

JURISDICTIONAL WATERS DELINEATION REPORT – FINAL

**West Michigan Shoreline Regional Development Commission
Muskegon, Michigan**

**Amoco Fish & Wildlife Habitat Restoration Project
23.26-Acre Site
1640 Lakeshore Drive
Muskegon, Muskegon County, Michigan**

July 24, 2019



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1. INTRODUCTION

This report presents the findings of jurisdictional water of the United States (WOTUS) identification and boundary delineation conducted for a 23.26-acre property located north of Lakeshore Drive, in the City of Muskegon, Muskegon County, Michigan (i.e., the Site; see [Figure 1](#)). The objective of this report is to provide information regarding the presence and location of freshwater wetland and other regulated WOTUS that may exist on the Site. This delineation report was prepared by O'Brien & Gere, part of Ramboll (OBG) for West Michigan Shoreline Regional Development Commission (WMSRDC).

1.1 SITE DESCRIPTION

1.1.1 Historic Information

The Site is located on the former Amoco Tank Farm which lies within the Muskegon Lake Area of Concern (AOC). Historic uses of the Site included lumber storage and sawmill operations in the late-1800s; and the storage and transfer of bulk petroleum products and marine and pipeline terminal related activities from 1922 to approximately 1992.

1.1.2 Existing Conditions

The project location includes the open-water shoreline west by northwest of the property and a coastal wetland south of a concrete wall (between shoreline bike trail and the railroad tracks). A portion of the Site is also located south of the railroad tracks, within a fenced-in area, and consists of upland habitat dominated by invasive species. One abandoned building is also located within the southern portion of the Site.

The Site is located within a residential and commercial area along Muskegon Lake. The areas outside the fenced-in Site are highly utilized by the local community for walking, running, biking, and fishing. The areas outside of the Site, along Muskegon Lake, are part of a Muskegon Lake Aquatic Habitat and Shoreline Restoration; a restoration project being conducted by the Great Lakes Commission, in partnership with the West Michigan Shoreline Regional Development Commission.

The Site is located within the Muskegon Lake/Muskegon River watershed (HUC 040601021004). According to the Federal Emergency Management Agency (FEMA) Flood Rate Map Service Center, the Site is within the Special Flood Hazard Area (Zone AE) and the 0.2% Annual Chance Flood Hazard Area. The southern portion of the Site, south of the railroad tracks is in an Area of Minimal Flood Hazard (Zone X). The FEMA Floodplain map is included herein as [Appendix A](#).

2. DELINEATION METHODS

Delineation field activities were conducted by OBG on May 22nd and 23rd, 2019. Appended to this report are the Muskegon County Hydric Soils List (soils located on-site highlighted; [Appendix B](#)), Wetland Determination Data Forms generated during the field activities ([Appendix C](#)), and site photographs ([Appendix D](#)) depicting field conditions observed on-site. County soil survey information and National Wetland Inventory (NWI) mapping of the project area are also included in this report ([Figures 2](#) and [3](#), respectively). The delineation was conducted in accordance with the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: North Central Northeast Region (Version 2.0) (Regional Supplement) (USACE 2012).

2.1 WETLANDS

The United States Army Corps of Engineers (USACE) and the United States Environmental Protection Agency (USEPA) jointly define wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions [33 CFR 328.3(b), 40 CFR 230.3(t)]. Criteria used to identify a wetland, as defined therein, consist of the following:

- The prevalent vegetation is hydrophytic (water tolerant)
- The soils observed have been classified as hydric, and/or anaerobic (reducing) conditions have developed in the soils
- The area is either permanently or periodically inundated at mean water depths less than or equal to 6.6 feet, or the soil is permanently or periodically saturated to the surface during the growing season.

To make a positive wetland determination, a minimum of one wetland indicator from each criterion (vegetation, soil, and hydrology) must be identified. The Routine Determination Method outlined in USACE (Environmental Laboratory 1987) was used in conjunction with procedures outlined in the Regional Supplement to identify and delineate wetlands within the survey area. Routine determinations involve simple, rapidly applied methods that result in sufficient qualitative data for identifying wetland and non-wetland areas. The Routine Determination Method consists of a combination of off-site data review and on-site inspection.

Desk-top review activities included an evaluation of available information regarding environmental conditions within the survey area. On-site activities consisted of collecting the field data required to identify and delineate wetland boundaries. Field data were gathered at sample plots (referred to herein as test sites) chosen in potential wetland areas, as well as in corresponding adjacent upland areas. While information obtained from off-site sources, such as the National Wetland Inventory Map and the Soil Survey Map for Muskegon County, were consulted during this wetland delineation, final wetland determinations were made based on information observed in the field. The following describes the approach used to complete the wetland identification and delineation effort.

2.1.1 Vegetation

The criterion for wetland vegetation is a dominance of hydrophytic (water tolerant) species. A species is considered hydrophytic per USACE methodology if it is classified either as obligate (OBL), facultative wet (FACW), or facultative (FAC) in The National Wetland Plant List, 2016 Update (NWPL; Lichvar 2016). A dominance of hydrophytes requires that more than 50% of the vegetative species in an area are classified as hydrophytic. In accordance with USACE methodology, observations of vegetation focus on dominant vegetative species in four categories: trees (minimum 3-inch diameter at breast height), saplings/shrubs (less than 3-inch diameter and greater than 3.28 ft. tall), herbs, and woody vines. Botanical and common names are referenced from The National Wetland Plant List.

Plant community types at the Site were visually evaluated and their dominant component species identified. Wetland indicator status was obtained from the NWPL, if available, for each species identified and recorded on the field data sheet. If greater than 50% of the dominant species in the plant community were observed to have

an indicator status of facultative (FAC) or wetter (FACW, OBL), then a hydrophytic vegetative community was determined to be present.

2.1.2 Hydrology

Prospective wetland areas were examined at the Site for the presence of hydrology in the areas occupied by the hydrophytic plant community. According to USACE methodology, wetland hydrology may include (but is not limited to) one or more of the following parameters: permanent or periodic inundation, water marks, aquatic fauna, reducing conditions, drift deposits, high water table, sparsely vegetated concave surface, sediment deposits, water stained leaves, or soil saturation to the surface during the growing season. If wetland hydrologic indicators were observed, then the area was considered to contain wetland hydrology.

2.1.3 Soils

Observed soil characteristics in the field were compared to the mapped soil descriptions from the soil survey since characteristics can vary from mapped description due to the scale at which the soil mapping was performed. Soil physical characteristics were evaluated up to 20 inches below ground surface (bgs) unless shallower refusal occurred. Soil color was evaluated using Munsell Soil Color Charts (Munsell 2000). Soil characteristics were compared to hydric soil criteria from the USACE methodologies.

Samples of the soil substrate in the prospective wetland areas at the Site were examined at each location. The characteristics of the soil were compared to hydric soil indicators as prescribed by the USACE Manual and Regional Supplement. If the soils were observed to have positive hydric soil indicators (histosol, aquatic moisture regime, low chroma colors, etc.), then hydric soil was considered to be present.

If all of the above characteristics (hydrophytic vegetation, wetland hydrology, and hydric soils) were found to be present in a prospective wetland area, the area was identified as a wetland. If any of the above characteristics were absent in a prospective wetland area, then the area was not considered a wetland. The point between the area where all three of these criteria were present and the area where at least one of these criteria was absent was defined as the wetland border.

2.2 NON-WETLAND WOTUS

In addition to wetlands, other potential WOTUS were identified and delineated during this study. In accordance with USACE and USEPA Clean Water Act regulations (33 CFR 328.3(a)), other WOTUS may include streams, drainages, and ponds. Potential streams were evaluated using current USACE methods, the USACE Jurisdictional Determination Form Instructional Guidebook (USACE 2008), and regulatory guidance provided in response to the Rapanos decision (USEPA/USACE 2008) and the 2015 Clean Water Rule (USEPA/USACE) 2015). Streams were classified as either perennial, intermittent, or ephemeral systems based on observed conditions in the field, desk-top information, evidence of bed and bank characteristics (*i.e.*, ordinary high-water mark) and other hydrologic indicators.

3. DELINEATION FINDINGS

Presented below are the findings from the desk-top review and on-site activities that were completed for this project.

3.1 DESK-TOP FINDINGS

OBG’s desk-top investigations included a review of available information from the following sources:

- Muskegon County Soil Survey
- Muskegon County, Michigan Hydric Soils List
- National Wetland Inventory (NWI) Map
- Regional Monthly Climatic Records

3.1.1 Muskegon County Soil Survey

Soil survey information for Muskegon County, Michigan was obtained from the United States Department of Agriculture – Natural Resources Conservation Service online soil survey mapping website (USDA/NRCS 2017). The following soil types were identified for the Site, as shown in [Figure 2](#):

- Oxyaquic Udipsamments Urban land complex, nearly level (EtmabA)
- Plainfield Metea Spinks, 0 to 6 % slopes (PlfadB)

The EtmabA soil mapping unit consists of sandy lacustrine deposit derived parent material on lake plains. The upper soil profile consists of sand from 0 to 80 inches below ground surface (bgs). The natural drainage class is moderately well drained. Depth to water table is approximately 18 inches.

The PlfadB soil mapping unit consists of sandy lacustrine deposit derived parent material on lake plains. The upper soil profile consists of sand from 0 to 80 inches bgs. The natural drainage class is described as excessively drained. The depth to water table is more than 80 inches.

3.1.2 Hydric Soils in Muskegon County

According to the USDA/NRCS, none of the soil mapping units contained on the Site are considered hydric soils for Muskegon County, Michigan (see [Appendix B](#)).

3.1.3 National Wetland Inventory (NWI) Map

The United States Fish & Wildlife Services’ (USFWS 2016) NWI map ([Figure 3](#)) depicts an NWI freshwater pond or lake habitat, Muskegon Lake, on the northeastern portion of the Site. No other NWI habitats are mapped on the Site; however, palustrine forested and palustrine emergent NWI habitats are located just west of the Site.

3.1.4 Regional Monthly Climatic Records

Per the National Oceanic and Atmospheric Administration (NOAA) preliminary monthly climatic data the Muskegon Region received 4.28 inches of precipitation since May 1, a +1.96 departure from the normal observed value. During the dates of the field reconnaissance (May 22nd and 23rd, 2019), Muskegon received 0.31 inches of precipitation.

According to the USACE Detroit District, heavy precipitation and high flows have continued to contribute to rising lake levels all across the Great Lakes. Lake levels have risen 5 – 8 inches over the last month. (USACE 2019.) Therefore, climatic conditions were not considered normal at the Site during the period of the delineation due to the increased amount of rainfall and the Great Lakes being at record water levels which supports the observed high level of inundation at the Site.

3.2 ON-SITE FINDINGS

Two OBG biologists trained in wetland delineation and assessment performed the field activities on May 22nd and 23rd, 2019. On-Site activities included the evaluation of vegetative communities, hydrologic characteristics, and the soil substrate to identify and delineate wetland boundaries within the Site limits. Field data, if needed, were gathered at representative sample plots. Wetlands were identified based on the presence of three parameters:

- A vegetative community dominated by hydrophytes
- Inundated or saturated soil conditions, and/or indicators of hydrologic patterns.
- Hydric soils

A follow-up site visit was completed by a senior OBG plant ecologist on July 5, 2019 to observe vegetation that had not emerged or fruited during the May 2019 field reconnaissance. The findings of this additional vegetation survey are reported below in subsection 3.2.1.

3.2.1 Vegetation

The plant community where wetlands were present on the Site consisted of the following tree and shrub species: pin oak (*Quercus palustris*), red maple (*Acer rubrum*), silky dogwood (*Cornus amomum*), sandbar willow (*Salix interior*), red osier dogwood (*Cornus alba*), common elderberry (*Sambucus nigra*), Tatarian honeysuckle (*Lonicera tatarica*), cottonwood (*Populus deltoids*), slender willow (*Salix petiolaris*), and glossy buckthorn (*Rhamnus cathartica*), and box elder (*Acer negundo*).

Herbaceous species observed within Site wetlands included: wiregrass sedge (*Carex lasiocarpa*), narrowleaf cattail (*Typha angustifolia*), sandbar willow, Canada goldenrod (*Solidago canadensis*), field horsetail (*Equisetum arvense*), lake sedge (*Carex lacustris*), sensitive fern (*Onoclea sensibilis*), Virginia creeper (*Parthenocissus quinquefolia*), red osier dogwood, soft rush (*Juncus effuses*), silky dogwood, purple loosestrife (*Lythrum salicaria*), silverweed (*Potentilla anserine*), glossy buckthorn, redtop (*Agrostis gigantea*), yellow rocket (*Barbaria vulgaris*), blue joint (*Calamagrostis canadensis*), water sedge (*Carex aquatilis*), woolly fruit sedge (*Carex lasiocarpa*), cypress-like sedge (*Carex pseudocyperus*), spikerush (*Eleocharis* sp.), southern blue flag (*Iris virginica*), silverweed (*Potentilla anserine*), curly dock (*Rumex crispus*), and softstem bulrush (*Schoenoplectus tabernaemontani*).

The plant community where uplands were present on the Site consisted of the following tree and shrub species: sandbar willow, tree of heaven (*Ailanthus altissima*), black walnut (*Juglans nigra*), and white mulberry (*Morus alba*), Tartarian honeysuckle, box elder, and glossy buckthorn.

Herbaceous species observed where uplands were present included: Kentucky bluegrass (*Poa pratensis*), cleavers, (*Gallium aparine*), Canada goldenrod, red raspberry (*Rubus strigosus*), garlic mustard (*Allaria petiolate*), orchard grass (*Dactylis glomerata*), wiregrass sedge, yellow sweet clover (*Melilotus officinalis*), white clover (*Trifolium repens*), common dandelion (*Taraxacum officinale*), mugwort (*Artemisia vulgaris*), field horsetail, red osier dogwood, reed canary grass (*Phalaris arundinacea*), switchgrass (*Panicum virgatum*), spotted knapweed (*Centaurea stoebe*), and white mulberry (*Morus alba*). cheatgrass (*Bromus tectorum*), hairy bittergrass (*Cardamine hirsuta*), Virginia creeper, black raspberry (*Rubus occidentalis*), bladder campion (*Silene vulgaris*), Canada goldenrod (*Solidago canadensis*), and common bladderwort (*Utricularia vulgaris*).

Vegetation was recorded as part of the wetland delineation data collection, vegetation survey, and invasive species assessment. Plants were recorded for the wetland delineation test sites on the Wetland Determination Data Forms, which are included as [Appendix C](#).

A follow-up field reconnaissance was conducted by a senior OBG plant ecologist on July 5th, 2019 to record herbaceous species that had not yet emerged or fruited during the May 2019 field visit. The following additional species were observed during the July 2019 vegetation survey: American water plantain (*Alisma subcordata*), swamp milkweed (*Asclepias incarnata*), river rush (*Bolboschaenus fluviatilis*), Bebb's sedge (*Carex bebbii*), Porcupine sedge (*Carex hystericina*), fox sedge (*Carex vulpinodia*), grass-leaved goldenrod (*Euthamia*

graminifolia), Baltic rush (*Juncus balticus*), Knotted rush (*Juncus nodosua*), brownfruit rush (*Juncus pelocarpus*), path rush (*Juncus tenuis*), peachleaf willow (*Salix amygdaloides*), pussywillow (*Salix discolor*), black willow (*Salix nigra*), dark green bulrush (*Scirpus atrovirens*), boneset (*Eupatorium perfoliatum*), and marsh skullcap (*Scutellaria galericulata*).

3.2.2 Hydrology

The wetland hydrological indicators observed on the Site were documented as surface water, high water table, saturation, geomorphic position, microtopographic relief, and FAC-neutral test. Hydrologic indicators observed were recorded for the wetland delineation test sites on the Wetland Determination Data Forms, which are included as [Appendix C](#).

3.2.3 Soils

As previously reported, hydric soils were not documented on the Site. A total of 13 soil pits (i.e., test sites) were completed across the Site to depths of approximately 8 to 15 inches bgs. In general, the soils on Site were documented as containing sandy redox. Soils were documented as sandy. Soil conditions observed were recorded for the wetland delineation test sites on the Wetland Determination Data Forms, which are included as [Appendix C](#).

3.3 DELINEATED WETLANDS

When all three wetland criteria (hydric soils, dominance of hydrophytes, and wetland hydrology) were met, the area represented by the test site was identified as wetland. The delineated wetland boundaries within the survey area were identified in the field with sequentially numbered (A-1, A-2, A-3, etc.) orange surveyor markers (flagging tape tied to vegetation).

Wetland test site locations were identified in the field with blue striped surveyor flagging and labeled TS-1, TS-2, TS-3, etc. The wetland boundary and sample plot flagging locations were surveyed by the field biologists using a hand-held Trimble Global Positioning System (GPS) unit and subsequent post processing of the raw data. The post-processed GPS data represent sub-meter accuracy (see [Figure 4](#)). The wetlands delineated on-Site are summarized in [Table 1](#) below:

Table 1 – Delineated Wetland Resources

Wetland ID	Acreage	General Location on the Site	Cowardin Classification
A	1.76	Northwest	PEM/PSS
B	0.37	Northeast (Muskegon Lake shoreline)	PEM/PSS
C	0.16	Southwest	PEM/PSS
D	0.01	Southwest	PEM
E	8.61	North/Northeast/Northwest	PEM/PSS/PFO
F	0.84	Central	PFO/PEM
G	0.07	Northeast	PEM/PSS
Total Acreage	11.82		

Source: O'Brien & Gere

Wetland Determination Data Forms are included as [Appendix C](#). Representative photos of the wetlands delineated are included as [Appendix D](#).

3.3.1 Wetland A

Wetland A consists of an emergent and scrub-shrub wetland community that is dominated by narrowleaf cattail. Wetland A is located in the northeast portion of the Site and is almost entirely contained within a concrete wall structure. Identified wetlands outside the concrete wall are more representative of a scrub-shrub plant community. Using NWI nomenclature, this wetland is representative of a palustrine-emergent (PEM) and palustrine scrub-shrub (PSS) habitat.

3.3.2 Wetland B

Wetland B consists of an emergent and scrub-shrub wetland community that is dominated by young pin oak, red maple, sandbar willow, and wiregrass sedge. Wetland B is located along the Muskegon Lake shoreline to the northwest of the bike path. Using NWI nomenclature, this wetland is representative of a PEM/PSS habitat.

3.3.3 Wetland C

Wetland C consists of an emergent and scrub-shrub wetland community that is dominated by sandbar willow, red osier dogwood, silky dogwood, field horsetweed, wiregrass sedge, and sensitive fern. Wetland C is located on the southwest part of the Site, north of the railroad tracks, along the concrete wall. Using NWI nomenclature, this wetland is representative of a PEM/PSS habitat.

3.3.4 Wetland D

Wetland D consists of an emergent wetland community dominated by field horsetweed. Wetland D is located in the southwest portion of the Site, north of the railroad tracks, along the concrete wall. Using NWI nomenclature, this wetland is representative of a PEM habitat.

3.3.5 Wetland E

Wetland E predominantly consists of an emergent community dominated by field horsetweed, and wiregrass sedge with some scrub-shrub and forested areas present. . The PSS and PFO communities for Wetland E are represented in other wetland data points taken across the Site, as the plant community was not diverse. Species depicted on other data forms for PSS/PFO communities are representative of what was observed in Wetland E. Wetland E is the largest contiguous wetland on the Site and encompasses the northwest, north, and northeast areas of the Site south of the bike path and concrete wall. Using NWI nomenclature, this wetland is representative of PEM habitat with PSS and PFO present.

3.3.6 Wetland F

Wetland F consists of an emergent and forested wetland community dominated by cottonwood, silky dogwood, and wiregrass sedge. Wetland F is located in the central portion of the Site in between man-made upland areas (sand and gravel fill areas) and appeared to not have a connection with Wetland E or other wetlands on the Site. Using NWI nomenclature, this wetland is representative of a PFO/PEM habitat.

3.3.7 Wetland G

Wetland G consists of an emergent and scrub-shrub wetland community dominated by soft rush and field horsetweed. Wetland G is located in the southern portion of the Site, north of the railroad tracks, along the concrete wall. Using NWI nomenclature, this wetland is representative of a PEM/PSS habitat.

Given the proximity of the wetlands on the Site to Muskegon Lake, the wetlands delineated at the Site would be considered adjacent to an interstate water (Muskegon Lake) which is termed a WOTUS in the 2015 Clean Water Rule; therefore, the delineated wetlands on the Site would likely be considered WOTUS and USACE-jurisdictional.

3.5 NON-WETLAND WOTUS

3.5.1 Streams

In addition to wetlands, OBG also investigated the potential presence of regulated streams on the Site based on the presence of waters with bed-banks, hydrology indicators, and/or field characteristics used by USACE. No streams were found to exist on the Site.

3.5.2 Open Water

One open-water area was delineated in the northwest corner of Wetland E, as depicted on Figure 4, and totaled 1.01 AC. This area was dominated by dogwood shrubs noted on other areas of the Site; however, it was observed that most of the shrubs present were dead or dying due the increased and sustained hydrology.

The open water area is depicted in the Site Photographs in [Appendix D](#).

4. CONCLUSIONS

OBG completed a jurisdictional WOTUS delineation survey on the 23.26-acre Amoco Fish and Wildlife Habitat Restoration Site which is located north of Lakeshore Drive, in the City of Muskegon, Muskegon County, Michigan. Field activities were completed on May 22nd and 23rd, 2019.

OBG identified seven wetlands ranging in size from 0.01 acres (Wetland D) to 8.61 acres (Wetland E) and one open water pond (1.0-acres) on the Site. The identified wetlands and waters at the Site, based on the 2015 Clean Water Rule, would likely be considered WOTUS by the USACE due to the adjacency to Muskegon Lake; however, jurisdiction would need to be verified with the USACE by completing a Preliminary Jurisdictional Determination.

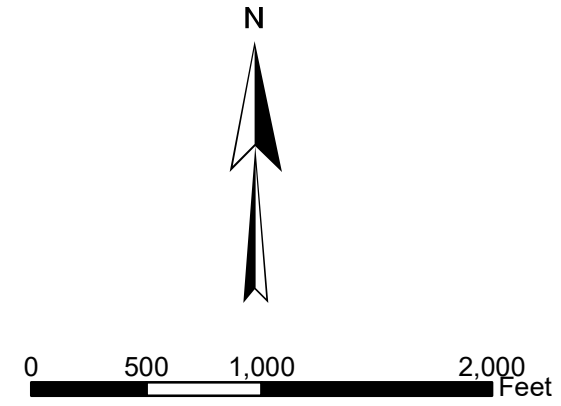
The identified potential WOTUS are presented in [Figure 4](#).

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Figures



AMOCO FISH & WILDLIFE
 HABITAT RESTORATION PROJECT
 1640 LAKESHORE DRIVE
 MUSKEGON
 MUSKEGON COUNTY, MICHIGAN

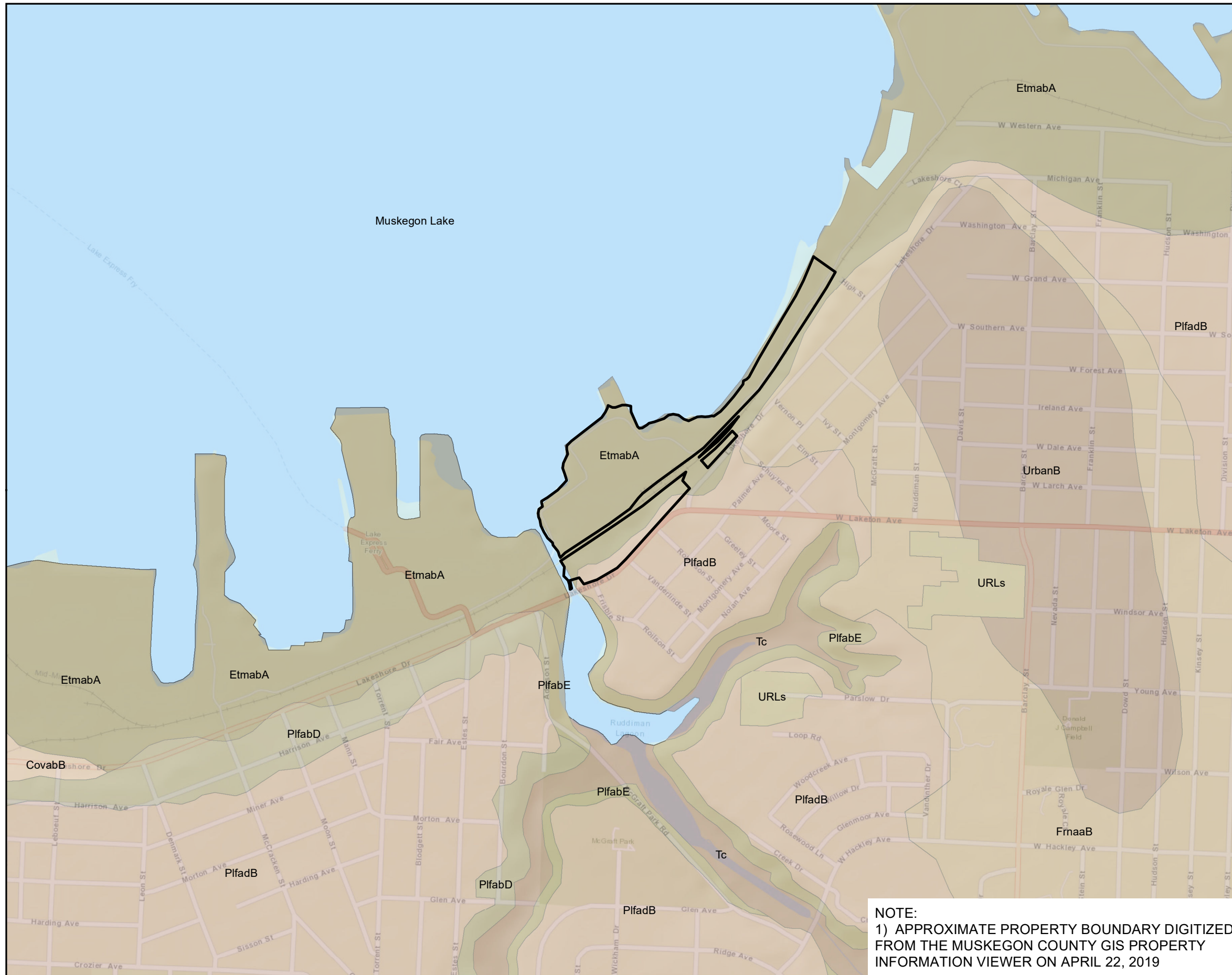
PROJECT LOCATION

NOTE:
 1) APPROXIMATE PROPERTY BOUNDARY DIGITIZED FROM THE MUSKEGON COUNTY GIS PROPERTY INFORMATION VIEWER ON APRIL 22, 2019

FILE NO. 72430
 DATE: May 28, 2019




O'BRIEN & GERE ENGINEERS, INC.



0 290 580 1,160 Feet

LEGEND

 Property boundary

AMOCO FISH & WILDLIFE
HABITAT RESTORATION PROJECT
1640 LAKESHORE DRIVE
MUSKEGON
MUSKEGON COUNTY, MICHIGAN

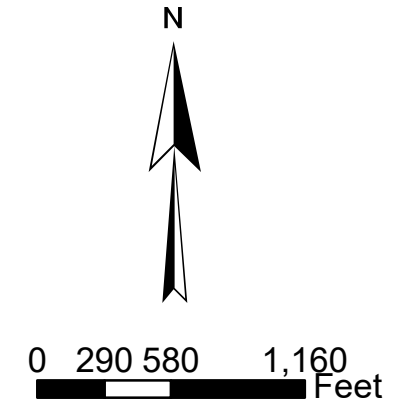
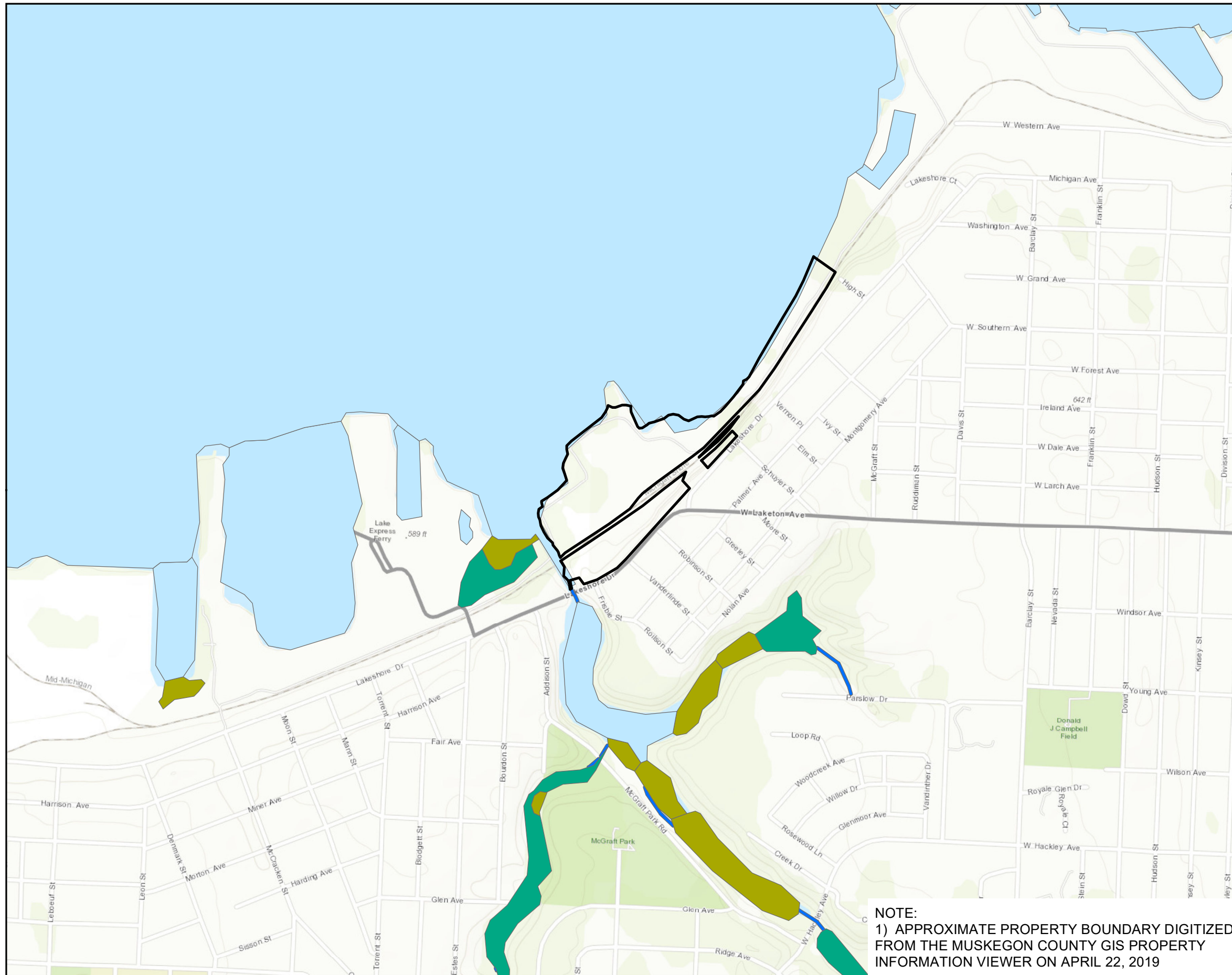
NRCS SOIL SURVEY

FILE NO. 72430
DATE: May 28, 2019








O'BRIEN & GERE ENGINEERS, INC.

NOTE:
1) APPROXIMATE PROPERTY BOUNDARY DIGITIZED FROM THE MUSKEGON COUNTY GIS PROPERTY INFORMATION VIEWER ON APRIL 22, 2019



LEGEND

-  Property boundary
-  Palustrine emergent wetland
-  Palustrine forested wetland
-  Freshwater pond or Lake
-  Riverine

AMOCO FISH & WILDLIFE
 HABITAT RESTORATION PROJECT
 1640 LAKESHORE DRIVE
 MUSKEGON
 MUSKEGON COUNTY, MICHIGAN

USFWS NATIONAL
 WETLAND INVENTORY

FILE NO. 72430
 DATE: May 28, 2019

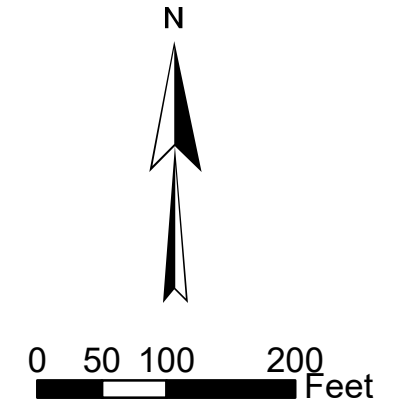


O'BRIEN & GERE ENGINEERS, INC.

NOTE:
 1) APPROXIMATE PROPERTY BOUNDARY DIGITIZED FROM THE MUSKEGON COUNTY GIS PROPERTY INFORMATION VIEWER ON APRIL 22, 2019

7/24/2019 11:35:36 AM

\\server27-01\Projects\Wmsrdc.33422\STDS\GIS\Amoco Delineation\MXD\Figure 4 - Delineation.mxd



LEGEND

- Property boundary
- Wetland
 - PFO = Palustrine Forested
 - PSS = Palustrine Scrub-Shrub
 - PEM = Palustrine Emergent
- Open water
- Wetland test site location (IN/OUT soil pit for Wetland Determination Data Forms)

AMOCO FISH & WILDLIFE
 HABITAT RESTORATION PROJECT
 1640 LAKESHORE DRIVE
 MUSKEGON
 MUSKEGON COUNTY, MICHIGAN

DELINEATION

Survey date: May 22-23, 2019
 Original map date: May 30, 2019
 Map update: July 24, 2019

FILE NO. 72430
 DATE: May 30, 2019



O'BRIEN & GERE ENGINEERS, INC.

NOTE:
 1) APPROXIMATE PROPERTY BOUNDARY DIGITIZED FROM THE MUSKEGON COUNTY GIS PROPERTY INFORMATION VIEWER ON APRIL 22, 2019

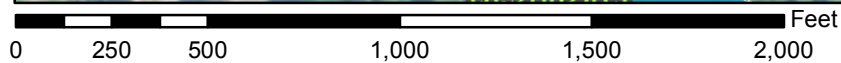


Appendix A
FEMA FIRM Map

National Flood Hazard Layer FIRMette



43°13'28.82"N



USGS The National Map: Orthoimagery, Data refreshed April, 2019. 1:6,000 43°13'2.60"N

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- Cross Sections with 1% Annual Chance Water Surface Elevation: 20.2, 17.5
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/28/2019 at 6:02:14 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

86°16'42.50"W





Appendix B
Muskegon County Hydric
Soils List

Interpretive Groups (MI)

Muskegon County, Michigan


Map symbol and soil name	Land capability classification	Michigan soil management group	Farmland classification	Hydric	Habitat type (primary/secondary)
EtmabA					
Oxyaquic Udipsamments	4 s	---	Not prime farmland	No	---
Urban land	---	---	Not prime farmland	Unranked	---
FrnaaB					
Fern	2 e	4/2a	Not prime farmland	No	---
Urban land	---	---	Not prime farmland	Unranked	---
Ga					
Granby, lake plain	4 w	5c	Farmland of local importance	Yes	F097XA008MI
Hp					
Hettinger	2 w	1.5c	Farmland of local importance	Yes	---
Pickford	3 w	1c	Farmland of local importance	Yes	---
Ht					
Houghton	5 w	Mc	Farmland of local importance	Yes	F097XA030MI
Houghton	5 w	Mc	Farmland of local importance	Yes	F096XB027MI
Houghton	5 w	Mc	Farmland of local importance	Yes	F096XA014MI
Houghton	5 w	Mc	Farmland of local importance	Yes	F098XA006MI
KaB					
Kalkaska	6 s	5a	Not prime farmland	No	F097XA004MI
Wallace	4 s	5a-h	Not prime farmland	No	---
KkA					
Kawkawlin	2 w	1.5b	Prime farmland if drained	No	---
KkB					
Kawkawlin	2 e	1.5b	Prime farmland if drained	No	---
KsA					
Kawkawlin	2 w	1.5b	Prime farmland if drained	No	---
Selkirk	2 w	1c	Prime farmland if drained	No	---
KsB					
Kawkawlin	2 e	1.5b	Prime farmland if drained	No	---
Selkirk	2 e	1c	Prime farmland if drained	No	---

Interpretive Groups (MI)

Muskegon County, Michigan

Map symbol and soil name	Land capability classification	Michigan soil management group	Farmland classification	Hydric	Habitat type (primary/secondary)
PlfafF					
Plainfield	7 s	5.3a	Not prime farmland	No	---
Metea	3 e	4/2a	Not prime farmland	No	---
Spinks	7 e	4a	Not prime farmland	No	---
PpsaaA					
Pipestone	3 w	5b	Not prime farmland	No	F097XA006MI
Covert	4 s	5a	Not prime farmland	No	---
Saugatuck	3 w	5b-h	Not prime farmland	No	F097XA006MI
PQ					
Pits, quarries	8 s	---	Not prime farmland	Unranked	---
PS					
Pits	---	---	Not prime farmland	Unranked	---
Ra					
Roscommon	5 w	5c	Not prime farmland	Yes	---
Au Gres	4 w	5b	Not prime farmland	No	F097XA006MI
RoB					
Rousseau	4 s	4a	Not prime farmland	No	---
Sa					
Saranac	5 w	L-2c	Not prime farmland	Yes	---
SL					
Sewage Lagoon	---	---	Not prime farmland	Unranked	---
Sm					
Sims	2 w	1.5c	Prime farmland if drained	Yes	---
SnkaaB					
Spinks	3 s	4a	Not prime farmland	No	---
So					
Sloan	5 w	L-2c	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	Yes	---

This report shows only the major soils in each map unit



Appendix C
Wetland Determination
Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-1
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): _____
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'18.46" Long: 86 degrees 16'54.02" Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments-Urban land complex, nearly level NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____ If yes, optional Wetland Site ID: <u>Wetland A</u>
Remarks: (Explain alternative procedures here or in a separate report.) 	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) _____ Water-Stained Leaves (B9) <input checked="" type="checkbox"/> High Water Table (A2) _____ Aquatic Fauna (B13) <input checked="" type="checkbox"/> Saturation (A3) _____ Marl Deposits (B15) _____ Water Marks (B1) _____ Hydrogen Sulfide Odor (C1) _____ Sediment Deposits (B2) _____ Oxidized Rhizospheres on Living Roots (C3) _____ Drift Deposits (B3) _____ Presence of Reduced Iron (C4) _____ Algal Mat or Crust (B4) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Iron Deposits (B5) _____ Thin Muck Surface (C7) _____ Inundation Visible on Aerial Imagery (B7) _____ Other (Explain in Remarks) _____ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <u>x</u> No _____ Depth (inches): <u>10</u> Water Table Present? Yes <u>x</u> No _____ Depth (inches): <u>above</u> Saturation Present? Yes <u>x</u> No _____ Depth (inches): <u>surface</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: 	
Remarks: Elevated hydrology; Great Lakes at record levels; increased inundation observed at site	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-1

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
_____ =Total Cover				Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">Total % Cover of:</th> <th style="width:50%;">Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species <u>80</u></td> <td>x 1 = <u>80</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>0</u></td> <td>x 4 = <u>0</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>80</u> (A)</td> <td><u>80</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>1.00</u></td> </tr> </tbody> </table>	Total % Cover of:	Multiply by:	OBL species <u>80</u>	x 1 = <u>80</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>0</u>	x 4 = <u>0</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>80</u> (A)	<u>80</u> (B)	Prevalence Index = B/A = <u>1.00</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>80</u>	x 1 = <u>80</u>																			
FACW species <u>0</u>	x 2 = <u>0</u>																			
FAC species <u>0</u>	x 3 = <u>0</u>																			
FACU species <u>0</u>	x 4 = <u>0</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>80</u> (A)	<u>80</u> (B)																			
Prevalence Index = B/A = <u>1.00</u>																				
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
_____ =Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
Herb Stratum (Plot size: <u>5</u>)																				
1. <u>Carex lasiocarpa</u>	<u>10</u>	<u>No</u>	<u>OBL</u>																	
2. <u>Typha angustifolia</u>	<u>70</u>	<u>Yes</u>	<u>OBL</u>																	
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
12. _____																				
_____ =Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.																
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
_____ =Total Cover				Hydrophytic Vegetation Present? Yes <u>X</u> No _____																

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: TS-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-10	10YR 2/1	97	10YR 4/4	3	c	m	Sandy	Distinct redox concentrations

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

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- High Chroma Sands (S11) (LRR K, L)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) (LRR K, L)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:
 This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-2
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): slight hillslope Local relief (concave, convex, none): none Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'18.31" Long: 86 degrees 16'56.65" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments-Urban land complex, nearly level NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.) Upland to Wetland A	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-2

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33.3%</u> (A/B)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
	_____ =Total Cover			Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%; text-align: center;">Total % Cover of:</td> <td style="width:50%; text-align: center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>30</u></td> <td>x 3 = <u>90</u></td> </tr> <tr> <td>FACU species <u>70</u></td> <td>x 4 = <u>280</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>100</u> (A)</td> <td><u>370</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>3.70</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>30</u>	x 3 = <u>90</u>	FACU species <u>70</u>	x 4 = <u>280</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>100</u> (A)	<u>370</u> (B)	Prevalence Index = B/A = <u>3.70</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>0</u>	x 2 = <u>0</u>																			
FAC species <u>30</u>	x 3 = <u>90</u>																			
FACU species <u>70</u>	x 4 = <u>280</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>100</u> (A)	<u>370</u> (B)																			
Prevalence Index = B/A = <u>3.70</u>																				
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
	_____ =Total Cover			Hydrophytic Vegetation Indicators: <u>1</u> - Rapid Test for Hydrophytic Vegetation <u>2</u> - Dominance Test is >50% <u>3</u> - Prevalence Index is ≤3.0 ¹ <u>4</u> - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain)																
Herb Stratum (Plot size: <u>5</u>)																				
1. <u>Poa pratensis</u>	<u>30</u>	<u>Yes</u>	<u>FACU</u>		¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.															
2. <u>Galium aparine</u>	<u>35</u>	<u>Yes</u>	<u>FACU</u>																	
3. <u>Solidago canadensis</u>	<u>1</u>	<u>No</u>	<u>FACU</u>																	
4. <u>Rubus idaeus</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>																	
5. <u>Alliaria petiolata</u>	<u>2</u>	<u>No</u>	<u>FACU</u>																	
6. <u>Dactylis glomerata</u>	<u>2</u>	<u>No</u>	<u>FACU</u>																	
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
12. _____																				
	<u>100</u> =Total Cover																			
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
	_____ =Total Cover			Hydrophytic Vegetation Present? Yes <u> </u> No <u> X </u>																

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: TS-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 3/2	100					Sandy	
4-14	10YR 5/6	100					Sandy	

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

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- High Chroma Sands (S11) (**LRR K, L**)
- Loamy Mucky Mineral (F1) (**LRR K, L**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- Coast Prairie Redox (A16) (**LRR K, L, R**)
- 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- Polyvalue Below Surface (S8) (**LRR K, L**)
- Thin Dark Surface (S9) (**LRR K, L**)
- Iron-Manganese Masses (F12) (**LRR K, L, R**)
- Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:
 This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-3
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): wetland fringe Local relief (concave, convex, none): concave Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'16.22" N Long: 86 degrees 17'4.28" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments-Urban land complex, nearly level NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, optional Wetland Site ID: <u>Wetland B</u>
Remarks: (Explain alternative procedures here or in a separate report.) 	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>2</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>above</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: 	
Remarks: Elevated water level; Great Lakes at record levels: increased inundation observed	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-3

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>Quercus palustris</u>	10	Yes	FACW	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)																
2. <u>Acer rubrum</u>	5	Yes	FAC																	
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
	<u>15</u>	=Total Cover																		
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>Cornus amomum</u>	4	No	FACW	Prevalence Index worksheet: <table style="width:100%; border:none;"> <tr> <td style="text-align:right;">Total % Cover of:</td> <td style="text-align:center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>60</u></td> <td>x 1 = <u>60</u></td> </tr> <tr> <td>FACW species <u>64</u></td> <td>x 2 = <u>128</u></td> </tr> <tr> <td>FAC species <u>5</u></td> <td>x 3 = <u>15</u></td> </tr> <tr> <td>FACU species <u>5</u></td> <td>x 4 = <u>20</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>134</u> (A)</td> <td><u>223</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align:center;">Prevalence Index = B/A = <u>1.66</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>60</u>	x 1 = <u>60</u>	FACW species <u>64</u>	x 2 = <u>128</u>	FAC species <u>5</u>	x 3 = <u>15</u>	FACU species <u>5</u>	x 4 = <u>20</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>134</u> (A)	<u>223</u> (B)	Prevalence Index = B/A = <u>1.66</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>60</u>	x 1 = <u>60</u>																			
FACW species <u>64</u>	x 2 = <u>128</u>																			
FAC species <u>5</u>	x 3 = <u>15</u>																			
FACU species <u>5</u>	x 4 = <u>20</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>134</u> (A)	<u>223</u> (B)																			
Prevalence Index = B/A = <u>1.66</u>																				
2. <u>Salix interior</u>	40	Yes	FACW																	
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
	<u>44</u>	=Total Cover																		
Herb Stratum (Plot size: <u>5</u>)																				
1. <u>Carex lasiocarpa</u>	60	Yes	OBL	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
2. <u>Salix interior</u>	10	No	FACW																	
3. <u>Solidago canadensis</u>	5	No	FACU																	
4. _____																				
5. _____																				
6. _____																				
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
12. _____																				
	<u>75</u>	=Total Cover																		
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.																
2. _____																				
3. _____																				
4. _____																				
				Hydrophytic Vegetation Present? Yes <u>X</u> No _____																

Remarks: (Include photo numbers here or on a separate sheet.)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-4
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'16.19" N Long: 86 degrees 17'4.33" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsammets-Urban land complex, nearly level NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.) Upland to Wetland B	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
--	---

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

Remarks:
 Elevated water level; Great Lakes at record levels: increased inundation observed

VEGETATION – Use scientific names of plants.

Sampling Point: TS-4

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0.0%</u> (A/B)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
			=Total Cover	Prevalence Index worksheet: <table style="width:100%; border:none;"> <tr> <td style="text-align:right;">Total % Cover of:</td> <td style="text-align:center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>5</u></td> <td>x 1 = <u>5</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>99</u></td> <td>x 4 = <u>396</u></td> </tr> <tr> <td>UPL species <u>3</u></td> <td>x 5 = <u>15</u></td> </tr> <tr> <td>Column Totals: <u>107</u> (A)</td> <td><u>416</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align:center;">Prevalence Index = B/A = <u>3.89</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>5</u>	x 1 = <u>5</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>99</u>	x 4 = <u>396</u>	UPL species <u>3</u>	x 5 = <u>15</u>	Column Totals: <u>107</u> (A)	<u>416</u> (B)	Prevalence Index = B/A = <u>3.89</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>5</u>	x 1 = <u>5</u>																			
FACW species <u>0</u>	x 2 = <u>0</u>																			
FAC species <u>0</u>	x 3 = <u>0</u>																			
FACU species <u>99</u>	x 4 = <u>396</u>																			
UPL species <u>3</u>	x 5 = <u>15</u>																			
Column Totals: <u>107</u> (A)	<u>416</u> (B)																			
Prevalence Index = B/A = <u>3.89</u>																				
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
			=Total Cover																	
Herb Stratum (Plot size: <u>5</u>)																				
1. <u>Poa pratensis</u>	<u>70</u>	<u>Yes</u>	<u>FACU</u>	Hydrophytic Vegetation Indicators: <u>1</u> - Rapid Test for Hydrophytic Vegetation <u>2</u> - Dominance Test is >50% <u>3</u> - Prevalence Index is ≤3.0 ¹ <u>4</u> - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
2. <u>Carex lasiocarpa</u>	<u>5</u>	<u>No</u>	<u>OBL</u>																	
3. <u>Melilotus officinalis</u>	<u>7</u>	<u>No</u>	<u>FACU</u>																	
4. <u>Trifolium repens</u>	<u>20</u>	<u>No</u>	<u>FACU</u>																	
5. <u>Taraxacum officinale</u>	<u>2</u>	<u>No</u>	<u>FACU</u>																	
6. <u>Artemisia vulgaris</u>	<u>3</u>	<u>No</u>	<u>UPL</u>																	
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
12. _____																				
			<u>107</u> =Total Cover																	
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
			=Total Cover																	
Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.																				
Hydrophytic Vegetation Present? Yes <u> </u> No <u> X </u>																				

Remarks: (Include photo numbers here or on a separate sheet.)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-5
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'10.27" N Long: 86 degrees 17'3" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments-Urban land complex, nearly level NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, optional Wetland Site ID: <u>Wetland C</u>
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>5</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>above</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Elevated hydrology; Great Lakes at record levels; increased inundation observed on the site	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-5

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>6</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)
1. <u>N/A</u>				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
			=Total Cover	
Sapling/Shrub Stratum (Plot size: <u>15</u>)				
1. <u>Salix interior</u>	23	Yes	FACW	
2. <u>Cornus alba</u>	25	Yes	FACW	
3. <u>Sambucus nigra</u>	6	No	FACW	
4. <u>Lonicera tatarica</u>	7	No	FACU	
5. <u>Cornus amomum</u>	25	Yes	FACW	
6. _____				
7. _____				
			86 =Total Cover	
Herb Stratum (Plot size: <u>5</u>)				
1. <u>Equisetum arvense</u>	40	Yes	FAC	
2. <u>Carex lacustris</u>	20	Yes	OBL	
3. <u>Onoclea sensibilis</u>	30	Yes	FACW	
4. <u>Parthenocissus quinquefolia</u>	2	No	FACU	
5. <u>Cornus alba</u>	2	No	FACW	
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
12. _____				
			94 =Total Cover	
Woody Vine Stratum (Plot size: <u>30</u>)				
1. <u>N/A</u>				
2. _____				
3. _____				
4. _____				
			=Total Cover	

	Total % Cover of:	Multiply by:		
OBL species	<u>20</u>	x 1 =	<u>20</u>	
FACW species	<u>111</u>	x 2 =	<u>222</u>	
FAC species	<u>40</u>	x 3 =	<u>120</u>	
FACU species	<u>9</u>	x 4 =	<u>36</u>	
UPL species	<u>0</u>	x 5 =	<u>0</u>	
Column Totals:	<u>180</u>	(A)	<u>398</u>	(B)
Prevalence Index = B/A =				<u>2.21</u>

Hydrophytic Vegetation Indicators:
<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation
<input checked="" type="checkbox"/> 2 - Dominance Test is >50%
<input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹
<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:
Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present?
Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

Remarks: (Include photo numbers here or on a separate sheet.)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-6
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): flat adjacent to gravel road Local relief (concave, convex, none): none Slope (%): none
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'10.41" N Long: 86 degrees 17'3" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsammets-Urban land complex, nearly level NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.) Upland to Wetland C and Wetland D	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u>0</u> Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u>11.5</u> Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u>11.5</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Elevated hydrology; Great Lakes at record levels; increased inundation observed on the site	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-6

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0.0%</u> (A/B)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
			=Total Cover	Prevalence Index worksheet: <table style="width:100%; border:none;"> <tr> <td style="text-align:right;">Total % Cover of:</td> <td style="text-align:right;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>2</u></td> <td>x 2 = <u>4</u></td> </tr> <tr> <td>FAC species <u>22</u></td> <td>x 3 = <u>66</u></td> </tr> <tr> <td>FACU species <u>82</u></td> <td>x 4 = <u>328</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>106</u> (A)</td> <td><u>398</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align:center;">Prevalence Index = B/A = <u>3.75</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>2</u>	x 2 = <u>4</u>	FAC species <u>22</u>	x 3 = <u>66</u>	FACU species <u>82</u>	x 4 = <u>328</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>106</u> (A)	<u>398</u> (B)	Prevalence Index = B/A = <u>3.75</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>2</u>	x 2 = <u>4</u>																			
FAC species <u>22</u>	x 3 = <u>66</u>																			
FACU species <u>82</u>	x 4 = <u>328</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>106</u> (A)	<u>398</u> (B)																			
Prevalence Index = B/A = <u>3.75</u>																				
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>N/A</u>				Hydrophytic Vegetation Indicators: <u>1</u> - Rapid Test for Hydrophytic Vegetation <u>2</u> - Dominance Test is >50% <u>3</u> - Prevalence Index is ≤3.0 ¹ <u>4</u> - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
			=Total Cover	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.																
Herb Stratum (Plot size: <u>5</u>)																				
1. <u>Poa pratensis</u>	70	Yes	FACU		Hydrophytic Vegetation Present? Yes <u> </u> No <u> X </u>															
2. <u>Rubus idaeus</u>	10	No	FAC																	
3. <u>Equisetum arvense</u>	12	No	FAC																	
4. <u>Solidago canadensis</u>	12	No	FACU																	
5. <u>Cornus alba</u>	2	No	FACW																	
6. _____																				
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
12. _____																				
			106 =Total Cover																	
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
			=Total Cover																	

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: TS-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-14	10YR 5/3	100					Sandy	

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

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Polyvalue Below Surface (S8) (LRR R, MLRA 149B)	<input type="checkbox"/> 2 cm Muck (A10) (LRR K, L, MLRA 149B)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Thin Dark Surface (S9) (LRR R, MLRA 149B)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> High Chroma Sands (S11) (LRR K, L)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (LRR K, L)	<input type="checkbox"/> Polyvalue Below Surface (S8) (LRR K, L)	
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Thin Dark Surface (S9) (LRR K, L)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 149B)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Mesic Spodic (TA6) (MLRA 144A, 145, 149B)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Red Parent Material (F21)	
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Marl (F10) (LRR K, L)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Stripped Matrix (S6)		<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Dark Surface (S7)			

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

Restrictive Layer (if observed):		Hydric Soil Present?	
Type: _____		Yes _____	No <u>X</u>
Depth (inches): _____			

Remarks:
 This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-7
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'11.35" N Long: 86 degrees 17'0.93" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments-Urban land complex, nearly level NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, optional Wetland Site ID: <u>Wetland D</u>
Remarks: (Explain alternative procedures here or in a separate report.) 	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u>0</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>7</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: 	
Remarks: Elevated hydrology; Great Lakes at record levels; increased inundation observed on the site	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-7

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
			=Total Cover	Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%; text-align:center;">Total % Cover of:</td> <td style="width:50%; text-align:center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>35</u></td> <td>x 1 = <u>35</u></td> </tr> <tr> <td>FACW species <u>11</u></td> <td>x 2 = <u>22</u></td> </tr> <tr> <td>FAC species <u>60</u></td> <td>x 3 = <u>180</u></td> </tr> <tr> <td>FACU species <u>0</u></td> <td>x 4 = <u>0</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>106</u> (A)</td> <td><u>237</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align:center;">Prevalence Index = B/A = <u>2.24</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>35</u>	x 1 = <u>35</u>	FACW species <u>11</u>	x 2 = <u>22</u>	FAC species <u>60</u>	x 3 = <u>180</u>	FACU species <u>0</u>	x 4 = <u>0</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>106</u> (A)	<u>237</u> (B)	Prevalence Index = B/A = <u>2.24</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>35</u>	x 1 = <u>35</u>																			
FACW species <u>11</u>	x 2 = <u>22</u>																			
FAC species <u>60</u>	x 3 = <u>180</u>																			
FACU species <u>0</u>	x 4 = <u>0</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>106</u> (A)	<u>237</u> (B)																			
Prevalence Index = B/A = <u>2.24</u>																				
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>N/A</u>				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
			=Total Cover	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.																
Herb Stratum (Plot size: <u>5</u>)																				
1. <u><i>Equisetum arvense</i></u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>		Hydrophytic Vegetation Present? Yes <u>X</u> No _____															
2. <u><i>Juncus effusus</i></u>	<u>21</u>	<u>No</u>	<u>OBL</u>																	
3. <u><i>Carex lacustris</i></u>	<u>12</u>	<u>No</u>	<u>OBL</u>																	
4. <u><i>Cornus amomum</i></u>	<u>11</u>	<u>No</u>	<u>FACW</u>																	
5. <u><i>Lythrum salicaria</i></u>	<u>2</u>	<u>No</u>	<u>OBL</u>																	
6. _____																				
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
12. _____																				
			<u>106</u> =Total Cover																	
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
			=Total Cover																	

Remarks: (Include photo numbers here or on a separate sheet.)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-8
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): slight depression adjacent to road Local relief (concave, convex, none): concave Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'12.21" N Long: 86 degrees 16'59.47" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments-Urban land complex, nearly level NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No X (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u> Hydric Soil Present? Yes <u> </u> No <u>X</u> Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u> If yes, optional Wetland Site ID: <u> </u>
Remarks: (Explain alternative procedures here or in a separate report.) documenting area of reed canary grass (multiple areas checked; representative point taken to document)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> Water Table Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> Saturation Present? Yes <u> </u> No <u>X</u> Depth (inches): <u> </u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u> </u> No <u>X</u>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Elevated hydrology; Great Lakes at record levels; increased inundation observed at the site	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-8

	Absolute % Cover	Dominant Species?	Indicator Status																		
Tree Stratum (Plot size: <u>30</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)																	
1.					Prevalence Index worksheet: <table style="width:100%; border:none;"> <tr> <td style="text-align:right;">Total % Cover of:</td> <td style="text-align:center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>1</u></td> <td>x 1 = <u>1</u></td> </tr> <tr> <td>FACW species <u>100</u></td> <td>x 2 = <u>200</u></td> </tr> <tr> <td>FAC species <u>1</u></td> <td>x 3 = <u>3</u></td> </tr> <tr> <td>FACU species <u>0</u></td> <td>x 4 = <u>0</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>102</u></td> <td>(A) <u>204</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align:center;">Prevalence Index = B/A = <u>2.00</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>1</u>	x 1 = <u>1</u>	FACW species <u>100</u>	x 2 = <u>200</u>	FAC species <u>1</u>	x 3 = <u>3</u>	FACU species <u>0</u>	x 4 = <u>0</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>102</u>	(A) <u>204</u> (B)	Prevalence Index = B/A = <u>2.00</u>	
Total % Cover of:	Multiply by:																				
OBL species <u>1</u>	x 1 = <u>1</u>																				
FACW species <u>100</u>	x 2 = <u>200</u>																				
FAC species <u>1</u>	x 3 = <u>3</u>																				
FACU species <u>0</u>	x 4 = <u>0</u>																				
UPL species <u>0</u>	x 5 = <u>0</u>																				
Column Totals: <u>102</u>	(A) <u>204</u> (B)																				
Prevalence Index = B/A = <u>2.00</u>																					
2.																					
3.																					
4.																					
5.																					
6.																					
7.																					
=Total Cover																					
Sapling/Shrub Stratum (Plot size: <u>15</u>)																					
1.	5	Yes	FACW																		
2.																					
3.																					
4.																					
5.																					
6.																					
7.																					
=Total Cover																					
Herb Stratum (Plot size: <u>5</u>)																					
1.	95	Yes	FACW	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																	
2.	1	No	FAC																		
3.	1	No	OBL																		
4.																					
5.																					
6.																					
7.																					
8.																					
9.																					
10.																					
11.																					
12.																					
=Total Cover																					
Woody Vine Stratum (Plot size: <u>30</u>)																					
1.				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.																	
2.																					
3.																					
4.																					
=Total Cover																					
				Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>																	

Remarks: (Include photo numbers here or on a separate sheet.)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-9
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'15.02" N Long: 86 degrees 17'0.75" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments-Urban land complex, nearly level NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, optional Wetland Site ID: <u>Wetland E</u>
Remarks: (Explain alternative procedures here or in a separate report.) Representative palustrine-emergent data point for Wetland E	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>8</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>above</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Elevated hydrology; Great Lakes at record levels; increased inundation observed at the site	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-9

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
_____ =Total Cover				Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%; text-align:center;">Total % Cover of:</th> <th style="width:50%; text-align:center;">Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species <u>40</u></td> <td>x 1 = <u>40</u></td> </tr> <tr> <td>FACW species <u>6</u></td> <td>x 2 = <u>12</u></td> </tr> <tr> <td>FAC species <u>60</u></td> <td>x 3 = <u>180</u></td> </tr> <tr> <td>FACU species <u>0</u></td> <td>x 4 = <u>0</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>106</u> (A)</td> <td><u>232</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align:center;">Prevalence Index = B/A = <u>2.19</u></td> </tr> </tbody> </table>	Total % Cover of:	Multiply by:	OBL species <u>40</u>	x 1 = <u>40</u>	FACW species <u>6</u>	x 2 = <u>12</u>	FAC species <u>60</u>	x 3 = <u>180</u>	FACU species <u>0</u>	x 4 = <u>0</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>106</u> (A)	<u>232</u> (B)	Prevalence Index = B/A = <u>2.19</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>40</u>	x 1 = <u>40</u>																			
FACW species <u>6</u>	x 2 = <u>12</u>																			
FAC species <u>60</u>	x 3 = <u>180</u>																			
FACU species <u>0</u>	x 4 = <u>0</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>106</u> (A)	<u>232</u> (B)																			
Prevalence Index = B/A = <u>2.19</u>																				
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
_____ =Total Cover																				
Herb Stratum (Plot size: <u>5</u>)																				
1. <u>Equisetum arvense</u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
2. <u>Cornus alba</u>	<u>5</u>	<u>No</u>	<u>FACW</u>																	
3. <u>Juncus effusus</u>	<u>15</u>	<u>No</u>	<u>OBL</u>																	
4. <u>Carex lasiocarpa</u>	<u>25</u>	<u>Yes</u>	<u>OBL</u>																	
5. <u>Potentilla anserina</u>	<u>1</u>	<u>No</u>	<u>FACW</u>																	
6. _____																				
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
12. _____																				
<u>106</u> =Total Cover																				
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
_____ =Total Cover																				
Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.				Hydrophytic Vegetation Present? Yes <u>X</u> No _____																

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: TS-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10YR 2/2	97	10YR 3/4	3	c	m	Sandy	Distinct redox concentrations

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

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- High Chroma Sands (S11) (LRR K, L)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) (LRR K, L)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-10
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): slight hillslope (placed sand) Local relief (concave, convex, none): flat Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'14.65" N Long: 86 degrees 17'0.36"W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments-Urban land complex, nearly level NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.) Upland to Wetland E (upland area soil substrate appears to be placed beach sand)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Elevated hydrology; Great Lakes at record levels; increased inundation observed on the site	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-10

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
			=Total Cover	Prevalence Index worksheet: <table style="width:100%; border:none;"> <tr> <td style="width:50%; text-align:center;">Total % Cover of:</td> <td style="width:50%; text-align:center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>100</u></td> <td>x 3 = <u>300</u></td> </tr> <tr> <td>FACU species <u>2</u></td> <td>x 4 = <u>8</u></td> </tr> <tr> <td>UPL species <u>2</u></td> <td>x 5 = <u>10</u></td> </tr> <tr> <td>Column Totals: <u>104</u></td> <td>(A) <u>318</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align:center;">Prevalence Index = B/A = <u>3.06</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>100</u>	x 3 = <u>300</u>	FACU species <u>2</u>	x 4 = <u>8</u>	UPL species <u>2</u>	x 5 = <u>10</u>	Column Totals: <u>104</u>	(A) <u>318</u> (B)	Prevalence Index = B/A = <u>3.06</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>0</u>	x 2 = <u>0</u>																			
FAC species <u>100</u>	x 3 = <u>300</u>																			
FACU species <u>2</u>	x 4 = <u>8</u>																			
UPL species <u>2</u>	x 5 = <u>10</u>																			
Column Totals: <u>104</u>	(A) <u>318</u> (B)																			
Prevalence Index = B/A = <u>3.06</u>																				
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>N/A</u>				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
			=Total Cover	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.																
Herb Stratum (Plot size: <u>5</u>)																				
1. <u><i>Equisetum arvense</i></u>	<u>80</u>	<u>Yes</u>	<u>FAC</u>		Hydrophytic Vegetation Present? Yes <u>X</u> No _____															
2. <u><i>Panicum virgatum</i></u>	<u>20</u>	<u>No</u>	<u>FAC</u>																	
3. <u><i>Solidago canadensis</i></u>	<u>2</u>	<u>No</u>	<u>FACU</u>																	
4. <u><i>Centaurea stoebe</i></u>	<u>2</u>	<u>No</u>	<u>UPL</u>																	
5. _____																				
6. _____																				
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
12. _____																				
			<u>104</u> =Total Cover																	
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
			=Total Cover																	

Remarks: (Include photo numbers here or on a separate sheet.)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-22-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-11
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): linear depression Local relief (concave, convex, none): concave Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'14.95" N Long: 86 degrees 16'54.82" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments_Urban land complex, nearly level NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, optional Wetland Site ID: <u>Wetland G</u>
Remarks: (Explain alternative procedures here or in a separate report.) Representative palustrine emergent / palustrine scrub-shrub wetland	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>7</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>above</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
---	---

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

Remarks:
 Elevated hydrology; Great Lakes at record levels; increased inundation observed on the site

VEGETATION – Use scientific names of plants.

Sampling Point: TS-11

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)
1. <u>N/A</u>				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
			=Total Cover	
Sapling/Shrub Stratum (Plot size: <u>15</u>)				
1. <u>Salix interior</u>	<u>70</u>	<u>Yes</u>	<u>FACW</u>	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
			=Total Cover	
Herb Stratum (Plot size: <u>5</u>)				
1. <u>Juncus effusus</u>	<u>30</u>	<u>Yes</u>	<u>OBL</u>	
2. <u>Salix interior</u>	<u>2</u>	<u>No</u>	<u>FACW</u>	
3. <u>Equisetum arvense</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>	
4. <u>Carex lasiocarpa</u>	<u>2</u>	<u>No</u>	<u>OBL</u>	
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
12. _____				
			=Total Cover	
Woody Vine Stratum (Plot size: <u>30</u>)				
1. <u>N/A</u>				
2. _____				
3. _____				
4. _____				
			=Total Cover	

	Total % Cover of:	Multiply by:	
OBL species	<u>32</u>	x 1 =	<u>32</u>
FACW species	<u>72</u>	x 2 =	<u>144</u>
FAC species	<u>10</u>	x 3 =	<u>30</u>
FACU species	<u>0</u>	x 4 =	<u>0</u>
UPL species	<u>0</u>	x 5 =	<u>0</u>
Column Totals:	<u>114</u>	(A)	<u>206</u> (B)
Prevalence Index = B/A =			<u>1.81</u>

Hydrophytic Vegetation Indicators:
<u> </u> 1 - Rapid Test for Hydrophytic Vegetation
<u> X</u> 2 - Dominance Test is >50%
<u> X</u> 3 - Prevalence Index is ≤3.0 ¹
<u> </u> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
<u> </u> Problematic Hydrophytic Vegetation ¹ (Explain)
¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:
Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present?
Yes <u> X </u> No <u> </u>

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: TS-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10YR 2/2	95	10YR 3/4	5	c	m	Sandy	Distinct redox concentrations

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

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- High Chroma Sands (S11) (LRR K, L)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) (LRR K, L)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:
 This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-23-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-12
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): flat adjacent to gravel road Local relief (concave, convex, none): none Slope (%): 0
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'13.94" N Long: 86 degrees 16'56.51" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments_Urban land complex, nearly level NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.) Upland to Wetland G and Wetland F	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Elevated hydrology; Great Lakes at record levels; increased inundation observed on the site	

VEGETATION – Use scientific names of plants.

Sampling Point: TS-12

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0.0%</u> (A/B)																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
_____ =Total Cover				Prevalence Index worksheet: <table style="width:100%; border:none;"> <tr> <td style="text-align:right;">Total % Cover of:</td> <td style="text-align:center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>1</u></td> <td>x 2 = <u>2</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>77</u></td> <td>x 4 = <u>308</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>78</u> (A)</td> <td><u>310</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align:center;">Prevalence Index = B/A = <u>3.97</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>1</u>	x 2 = <u>2</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>77</u>	x 4 = <u>308</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>78</u> (A)	<u>310</u> (B)	Prevalence Index = B/A = <u>3.97</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>1</u>	x 2 = <u>2</u>																			
FAC species <u>0</u>	x 3 = <u>0</u>																			
FACU species <u>77</u>	x 4 = <u>308</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>78</u> (A)	<u>310</u> (B)																			
Prevalence Index = B/A = <u>3.97</u>																				
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
_____ =Total Cover				Hydrophytic Vegetation Indicators: <u>1</u> - Rapid Test for Hydrophytic Vegetation <u>2</u> - Dominance Test is >50% <u>3</u> - Prevalence Index is ≤3.0 ¹ <u>4</u> - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain)																
Herb Stratum (Plot size: <u>5</u>)																				
1. <u>Poa pratensis</u>	<u>60</u>	<u>Yes</u>	<u>FACU</u>		¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.															
2. <u>Solidago canadensis</u>	<u>15</u>	<u>No</u>	<u>FACU</u>																	
3. <u>Morus alba</u>	<u>2</u>	<u>No</u>	<u>FACU</u>																	
4. <u>Cornus alba</u>	<u>1</u>	<u>No</u>	<u>FACW</u>																	
5. _____																				
6. _____																				
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
12. _____																				
<u>78</u> =Total Cover																				
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>																				
2. _____																				
3. _____																				
4. _____																				
_____ =Total Cover				Hydrophytic Vegetation Present? Yes <u> </u> No <u> X </u>																

Remarks: (Include photo numbers here or on a separate sheet.)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Amoco FW Habitat Restoration City/County: Muskegon / Muskegon Sampling Date: 05-23-19
 Applicant/Owner: Great Lakes Commission/ West MI Shoreline Regional Development Commission State: MI Sampling Point: TS-13
 Investigator(s): Tara Sturgill; Larry Brewer Section, Township, Range: N/A
 Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0-1
 Subregion (LRR or MLRA): LRR L Lat: 43 degrees 13'13.95" N Long: 86 degrees 16'57.8" W Datum: St. PL MI S
 Soil Map Unit Name: EtmbaA: Oxyaquic Udipsamments_Urban land complex, nearly level NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, optional Wetland Site ID: <u>Wetland F</u>
Remarks: (Explain alternative procedures here or in a separate report.) Data point representative of a palustrine forested (PFO) habitat	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>3</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>above</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
 Elevated hydrology; Great Lakes at record levels; increased inundation observed on the site

VEGETATION – Use scientific names of plants.

Sampling Point: TS-13

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>Populus deltoides</u>	<u>80</u>	Yes	FAC	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
	<u>80</u> =Total Cover			Prevalence Index worksheet: <table style="width:100%; border:none;"> <tr> <td style="width:50%; text-align:center;">Total % Cover of:</td> <td style="width:50%; text-align:center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>12</u></td> <td>x 1 = <u>12</u></td> </tr> <tr> <td>FACW species <u>46</u></td> <td>x 2 = <u>92</u></td> </tr> <tr> <td>FAC species <u>83</u></td> <td>x 3 = <u>249</u></td> </tr> <tr> <td>FACU species <u>7</u></td> <td>x 4 = <u>28</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>148</u> (A)</td> <td><u>381</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align:center;">Prevalence Index = B/A = <u>2.57</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>12</u>	x 1 = <u>12</u>	FACW species <u>46</u>	x 2 = <u>92</u>	FAC species <u>83</u>	x 3 = <u>249</u>	FACU species <u>7</u>	x 4 = <u>28</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>148</u> (A)	<u>381</u> (B)	Prevalence Index = B/A = <u>2.57</u>	
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Column Totals: <u>148</u> (A)	<u>381</u> (B)																			
Prevalence Index = B/A = <u>2.57</u>																				
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. <u>Cornus amomum</u>	<u>40</u>	Yes	FACW																	
2. <u>Lonicera tatarica</u>	<u>7</u>	No	FACU																	
3. <u>Salix petiolaris</u>	<u>6</u>	No	FACW																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
	<u>53</u> =Total Cover																			
Herb Stratum (Plot size: <u>5</u>)																				
1. <u>Carex lasiocarpa</u>	<u>12</u>	Yes	OBL	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
2. <u>Rhamnus cathartica</u>	<u>2</u>	No	FAC																	
3. <u>Equisetum arvense</u>	<u>1</u>	No	FAC																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____																	
10. _____	_____	_____	_____																	
11. _____	_____	_____	_____																	
12. _____	_____	_____	_____																	
	<u>15</u> =Total Cover																			
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. <u>N/A</u>	_____	_____	_____	Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
	_____ =Total Cover																			
<table style="width:100%; border:none;"> <tr> <td style="width:60%;">Hydrophytic Vegetation Present?</td> <td style="width:20%; text-align:center;">Yes <u>X</u></td> <td style="width:20%; text-align:center;">No _____</td> </tr> </table>					Hydrophytic Vegetation Present?	Yes <u>X</u>	No _____													
Hydrophytic Vegetation Present?	Yes <u>X</u>	No _____																		

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: TS-13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10YR 3/2	95	10YR 4/4	5	c	m	Sandy	Distinct redox concentrations

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

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- High Chroma Sands (S11) (LRR K, L)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) (LRR K, L)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:


This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)




Appendix D


Site Photographs


APPENDIX D – SITE PHOTOGRAPHS

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 1	DATE: 05/22/19		
DESCRIPTION General view of Site, north of railroad tracks, near entrance. Photo taken standing on gravel road facing west.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 2	DATE: 05/22/19		
DESCRIPTION General view of Site, north of railroad tracks, near entrance. Photo taken standing on gravel road facing north.			


CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 3	DATE: 05/22/19		
DESCRIPTION View of the Site, south of the railroad tracks, east of the gravel pad area. This area of the Site had no indicators of wetlands and was dominated by invasive species. Photo taken facing northeast.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 4	DATE: 05/22/19		
DESCRIPTION View of Site, south of the railroad tracks. Note clump of trees along fence-line is tree of heaven (<i>Ailanthus altissima</i>) an invasive woody species, and a common tree in this area. Photo taken in northeastern portion of the Site facing southwest.			


CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 5	DATE: 05/22/19		
DESCRIPTION View of test site (TS) 1, the wetland data point for Wetland A. Photo taken facing east.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 6	DATE: 05/22/19		
DESCRIPTION View of Wetland A depicting the area dominated by narrowleaf cattail. Photo taken facing southeast.			


CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 7	DATE: 05/22/19		
DESCRIPTION Alternate view of Wetland A depicting the scrub-shrub area, outside of the concrete wall area where narrowleaf cattail is no longer dominant. Photo taken facing north.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 8	DATE: 05/22/19		
DESCRIPTION View of TS-3, the wetland data point for Wetland B. Photo taken facing east.			


CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 9	DATE: 05/22/19		
DESCRIPTION View of Wetland B along the shoreline of Muskegon Lake. Photo taken facing south.			


CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 10	DATE: 05/22/19		
DESCRIPTION View of TS-5, the wetland data point for Wetland C. Photo taken facing south.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 11	DATE: 05/22/19		
DESCRIPTION View of Wetland C. Photo taken facing southwest.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 12	DATE: 05/22/19		
DESCRIPTION View of TS-7, the wetland data point for Wetland D. Photo taken facing south.			


CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 13	DATE: 05/22/19		
DESCRIPTION View of Wetland D. Photo taken facing southwest.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 14	DATE: 05/22/19		
DESCRIPTION View of TS-9, the wetland data point for Wetland E. Photo taken facing west.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 15	DATE: 05/22/19		
DESCRIPTION View of the emergent and scrub-shrub area of Wetland E. Photo taken facing north.			


CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 16	DATE: 05/22/19		
DESCRIPTION Alternate view of Wetland E. Photo taken facing east.			


CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 17	DATE: 05/22/19		
DESCRIPTION Alternate view of Wetland E depicting the forested, scrub-shrub, and emergent habitats of the wetland. Photo taken facing west standing on an upland area (north of Wetland F).			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 18	DATE: 05/22/19		
DESCRIPTION Alternate view of Wetland E depicting the deeper-water emergent and scrub-shrub habitat south of the open water area. Photo taken facing south.			


CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 19	DATE: 05/22/19		
DESCRIPTION View of TS-11, the wetland data point for Wetland G. Photo taken facing south.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 20	DATE: 05/22/19		
DESCRIPTION View of Wetland G. Photo taken facing southwest.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 21	DATE: 05/22/19		
DESCRIPTION View of TS-13, the wetland data point for Wetland F. Photo taken facing north.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 22	DATE: 05/22/19		
DESCRIPTION View of Wetland F. Photo taken facing west.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 23	DATE: 05/22/19		
DESCRIPTION View of open water area located in the northwest portion of the Site. Photo taken facing north.			

CLIENT NAME: West Michigan Shoreline Regional Development Commission		SITE LOCATION: 1640 Lakeshore Drive, Muskegon, Muskegon County, Michigan	PROJECT NO. 72430
PHOTO NO. 24	DATE: 05/22/19		
DESCRIPTION Alternate view of open water area. Photo taken facing northwest.			