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1.0 Introduction

Under contractual agreement with the Michigan Department of Natural Resources (MDNR), Wilcox Professional Services, LLC (Wilcox) has prepared this wetland mitigation monitoring report. This report shall serve as the first annual monitoring report as required by Michigan Department of Environmental Quality (MDEQ) Permit No. 08-71-0017-P. Copies of the MDEQ permit and approved wetland mitigation (i.e., Black Mountain Mitigation Site Plan and Design Justification Report) are included in Appendix A. The MDEQ permit required a minimum of 1.14 acres of new forested wetland be constructed to offset wetland impacts from relocation of a section of the Black Mountain Snowmobile Trail. This monitoring report was prepared by Mr. Brian Huebner of Wilcox using guidance presented in the MDEQ “Model Mitigation Monitoring Plan”. A visit to the mitigation site was performed by Mr. Huebner on August 9, 2012. The visit was preceded by normal seasonal conditions (i.e., “dry season”). Approximately 4 to 5 hours were spent on-site during the evaluation. Mr. Huebner was accompanied by Ms. Jennifer Nemeth of the MDNR for a portion of the visit.

2.0 Project Location and Description

The mitigation site is located in Section 1, North Allis Township, Presque Isle County, Michigan in the “Ocqueoc” watershed (MDEQ “Michigan Wetland Mitigation Banking Watersheds”). The location and boundaries of the mitigation site are depicted on the Site Location and Wetland Mitigation Diagrams in Appendix B.

A description of the proposed wetland mitigation was presented in the MDEQ-approved Black Mountain Mitigation Site Plan and Design Justification Report prepared by Gould Engineering, Inc. of Flint, Michigan and Niswander Environmental, LLC of Brighton, Michigan, respectively. Copies of these documents are included in Appendix A. Construction of the wetland mitigation was completed in October, 2010. The wetland mitigation was designed to result in a shallow excavation that intersected the seasonal groundwater table. The wetland mitigation was designed to be characterized by seasonally saturated soil conditions capable of and supporting forested wetland habitat.

The mitigation wetland was constructed by excavating and grading the proposed mitigation area to a point approximately six to nine inches below the desired final grades. When initial grading was completed, organic rich, sandy topsoil soil was used to bring the mitigation area up to the final grades. Habitat structures were installed and the area planted with trees and seeded with the prescribed seed mixtures. Final conditions in the mitigation area immediately following construction were documented in two MDOT Daily Inspection Reports completed by Niswander Environmental (copies included in Appendix A). It was noted the planting and seeding was performed under seasonally wet conditions.

3.0 Mitigation Monitoring Requirements and Performance Standards

The constructed wetland was to be monitored for a period of five years beginning the first growing season following construction. Upon completing construction of the wetland mitigation, a final set of “as-built” plans prepared by a registered engineer was to be submitted to the MDEQ and the mitigation area was to be placed in a MDEQ conservation easement. The approximate limits of the conservation easement were to be identified in the field with signs.

Monitoring requirements were presented in the MDEQ permit (i.e., Wetland Mitigation Monitoring, Items 24 through 25, pages 7 and 8 of the permit). The MDEQ permit indicated annual monitoring reports are due by January 31 of the year following the respective annual monitoring (i.e., 2012 monitoring results are to be presented to the MDEQ by January 31, 2013).

Performance standards were presented in the MDEQ permit (Wetland Mitigation Performance Standards, Items 21a through 21i, pages 5, 6 and 7 of the permit). The following is a summary of those standards.
1. (21a) Construction has been completed in accordance with the MDEQ permit.
2. (21b) The wetland mitigation area is characterized by the presence of water at a frequency and duration sufficient to support a predominance of wetland vegetation and the types specified in the mitigation plan at the end of the monitoring period.
3. (21c) A layer of high-quality soil is placed over the entire created wetland at a minimum thickness of 6 inches.
4. (21d) The wetland mitigation area shall be free of oil, grease, debris and other contaminants.
5. (21e) A minimum of 6 habitat structures, consisting of at least 3 types, have been placed per acre of wetland mitigation.
6. (21f) Mean percent cover of native wetland species in the herbaceous layer at the end of the monitoring period is not less than 80 percent.

    Extensive open water and areas having no emergent and/or floating vegetation shall not exceed 20 percent of the mitigation area.

    Extensive areas of bare soil shall not exceed 5 percent of the mitigation area.

    The total cover of wetland species in each plot shall be averaged for plots taken in the same wetland type to obtain a mean percent cover for each wetland type.

7. (21g) The mitigation wetland supports a predominance of wetland vegetation in each vegetative layer, represented by a minimum number of native wetland species, at the end of the monitoring period. The minimum number of native wetland species per wetland type shall not be less than 15 species within the forested wetland.

8. (21h) At the end of the monitoring period, the mitigation wetland supports a minimum of 300 individual surviving, established and free-to-grow trees per acre in the forested wetland that are classified as native wetland species consisting of at least three different species.

9. (21i) The mean percent cover of invasive species including, but not limited to, common reed (Phragmites australis), purple loosestrife (Lythrum salicaria) and canary grass (Phalaris arundinacea) shall in combination be limited to no more than 10 percent within each wetland type.

4.0 Methods

Mr. Brian Huebner of Wilcox visited the wetland mitigation area on August 9, 2012. Soil conditions were evaluated using a shovel and test excavation to depths of approximately 18 inches and/or a slotted soil probe pushed into the ground to depths up to approximately 24 inches. Soil conditions were noted in several areas throughout the mitigation area, including a majority of the sample plots. Soil texture was evaluated using criteria established by the Natural Resource Conservation Service (NRCS) and soil colors were determined using a Munsell® Color Chart.

Hydrology was evaluated through direct observation of standing water and visual evaluation of soil conditions during the monitoring visit (i.e., depth to groundwater or saturation) and/or visual indications of a persistent water table such as dried algae, water marks, etc. There were no staff gages or monitoring wells present at the site.

Vegetation was evaluated by walking over the wetland mitigation area and establishing two transects (T1 and T2) across representative portions of the wetland mitigation area. Based on visual evaluation of the vegetation community within the mitigation area and use of a species-area curve (Table 1 included in Appendix C), a total of eight sample plots (T1-S1 through T1-S5 and T2-S1 through T2-S3) were established at intervals along the transects. Sample plots consisted of a square meter formed using four, 1-inch diameter PVC pipe lengths cut to approximately 1 meter in length and connected to form a square meter. We also established five 30-foot radius sample plots centered on select square meter sample plots to document/evaluate the presence of woody plants (trees and shrubs) within the wetland mitigation areas. The number of trees and shrubs, species and general estimate of specimen health within each 30-foot radius plot was tallied. The approximate location of sample transects and sample plots are depicted on the Wetland Mitigation Diagram in Appendix B. In addition, we also noted the presence of vegetation in the wetland mitigation area outside of the sample plots.
Total vegetative cover was estimated in each square meter sample plot. Plant species were identified and assigned a relative percentage of cover within the vegetated portions of the sample plot. Results from vegetation sampling in the sample plots were compiled and used to generate calculations of species richness, Shannon's diversity index ($H'$) and evenness for the sampled area.

Species richness is the number of species present within a specific sample plot. It is a simple measure of diversity that does not take into account relative abundances.

Shannon's diversity index ($H'$) is a measure of species diversity in a community which takes into account the relative abundance of different species. $H'$ is calculated using the following formula where $S$ is the total number of species in the sample plot (species richness) and $p_i$ is the fraction of individuals belonging to the $i$-th species.

$$H' = - \sum_{i=1}^{S} p_i \ln p_i$$

The higher the $H'$, the more diverse the species community.

Evenness ($E$) is the relative abundance or proportion of individuals among the species. Evenness is calculated using the following formula where $S$ is the total number of species in the sample plot (species richness):

$$E = \frac{H'}{\ln(S)}$$

Evenness ranges between 0 and 1 with 1 being complete evenness.

Calculations of species richness, Shannon’s diversity index and species evenness provide results that can be used to compare the development of the plant community between monitoring events.

The wetland indicator status for vegetation noted during the evaluation was obtained from either the United States Fish & Wildlife Service (USFWS) National List of Plant Species that Occur in Wetlands for USFWS Region 3 or the MDNR Floristic Quality Assessment for the State of Michigan. The wetland indicator status is a measure of the relative tendency of a particular species to occur in wetlands under normal conditions. The following is a summary of the indicator categories and the estimated probability the species is located in a wetland:

- **Obligate (Obl)** Probability >99%
- **Facultative Wetland (FacW)** Probability 67% - 99%
- **Facultative (Fac)** Probability 34% - 66%
- **Facultative Upland (FacU)** Probability 1% - 33%
- **Upland (Upl)** Probability <1%

Apparent animal use/presence was evaluated through direct observation and/or indirect observation of tracks, hair, feathers, scat, etc.

The approximate limits of the MDEQ conservation easement were identified in the field with signs placed along the outer limits of the conservation easement area. Signs were constructed of metal sign posts driven into the ground and topped with an aluminum billet bearing words consistent with MDEQ permit requirements. A total of nine signs were placed. The signs were in good condition at the time of the 2012 visit. A typical sign is depicted in the photographs included in Appendix D (i.e., Photo 14).

5.0 Data Collected and Results

Soil

Information presented in the MDOT Daily Inspection Reports (Appendix B) indicated the mitigation area had been covered with topsoil that met with design specifications (i.e., appropriate thickness of “rich loamy sand with peat”). Photographs documenting the placement of suitable soil in the mitigation area were included with the MDOT Daily Inspection Reports.
Results of the soil evaluation during the monitoring visit indicated soil in most portions of the wetland mitigation area consists of an average of approximately six inches very dark gray (10YR3/1) to black (10YR2/1) loamy sand with high organic content underlain by brown (10YR4/3 to 7.5YR4/3) sand. The upper layer of organic-rich loamy sand varied in thickness between approximately 3 to 10 inches throughout most portions of the mitigation area. In some areas, particularly the vicinity of sample plots T2-S1 and T2-S3, the upper layer of loamy sand was underlain by brown (7.5YR5/4) clay with few to common strong brown (7.5YR5/6) and few light gray (10YR7/1) mottles.

Hydrology

There were no areas of standing water in the wetland mitigation area during the 2012 monitoring visit. However, based on visual observation of dried algae, water marks and areas with little vegetation and cracked soil surface, it appeared portions of the wetland mitigation area are seasonally inundated with water six or more inches deep. The approximate limits of areas characterized by seasonal standing water are depicted on the Wetland Mitigation Diagram in Appendix B. During our visit, soil in the wetland mitigation area was not saturated within the upper 24 inches except in some of the lower areas characterized by seasonal standing water. Soil in these areas was saturated areas at depths of approximately 12 to 18 inches below the ground surface (bgs). It is noted the monitoring visit was conducted during a normally dry time of the season. Based on the results of visual evaluation of hydrology indicators in and near the wetland mitigation area, it appears hydrology within the wetland mitigation area is strongly affected by a water table that fluctuates significantly on a seasonal basis.

Vegetation

A summary of vegetation noted in the wetland mitigation area and samples plots is presented on the following tables in Appendix C:

- Table 2. Summary of Vegetation in Wetland Mitigation Area Sample Plots on August 9, 2012
- Table 3. Summary of Trees/Shrubs in Select Wetland Mitigation Area Sample Plots on August 9, 2012
- Table 4. Summary of Vegetation Noted in Wetland Mitigation Area on August 9, 2012

Table 2 depicts information obtained from specific square meter sample plots and includes reference to wetland indicator status, non-native/invasive species (NNIS) status, total cover, relative percent cover, frequency, species richness, Shannon’s diversity index and species evenness. Table 3 depicts information obtained from specific 30-foot radius plots and includes a tally of the number and species of trees and shrubs in the respective plots. Table 4 includes a summary of all vegetation noted in the wetland mitigation area at the time of the monitoring visit.

At the time of the 2012 monitoring visit, the wetland mitigation area consisted predominantly of wet meadow with some shallow water emergent (i.e., marsh) habitat. At least 39 different species were noted in the wetland mitigation area (Table 4), with at least 27 represented in the sample plots (Table 2). Of the species noted in the overall wetland mitigation area, four were typically considered NNIS such as bluegrass (*Poa pratensis*; Fac), Canada thistle (*Cirsium arvense*; FacU), rough fruited cinquefoil (*Potentilla recta*; Upl) and purple loosestrife. Some of the vegetation noted during the visit could not be identified due to immature specimens and/or lack of characteristic features that would allow rapid identification, particularly with respect to some grasses, rushes and sedges. Attempts will be made to identify these species as the vegetation community matures.

Vegetation cover in the square meter sample plots (Table 2) ranged between approximately 70 and 100 percent with an average (mean) cover of approximately 90 percent. The total cover of native plant species in the sample plots with an indicator status of Fac or wetter was approximately 82 percent. Species richness ranged between 4 and 14, with an average of 9.0; Shannon’s diversity index ranged between 0.708 and 2.292 with an average of 1.71 and species evenness ranged between 0.511 and 0.939 with an average of 0.79. Approximately 89 percent of the species in the sample plots (i.e., 24 out of 27) were native species as indicated in the MDNR Floristic Quality Assessment (FQA) for the State of Michigan, including at least 11 species of grasses, sedges or rushes. Based on results of the sample plot data, NNIS comprised approximately 6 percent of the total cover within the combined area of the sample plots. The most prevalent NNIS was bluegrass (*Poa* sp., assumed *P. pratensis*; Fac), which comprised approximately 4 percent of the cover.
In the 30-foot radius plots (Table 3), the number of trees and shrubs varied between 1 and 15. Many of the trees and shrubs were dead. Those that were not dead were in fair to poor conditions except for tag alder (*Alnus rugosa*; Obi), which generally appeared in fair to good condition. The total number of surviving trees within the plots was 26, which is equivalent to approximately 81 to 82 trees/shrubs per acre of wetland mitigation (i.e., each 30-foot sample plot is approximately 2,826 square feet in size and there are 43,560 square feet per acre). At least 5 different woody species were present in the planted specimens. In addition, there were willow (*Salix* sp.) seedlings noted in portions of the wetland mitigation area. These seedlings may mature and become large enough to be tallied during future monitoring visits.

**Animal Use/Presence**

Animals noted in the wetland mitigation area during the monitoring visit included leopard frogs and various songbirds. Indirect observation of tracks, hair, feathers, etc. indicated the wetland mitigation area is visited by white tail deer and wading birds.

### 6.0 Results Vs Performance Standards

1. **Construction has been completed in accordance with the MDEQ permit.**

   Based on review of site conditions, most portions of the wetland mitigation area have been constructed in general accordance with the plans included with the MDEQ permit. Based on results of the initial monitoring visit, it appears the constructed wetland mitigation area is approximately 1.3 acres in size, which is greater than the 1.14 acres required by the MDEQ permit.

2. **The wetland mitigation area is characterized by the presence of water at a frequency and duration sufficient to support a predominance of wetland vegetation and the types specified in the mitigation plan at the end of the monitoring period.**

   Based on results of visual evaluation of surface water hydrology and apparent soil conditions, it appeared a majority of the wetland mitigation area was characterized by wetland hydrology with some areas seasonally inundated with water six or more inches deep. The approximate limits of standing water are depicted on the Wetland Mitigation Diagram in Appendix B. The areas characterized by seasonally standing water appear to have been too wet to support the planted trees and shrubs and trees. Based on our observations and past experience, Wilcox is of the opinion these areas are likely to continue being too wet to support a predominance of trees through the initial 5-year monitoring period required by the MDEQ permit. Based on our observations and past experience, Wilcox is of the opinion the wetland mitigation area will develop into a combination of wet meadow and scrub-shrub habitat over time. Corrective measures and/or continued monitoring will be required to facilitate/evaluate development of the wetland mitigation area into forested wetland.

3. **A layer of high-quality soil is placed over the entire created wetland at a minimum thickness of 6 inches.**

   Based on observations during construction and the results of soil probes performed during the monitoring visits, it appears topsoil consisted of an average of approximately six inches of loamy sand with high organic content. Based on visual evaluation and our past experience, Wilcox is of the opinion the topsoil meets requirements of the MDEQ permit.

4. **The wetland mitigation area shall be free of oil, grease, debris and other contaminants.**

   Based on visual evaluation of conditions present during the monitoring visit, Wilcox did not note the presence of oil, grease, debris or other contaminants in the wetland mitigation area. However, there were small areas in which sediment (sand) had been deposited into the wetland mitigation area as a result of erosion from adjoining uplands (i.e., soil excavated from the wetland mitigation area during construction), particularly along the middle of the north limits of the wetland mitigation area (depicted in the Site Photographs in Appendix D; Photo 13). The approximate location of sediment in the mitigation area is depicted on the Wetland Mitigation Diagram.
5. A minimum of 6 habitat structures, consisting of at least 3 types, have been placed per acre of wetland mitigation.

At least 10 habitat structures were placed in the wetland mitigation area. Structures included the following:

- 1 tree stump with root ball
- 4 logs with root balls laid horizontally
- 3 logs
- 2 trees with root balls laid horizontally

Typical structures are evident in the photographs included in Appendix D. Based on the size of the new wetland in the wetland mitigation area (i.e., approximately 1.3 acres), approximately 7 to 8 structures have been placed per acre of wetland mitigation.

6. Mean percent cover of native wetland species in the herbaceous layer at the end of the monitoring period is not less than 80 percent.

Based on results of data obtained from vegetation sampling during the 2011 visit (Table 1), the mean percent cover of native wetland species in the wetland mitigation areas is approximately 82 percent.

Extensive open water and areas having no emergent and/or floating vegetation shall not exceed 20 percent of the mitigation area.

There were no significant areas of open water with no emergent and/or floating vegetation.

Extensive areas of bare soil shall not exceed 5 percent of the mitigation area.

There were no extensive areas (i.e., greater than 436 square feet) of bare soil in the mitigation area.

The total cover of wetland species in each plot shall be averaged for plots taken in the same wetland type to obtain a mean percent cover for each wetland type.

The mean percent cover of wetland species in the sample plots was approximately 90 percent. For purposes of this evaluation, the entire wetland mitigation area was considered on wetland type.

7. The mitigation wetland supports a predominance of wetland vegetation in each vegetative layer, represented by a minimum number of native wetland species, at the end of the monitoring period. The minimum number of native wetland species per wetland type shall not be less than 15 species.

Based on results of data obtained from vegetation sampling, each of the sampled plots supported a predominance of wetland vegetation (Table 2). The total cover of native wetland vegetation in the area of the sample plots was approximately 90 percent. The wetland mitigation area currently supports at least 35 native wetland species, including at least 14 different species of grasses, sedges or rushes (Table 4).

8. At the end of the monitoring period, the mitigation wetland supports a minimum of 300 individual surviving, established and free-to-grow trees per acre in the forested wetland that area classified as native wetland species consisting of at least three different species.

Based on results of data obtained from vegetation sampling, the wetland mitigation area currently supports an average of approximately 80 to 85 surviving and established trees/shrubs per acre. Trees/shrubs are represented by three native trees species and 2 native shrub species.
9. The mean percent cover of invasive species including, but not limited to, common reed (Phragmites australis), purple loosestrife (Lythrum salicaria) and canary grass (Phalaris arundinacea) shall in combination be limited to no more than 10 percent within each wetland type.

Based on results of data obtained from the sample plots, the total cover of NNIS in the wetland mitigation area was approximately 6 percent. The most prevalent NNIS was bluegrass which comprised approximately 4 percent of the total cover in the sample plots. Based on visual evaluation, it appeared the total cover of NNIS in the overall wetland mitigation area was less than 6 percent.

7.0 Problems Encountered and Corrective Measures

There were four problems noted in the wetland mitigation area. These problems are summarized as follows and discussed further in the following paragraphs.

- Some areas appear too wet with water too deep to support trees and shrubs (i.e., less forested wetland habitat in the wetland mitigation area than required by the MDEQ permit).
- High planted tree mortality.
- Presence of NNIS portions of the wetland mitigation area.
- Presence of sediment in portions of the wetland mitigation area.

Some areas appear too wet with water too deep to support trees and shrubs (i.e., less forested habitat within the wetland mitigation area than required by the MDEQ permit).

Based on results of visual evaluation and the “as-built” survey, it appeared approximately half of the wetland mitigation area consists of habitat characterized by seasonally standing water up to six or more inches deep. These areas are depicted on the Wetland Mitigation Diagram in Appendix B and generally correspond with those areas planned for excavation and finish grade of elevation 676 and below as depicted on the mitigation plan drawing prepared by Niswander and Gould Engineering (Appendix A). Based on observations during the monitoring visit and our past experience, it appears likely at least portions of these wet areas will remain too wet to support a predominance of trees and/or shrubs. Additional monitoring would be required to observe and document seasonal water levels in the mitigation area. It is possible over time that woody vegetation may become established in these wetter areas, particularly if there is a period of unusually low water table for one or more growing seasons.

If required by the MDEQ, corrective measures to improve the suitability of the wetland mitigation area to support woody vegetation may include one or more of the following.

- Install one or more staff gages and/or monitoring wells in the wetland mitigation area to monitor and document water levels (elevations) in the lower areas. Staff gages will allow a more reliable reference point for estimating seasonal variations in water levels. Frequent visits to document water levels, particularly during the early part of the growing season would assist in determining what elevation would be most appropriate to establish a forested wetland. Electronic meters are available to monitor groundwater fluctuations in monitoring wells on a frequent basis for extended periods of time.
- Raise the elevation of the ground surface throughout the lower areas by building them up with suitable topsoil. Additional monitoring and evaluation may be prudent to determine the most appropriate elevation. However, based on our observations during the monitoring visit and assuming the mitigation area was constructed to plan grades, Wilcox is of the opinion raising the lower areas to approximate elevation 676.25 to 676.5 may be more conducive to the persistent growth of woody vegetation.
• Create discreet mounds of soil/growing substrate for trees within the lower areas. Mounds could be created from individual piles of soil, logs and/or stumps buried with soil, etc. to form hummocks similar to those resulting from wind throw and falling trees in some natural settings. The top of any mounds should be set, at least initially, approximately ½ foot or more above the anticipated high seasonal water level. The mounds would then be planted with select wetland tree and/or shrub species as desired. In addition to those species specified in the MDEQ-approved mitigation plan, some tree species that may be considered include, but are not necessarily limited to, northern white-cedar (*Thuja occidentalis*), silver maple (*Acer saccharinum*), American elm (*Ulmus americana*), balsam poplar (*Populus balsamifera*) and yellow birch (*Betula alleghaniensis*). Both black and green ash (*Fraxinus nigra* and *F. pennsylvanica*) may also be considered. However, these may not be acceptable to the MDEQ due to their susceptibility to the emerald ash borer.

• Plant tree species in lower areas that are more tolerant of the anticipated depth and period of inundation and saturation. Some species that may be considered include those presented in the previous paragraph.

**High planted tree mortality.**

During the monitoring visit, it appeared a majority of planted trees and shrubs were dead, dying or in poor condition except for tag alder, of which most appeared to be in fair to good condition. As a result, there are not as many trees as required to meet MDEQ permit requirements for forested wetlands. The primary reason for the high mortality appears to be soil that is seasonally inundated or saturated with water for a period of time that is too long to support the planted specimens. It also appears there may have been some mortality due to foraging by deer.

If required by the MDEQ, corrective measures to improve the suitability of the wetland mitigation area to support woody vegetation may include one or more of the following.

• Improve growing conditions by raising the ground elevation in areas that will be planted with trees.
• Plant more trees to include those specified in the MDEQ-approved mitigation plan and presented above.
• Plant new trees using seedlings and/or whips obtained from nearby wetland areas with similar hydrology.
• Plant new trees with nursery stock grown under conditions similar to those at the mitigation site.
• Protect planted trees with fencing to reduce foraging.

**Presence of NNIS in portions of the wetland mitigation area.**

Based on results of vegetation sampling in the combined area of all sample plots, NNIS comprised approximately six percent of the mean cover within the combined area of the sample plots. A total of four different NNIS were noted in the overall wetland mitigation area. The most prevalent NNIS was bluegrass which comprised approximately 4 percent of the total cover. Bluegrass is a “weedy” species capable of quickly spreading in disturbed areas. Its presence may decrease as the vegetation community matures.

At this time, the total cover of NNIS does not exceed 10 percent as specified in the MDEQ permit. However, it may be prudent to continue visual evaluation and reduce the presence of NNIS, possibly by physical removal and/or chemical treatment of established clumps. Please be advised that approval should be obtained from the MDEQ prior to any herbicide application. Areas disturbed by NNIS removal should be re-seeded with a mixture of wetland species.

**Presence of sediment in portions of the wetland mitigation area.**

There were small areas in which sediment (sand) had been deposited into the wetland mitigation area as a result of erosion from adjoining uplands. The approximate location of sediment in the mitigation area is depicted on the Wetland Mitigation Diagram. At this time, the sediment has not reduced the area of created wetland significantly, nor does it appear that continued erosion and sedimentation will significantly reduce the area of created wetland.
If required by the MDEQ, corrective measures to reduce the presence of sediment in the wetland mitigation area may include one or more of the following.

- Remove accumulated sediment from the wetland mitigation area.
- Repair/install new silt fence in areas down slope of unstable soil adjacent to the mitigation area. Note: remove silt fencing once soil has been stabilized by vegetation.
- Seed/stabilize slopes adjacent to the wetland mitigation area as appropriate. Based on observed conditions, a mixture of native grasses and forbs tolerant of dry sandy conditions may be prudent.

8.0 Photographic Log

Select photographs depicting typical conditions in the wetland mitigation area at the time of the 2012 monitoring visit are included in Appendix D. The approximate locations from which the photographs were taken are indicated on the Wetland Mitigation Diagram in Appendix B.

9.0 Summary and Conclusions

Based on results of the monitoring visit and wetland delineation and survey, it appears the area of created wetlands is approximately 1.3 acres in size, which is greater than the 1.14 acres required by the MDEQ permit. Most portions of the wetland mitigation area appeared to consist of wet meadow with some developing marsh, though it appears much of the wetland mitigation area may develop into forested/scrub-shrub and wet meadow habitat over time. Total cover of vegetation in the wetland mitigation area was relatively high (approximately 90 to 100 percent) in most areas. Vegetation in the wetland mitigation area was dominated by native wetland species with a relatively low percentage of NNIS. Based on the results of the monitoring, it appears the wetland mitigation has been constructed as required by the MDEQ permit with four potential problems as noted in Section 7.0. Continued monitoring is required to evaluate progress toward the final performance requirements stated in the MDEQ permit and refine opinions regarding potential corrective measures, if required.

10.0 General Comments

This monitoring report was performed in accordance with accepted procedures in conducting wetland mitigation monitoring. Our conclusion reflects our professional opinion based on conditions present at the time of the evaluation. No warranties, implied or expressed, are made. It is expressly understood that Wilcox assumes no responsibility for reporting to any federal, state or local authority or private parties, information disclosed by this or any future phase of work performed at this site. Please be advised the MDEQ does have regulatory authority regarding wetlands on the site. Discrepancies may arise between current and future evaluation of wetlands on the site due to changes in vegetation and/or hydrology.

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Wetland Scientist     Project Professional