolatum	White panicle aster	NI	3	2	Native	☐	4	7.00
Teucrium canadense	Canada germander	FACW	2	4	Native	☑	1	3.00
Unknown 1	Unknown seedling	--	3		--	☐	1	0.50

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

SECTION E-3

MITIGATION SITE WM-6 GROUND PHOTOGRAPHS

Photo 1: View north of Transect 1 in WM-6 (June 2013).

Photo 2: View east of Gradsect 1 on Transect 1 in WM-6 (June 2013).

Photo 3: View east of Gradsect 2 on Transect 1 in WM-6 (June 2013).

Photo 4: View north of Transect 1 in WM-6 (September 2013).

Photo 5: View east of Gradsect 1 on Transect 1 in WM-6 (September 2013).

Photo 6: View east of Gradsect 2 on Transect 1 in WM-6 (September 2013).

SECTION E-4

WETLAND VEGETATION COVER AND WATER DEPTH RAW DATA SHEETS

Wetland Vegetation Cover and Water Depth at Wetland 6

Wetland Name: **WM-6**

Wetland Transect/Gradsect #: WM6-1-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	5	5
Andropogon gerardii		5	5	6	4
Bromus inermis	5	3	3	4	5
Festuca arundinacea	4		4	4	4
Helianthus tuberosus			1	3	3
Melilotus officinalis	4			2	2
Poa pratensis	5	4	5	5	4

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 6

Wetland Name: **WM-6**

Wetland Transect/Gradsect #: WM6-1-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):			0.25		
Open Water (in):			4		
Bare Soil (in):	6	7	7	7	6
Ambrosia artemisiifolia	2				
Ambrosia trifida		2	2		3
Andropogon gerardii	3				4
Bromus inermis					3
Carex sp. 1	3				
Carex vulpinoidea	4				
Cyperus esculentus		3	2	2	
Elymus virginicus	4	3			4
Equisetum hyemale					3
Erigeron strigosus	2	2			
Festuca arundinacea	4				5
Helianthus tuberosus	4	4			
Juncus dudleyi			2		
Lycopus americanus		3	1		1
Lythrum alatum	3	3	4	2	3
Medicago lupulina					2
Polygonum pensylvanicum		2			
Symphyotrichum lanceolatum	2	2	3		3
Teucrium canadense	3				
Unknown 1			2		

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 6

Wetland Name: **WM-6**

Wetland Transect/Gradsect #: WM6-1-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	6	5	5	6
Andropogon gerardii			3	4	
Bouteloua curtipendula		4	4		
Bromus inermis	4	4			4
Festuca arundinacea	3		3		
Helianthus tuberosus					3
Melilotus officinalis					3
Poa pratensis	6	4	4	5	5
Schizachyrium scoparium	4	5	5	5	4

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 6

Wetland Name: **WM-6**

Wetland Transect/Gradsect #: WM6-1-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	7	7	7	6
Ambrosia trifida			2		2
Bromus inermis			2	2	
Carex vulpinoidea	4				
Cyperus esculentus		3	2		
Eleocharis erythropoda		3		2	
Elymus virginicus	3				3
Equisetum hyemale					3
Erigeron strigosus	2				
Festuca arundinacea		2			4
Helianthus tuberosus	5	4			
Lycopus americanus		3	2		
Melilotus officinalis			3	2	3
Oligoneuron riddellii		2	2		
Panicum virgatum				2	
Poa pratensis	4				3
Populus deltoides		2			
Salix amygdaloides	3				
Setaria pumila ssp. pumila					4
Symphyotrichum lanceolatum			3		3
Trifolium repens					3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

APPENDIX I - SECTION F

WATER TREATMENT PLANT MITIGATION SITE WM-7 MONITORING DATA

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FIGURES

Path: V:\OMAHAMUD\34676\GIS-Soard\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013

Feet
0 25 50 75 100

N

Source: Wilson & Company 2013 Aerial Photography

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Figure 1
Sample Plot Location Map for
Wetland Mitigation 7
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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V:\OMAHAMUD\34676\GIS-Soard\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013\CIR_WM7_2013.mxd

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Feet
0 25 50 75 100

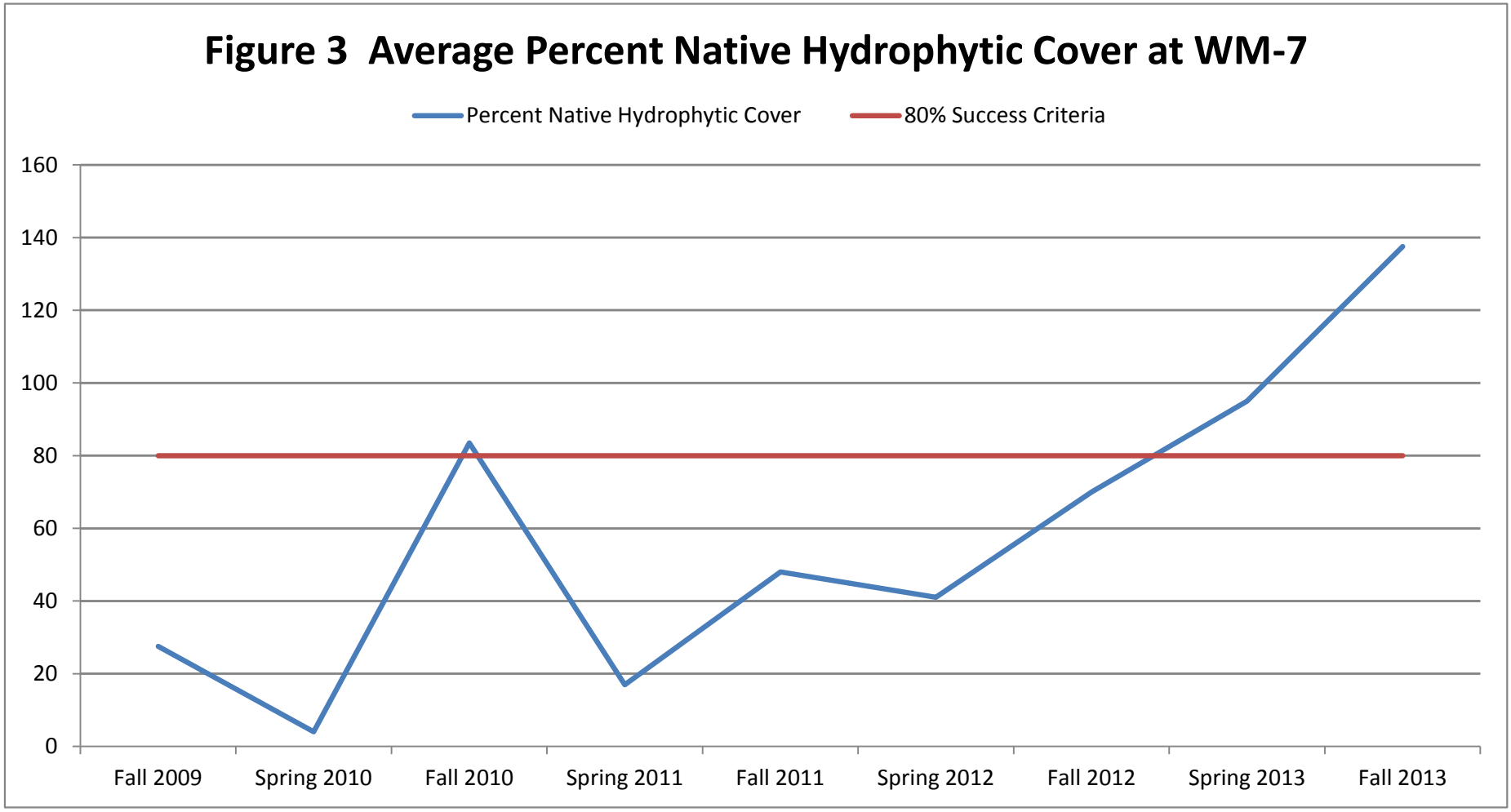
N

Source: Wilson & Company 2013 Aerial Photography

Burns & McDonnell
SINCE 1898

Figure 2
2013 CIR Aerial Photograph for
Wetland Mitigation 7
Water Treatment Plant - Douglas County
Metropolitan Utilities District

Figure 3 Average Percent Native Hydrophytic Cover at WM-7



SECTION F-2

TABLES

Table 1 Summary of Wetland Monitoring Data for WM-7

Wetland Name: **WM-7**
Wetland Type: **PEM**
County: **Douglas**

Number of Transects/Macroplots: **1**
Number of Gradsects: **2**
Number of Sample Plots: **10**
Number of Wetland Sample Plots: **5**

Sampling Effort: **2013 Fall**

Weighted Average: **1.39**
Species Richness: **13**
Species Diversity: **23.33**
FQI: **14.72**

Percent Native Species: **92**
Percent Invasive Species: **23**
Percent Perennial/Biennial/Annual Species **92 / 0 / 8**
Mean C-Value: **4.25**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Echinochloa crus-galli	Barnyardgrass	FACW	24.5
Typha latifolia	Broadleaf cattail	OBL	37

Sampling Effort: **2013 Spring**

Weighted Average: **1.70**
Species Richness: **9**
Species Diversity: **15.17**
FQI: **16.67**

Percent Native Species: **100**
Percent Invasive Species: **11**
Percent Perennial/Biennial/Annual Species **100 / 0 / 0**
Mean C-Value: **5.56**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Carex brevior	Shortbeak sedge	FAC	20
Carex lupulina	Hop sedge	FACW+	20
Carex vulpinoidea	Fox sedge	OBL	20
Potamogeton amplifolius	Largeleaf pondweed	OBL	12.5

Table 2 Species List and Vegetative Characteristics for WM-7

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Fall**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Carex lupulina	Hop sedge	FACW+	2	8	Native	☐	2	20.00
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	2	20.00
Echinochloa crus-galli	Barnyardgrass	FACW	2		Introduced	☑	2	24.50
Eupatorium perfoliatum	Common boneset	OBL	1	5	Native	☐	1	7.50
Helianthus tuberosus	Jerusalem artichoke	FAC	3	4	Native	☑	1	3.00
Lemna minor	Common duckweed	OBL	1	0	Native	☐	2	6.00
Lythrum alatum	Winged lythrum	OBL	1	6	Native	☐	1	3.00
Potamogeton amplifolius	Largeleaf pondweed	OBL	1	10	Native	☐	1	7.50
Sagittaria cuneata	arumleaf arrowhead	OBL	1	1	Native	☐	2	20.00
Sagittaria latifolia	Broadleaf arrowhead	OBL	1	5	Native	☐	2	10.50
Scirpus atrovirens	Green bulrush	OBL	1	5	Native	☐	1	3.00
Symphyotrichum lanceolatum	White panicle aster	NI	3	2	Native	☐	1	7.50
Typha latifolia	Broadleaf cattail	OBL	1	1	Native	☑	3	37.00

Sampling Effort: **2013 Spring**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-7

Report generated:
Thursday, January 02, 2014

Carex brevior	Shortbeak sedge	FAC	3	4	Native	☐	2	20.00
Carex comosa	Longhair sedge	OBL	1	5	Native	☐	1	3.00
Carex lupulina	Hop sedge	FACW+	2	8	Native	☐	2	20.00
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	2	20.00
Eupatorium perfoliatum	Common boneset	OBL	1	5	Native	☐	1	3.00
Juncus effusus	Common rush	OBL	1	6	Native	☐	1	7.50
Potamogeton amplifolius	Largeleaf pondweed	OBL	1	10	Native	☐	1	12.50
Potamogeton foliosus	Leafy pondweed	OBL	1	5	Native	☐	3	9.00
Symphyotrichum ericoides	White heath aster	FACU	4	3	Native	☑	1	3.00

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

SECTION F-3

MITIGATION SITE WM-7 GROUND PHOTOGRAPHS

Photo 1: View south of Transect 1 in WM-7 (June 2013).

Photo 2: View east of Gradsect 1 on Transect 1 in WM-7 (June 2013).

Photo 3: View east of Gradsect 2 on Transect 1 in WM-7 (June 2013).

Photo 4: View south of Transect 1 in WM-7 (September 2013).

Photo 5: View east of Gradsect 1 on Transect 1 in WM-7 (September 2013).

Photo 6: View east of Gradsect 2 on Transect 1 in WM-7 (September 2013).

SECTION F-4

WETLAND VEGETATION COVER AND WATER DEPTH RAW DATA SHEETS

Wetland Vegetation Cover and Water Depth at Wetland 7

Wetland Name: **WM-7**

Wetland Transect/Gradsect #: WM7-1-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	6	6	6	6
Andropogon gerardii			4		4
Bromus inermis	7	6	5	6	6
Festuca arundinacea		5	5	4	5
Helianthus tuberosus		3			3
Poa pratensis	5	4	4	4	4

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 7

Wetland Name: **WM-7**

Wetland Transect/Gradsect #: WM7-1-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):	4.5	6	28	16	16
Open Water (in):	6	6	7	7	7
Bare Soil (in):	6	7	7	7	7
Carex brevior	4	5			
Carex comosa	3				
Carex lupulina	4	5			
Carex vulpinoidea	4	5			
Eupatorium perfoliatum	3				
Juncus effusus	4				
Potamogeton amplifolius					5
Potamogeton foliosus		3		3	3
Symphyotrichum ericoides	3				

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 7

Wetland Name: **WM-7**

Wetland Transect/Gradsect #: WM7-1-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	5	5	5	5
Agrostis stolonifera					3
Bouteloua curtipendula	4	5	6	4	4
Bromus inermis	6	4	5	5	6
Elymus canadensis	3		3		
Festuca arundinacea		4		4	
Helianthus tuberosus		3			3
Panicum virgatum		3		4	
Poa pratensis	4		4	4	4
Schizachyrium scoparium		5			

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 7

Wetland Name: **WM-7**

Wetland Transect/Gradsect #: WM7-1-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):	2.5	2.5	20	13	12
Open Water (in):	6	7	7	7	7
Bare Soil (in):	6	6	7	7	7
Carex lupulina	6	3			
Carex vulpinoidea	4	5			
Echinochloa crus-galli	4	6			
Eupatorium perfoliatum	4				
Helianthus tuberosus	3				
Lemna minor				3	3
Lythrum alatum	3				
Potamogeton amplifolius				4	
Sagittaria cuneata		4	5		
Sagittaria latifolia		3			4
Scirpus atrovirens		3			
Symphyotrichum lanceolatum	4				
Typha latifolia			4	6	5

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

APPENDIX I - SECTION G

WATER TREATMENT PLANT MITIGATION SITE WM-8 MONITORING DATA

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SECTION G-1

FIGURES

Path: V:\OMAHAMUD\34676\GIS-Soard\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013

Source: Wilson & Company 2013 Aerial Photography

Figure 1
Sample Plot Location Map for
Wetland Mitigation 8
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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V:\OMAHAMUD\34676\GIS-Soard\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013\CIR_WM8_2013.mxd

Source: Wilson & Company 2013 Aerial Photography

Figure 2
2013 CIR Aerial Photograph for
Wetland Mitigation 8
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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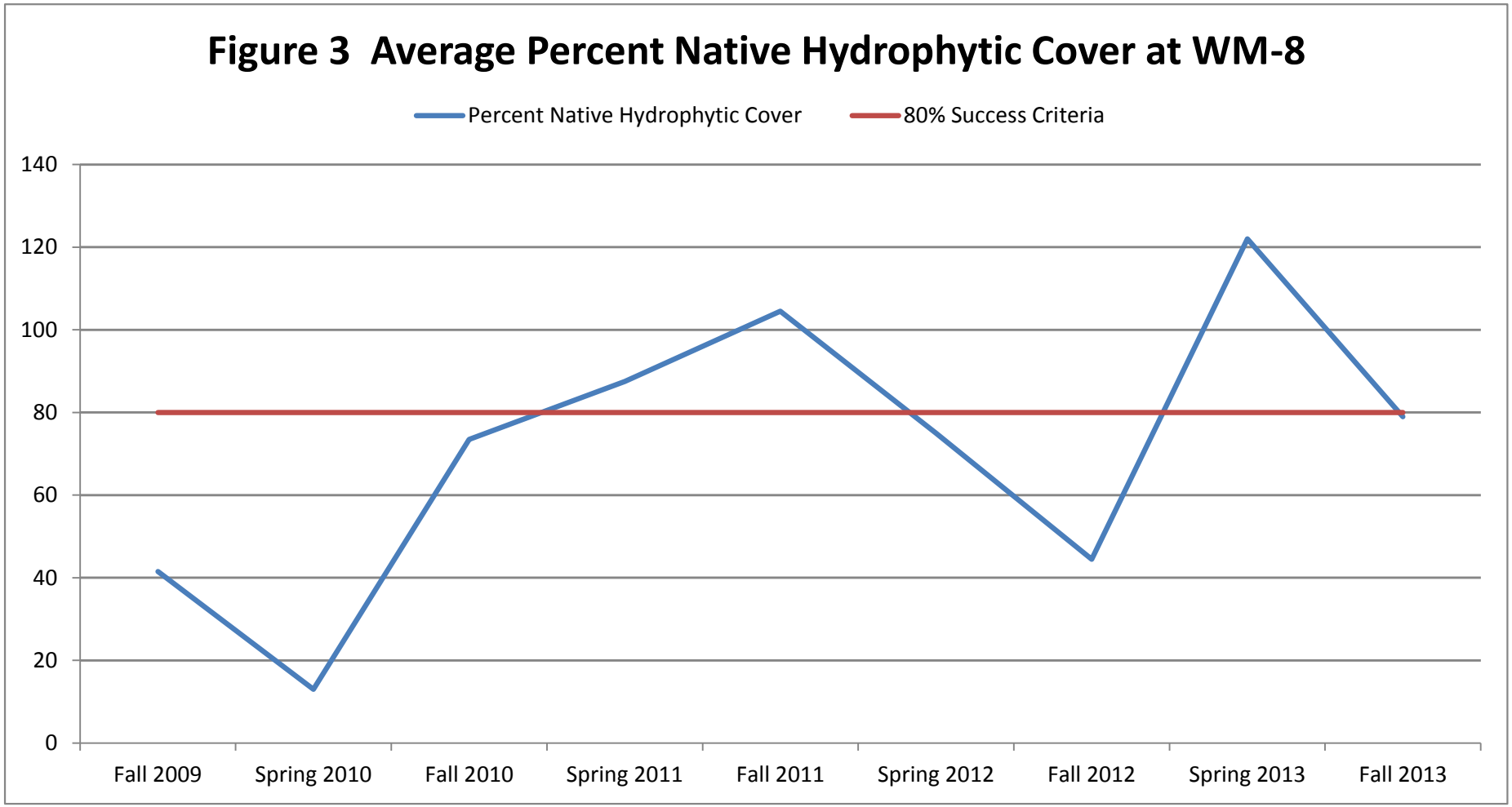
Figure 3 Average Percent Native Hydrophytic Cover at WM-8
Percent Native Hydrophytic Cover
80% Success Criteria
140
120
100
80
60
40
20
0
Fall 2009
Spring 2010
Fall 2010
Spring 2011
Fall 2011
Spring 2012
Fall 2012
Spring 2013
Fall 2013

SECTION G-2

TABLES

Table 1 Summary of Wetland Monitoring Data for WM-8

Wetland Name: **WM-8**
Wetland Type: **PEM**
County: **Douglas**

Number of Transects/Macroplots: **1**
Number of Gradsects: **2**
Number of Sample Plots: **10**
Number of Wetland Sample Plots: **5**

Sampling Effort: **2013 Fall**

Weighted Average: **2.63**
Species Richness: **20**
Species Diversity: **50.00**
FQI: **17.54**

Percent Native Species: **90**
Percent Invasive Species: **30**
Percent Perennial/Biennial/Annual Species: **90 / 10 / 15**
Mean C-Value: **4.13**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Elymus virginicus	Virginia wildrye	FAC	15
Poa pratensis	Kentucky bluegrass	FACU	20

Sampling Effort: **2013 Spring**

Weighted Average: **2.27**
Species Richness: **21**
Species Diversity: **39.55**
FQI: **20.91**

Percent Native Species: **81**
Percent Invasive Species: **38**
Percent Perennial/Biennial/Annual Species: **90 / 10 / 19**
Mean C-Value: **5.07**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Elymus virginicus	Virginia wildrye	FAC	20
Helianthus tuberosus	Jerusalem artichoke	FAC	15.5
Potamogeton foliosus	Leafy pondweed	OBL	53.5
Rumex crispus	Curly dock	FACW	12.5

Table 2 Species List and Vegetative Characteristics for WM-8

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Fall**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Boehmeria cylindrica	Smallspike false nettle	OBL	1	6	Native	☐	1	3.00
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	1	3.00
Carex lupulina	Hop sedge	FACW+	2	8	Native	☐	1	3.00
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	2	10.50
Chamaecrista fasciculata	Partridge pea	NL	3	1	Native	☐	1	7.50
Conyza canadensis	Canadian horseweed	FACU-	4	0	Native	☑	1	3.00
Elymus virginicus	Virginia wildrye	FAC	3	4	Native	☐	2	15.00
Helianthus tuberosus	Jerusalem artichoke	FAC	3	4	Native	☑	1	12.50
Juncus effusus	Common rush	OBL	1	6	Native	☐	1	7.50
Melilotus officinalis	Yellow sweetclover	FACU	4		Introduced	☑	1	3.00
Oligoneuron riddellii	Riddell's goldenrod	NI	3		Native	☐	1	12.50
Phyla lanceolata	Lanceleaf fogfruit	OBL	1	3	Native	☐	1	3.00
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	2	20.00
Potamogeton amplifolius	Largeleaf pondweed	OBL	1	10	Native	☐	3	11.00
Rumex sp.	Dock	--	3		--	☐	1	3.00
Salix amygdaloides	Peachleaf willow	FACW	2	4	Native	☐	1	3.00
Salix interior	Sandbar willow	NL	3	3	Native	☐	1	12.50
Symphyotrichum lanceolatum	White panicle aster	NI	3	2	Native	☐	1	7.50

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-8

Report generated:
Thursday, January 02, 2014

Typha latifolia	Broadleaf cattail	OBL	1	1	Native	☑	1	3.00
Zizia aurea	Golden zizia	FAC	3	6	Native	☐	1	7.50

Sampling Effort: **2013 Spring**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Boehmeria cylindrica	Smallspike false nettle	OBL	1	6	Native	☐	1	3.00
Bromus arvensis	Field brome	NL	3		Introduced	☐	1	7.50
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	2	10.50
Carex brevior	Shortbeak sedge	FAC	3	4	Native	☐	1	3.00
Carex lupulina	Hop sedge	FACW+	2	8	Native	☐	1	3.00
Chenopodium album	Lambsquarters	FAC	3		Native & Introduced	☑	1	0.50
Desmanthus illinoensis	Illinois bundleflower	FACU	4	5	Native	☐	1	0.50
Elymus virginicus	Virginia wildrye	FAC	3	4	Native	☐	2	20.00
Erigeron strigosus	Prairie fleabane	FAC	3	2	Native	☑	2	8.00
Eupatorium perfoliatum	Common boneset	OBL	1	5	Native	☐	1	0.50
Festuca arundinacea	Tall fescue	FACU	4		Introduced	☑	1	7.50
Helianthus tuberosus	Jerusalem artichoke	FAC	3	4	Native	☑	2	15.50
Juncus effusus	Common rush	OBL	1	6	Native	☐	1	7.50
Melilotus officinalis	Yellow sweetclover	FACU	4		Introduced	☑	2	6.00
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	1	7.50

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-8

Report generated:
Thursday, January 02, 2014

Potamogeton amplifolius	Largeleaf pondweed	OBL	1	10	Native	☐	3	1.50
Potamogeton foliosus	Leafy pondweed	OBL	1	5	Native	☐	3	53.50
Rumex crispus	Curly dock	FACW	2		Introduced	☑	1	12.50
Salix amygdaloides	Peachleaf willow	FACW	2	4	Native	☐	1	3.00
Symphyotrichum lanceolatum	White panicle aster	NI	3	2	Native	☐	1	3.00
Zizia aurea	Golden zizia	FAC	3	6	Native	☐	1	3.00

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

SECTION G-3

MITIGATION SITE WM-8 GROUND PHOTOGRAPHS

Photo 1: View north of Transect 1 in WM-8 (June 2013).

Photo 2: View east of Gradsect 1 on Transect 1 in WM-8 (June 2013).

Photo 3: View east of Gradsect 2 on Transect 1 in WM-8 (June 2013).

Photo 4: View north of Transect 1 in WM-8 (September 2013).

Photo 5: View east of Gradsect 1 on Transect 1 in WM-8 (September 2013).

Photo 6: View east of Gradsect 2 on Transect 1 in WM-8 (September 2013).

SECTION G-4

WETLAND VEGETATION COVER AND WATER DEPTH RAW DATA SHEETS

Wetland Vegetation Cover and Water Depth at Wetland 8

Wetland Name: **WM-8**

Wetland Transect/Gradsect #: WM8-1-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Andropogon gerardii		4			
Desmanthus illinoensis		3			
Festuca arundinacea	7	5	6	6	5
Helianthus tuberosus	4	3	3	3	3
Melilotus officinalis		3	2	3	2
Poa pratensis	5	4	5	4	4

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 8

Wetland Name: **WM-8**

Wetland Transect/Gradsect #: WM8-1-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Depth of Standing Water (in):		7	10	8	
Open Water (in):		7	7	7	
Bare Soil (in):	6	7	7	7	6
Boehmeria cylindrica	3				
Bromus arvensis					4
Bromus inermis	3				4
Carex brevior	3				
Carex lupulina	3				
Chenopodium album					2
Desmanthus illinoensis	2				
Elymus virginicus	4				5
Erigeron strigosus	2				
Eupatorium perfoliatum	2				
Festuca arundinacea	4				
Helianthus tuberosus	3				5
Juncus effusus	4				
Melilotus officinalis	3				3
Poa pratensis					4
Potamogeton amplifolius		2	2	2	
Potamogeton foliosus		7	6	6	
Rumex crispus					5
Salix amygdaloides	3				
Symphyotrichum lanceolatum					3
Zizia aurea	3				

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 8

Wetland Name: **WM-8**

Wetland Transect/Gradsect #: WM8-1-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	5	5	6	6	6
Bouteloua curtipendula			3		
Chamaecrista fasciculata			3	4	2
Festuca arundinacea	6	6	6	6	6
Helianthus tuberosus	3	3	3	3	3
Poa pratensis	6	5	5	6	6

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 8

Wetland Name: **WM-8**

Wetland Transect/Gradsect #: WM8-1-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Depth of Standing Water (in):		4	4.5	3.5	
Open Water (in):		7	7	7	
Bare Soil (in):	6	7	7	7	6
Boehmeria cylindrica	3				
Bromus inermis					3
Carex lupulina	3				
Carex vulpinoidea	3				4
Chamaecrista fasciculata	4				
Conyza canadensis	3				
Elymus virginicus	4				4
Helianthus tuberosus					5
Juncus effusus	4				
Melilotus officinalis	3				
Oligoneuron riddellii	5				
Phyla lanceolata					3
Poa pratensis	5				4
Potamogeton amplifolius		2	3	4	
Rumex sp.					3
Salix amygdaloides	3				
Salix interior					5
Symphyotrichum lanceolatum					4
Typha latifolia		3			
Zizia aurea	4				

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

APPENDIX I - SECTION H

WATER TREATMENT PLANT MITIGATION SITE WM-9 MONITORING DATA

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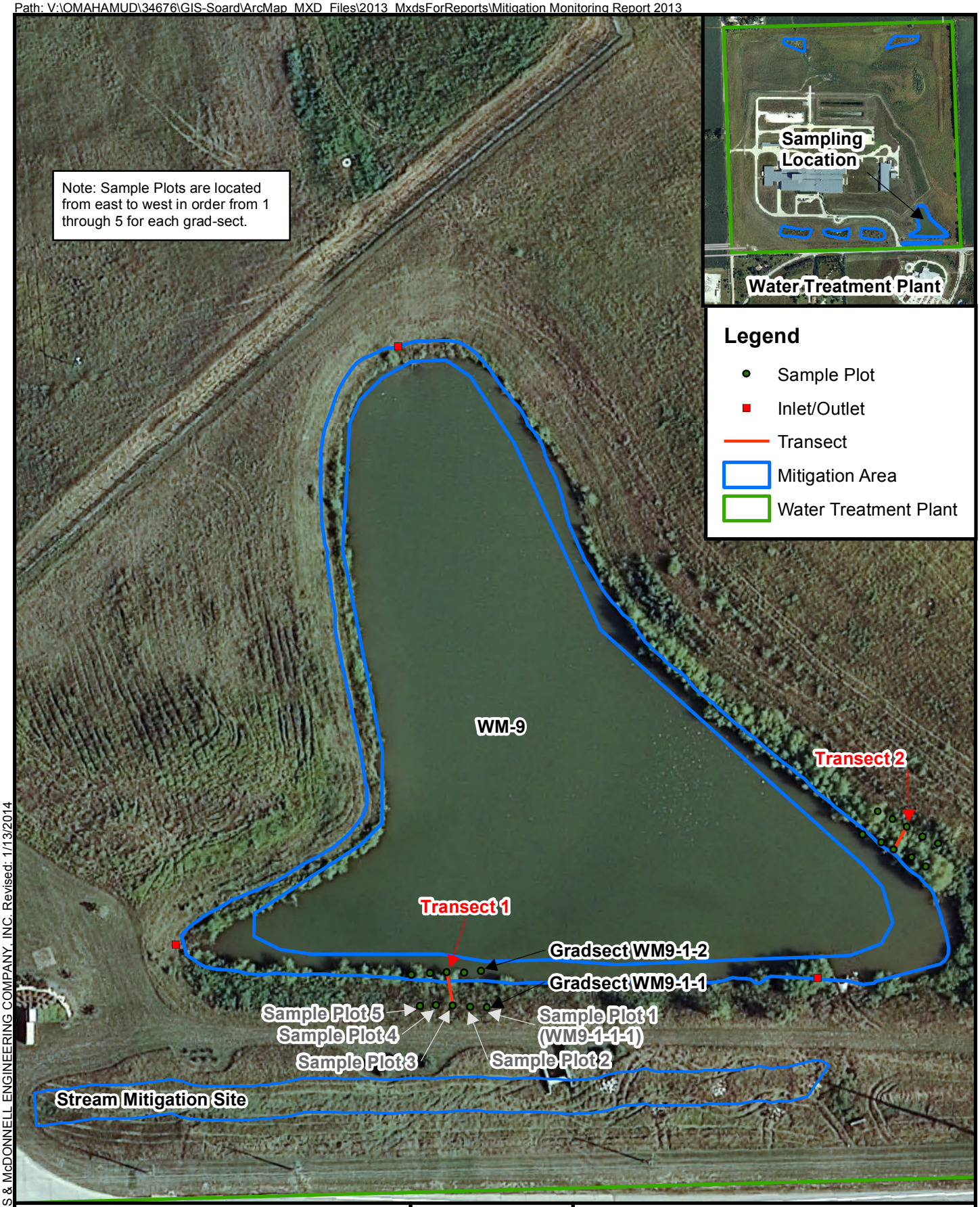
FIGURES

Path: V:\OMAHAMUD\34676\GIS-Soard\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013



Feet
0 30 60 90 120

N

Source: Wilson & Company 2013 Aerial Photography

Burns & McDonnell SINCE 1898

Figure 1
Sample Plot Location Map for
Wetland Mitigation 9 and the
Stream Mitigation Site
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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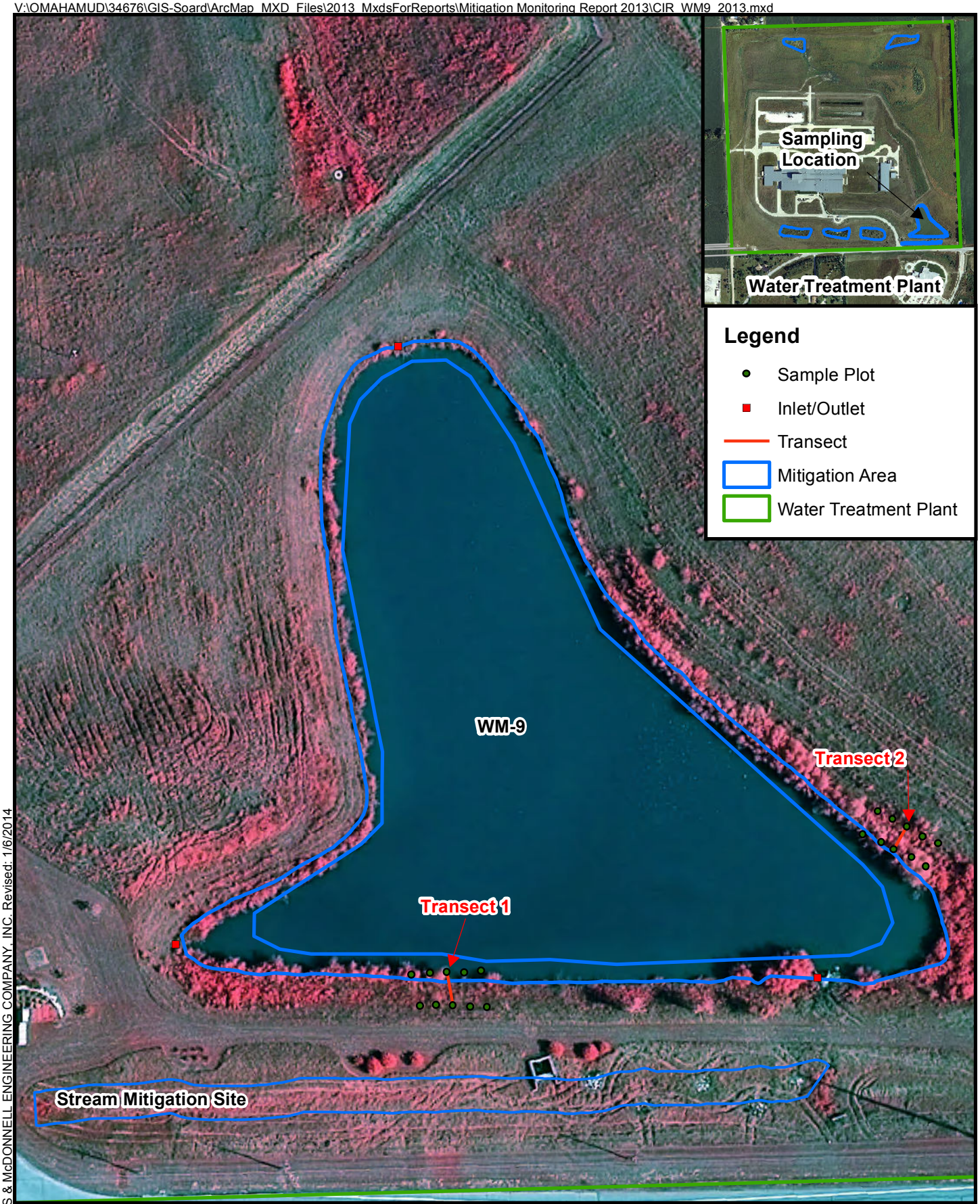
V:\OMAHAMUD\34676\GIS-Soard\ArcMap_MXD_Files\2013_MxdsForReports\Mitigation Monitoring Report 2013\CIR_WM9_2013.mxd



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0 30 60 90 120 Feet

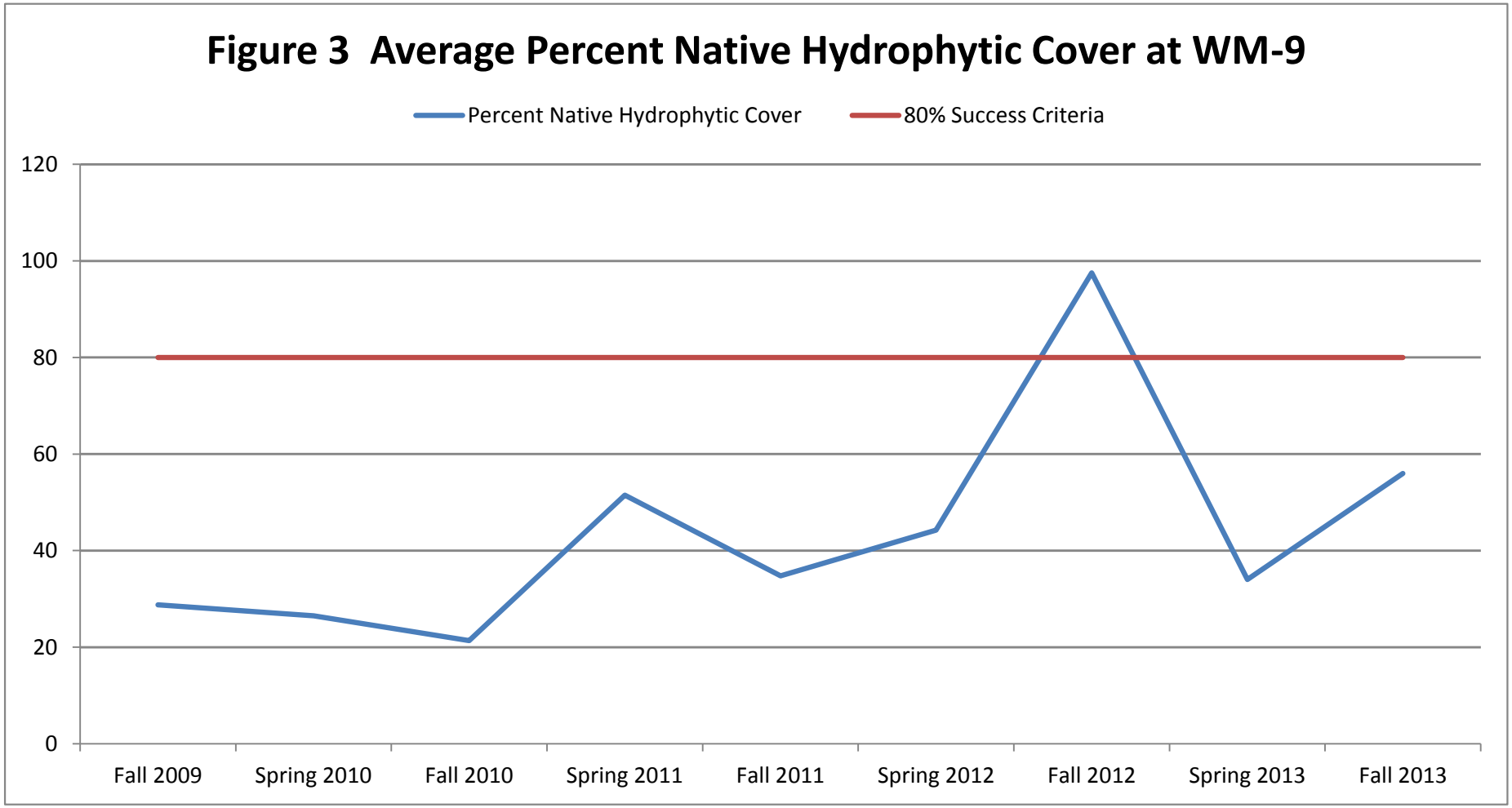
N

Source: Wilson & Company 2013 Aerial Photography

Burns & McDonnell SINCE 1898

Figure 2
2013 CIR Aerial Photograph for
Wetland Mitigation 9 and the
Stream Mitigation Site
Water Treatment Plant - Douglas County
Metropolitan Utilities District

Figure 3 Average Percent Native Hydrophytic Cover at WM-9



SECTION H-2

TABLES

Table 1 Summary of Wetland Monitoring Data for WM-9

Wetland Name: **WM-9**
Wetland Type: **PEM**
County: **Douglas**

Number of Transects/Macroplots: **2**
Number of Gradsects: **4**
Number of Sample Plots: **20**
Number of Wetland Sample Plots: **10**

Sampling Effort: **2013 Fall**

Weighted Average: **2.37**
Species Richness: **18**
Species Diversity: **11.27**
FQI: **14.30**

Percent Native Species: **83**
Percent Invasive Species: **39**
Percent Perennial/Biennial/Annual Species **89 / 0 / 11**
Mean C-Value: **3.69**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Bromus inermis	Smooth brome	NL	7.5
Salix amygdaloides	Peachleaf willow	FACW	6.75
Salix interior	Sandbar willow	NL	11.5
Spartina pectinata	Prairie cordgrass	FACW	29.75

Sampling Effort: **2013 Spring**

Weighted Average: **2.74**
Species Richness: **14**
Species Diversity: **19.71**
FQI: **12.90**

Percent Native Species: **79**
Percent Invasive Species: **43**
Percent Perennial/Biennial/Annual Species **100 / 0 / 7**
Mean C-Value: **3.89**

Dominant Species:

Scientific Name	Common Name	Wetland Indicator Status	Percent Cover per Wetland
Bromus inermis	Smooth brome	NL	7.5
Calystegia sepium	Hedge false bindwee	FAC	10
Salix interior	Sandbar willow	NL	8.25
Spartina pectinata	Prairie cordgrass	FACW	9

Table 2 Species List and Vegetative Characteristics for WM-9

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Fall**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Ambrosia trifida	Great ragweed	FACW	2	0	Native	☑	1	1.50
Boehmeria cylindrica	Smallspike false nettle	OBL	1	6	Native	☐	1	0.25
Bouteloua curtipendula	Sideoats grama	NL	3	5	Native	☐	1	3.75
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	2	7.50
Calystegia sepium	Hedge false bindweed	FAC	3	1	Native & Introduced	☑	1	0.25
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	1	3.75
Elymus virginicus	Virginia wildrye	FAC	3	4	Native	☐	1	1.50
Festuca arundinacea	Tall fescue	FACU	4		Introduced	☑	1	6.25
Lycopus americanus	American water horehound	OBL	1	4	Native	☑	2	1.75
Panicum virgatum	Switchgrass	FAC	3	4	Native	☐	1	3.75
Populus deltoides	Eastern cottonwood	FAC	3	3	Native	☐	1	1.50
Rumex crispus	Curly dock	FACW	2		Introduced	☑	1	1.50
Salix amygdaloides	Peachleaf willow	FACW	2	4	Native	☐	3	6.75
Salix interior	Sandbar willow	NL	3	3	Native	☐	3	11.50
Schoenoplectus fluviatilis	River bulrush	OBL	1		Native	☐	1	1.50
Schoenoplectus tabernaemont	Softstem bulrush	OBL	1	5	Native	☐	1	3.75
Setaria pumila ssp. pumila	Yellow foxtail	FAC	3		Introduced	☑	1	1.50
Spartina pectinata	Prairie cordgrass	FACW	2	5	Native	☐	9	29.75

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

Table 2 Species List and Vegetative Characteristics for WM-9

Report generated:
Thursday, January 02, 2014

Sampling Effort: **2013 Spring**

Scientific Name	Common Name	Wetland Indicator Status[1]	Ecological Index[2]	C-Value	Native Status	Invasive?	Frequency[3]	Average Percent Cover[4]
Boehmeria cylindrica	Smallspike false nettle	OBL	1	6	Native	☐	1	1.50
Bromus inermis	Smooth brome	NL	3		Native & Introduced	☑	2	7.50
Calystegia sepium	Hedge false bindweed	FAC	3	1	Native & Introduced	☑	2	10.00
Carex vulpinoidea	Fox sedge	OBL	1	4	Native	☐	1	3.75
Eleocharis erythropoda	Bald spikerush	OBL	1	5	Native	☐	1	1.50
Elymus virginicus	Virginia wildrye	FAC	3	4	Native	☐	2	3.00
Festuca arundinacea	Tall fescue	FACU	4		Introduced	☑	1	6.25
Medicago lupulina	Black medick	FAC	3		Introduced	☑	1	1.50
Poa pratensis	Kentucky bluegrass	FACU	4		Native & Introduced	☑	2	5.25
Populus deltoides	Eastern cottonwood	FAC	3	3	Native	☐	1	1.50
Rumex crispus	Curly dock	FACW	2		Introduced	☑	2	1.75
Salix amygdaloides	Peachleaf willow	FACW	2	4	Native	☐	1	3.75
Salix interior	Sandbar willow	NL	3	3	Native	☐	4	8.25
Spartina pectinata	Prairie cordgrass	FACW	2	5	Native	☐	3	9.00

1 = OBL - obligate; FACW - facultative wet; FAC - facultative; FACU - facultative upland; UPL - upland; NI - no indicator

2 = Ecological Index values correspond to the wetland indicator status for each species

3 = Frequency is the total number of plots in which the species was identified

4 = Average percent cover is calcuated from the coverages estimated during this monitoring effort.

SECTION H-3

MITIGATION SITE WM-9 GROUND PHOTOGRAPHS

Photo 1: View north of Transect 1 in WM-9 (June 2013).

Photo 2: View east of Gradsect 1 on Transect 1 in WM-9 (June 2013).

Photo 3: View east of Gradsect 2 on Transect 1 in WM-9 (June 2013).

Photo 4: View south of Transect 2 in WM-9 (June 2013).

Photo 5: View southeast of Gradsect 1 on Transect 2 in WM-9 (June 2013).

Photo 6: View southeast of Gradsect 2 on Transect 2 in WM-9 (June 2013).

Photo 7: View north of Transect 1 in WM-9 (September 2013).

Photo 8: View east of Gradsect 1 on Transect 1 in WM-9 (September 2013).

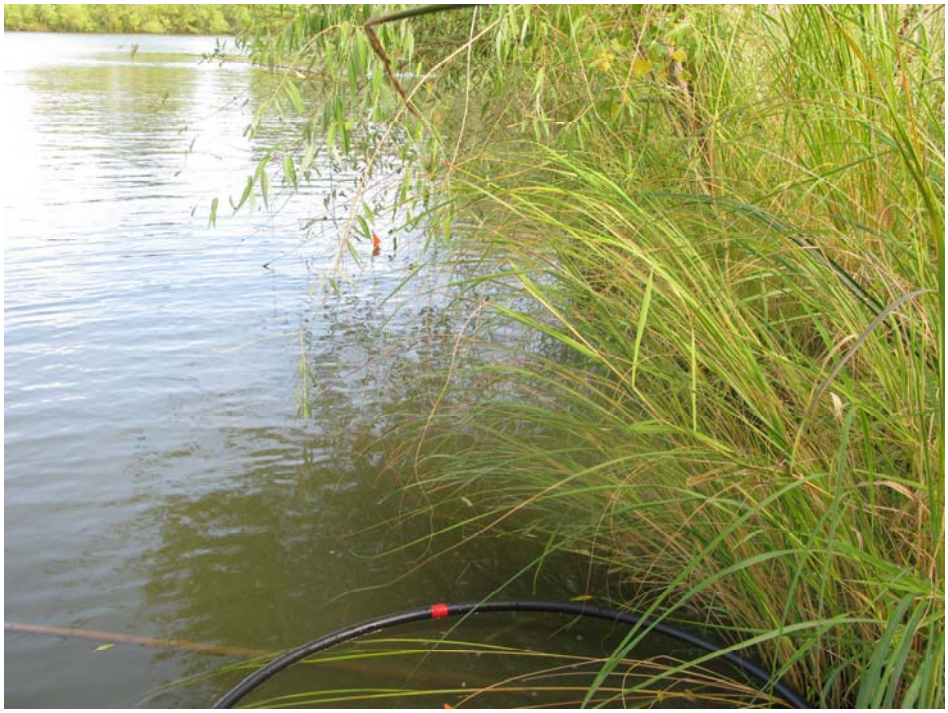


Photo 9: View east of Gradsect 2 on Transect 1 in WM-9 (September 2013).

Photo 10: View south of Transect 2 in WM-9 (September 2013).

Photo 11: View southeast of Gradsect 1 on Transect 2 in WM-9 (September 2013).

Photo 12: View southeast of Gradsect 2 on Transect 2 in WM-9 (September 2013).

SECTION H-4

WETLAND VEGETATION COVER AND WATER DEPTH RAW DATA SHEETS

Wetland Vegetation Cover and Water Depth at Wetland 9

Wetland Name: **WM-9**

Wetland Transect/Gradsect #: WM9-1-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Bromus inermis	3	4	6	6	6
Festuca arundinacea	5	6	3		
Helianthus tuberosus	4	4	4	4	
Melilotus officinalis	3	3			

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 9

Wetland Name: **WM-9**

Wetland Transect/Gradsect #: WM9-1-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Depth of Standing Water (in):	8	8	7.5	8.5	7
Open Water (in):	7	7	7	7	7
Bare Soil (in):	7	7	7	7	7
Spartina pectinata					3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 9

Wetland Name: **WM-9**

Wetland Transect/Gradsect #: WM9-2-1

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	7	6
Andropogon gerardii	4	3			3
Bromus arvensis			4		
Bromus inermis	3	3	4		4
Calystegia sepium				2	
Festuca arundinacea	5	6	5	4	4
Helianthus tuberosus	4	4			
Medicago lupulina					2
Melilotus officinalis			3	3	
Salix interior				3	4

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 9

Wetland Name: **WM-9**

Wetland Transect/Gradsect #: WM9-2-2

Sampling Date: 6/12/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Depth of Standing Water (in):			3.5	6	12
Open Water (in):			5	7	7
Bare Soil (in):	6	6	7	7	7
Boehmeria cylindrica		3			
Bromus inermis	4	4			
Calystegia sepium	4	5			
Carex vulpinoidea			4		
Eleocharis erythropoda			3		
Elymus virginicus		3	3		
Festuca arundinacea	5				
Medicago lupulina		3			
Poa pratensis	3	4			
Populus deltoides			3		
Rumex crispus		3	2		
Salix amygdaloides			4		
Salix interior	4	3	3	3	
Spartina pectinata		4		4	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 9

Wetland Name: **WM-9**

Wetland Transect/Gradsect #: WM9-1-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	5	6	6	6
Bromus inermis	5	5	6	5	5
Festuca arundinacea	6	5	4	4	4
Helianthus tuberosus		4	5	5	4
Poa pratensis				4	5
Setaria pumila ssp. pumila					4

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 9

Wetland Name: **WM-9**

Wetland Transect/Gradsect #: WM9-1-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Depth of Standing Water (in):	12	12	12	10	10
Open Water (in):	7	7	7	7	7
Bare Soil (in):	7	7	7	7	7
Lycopus americanus					2
Salix amygdaloides	3				
Schoenoplectus tabernaemont					4
Spartina pectinata	3	3		4	5

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 9

Wetland Name: **WM-9**

Wetland Transect/Gradsect #: WM9-2-1

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):					
Open Water (in):					
Bare Soil (in):	6	6	6	6	6
Andropogon gerardii	5	4			
Apocynum cannabinum			3		
Bouteloua curtipendula		5	5	3	4
Bromus arvensis			5		
Bromus inermis	4	4			
Calystegia sepium				4	
Conyza canadensis	3				
Festuca arundinacea	3	4	4	5	6
Helianthus tuberosus	4	4			3
Melilotus officinalis	4	3	5	4	4
Poa pratensis	5				
Salix interior		3	4	4	6
Setaria pumila ssp. pumila	4	3	3		
Trifolium repens	4		3	3	

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

Wetland Vegetation Cover and Water Depth at Wetland 9

Wetland Name: **WM-9**

Wetland Transect/Gradsect #: WM9-2-2

Sampling Date: 9/18/2013 **Last Rain Date:** **Last Rain Amount (in):** 0

Canopy Coverage Analysis	**Plot 1**	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**
Depth of Standing Water (in):			7	6	7
Open Water (in):			5	6	7
Bare Soil (in):	6	7	6	7	7
Ambrosia trifida	3				
Boehmeria cylindrica		2			
Bouteloua curtipendula	4				
Bromus inermis	4	4			
Calystegia sepium		2			
Carex vulpinoidea			4		
Elymus virginicus			3		
Festuca arundinacea	5				
Lycopus americanus				3	
Panicum virgatum	4				
Populus deltoides			3		
Rumex crispus		3			
Salix amygdaloides			3	4	
Salix interior	5		3	4	
Schoenoplectus fluviatilis					3
Setaria pumila ssp. pumila	3				
Spartina pectinata	4	3	4	5	3

Class 1: 0-1%; Class 2: 1-5%; Class 3: 5-25%; Class 4: 25-50%; Class 5: 50-75%; Class 6: 75-95%; Class 7: 95-100%

APPENDIX I - SECTION I

WATER TREATMENT PLANT MITIGATION SITE STREAM MITIGATION MONITORING DATA

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SECTION I-1

FIGURES

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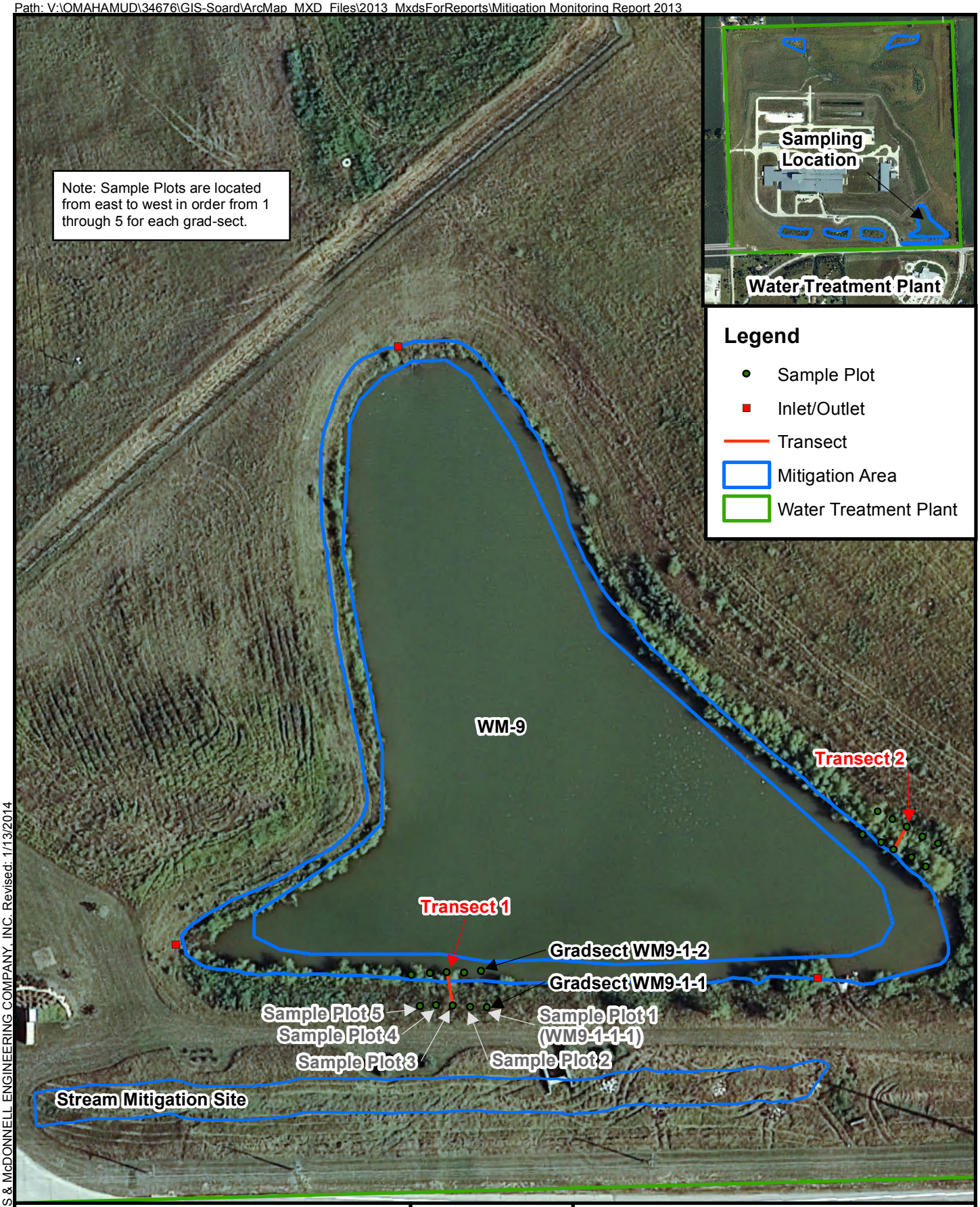

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0 30 60 90 120

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Source: Wilson & Company 2013 Aerial Photography

Burns & McDonnell SINCE 1898

Figure 1
Sample Plot Location Map for
Wetland Mitigation 9 and the
Stream Mitigation Site
Water Treatment Plant - Douglas County
Metropolitan Utilities District

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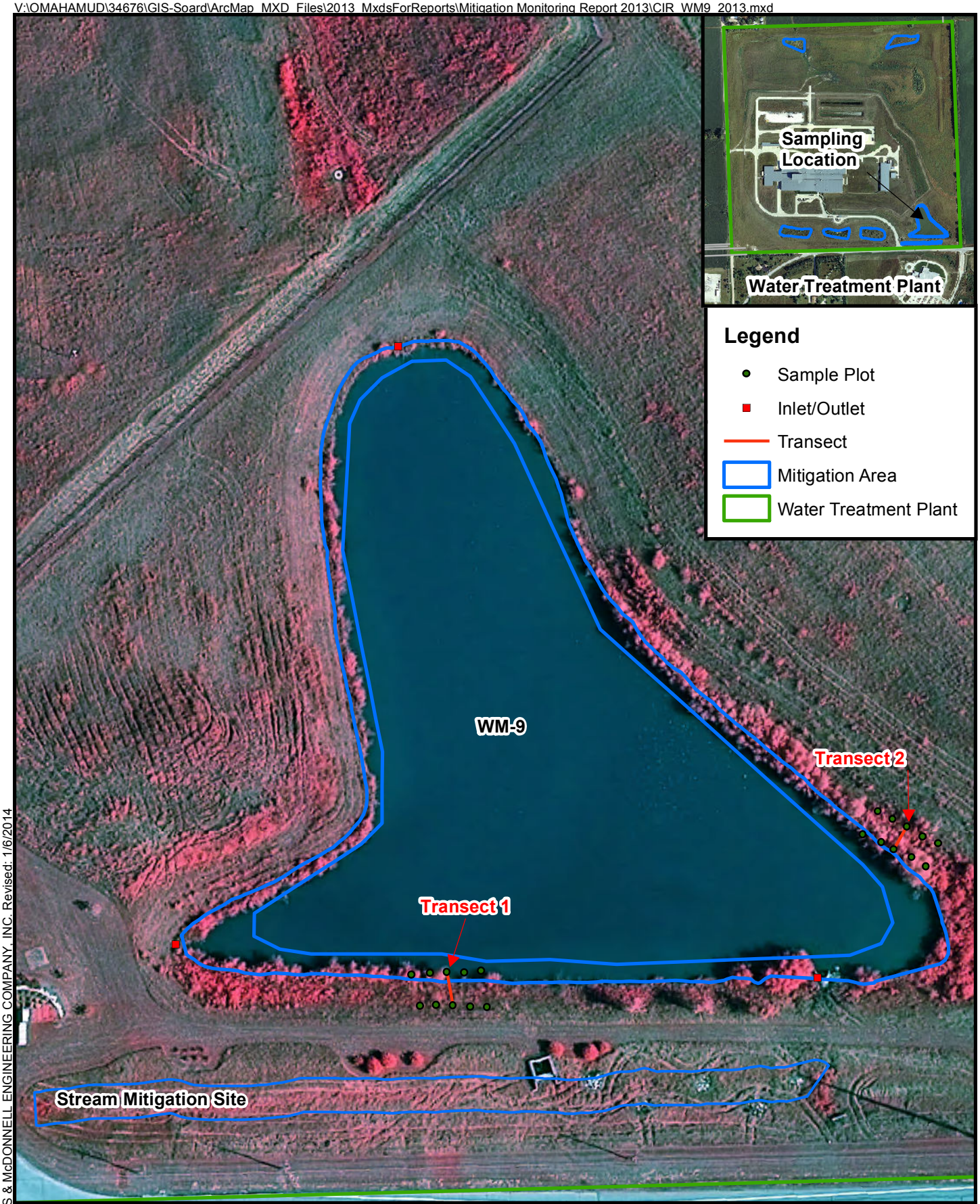

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0 30 60 90 120 Feet

N

Source: Wilson & Company 2013 Aerial Photography

Burns & McDonnell SINCE 1898

Figure 2
2013 CIR Aerial Photograph for
Wetland Mitigation 9 and the
Stream Mitigation Site
Water Treatment Plant - Douglas County
Metropolitan Utilities District

SECTION I-2

STREAM MITIGATION GROUND PHOTOGRAPHS

Photo 1: View east of the Stream Mitigation Site (June 2013).

Photo 2: View west of the Stream Mitigation Site (June 2013).

Photo 3: View east of the Stream Mitigation Site (June 2013).

Photo 4: View west of the Stream Mitigation Site bank (June 2013).

Photo 5: View east of the Stream Mitigation Site (September 2013).

Photo 6: View west of the Stream Mitigation Site (September 2013).

Photo 7: View east of the Stream Mitigation Site (September 2013).

Photo 8: View west of the Stream Mitigation Site bank (September 2013).

APPENDIX II

HYDROLOGICAL DATA

APPENDIX II

HYDROLOGICAL DATA

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Figure 1 2013 Piezometer Readings at the Phase I and Phase II Wet Meadow Mitigation Sites (WM-1 and WM-2)

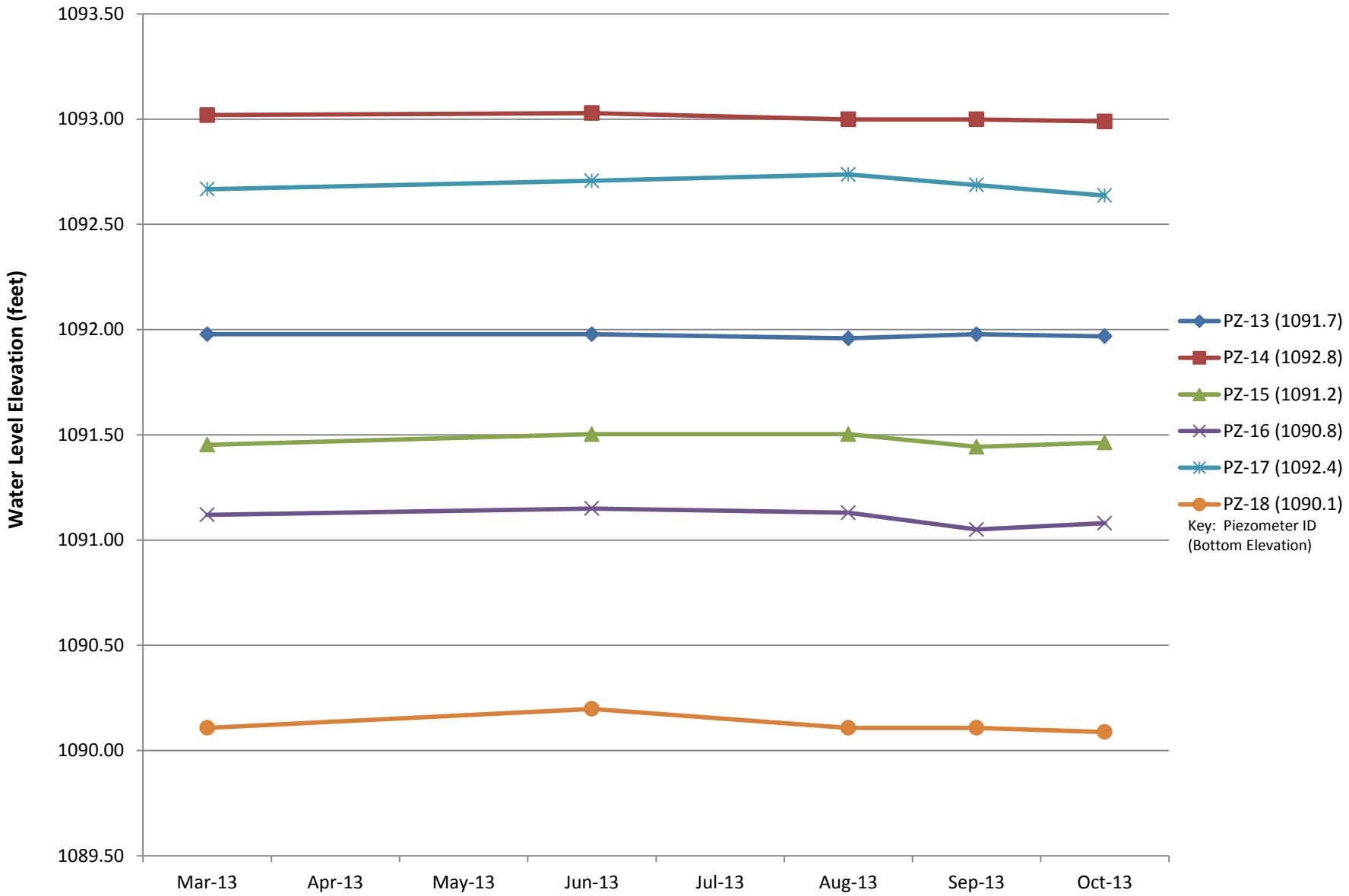


Figure 2 2013 Total Monthly Precipitation
Fremont, NE

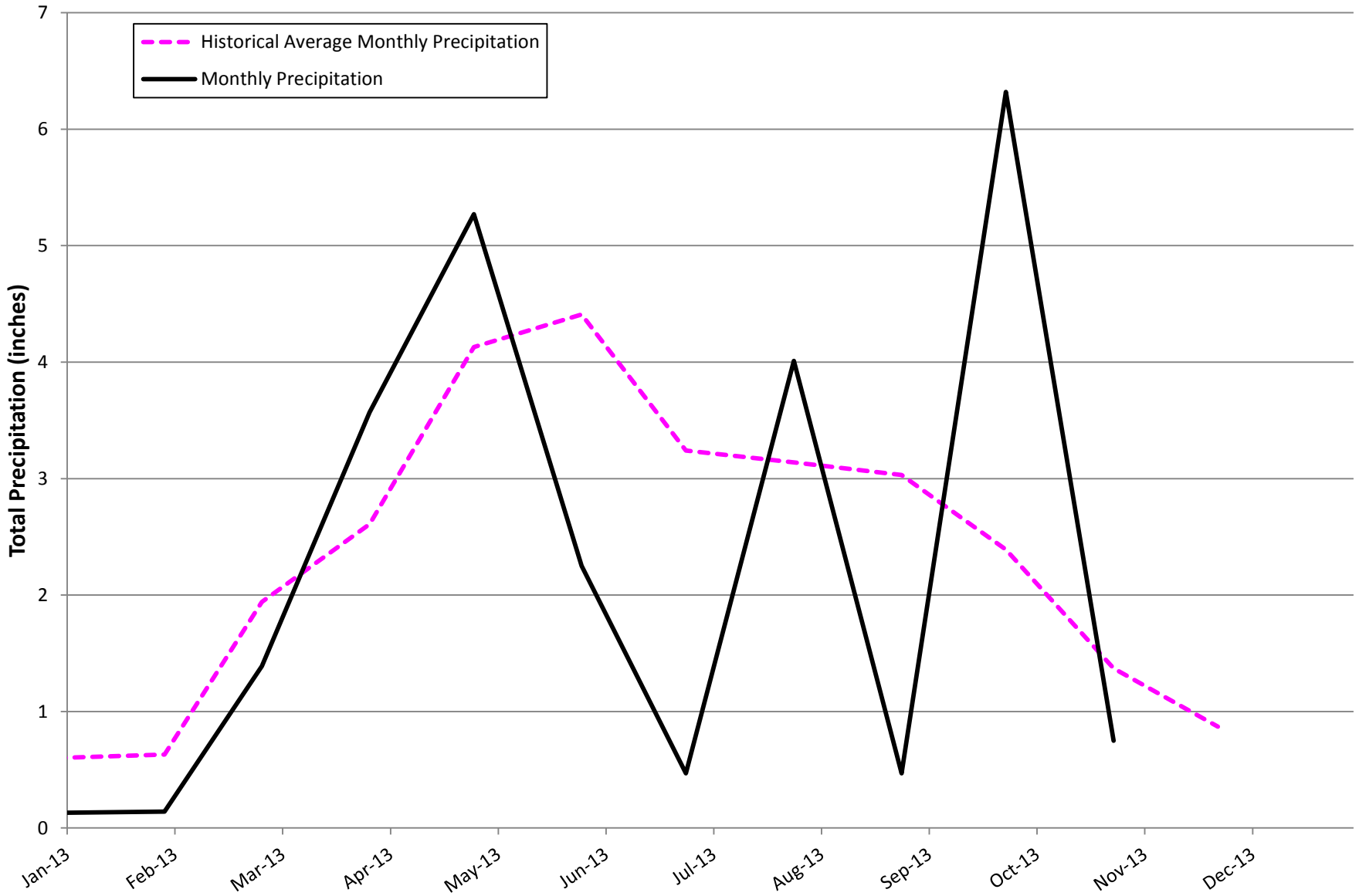


Figure 3 2013 Monthly Average Ambient Air Temperature
Fremont, NE

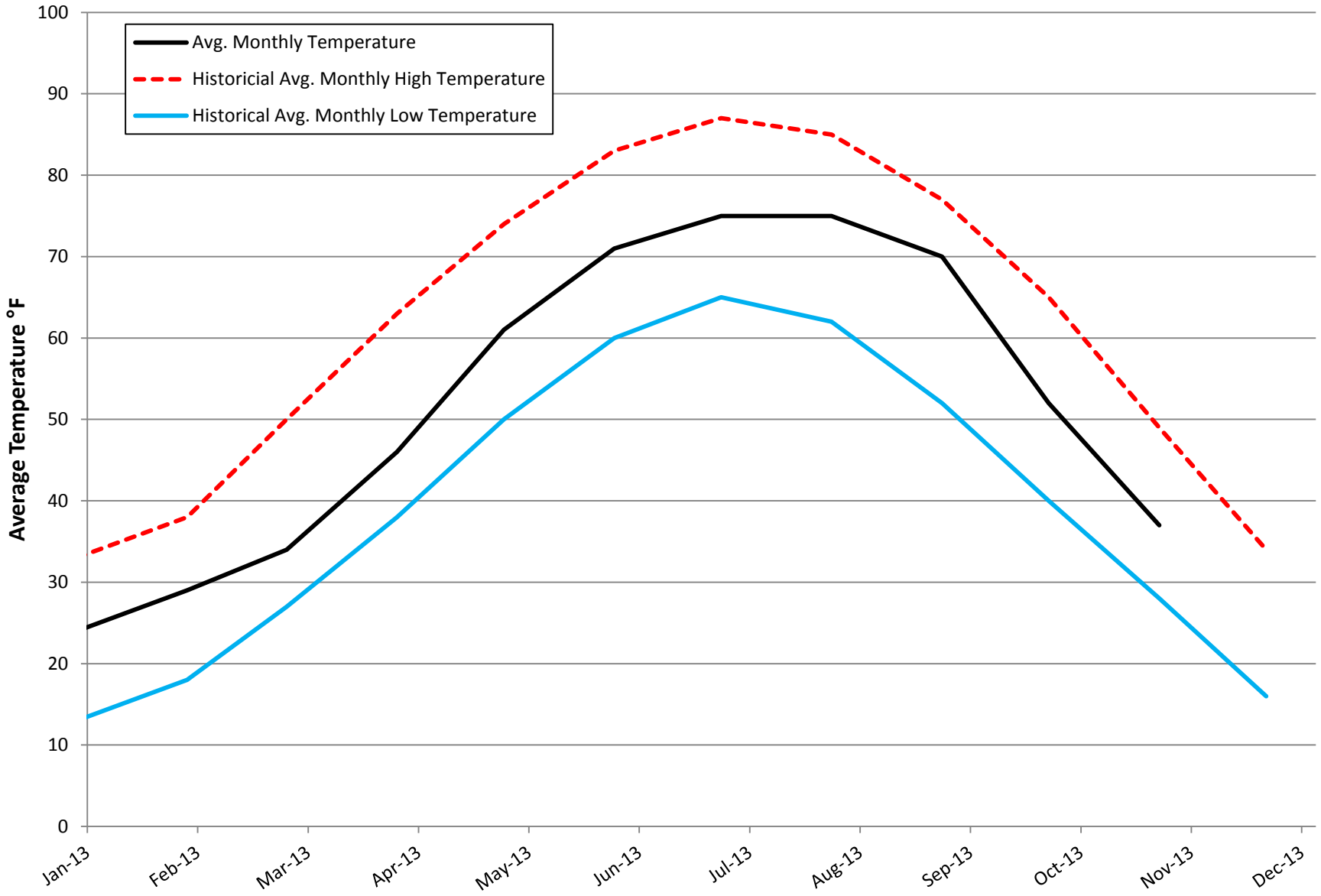
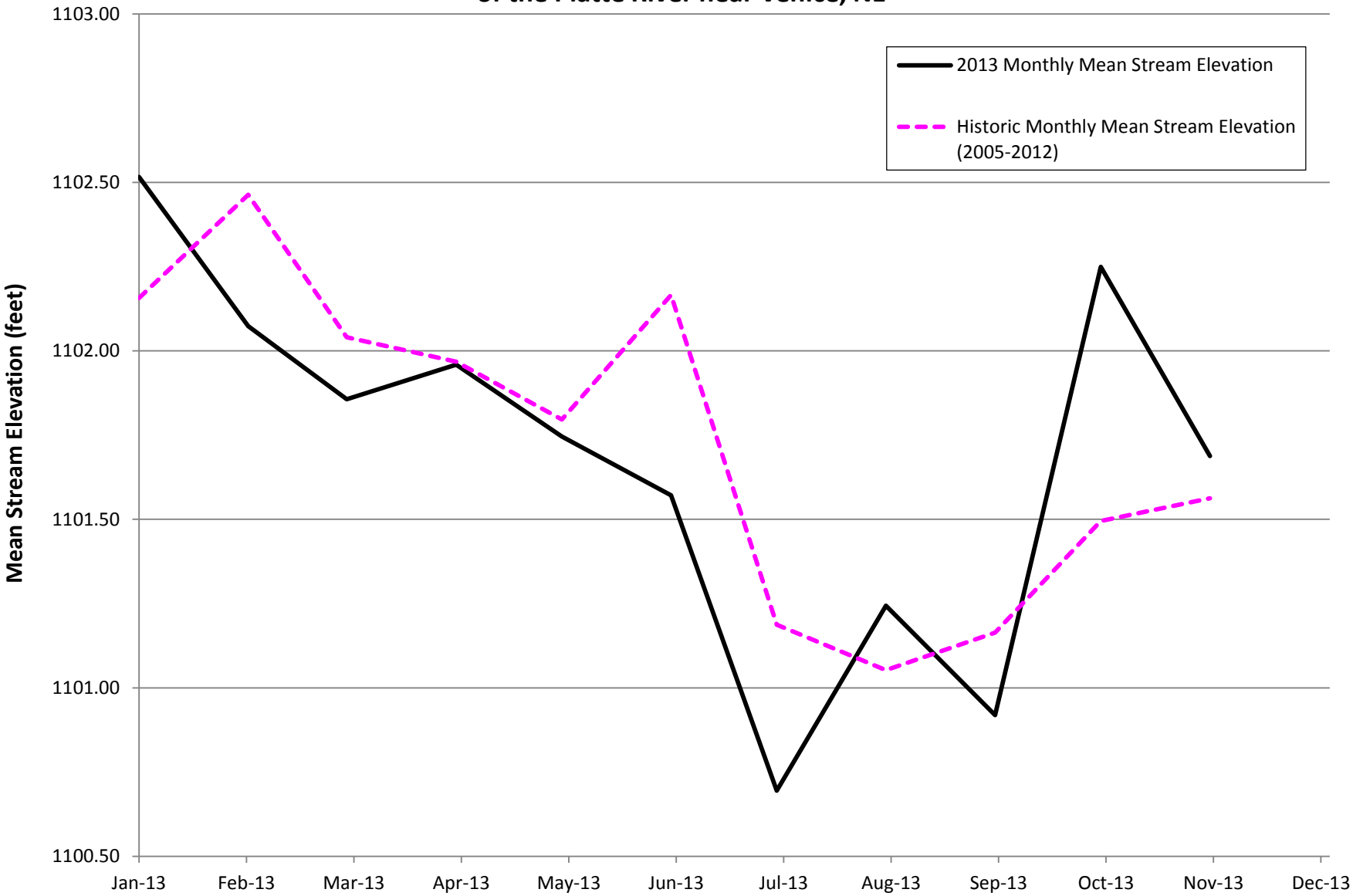
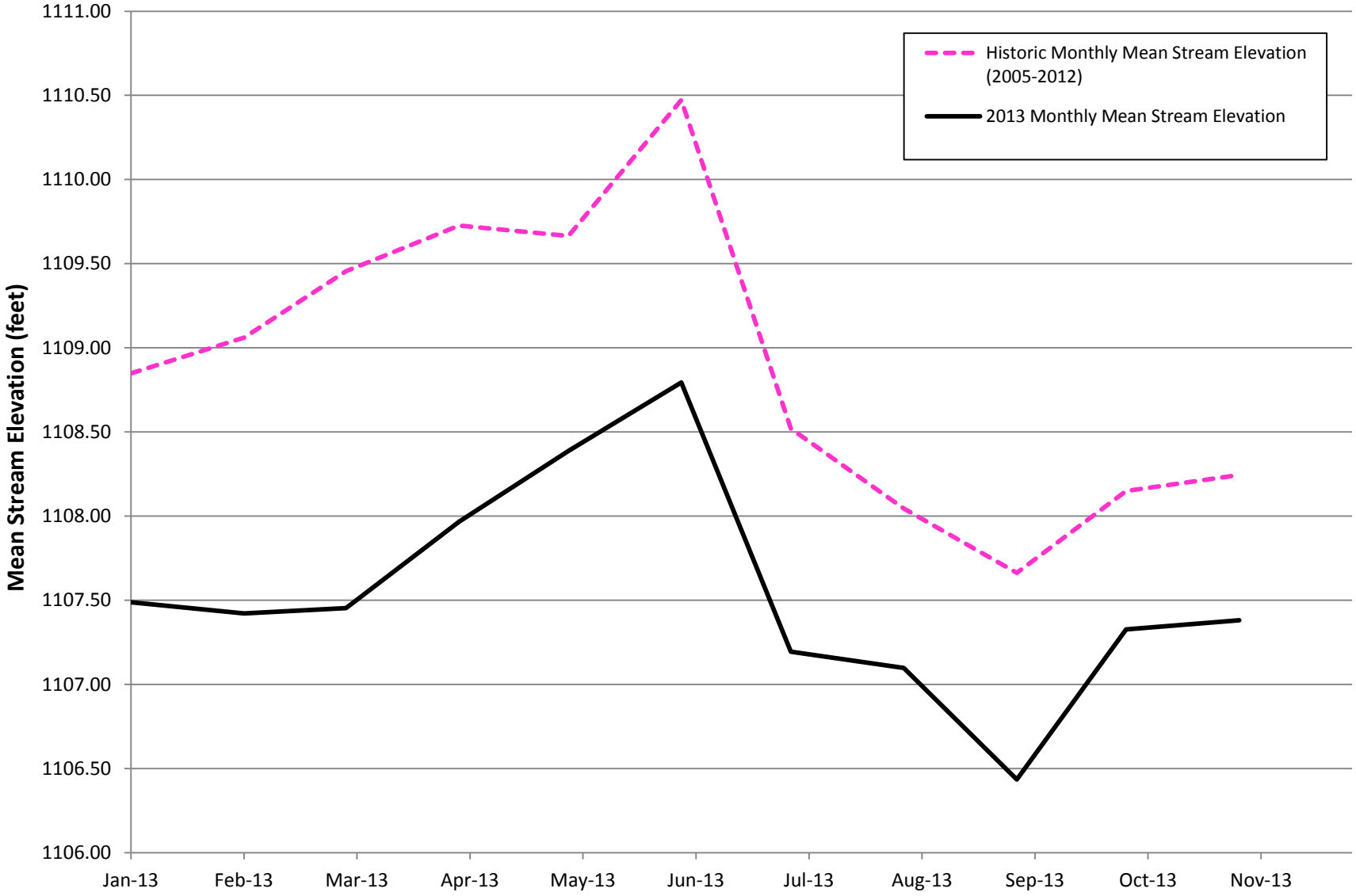


Figure 4 2013 Monthly Mean Stream Elevation of the Platte River near Venice, NE



Source: USGS. 2013b. National Water Information System: Platte River near Venice, Nebraska 06796550.

Figure 5 2013 Monthly Mean Stream Elevation of the Elkhorn River at Waterloo, NE



Source: USGS. 2013a. National Water Information System: Elkhorn River at Waterloo, Nebraska 06800500.

APPENDIX III

WM-1 COMPLETION LETTER

June 4, 2013

Mr. John P. Snowdon
U.S. Army Corps of Engineers, Omaha District
Wehrspann Field Office
8901 South 154th Street, Suite 1
Omaha, NE 68138-3621

Re: Completion of Monitoring Requirements at Wetland Mitigation Site WM-1
Metropolitan Utilities District
Platte West Water Production Facilities Project
Burns & McDonnell Project No.: 60787

Dear Mr. Snowdon:

Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell), on behalf of the Metropolitan Utilities District (District), would like to respectfully request confirmation of the completion of monitoring requirements at the Wet Meadow Mitigation Site (WM-1) located in the Saunders County well field, Saunders County, Nebraska. Burns & McDonnell has completed six full years of monitoring at WM-1 and the site is meeting all success criteria established in the Mitigation Plan for Wetland Impacts – Phase I (Mitigation Plan) prepared by Burns & McDonnell in 2005 and approved by the U.S. Army Corps of Engineers (USACE). For a detailed account of the most recent monitoring effort at WM-1, please refer to the 2012 Annual Mitigation Site Monitoring Report (Burns & McDonnell 2013).

Mitigation Site Requirements

A total of 0.3 acre of wetlands were permanently impacted due to the construction of the Project in the two well fields. These impacts were mitigated at a 1.5 to 1.0 (created wetlands to impacted wetlands) ratio. As a result, approximately 0.45 acre of wetlands was required for up-front well field construction mitigation. The 3.3-acre WM-1 mitigation site was constructed in 2005 in agricultural land adjacent to the wet meadow in the Saunders County well field. This is approximately 2.85 acres of wetlands more than is currently required for mitigation. The acreage of wetland created above the required 0.45 acre will be retained as mitigation credit and applied towards any necessary Phase II mitigation requirements.

Success Criteria

The Mitigation Plan included specific requirements that needed to be accomplished. The mitigation efforts will be considered successful at a given mitigation site if the following criteria occur:

1. Eighty percent cover of native wetland vegetation will be established in the created emergent wetlands and along the banks of the created stream channel.
2. Positive indicators of hydric soils such as low chroma dominant colors, redoximorphic features, or oxidized rhizospheres are found in the created emergent wetlands.

3. Positive indicators of wetland hydrology such as inundation, saturation in the upper 12 inches of the soil, watermarks, and drift lines are found in the created emergent wetlands.

Monitoring Results

WM-1 has been monitored twice each year since construction completion in 2005 following the protocols outlined in the Mitigation Plan. WM-1 meets all three of the success criteria described above.

1. The mean percent cover of native wetland vegetation was 90.0 percent in 2012 (a drought year). In 2011, the percent cover of native wetland vegetation was 115.4.
2. The soils sampled at each of the sample plots in WM-1 demonstrated hydric soil characteristics with low chroma matrix colors and prominent, distinct mottling. Hydric soil indicators F3 Depleted (Gray) Matrix and F7 Depleted Dark Surface were met.
3. Indicators of hydrology in WM-1 included drainage patterns, the FAC Neutral Test, and geomorphic position.

A total of approximately 3.3 acres of emergent wetland has been created at WM-1. Because WM-1 meets all three monitoring goals and has been successfully established, it should not require additional monitoring. This letter has been prepared to formally request a signed letter of compliance for the completion of mitigation monitoring requirements at WM-1.

If you have any questions or require any additional information to process this request, please do not hesitate to contact me by telephone at (816) 822-4330 or by email at ssoard@burnsmcd.com.

Sincerely,

Sarah Soard, PWS
Project Manager

cc: Kevin Tobin, Metropolitan Utilities District
Mike Gilbert, USACE