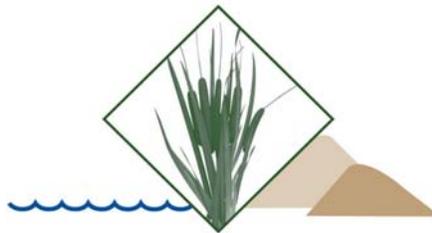

WETLAND MITIGATION PLAN

Prepared for:

Bay County Drain Commissioner
and
Wade Trim

Prepared by:



Wetland and Coastal Resources, Inc.
5801 West Michigan Avenue
Lansing, Michigan 48917

May 24, 2006



Introduction

In 1986 and 1996, localized flooding of the Dell Creek Drain and its Branches caused over \$900,000 in damage to homes within the subdivisions of Walters, Garfield, and Country Estates. As a result of this property damage, the Bay County Drain Commissioner applied for and was awarded a Hazard Mitigation Grant. Wade Trim prepared a flood mitigation report evaluating various options to alleviate flooding in the Walters, Garfield, and Country Estates subdivisions. The selected alternative would require placement of 1498 cubic yards of fill in 0.41 acres of regulated wetland and the excavation of 448 cubic yards of material from 0.66 acres of wetland, of which 3.17 acres is an old detention basin, to relocate Dell Creek Drain and create a larger regional detention basin and wetland complex for the drainage district. This project will create a larger wetland complex approximately 22.26 acres in size, resulting in a net gain of 18.02 acres of regulated wetland resources, in exchange for impacting 1.07 acres of regulated wetland. This document presents a mitigation plan to replace the values and functions associated with the wetlands that will be impacted by this project.

Requirements

This mitigation plan contains the following items necessary for the MDEQ and United States Army Corps of Engineers (USACE) staff to determine that the proposed mitigation wetland sites are satisfactory for the creation of wetlands and, if properly constructed (according to permit conditions), can mitigate for the proposed wetland impacts on the subject property:

- I. Wetland Mitigation Goals and Objectives: A narrative description of the proposed mitigation goals and objectives, including 1) the acreage to be created, 2) a description of the ecological types, hydrology, soils, and vegetation of the wetlands to be impacted, and 3) a description of the functions provided by the wetlands to be impacted and the proposed mitigation wetlands.
- II. Mapping: A map showing the location of the wetland mitigation site in relation to surrounding roads and other landmarks.
- III. Baseline Conditions: A narrative description of the existing baseline conditions at the proposed wetland mitigation site, including 1) a description of the topography, soils, hydrology, and vegetation, 2) a plan view that includes topographic information (in one or two foot contour intervals), roads, trails, existing wetlands, streams, and floodplains to the 100-year elevation, 3) typical cross sections, and 4) an explanation of why the site was selected.
- IV. Site Development Plan: The proposed wetland mitigation design, including 1) a description of the sources of hydrology, the source and type of soil amendments, wetland vegetation establishment, and wildlife structures, 2) a plan view showing all of the proposed conditions of the mitigation site including all contour elevations (at one foot contour intervals), structures, the type and size of all proposed wetland areas, property lines, directional arrows, scale, and conservation easement area, 3) typical cross-sections, 4) a water budget of inputs and outputs to the proposed wetland, and 5) a vegetative



establishment plan which includes a plan view, methods, species list with scientific and common names, and source of any plant or seed stock.

- V. Performance standards
- VI. Monitoring Plan: A monitoring plan including location of vegetative sampling transects, photo points, monitoring wells, and staff gages.
- VII. Schedule and Construction Methods: A narrative description of the schedule for completion of the mitigation site and construction methods, including site preparation and soil erosion/sedimentation controls methods.
- VIII. Long-term Protection: Information on current site ownership, the conservation easement, and methods used to prevent and control the establishment of invasive plant species, to prevent over-grazing of vegetation, and to remove trash.
- IX. Financial Assurances: Cost estimates for construction, planting, monitoring, and any necessary land acquisition.

Each of the required items will be discussed and presented below:

Wetland Mitigation Goals and Objectives

There are 6.09 acres of wetland on the subject property of which 0.23 acres are unregulated and 5.86 acres that are regulated by the MDEQ pursuant to Part 303 of NREPA (Table 1). Figure 1 shows the approximate location of those wetland complexes. Of the 5.86 acres of regulated wetland on the subject property 1.07 acres will be impacted by the proposed activities by the Bay County Drain Commissioner. Impacts to wetlands have been avoided wherever possible and where unavoidable they have been minimized.

Approximately 0.41 acres of regulated emergent wetland will be impacted from the relocation of existing drainage courses and the creation of the new regional detention basin/wetland mitigation area by the placement of fill to construct a berm around the new basin. Approximately 0.65 acres of emergent and scrub-shrub wetland, within the previously constructed detention, will be impacted by the regarding of the basin. Approximately 0.010 acres of a 0.363 perched regulated forested wetland complex (located within 500 feet of Dell Creek) will be unavoidably impacted by the placement of dredged spoils. All of these impacts represent 1.07 acres of impact and are significantly less than the originally proposed 4.14 acres of wetland impact. Descriptions and locations of all of the proposed impact areas are provided in Table 1.

Construction of 22.26 acres of mitigation wetlands is being proposed to mitigate for the 1.07 acres of impact associated with this Bay County Drain Commissioner's project.

A portion of the wetlands being mitigated are located within county designated drains within the Dell Creek Drainage District. The size and location of these linear wetlands/existing drainage ditches within the Dell Creek Drain Drainage District are provided in Table 2. Given the excess of wetland acreage being constructed by this project it is not the Drain Commissioner's position, at this time, to dispute MDEQ's regulatory jurisdiction or exemption of any wetlands within these county designated drains.



Acreage to be created

Approximately 22.26 acres of wetland will be constructed on the subject property as part of the regional storm water detention basin that is needed to create 65 acre-feet of storm water storage for the Dell Creek Drainage district. Another 0.82 acres of wetland will be created by the rerouting of county drains around the perimeter of the proposed basin. Within the 22.26 acre wetland complex a minimum of 1.7 acres of emergent/scrub shrub wetland will be monitored and maintained in accordance with the performance standards and requirements approved and/or conditioned by the MDEQ in the anticipated permit for this project. Figures 2A and 2B show the location and configuration of the proposed 22.26 acre wetland complex and the location of the mitigation wetlands that will be monitored and maintained, respectively.

Description of the ecological types, hydrology, soils, and vegetation

The wetlands being impacted on the subject property are composed predominantly of emergent and scrub-shrub community types, however there is one small area of forested wetland that will be impacted. A description of the wetlands of the subject property, inclusive of plant species, soils and topographic features, is provided in WCR's Wetland Assessment Report (dated September 20, 2005). Wetland Data forms are included in Appendix A for the additional wetland areas delineated by WCR, per request of the MDEQ at a March 28, 2006 on-site meeting.

To summarize the data provided in the Wetland Assessment Report and Appendix A the wetlands that will be impacted by the relocation of the drain are emergent wetlands predominated by narrowleaf cattail (*Typha angustifolia*). The existing drain during storm events contains upwards of 2 feet of water however during the summer months flows can be minimal and water levels within the drain can be less than an inch of water.

Wetlands located within the edges of the existing detention that will be impacted by a berm include a mixture of emergent and scrub shrub wetland vegetation. The herbaceous species are narrow leaf cattail, softrush (*Juncus effusus*), reed canary grass (*Phalaris arundinacea*) and giant reed grass (*Phragmites australis*). The predominant shrub species are sandbar willow (*Salix exigua*), cottonwood, and gray dogwood (*Cornus foemina*). The soil profile of this area has been disturbed due to past excavation activities; a thin layer of dark mineral soil over sandy soils.

Newly identified forested wetlands north of the old detention basin are predominated by a wetland rated overstory and an upland rated understory. Dominant tree and shrub species include American elm (*Ulmus americana*), green ash (*Fraxinus americana*) and box-elder (*Acer negundo*). Dominant herbaceous species included Pennsylvania sedge (*Carex pennsylvanica*), wild black currant (*Ribes americanum*), and prickly gooseberry (*Ribes cynosbati*). This area appears to be losing its wetland hydrology given the depth and proximity to the drain to the east. Soils were identified as being mineral sandy soils with a dark surface horizon; no redoximorphic features were identified in the upper 12" of the soil profile. Only 0.010 acres of this forested habitat will be impacted by the placement of dredged spoils.



Description of the functions provided by the wetlands (impacted and proposed)

The relocation of the drain will result in the loss of wetland functions, benefits, value, and uses associated with the emergent wetlands of this wetland complex. The emergent wetlands are providing nesting, cover, resting, feeding, rearing-of-young, and perching sites for songbirds, waterfowl and small mammals. However, the relocated channel will also, once vegetated, provide the same functions, values, benefits, and uses with an additional benefit of having less erosion and temporary loss of habitat and degradation of water quality from an improperly stabilized and unstable channel.

The forested wetland complex is providing some wildlife and water quality functions however given its relatively low plant diversity and impacts from the drain to the east these functions are being compromised. The old agricultural ditch north of the forested wetland complex is nearly devoid of herbaceous vegetation containing only overstory trees and shrubs. Like the forested wetland area, this old ditch is perched above the elevation of the drain and is providing some filtration and ground water recharge functions.

The mitigation wetlands have been designed to provide emergent and scrub wetlands that have greater wetland functions, values, benefits, and use than those of the existing wetlands on the subject property. No forested wetlands have been incorporated into the design of the basin given the difficulty in assuring proper hydrology (for meeting forested wetland performance standard criteria) within this regional storm water detention basin.

The proposed activities will result in a temporary loss of 1.07 acres of regulated wetlands. However, there will be a net gain of 18.02 acres of wetland upon completion of the 22.26 acre mitigation wetlands/storm water detention basin and county drain relocation.

Mapping

Figure 1 shows the approximate location of the existing wetland complexes on the subject property. Figures 2A and 2B illustrate the location of the proposed activities on the property. Figure 1 has been revised from the original figure created for WCR's September 20, 2005 wetland assessment report to show the presence of additional wetlands requested by the MDEQ during a March 2006 site inspection of the property. This figure shows the inclusion of Wetland Complex (WC) 14 into WC 13 and the addition of WC 20-WC30. Figure 3 labels the location of the upland portions of the property that will be excavated and/or utilized for the creation of the 22.26 acre regional detention/wetland complex. All of the figures and tables referenced in this document are provided in Appendix B (Figures and Tables).

Baseline Conditions of Proposed Mitigation Site

Description of site

The proposed mitigation site encompasses both wetland and upland. Figure 2 shows the location of the mitigation area in relation to US-10, wetlands, Dell Creek Drain, floodplains and other



physical features of the area. This figure also provides topographic information of the site in two-foot contours. Representative cross-section views through the proposed mitigation site are provided in Figure 3.

The wetland portions of the basin were discussed in the previous section. Descriptions of the upland portions of the mitigation area are provided below and correlate with Figure 4 that identifies the various upland portions of the property and that are lettered A through I.

Area A is a fallow farm field that historically was used for growing corn. These areas are predominated by well drained sandy soils with depth to water/soil saturation being approximately 5.4/4.2 feet, respectively. This upland area will be utilized both for the regional detention basin and construction of the relocated county drain.

Area B and C are a forested coniferous woodland areas dominated by white pines (*Pinus strobus*) with the outer edges of the woodlots along the agricultural fields being dominated by gray dogwood and black raspberry (*Rubus occidentalis*). This area is predominated by well drained sandy soils with depth to water/soil saturation being approximately 4.9/3.7 feet, respectively.

Area D and H are actively being farmed for corn. These areas are predominated by well drained sandy soils with depth to water/soil saturation being approximately 5.9/4.5 feet, respectively.

Area E is a soil spoils pile upwards of 10 feet high. Only a few weedy plant species, namely Canada thistle (*Cirsium arvense*), are present on the spoils pile.

Area F is being used for growing nursery stock trees such as spruce trees (*Picea* spp.). Soils at this location are also sandy with depth to water/soil saturation being approximately 4.5/3.5 feet, respectively.

Area G is the upland woodlot that also contains a “remnant” pocket of forested wetland. This woodlot is dominated by American elm, wild black cherry (*Prunus serotina*), box-elder, basswood (*Tilia americana*), and various upland shrub species. Portions of this area is also open field dominated by autumn olive (*Eleagnus umbellata*), Canada bluegrass (*Poa compressa*), Queen Ann’s lace/wild carrot (*Daucus carota*), and Tall goldenrod (*Solidago altissima*).

Area I is the upland portions of the old detention basin. The dominant vegetation in the basin is Canada bluegrass, Queen Ann’s lace and tall goldenrod. Soils are non-hydric containing a dark mineral surface layer over oxidized reddish/yellow sands with no signs of organic streaking. Depth to water/soil saturation being approximately 24”/18”, respectively.

Selection of this mitigation site

For typical community flood protection projects, the optimum location for detention ponds is immediately upstream from the impacted area. The proposed storage pond is located upstream of the Garfield and Waters Subdivisions, at the confluence of the Dell Creek Main Branch, Branch #1, Branch #2, and Branch #6. The proposed design requires these four drains to be



combined into one open channel. The drainage channel capacity is limited to 200 cubic feet per second (cfs). Flow in excess of this could flood the subdivision areas. The pond is design to receive these flows above the 200 cfs limit and temporarily store the storm water. As the storm event subsides, the detained water will bleed back into the Dell Creek Drain via a culvert outlet with flap gate.

Site Development Plan

The proposed wetland mitigation design, including 1) a description of the sources of hydrology, the source and type of soil amendments, wetland vegetation establishment, and wildlife structures, 2) a plan view showing all of the proposed conditions of the mitigation site including all contour elevations (at one foot contour intervals), structures, the type and size of all proposed wetland areas, property lines, directional arrows, scale, and conservation easement area, 3) typical cross-sections, 4) a water budget of inputs and outputs to the proposed wetland, and 5) a vegetative establishment plan which includes a plan view, methods, species list with scientific and common names, and source of any plant or seed stock.

The design of the mitigation wetlands includes the excavation of upland, forested wetland, and existing detention basin/emergent and scrub shrub wetlands to create a 22.3 acre regional detention basin/wetland complex. The wetland will be created based on modeling of the groundwater table and the elevations of Dell Creek Drain.

The soils of the subject property have been assessed through soil borings and observations of the existing detention basin to determine that the soil profiles will support the planned detention basin. A layering of suitable loamy soils and organic material to the final design grades of the mitigation wetlands will assure that proper hydrology is achieved to ensure success of the mitigation wetlands. Wildlife structures, 6/acre, are proposed to be placed within the mitigation wetland areas of the project.

The planting scheme for the wetland will consist of native wetland vegetation providing similar habitats to the wetlands that were destroyed in the construction of the complex facility. The site will consist of shrub/scrub and emergent wetlands.

The mitigation wetlands will be over excavated 6"-12" to accommodate for the layering of 6"-12" of organic soils within the excavated basins. The final bottom grade of the mitigation wetlands will be roughly contoured to create "pit and mounds" to provide diversity within the bottom of the wetland. Water depths within the mitigation wetland will vary from soil saturation within 6" of the ground surface in the scrub shrub wetland edges to a maximum of 3 feet of water in the emergent wetland complex.

The planting scheme for the wetland will consist of native wetland vegetation providing similar habitats to the wetlands that currently exist on the property. The seed mixture contains numerous native plant species currently not present due in part to the competition of giant reed grass and reed canary grass on native species.



A water budget has not been prepared for this site since the source of hydrology will be directly related to the water elevation of Dell Creek. Hydrologic data for the drainage district is available upon request to Wade Trim's Bay City office.

The commercial source of seed, tubers, and saplings will be determined based upon availability and quality of the nursery stock at the time of the required plantings. Currently, JFNew and Wildtype nurseries are being considered as the primary source for our seeding/plantings. The following is the projects vegetative management plan:

The mitigation wetland will be designed to create a minimum of 1.7 acres of emergent wetlands. A minimum of six inches of topsoil will be placed throughout the mitigation wetland. The emergent area, approximately 1.4 acres in size, will be planted with tubers and plugs. This area will be designed to maintain between 6 and 18 inches of water above the final grade of the wetland complex. Species to be planted include the following: *Acorus calamus*, *Carex aquatilis*, *Carex lacustris*, *Carex stricta*, *Juncus effusus*, *Peltandra virginica*, *Pondetaria cordata*, *Sagittaria latifolia* (and/or *S. angustifolia*), *Scirpus acutus*, *Scirpus americanus*, *Scirpus atrovirens*, *Scirpus cyperinus*, *Scirpus fluviatilis*, *Sparganium eurycarpum*. The previous list may be modified due to availability.

The scrub shrub wetland area, approximately 0.3 acres in size, will be designed to maintain soil saturation at the soil surface and no less than 12" below ground elevation. The scrub shrub wetland areas will include pit and mound topography to mimic a natural system and ensure the planted vegetation does not become too wet during the initial establishment period. The shrubs will be planted on raised berms with a minimum width of 7 feet with a flat crown approximately 3 feet in width. The berms will be created in an irregular fashion to maintain a more natural appearance. Straight lines will be avoided but the mounds will run perpendicular to the long axis of the emergent wetlands to insure surface water inundation of the troughs during the storm events. Topsoil will be stripped and stockpiled. A minimum of 6 inches of topsoil will be placed in the mounds throughout the scrub/shrub wetland. Scrub/shrub areas will be planted using plugs at a rate of 1,200 per acre. The following species will be planted in the scrub shrub areas:

<u>Scientific Name</u>	<u>Common Name</u>
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Cornus amomum</i>	Silky dogwood
<i>Cornus stolonifera</i>	Red-osier dogwood
<i>Physocarpus opulifolius</i>	Ninebark
<i>Viburnum opulus var americanum</i>	Highbush cranberry
<i>Viburnum lentago</i>	Nannyberry
<i>Sambucus canadensis</i>	American elderberry
<i>Salix discolor</i>	Pussy willow
<i>Salix exigua</i>	Sandbar willow

As weather permits, the scrub/shrub and emergent wetland areas will be seeded with a wetland seed mix including a cover crop for quick establishment. The seed mix may contain the following species (species may be modified due to availability); again specified mixtures for



emergent wetlands will be used as will specific mixes for scrub shrub wetlands. The following is provided to give a listing of the diversity of plants that may be included in these seedings.

<u>Scientific Name</u>	<u>Pure Live Seed (PLS)/ Approximate Ounces Per Acre</u>
<i>Grasses and Forbs - apply at 4 lbs./acre</i>	
<i>Calamagrostis canadensis</i>	1.00
<i>Carex comosa</i>	2.00
<i>Carex crinita</i>	1.25
<i>Carex hystericina</i>	2.00
<i>Carex lacustris</i>	
<i>Carex lupulina</i>	1.50
<i>Carex lurida</i>	1.50
<i>Carex stricta</i>	
<i>Carex vulpinoidea</i>	3.00
<i>Echinochloa crusgalli</i>	5.00
<i>Elymus virginicus</i>	7.50
<i>Glyceria striata</i>	1.00
<i>Leersia oryzoides</i>	1.50
<i>Scirpus atrovirens</i>	1.50
<i>Scirpus fluviatilis</i>	2.00
<i>Spartina pectinata</i>	2.00
<i>Scirpus validus</i>	1.25
<i>Asclepias incarnata</i>	1.00
<i>Aster novae-angliae</i>	1.00
<i>Aster umbellatus</i>	1.00
<i>Bidens cernua</i>	1.00
<i>Chelone glabra</i>	0.50
<i>Eupatorium maculatum</i>	4.00
<i>Eupatorium perfoliatum</i>	3.00
<i>Euthamia graminifolia</i>	0.75
<i>Liatris spicata</i>	2.00
<i>Lobelia cardinalis</i>	0.50
<i>Lobelia siphilitica</i>	0.50
<i>Rudbeckia laciniata</i>	5.00
<i>Rudbeckia subtomentosa</i>	6.00
<i>Solidago rugosa</i>	0.50
<i>Verbena hastata</i>	2.00
<i>Vernonia missurica</i>	1.50
<i>Veronicastrum virginicum</i>	<u>0.25</u>
	64.00
<u>Cover Crop</u>	
<i>Elymus canadensis</i>	48.00



Performance standards

Measurable performance standards have been established to determine if wetland mitigation areas are progressing towards successful establishment. Annual inspections and annual reports will document and report the progress of the wetland mitigation areas. The targeted performance standards for identifying a successful wetland mitigation area include:

- Construction has been completed in accordance with the MDEQ approved plans and specifications referenced in the permit.
- The mitigation wetland is characterized by the presence of water at a frequency and duration sufficient to support a predominance of wetland vegetation and wetland types specified in the mitigation plan at the end of the monitoring period.
- A layer of high-quality soil of organic material or a loamy A horizon is present over the entire created wetland to a depth of at least six inches.
- The mitigation area is free of oil, grease, debris, and all other contaminants.
- A minimum of six habitat structures, consisting of three types have been placed per acre of mitigation wetland. At least 50 percent of each structure extends above the normal water level.
- Mean percent cover of native wetland species in the herbaceous layer at the end of the monitoring period is not less than 80 percent for scrub-shrub wetland and 60 percent for emergent wetland.
- Extensive (greater than 0.01 acres in size) open water and submergent vegetation areas having no emergent and/or floating vegetation do not exceed 20 percent of the mitigation wetland area.
- Extensive (greater than 0.01 acres in size) areas of bare soil do not exceed 5 percent of the mitigation wetland area.
- The minimum number of native wetland plant species is not less than 15 in both scrub-shrub wetland and emergent wetland.
- At the end of the monitoring period, the mitigation wetland supports a minimum of 300 individual surviving, established, and free-to-grow shrubs per acre in the scrub-shrub wetland that are classified as native wetland species and consist of at least four different plant species.
- The mean percent cover of invasive species such as *Phragmites australis*, *Lythrum salicaria*, and *Phalaris arundinacea* in combination is no more than 10 percent of each wetland type.
- Invasive species do not dominate the vegetation in any extensive (greater than 0.01 acres in size) area of the mitigation wetland.

Should vegetation fail to establish within the emergent wetland areas within 2 years, additional wetland plantings will be proposed. The location, number and type of plantings selected will be based on water depths and soil saturation levels. This information will be submitted to the MDEQ for final review and approval. Plant tubers and saplings will be used in conjunction with a wetland seed mix to promote re-vegetation of the area.



Should vegetation fail to establish within the scrub shrub areas within 3 years, the hydrologic inputs into and out of the basin will be reassessed and additional shrub plantings will be proposed. The location, number and type of plantings will be selected based on the density of surviving species, water depths, and soil saturation levels. This information will be submitted to the MDEQ for final review and approval.

Monitoring Plan

Performance standards associated with the wetland mitigation area focus on establishing wetland hydrology and desirable wetland vegetation. Periodic monitoring of the mitigation area will provide necessary data to show if performance standards are being met. Monitoring is proposed for 5 years. Monitoring shall be conducted and reported as follows:

- Inundation and saturation at all staff gages, monitoring wells, and other stationary points shown on the mitigation plan shall be measured monthly during the growing season.
- Vegetation in the sample plots located along the transects (shown in Figure 5) shall be sampled once between July 15 and August 31. The number of sample plots within each wetland type shall be determined by use of a species-area curve or other approach approved by the MDEQ. The minimum number of sample plots per wetland type shall be no fewer than five.
- The herbaceous layer of each wetland type shall be sampled using one square meter sample plots.
- The shrub and tree layers of each wetland type shall be sampled using 30-foot radius sample plots.
- Plant species identified in the sample plots shall be listed using their scientific and common names and wetland indicator category from the USFWS's "National List of Plant Species That Occur in Wetlands" for Region 3. Species shall be identified as native or non-native according to the Michigan Floristic Quality Assessment. Nomenclature shall follow Voss (1972, 1985, 1996) or Gleason and Cronquist (1991).
- The location of sample transects and plots, and wetland types shall be shown on a plan view in the monitoring report.
- The sample transects shall be permanently staked in the field.
- Extensive (0.01 acres or greater) open water areas, bare soil areas, areas dominated by invasive species, and areas without a predominance of wetland vegetation shall be delineated and shown on a plan view in the monitoring report.
- Sightings or evidence of wading birds, songbirds, waterfowl, amphibians, reptiles, and other animals shall be documented by number, date, and hour of the sighting or evidence.
- The mitigation area shall be inspected for oil, grease, man-made debris, and all other contaminants.
- The water clarity in the mitigation area shall be evaluated as "poor", "fair", "good", or "excellent".
- The development of the mitigation area shall be documented yearly from permanent photo stations. At a minimum, photo stations shall be located at both ends of each transect.



- Placement of high quality wetland soil into the mitigation shall be documented photographically during site construction.
- Habitat structures installed in the mitigation area shall be described and documented photographically.
- A written summary of data from previous monitoring periods shall be provided and compared to data of the current monitoring year. A discussion shall be provided of changes or trends observed in the mitigation area based on data from all monitoring years.
- A calculation of the area of each wetland type shall be provided.
- A written summary of all identified problem areas and proposed corrective measures shall be provided.
- The annual monitoring report shall be submitted to the MDEQ prior to January 31 for monitoring undertaken the previous year.

Schedule and Construction Methods

This construction sequence is based on the assumption that the MDEQ will approve the submitted permit application by spring of 2006. Prior to construction all necessary soil erosion and sedimentation control fences and structure will be installed at the toe of all permitted fill slopes and locations to prevent inadvertent discharge of sediment to wetlands and/or the drain. The soil erosion and sedimentation control structures/measures will be installed and maintained in accordance with an anticipated Part 91, Soil Erosion and Sedimentation Control, of NREPA permit.

The construction of the mitigation wetland site will commence prior to or concurrently with the MDEQ permitted activities on the subject property. The mitigation wetland is expected to be constructed by the fall of 2006 with final seeding and planting of the wetland in the late fall of 2006. A wetland seed mix will be used in the scrub shrub areas along with a cover crop to help reduce erosion. The emergent plantings will occur concurrently with the seeding, provided the necessary hydrology is available for a 60 day growing season (if not seeding/planting of the emergent areas will be in the spring of 2007. The scrub shrub saplings will be planted after the plants go dormant between October 20 and December 10th.

Long-term Protection

- 1) The Bay County Drain Commissioner and/or the Dell Creek Drain Drainage District will be the landowner of the subject property for the mitigation wetlands.
- 2) A conservation easement will be placed upon all of the mitigation wetlands as shown in Figure 6 and as described in Appendix C. The conservation easement will include a minimum of 1.5 acres of land, of which a minimum of 1.5 acres is wetland.
- 3) Invasive and undesirable plant species will be controlled. The following summarizes the actions to be taken should these plant species begin to establish in the wetland mitigation areas. The wetland mitigation area will be reviewed periodically to



determine if undesirable plant species are beginning to establish. Each plant will be removed by hand if possible.

Should these species become prolific and unmanageable to effectively control/remove by hand, hydrologic alterations, controlled burning and/or chemical application may be necessary to eradicate/control these species. A plan for controlling these species, including a new planting scheme (if necessary), will be submitted to the MDEQ for review and approval prior to initiating the proposed control.

Financial Assurances

The following are cost estimates for construction, planting and monitoring of the mitigation wetlands.

Acquisition of Land:	\$ 245,000	
Construction: (per engineer)	\$ 96,000	
Vegetative Plantings:		
Emergent wetlands (1.4 acres):		
Plugs & Tubers	\$ 2,100	based on \$1500/acre
Seedings	\$ 1,750	based on \$1250/acre
Labor	\$ 7,700	
Scrub shrub wetlands (0.3 acres):		
Saplings	\$ 450	based on \$1500/acre
Seedings	\$ 375	based on \$1250/acre
Labor	\$ 1,650	
Total Planting Costs	\$ 14,025	
Monitoring:	\$ 41,391	
See Table 4 of Appendix B		
TOTAL ESTIMATED COSTS:	\$ 396,416	



Appendix A

Wetland Data Forms



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, LAND AND WATER MANAGEMENT DIVISION
PART 303 - WETLAND DATA FORM

This information is collected pursuant to Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

Applicant: Bay County Drain Commissioner For DEQ Use: File: 05-09-0032-P
 County: Bay T R S Date: 04/26/2006
 Form Completed By: Eric Kogge Wetland Area: Forested area bordering
Spill placement area

INSTRUCTIONS:

Fill out all pertinent information on the following worksheets to substantiate your review. All methods should be in accordance with the *MDEQ Wetland Identification Manual: A Technical Manual for Identifying Wetlands in Michigan* and Part 303. Nomenclature shall follow Voss (1972, 1985, and 1996) or Gleason and Cronquist (2004).

SITE REVIEW:

N (Y/N) Is the site significantly disturbed? If yes, describe: _____

N (Y/N) Is there a potential Problem Area as described in the MDEQ Wetland Identification Manual?
If yes, describe: _____

VEGETATION AND AQUATIC LIFE: Acrey delin. by GS, HH, II, JJ, KKK lines

Dominant Vegetation on Wetland Side of the Boundary (use additional sheets if necessary)

Genus/Species	Common Name	Stratum*	Indicator Status
<u>Ulmus americana</u>			
<u>Prunus serotina</u>			
<u>Populus deltoides</u>			
<u>Rhamnus cathartica</u>			
<u>Rhamnus frangula</u>			
<u>Prunus serotina</u>			
<u>Prunus pennsylvanica</u>			
<u>Lonicera spp</u>	<u>Honeysuckle</u>	<u> </u>	
<u>Ribes americanum</u>			
<u>Glyceria striata</u>			
<u>Ribes cynosbati</u>			

Aquatic Life Observed _____

Dominant Vegetation on Upland Side of the Boundary (use additional sheets if necessary)

Genus/Species	Common Name	Stratum*	Indicator Status
<u>Prunus serotina</u>		<u>OS</u>	
<u>Acer negundo</u>		<u>OS</u>	
<u>Rhamnus cathartica</u>		<u>SS</u>	
<u>Prunus virginiana</u>		<u>SS</u>	
<u>Lonicera spp</u>	<u>Honeysuckle</u>	<u> </u>	
<u>Fragaria virginiana</u>	<u>Wild Strawberry</u>	<u>H</u>	
<u>Batterococcus virginicus</u>	<u>Virginia Creeper</u>	<u>H/V</u>	

Stratum: H = Herbaceous (woody and herbaceous plants <3' ft. tall); S = Sapling/Shrub (≥3.2 ft. tall AND <3" DBH); O = Overstory (≥3" DBH)

Ribes cynosbati
~~Ribes virginiana~~



HYDROLOGY (Requires One Primary or Two Secondary Indicators):

Primary Indicators:

- (v) Visible observation of inundation (Depth in.)
- (v) Visible observation of soil saturation (Depth in.)
- (v) Hydric soils (v below)
- (v) Watermarks
- (v) Drift lines
- (v) Sediment deposits
- (v) Drainage patterns within wetlands

Secondary Indicators:

- (v) Oxidized rhizospheres in upper 12"
- (v) Water stained leaves
- (v) Confirm soil profile matches hydric soil list
- (v) FAC-Neutral test
- (v) Bare soil areas (early spring before veg.)
- (v) Morphological plant adaptations (v below)

"Forested Area bordering Sport placement area"

Other: _____

Hydric Indicators for Non-Sandy Soils

- (v) Organic soils (Histosols)
- (v) Histic epipedon
- (v) Sulfidic material (H₂S odor)
- (v) Soil color (immediately below A-horizon or within 10 inches of the surface, whichever is shallower)
 - (v) Gleyed (gray) soil (i.e. matches Gley page)
 - (v) Matrix chroma of 2 or less in mottled soils
 - (v) Matrix chroma of 1 or less in unmottled soils
 - (v) Black mineral soil with gray mottles at ≤ 10 inches
- (v) Confirm soil profile matches local hydric soil list
- (v) Iron and manganese concretions
- (v) Reducing soil conditions (ferrous iron test)
- (v) Aquic or peraquic moisture regime

Additional Hydric Indicators for Sandy Soils

- (v) High organic matter in the surface horizon (few areas)
- (v) Streaking of subsurface horizons by organic matter
- (v) Organic pans: at depth of _____ inches (few areas)

Supplemental Indicators of Hydric Soils:

(e.g., NRCS Field Indicators of Hydric Soils):

- Morphological Plant Adaptations Observed** (v): Adventitious roots Shallow root system Floating leaves
- Inflated leaves, stems, or root Polymorphic leaves Oxygen pathway to roots Floating stem
- Hypertrophied lenticels Multiple trunks or stooling Buttressed tree trunks Pneumatophores

SOIL PROFILE NOTES:

Soil Profile on Wetland Side of the Boundary				
Map Unit from Soil Survey:				
Depth (inches)	Matrix color (hue/value/chroma)	Mottle Color (if present)	Texture (e.g., sandy loam, etc.)	Notes
VARIED				
0-12"	10YR 3/2	10YR 4/4	Sandy/mineral w/ organic & mineral streaks	
12"+	10YR 3/2	10YR 4/4	Sandy	
Soil Profile on Upland Side of the Boundary				
Map Unit from Soil Survey (if different than above):				
Depth (inches)	Matrix color (hue/value/chroma)	Mottle Color (if present)	Texture (e.g., sandy loam, etc.)	Notes
0-12"	10YR 3/2	—	Sandy	

WETLAND DETERMINATION

- (v) Predominance of wetland vegetation (Fac, Fac+, FacW-, FacW, FacW+, OBL) or aquatic life
- (v) Wetland hydrology and/or hydric soil present
- (Y/N) Is the area wetland (both wetland hydrology/soils and a predominance of wetland vegetation present)?
- (Y/N) Is the area REGULATED wetland (refer to Part 303 - Wetland Jurisdictional Determination Form)?

→ wetlands in spring 2006 for MDEQ permit processing

Wetland Types (v all that are present):

- (v) Emergent Marsh (v) Deciduous Swamp (v) Fen (v) Shrub Swamp
- (v) Wet Meadow (v) Coniferous Swamp (v) Bog/Muskeg (v) Floodplain Forest
- (v) Wet Prairie (v) Deciduous Forest (v) Great Lakes Marsh (v) Submergent Marsh

Other (e.g. rare and imperiled community, reed canary grass dominated, highly disturbed): _____

Comments: old farm drainage area parallel to farm fields - WCR

July 2005 assessment didn't id these areas due to lack of wetland rated

understory - historically (overstory) areas were wetland but majority area impacted by farming and draining activities - identified as



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, LAND AND WATER MANAGEMENT DIVISION
PART 303 - WETLAND DATA FORM

This information is collected pursuant to Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

Applicant: Bay County Drain Commission For DEQ Use: File: 05-09-0032-P
 County: Bay T R S Date: 04/26/2006
 Form Completed By: S. Kogge Wetland Area: "Forested Wetland of farm ditch in woodlot"

INSTRUCTIONS:

MM-26
Fill out all pertinent information on the following worksheets to substantiate your review. All methods should be in accordance with the MDEQ Wetland Identification Manual: A Technical Manual for Identifying Wetlands in Michigan and Part 303. Nomenclature shall follow Voss (1972, 1985, and 1996) or Gleason and Cronquist (2004).

SITE REVIEW:

N (Y/N) Is the site significantly disturbed? If yes, describe: _____

N (Y/N) Is there a potential Problem Area as described in the MDEQ Wetland Identification Manual?
If yes, describe: _____

VEGETATION AND AQUATIC LIFE:

Dominant Vegetation on Wetland Side of the Boundary (use additional sheets if necessary)			
Genus/Species	Common Name	Stratum*	Indicator Status
<i>Ulmus americana</i>		OS	FACW
<i>Fraxinus pennsylvanica</i>		OS	FACW
<i>Acer negundo</i>		OS	FAC
<i>Panicum serotinum</i>		SS	UPL
<i>Carex pennsylvanica</i>	Sedge	H	UPL
<i>Corchorus flammula</i>		SS	FACW
<i>Ulmus americana</i>		SS	FACW
<i>Ribes americanum</i>	Wild Black Currant	H	FACW
Aquatic Life Observed <u> </u>			
Dominant Vegetation on Upland Side of the Boundary (use additional sheets if necessary)			
Genus/Species	Common Name	Stratum*	Indicator Status
<i>Panicum serotinum</i>	Black Cherry	OS	UPL
<i>Rubus cynosbati</i>	Prickly gooseberry	H	UPL
<i>Poa compressa</i>	Canada bluegrass	H	FACU+
<i>Carex pennsylvanica</i>	Sedge	H H	UPL
<i>Panicum serotinum</i>	Black Cherry	SS	UPL

*Stratum: H = Herbaceous (woody and herbaceous plants <3.2 ft. tall); S = Sapling/Shrub (≥3.2 ft. tall AND <3" DBH); O = Overstory (≥3" DBH)



HYDROLOGY (Requires One Primary or Two Secondary Indicators):

Forested wetland 4 from ditch

Primary Indicators:

- Visible observation of inundation (Depth _____ in.)
- Visible observation of soil saturation (Depth *12* in.)
- Hydric soils (✓ below)
- Watermarks
- Drift lines
- Sediment deposits
- Drainage patterns within wetlands

Secondary Indicators:

- Oxidized rhizospheres in upper 12" *Area (cont)*
- Water stained leaves
- Confirm soil profile matches hydric soil list
- FAC-Neutral test
- Bare soil areas
- Morphological plant adaptations (✓ below)

Other: _____

Hydric Indicators for Non-Sandy Soils

- Organic soils (Histosols)
- Histic epipedon
- Sulfidic material (H₂S odor)
- Soil color (immediately below A-horizon or within 10 inches of the surface, whichever is shallower)
 - Gleyed (gray) soil (i.e. matches Gley page)
 - Matrix chroma of 2 or less in mottled soils
 - Matrix chroma of 1 or less in unmottled soils
 - Black mineral soil with gray mottles at ≤ 10 inches
- Confirm soil profile matches local hydric soil list
- Iron and manganese concretions
- Reducing soil conditions (ferrous iron test)
- Aquic or peraquic moisture regime

Additional Hydric Indicators for Sandy Soils

- High organic matter in the surface horizon
- Streaking of subsurface horizons by organic matter
- Organic pans: at depth of _____ inches

Supplemental Indicators of Hydric Soils:

(e.g., NRCS Field Indicators of Hydric Soils): _____

Morphological Plant Adaptations Observed(✓):

- Adventitious roots
- Shallow root system
- Floating leaves
- Inflated leaves, stems, or root
- Polymorphic leaves
- Oxygen pathway to roots
- Floating stem
- Hypertrophied lenticels
- Multiple trunks or stooling
- Buttressed tree trunks
- Pneumatophores

SOIL PROFILE NOTES:

Soil Profile on Wetland Side of the Boundary

Map Unit from Soil Survey:

Depth (inches)	Matrix color (hue/value/chroma)	Mottle Color (if present)	Texture (e.g., sandy loam, etc.)	Notes
0-9"	10YR 3/1	-	mineral - sandy	

Soil Profile on Upland Side of the Boundary

Map Unit from Soil Survey (if different than above):

Depth (inches)	Matrix color (hue/value/chroma)	Mottle Color (if present)	Texture (e.g., sandy loam, etc.)	Notes
0-9"	10YR 3/1.5-1.5	-	mineral sandy	

WETLAND DETERMINATION

- (✓) Predominance of wetland vegetation (Fac, Fac+, FacW-, FacW, FacW+, OBL) or aquatic life
- (✓) Wetland hydrology and/or hydric soil present
- (Y/N) Is the area wetland (both wetland hydrology/soils and a predominance of wetland vegetation present)?
- (Y/N) Is the area REGULATED wetland (refer to *Part 303 - Wetland Jurisdictional Determination Form*)?

Wetland Types (✓ all that are present):

- Emergent Marsh
- Wet Meadow
- Wet Prairie
- Deciduous Swamp
- Coniferous Swamp
- Deciduous Forest
- Fen
- Bog/Muskeg
- Great Lakes Marsh
- Shrub Swamp
- Floodplain Forest
- Submergent Marsh

Other (e.g. rare and imperiled community, reed canary grass dominated, highly disturbed): _____

Comments:

historically wetland was large but due to diking has diminished during later half of year I doubt area will be classified as wetland but ✓ upland per WCR July 2005 Assessment



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, LAND AND WATER MANAGEMENT DIVISION
PART 303 - WETLAND DATA FORM

This information is collected pursuant to Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

Applicant: Bay County Drain Commissioner For DEQ Use: File: 05-09-0032-P
 County: Bay T R S Date: 04/25/2006
 Form Completed By: Stu Kogge Wetland Area: "Wetlands within old detention basin"
(Wetland Complex and newly det. U-line)

INSTRUCTIONS:

Fill out all pertinent information on the following worksheets to substantiate your review. All methods should be in accordance with the MDEQ Wetland Identification Manual: A Technical Manual for Identifying Wetlands in Michigan and Part 303. Nomenclature shall follow Voss (1972, 1985, and 1996) or Gleason and Cronquist (2004).

SITE REVIEW:

(Y/N) Is the site significantly disturbed? If yes, describe: -see below - disturbed soil profile -

(Y/N) Is there a potential Problem Area as described in the MDEQ Wetland Identification Manual? If yes, describe: soils have been altered / topsoil removed - minimal organic layer - area used for stormwater detention

VEGETATION AND AQUATIC LIFE:

Dominant Vegetation on Wetland Side of the Boundary (use additional sheets if necessary)

Genus/Species	Common Name	Stratum*	Indicator Status
<i>Salix exigua</i>	Sandbar willow	SS	OBL
<i>Populus deltoides</i>	Cottonwood	OS	FAC+
<i>Cornus racemosa</i>	Graydogwood	SS	FACW-
<i>Populus tremuloides</i>	Trembling aspen	OS	FAC
<i>Typha angustifolia</i>	Narrow leaf cattail	H	OBL
<i>Phragmites australis</i>	Giant reed grass	H	FACW+
<i>Phalaris arundinacea</i>	Reed canary grass	H	FACW+

Aquatic Life Observed mosquito larvae

Dominant Vegetation on Upland Side of the Boundary (use additional sheets if necessary)

Genus/Species	Common Name	Stratum*	Indicator Status
<i>Quercus coccinea</i>	Queen Ann's lace	H	UPL
<i>Solidago altissima</i>	Tall goldenrod	H	FACU
<i>Poa compressa</i>	Canada bluegrass	H	FACU+
<i>Elaeagnus umbellata</i>	Autumn Olive	SS	FACU
<i>Salix exigua</i>	Sandbar willow	SS	OBL
<i>Taraxacum officinale</i>	Dandelion	H	UPL

*Stratum: H = Herbaceous (woody and herbaceous plants <3.2 ft. tall); S = Sapling/Shrub (≥3.2 ft. tall AND <3" DBH); O = Overstory (≥3" DBH)



HYDROLOGY (Requires One Primary or Two Secondary Indicators):

Wetlands within old detention basin (cont.)

Primary Indicators:

- (v) Visible observation of inundation (Depth 12" in.)
- (v) Visible observation of soil saturation (Depth 0-18 in.)
- (v) Hydric soils (v below)
- (v) Watermarks
- (v) Drift lines
- (v) Sediment deposits
- (v) Drainage patterns within wetlands

Secondary Indicators:

- (v) Oxidized rhizospheres in upper 12"
- (v) Water stained leaves
- (v) Confirm soil profile matches hydric soil list
- (v) FAC-Neutral test
- (v) Bare soil areas
- (v) Morphological plant adaptations (v below)

Other: _____

Hydric Indicators for Non-Sandy Soils

- (v) Organic soils (Histosols)
- (v) Histic epipedon
- (v) Sulfidic material (H₂S odor)
- (v) Soil color (immediately below A-horizon or within 10 inches of the surface, whichever is shallower)
 - (v) Gleyed (gray) soil (i.e. matches Gley page)
 - (v) Matrix chroma of 2 or less in mottled soils
 - (v) Matrix chroma of 1 or less in unmottled soils
 - (v) Black mineral soil with gray mottles at ≤ 10 inches
- (v) Confirm soil profile matches local hydric soil list
- (v) Iron and manganese concretions
- (v) Reducing soil conditions (ferrous iron test)
- (v) Aquic or peraquic moisture regime

Additional Hydric Indicators for Sandy Soils

- (v) High organic matter in the surface horizon
- (v) Streaking of subsurface horizons by organic matter
- (v) Organic pans: at depth of _____ inches

Supplemental Indicators of Hydric Soils: (e.g., NRCS Field Indicators of Hydric Soils):

- Morphological Plant Adaptations Observed (v):**
- Adventitious roots
 - Shallow root system
 - Floating leaves
 - Inflated leaves, stems, or root
 - Polymorphic leaves
 - Oxygen pathway to roots
 - Floating stem
 - Hypertrophied lenticels
 - Multiple trunks or stooling
 - Buttressed tree trunks
 - Pneumatophores

SOIL PROFILE NOTES:

Soil Profile on Wetland Side of the Boundary

Map Unit from Soil Survey: _____

Depth (inches)	Matrix color (hue/value/chroma)	Mottle Color (if present)	Texture (e.g., sandy loam, etc.)	Notes
0-4"	10YR 3/1	-	sandy/minimal organic	Some areas with darker/greater org. content
4-12"	10YR 3/3	10YR 4/3	sandy	

Soil Profile on Upland Side of the Boundary

Map Unit from Soil Survey (if different than above): _____

Depth (inches)	Matrix color (hue/value/chroma)	Mottle Color (if present)	Texture (e.g., sandy loam, etc.)	Notes
0-1"	10YR 3/2.5	-	Sandy	
1-12"+	10YR 3/3-4	none	Sandy	

WETLAND DETERMINATION

- (v) Predominance of wetland vegetation (Fac, Fac+, FacW-, FacW, FacW+, OBL) or aquatic life
- (v) Wetland hydrology and/or hydric soil present
- (Y/N) Is the area wetland (both wetland hydrology/soils and a predominance of wetland vegetation present)?
- (Y/N) Is the area REGULATED wetland (refer to Part 303 - Wetland Jurisdictional Determination Form)?

Wetland Types (v all that are present):

- (v) Emergent Marsh
- (v) Wet Meadow
- (v) Wet Prairie
- (v) Deciduous Swamp
- (v) Coniferous Swamp
- (v) Deciduous Forest
- (v) Fen
- (v) Bog/Muskeg
- (v) Great Lakes Marsh
- (v) Shrub Swamp
- (v) Floodplain Forest
- (v) Submergent Marsh

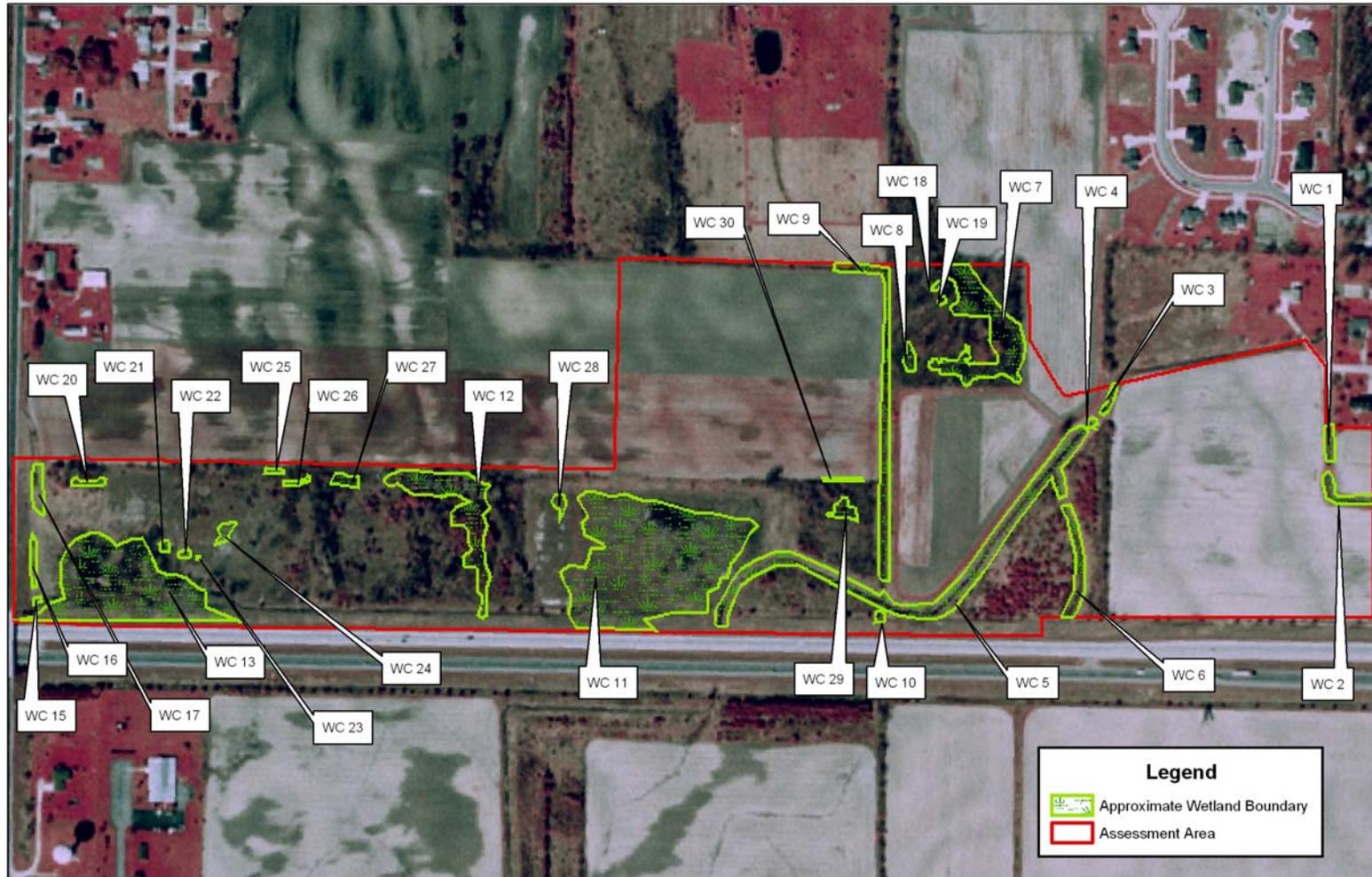
Other (e.g. rare and imperiled community, reed canary grass dominated, highly disturbed): _____

Comments: part of old detention basin - some areas of giant reed grass, willow, cattails, and standing aspen/cottonwood



Appendix B

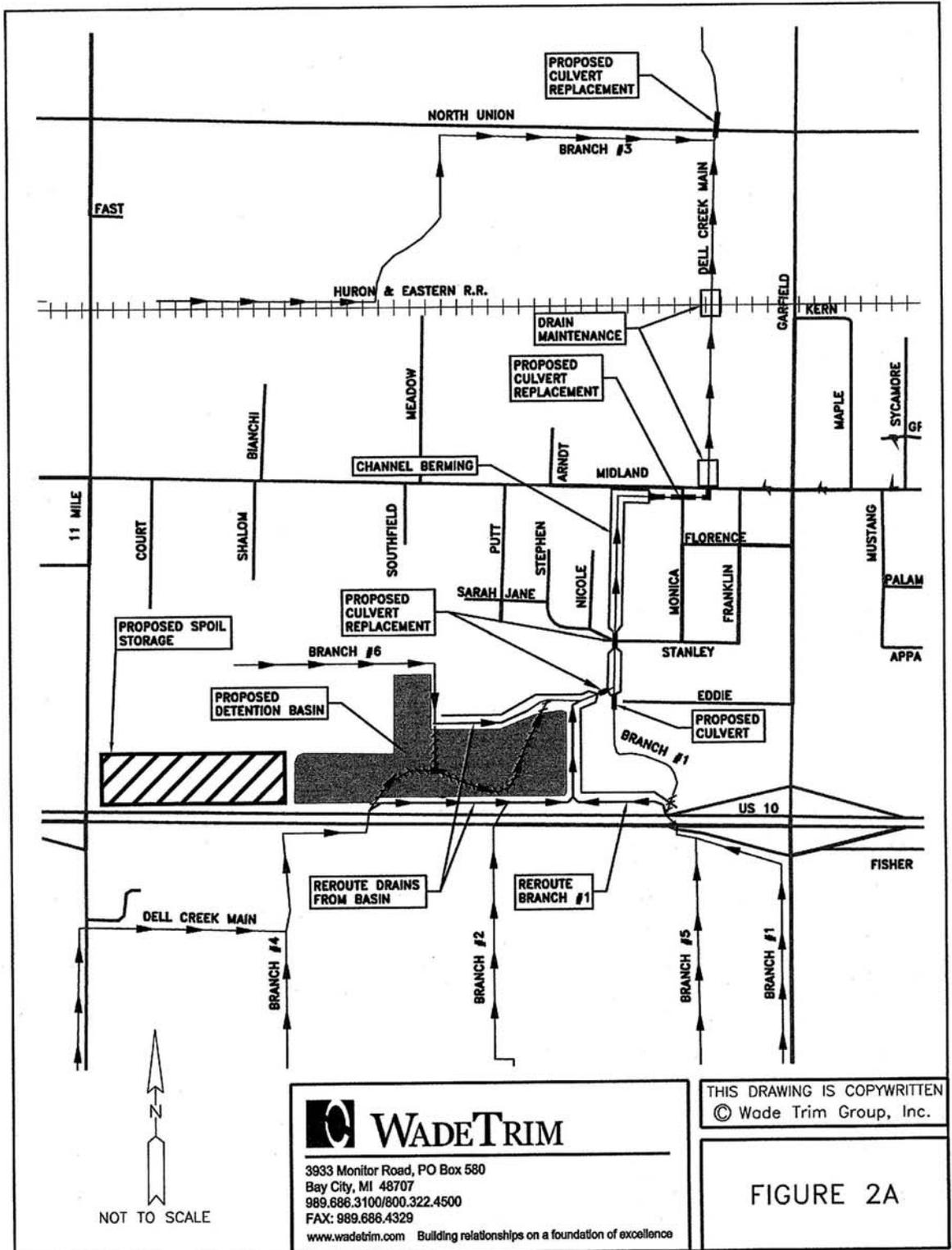
Figures and Tables



0 250 500 1,000 Feet



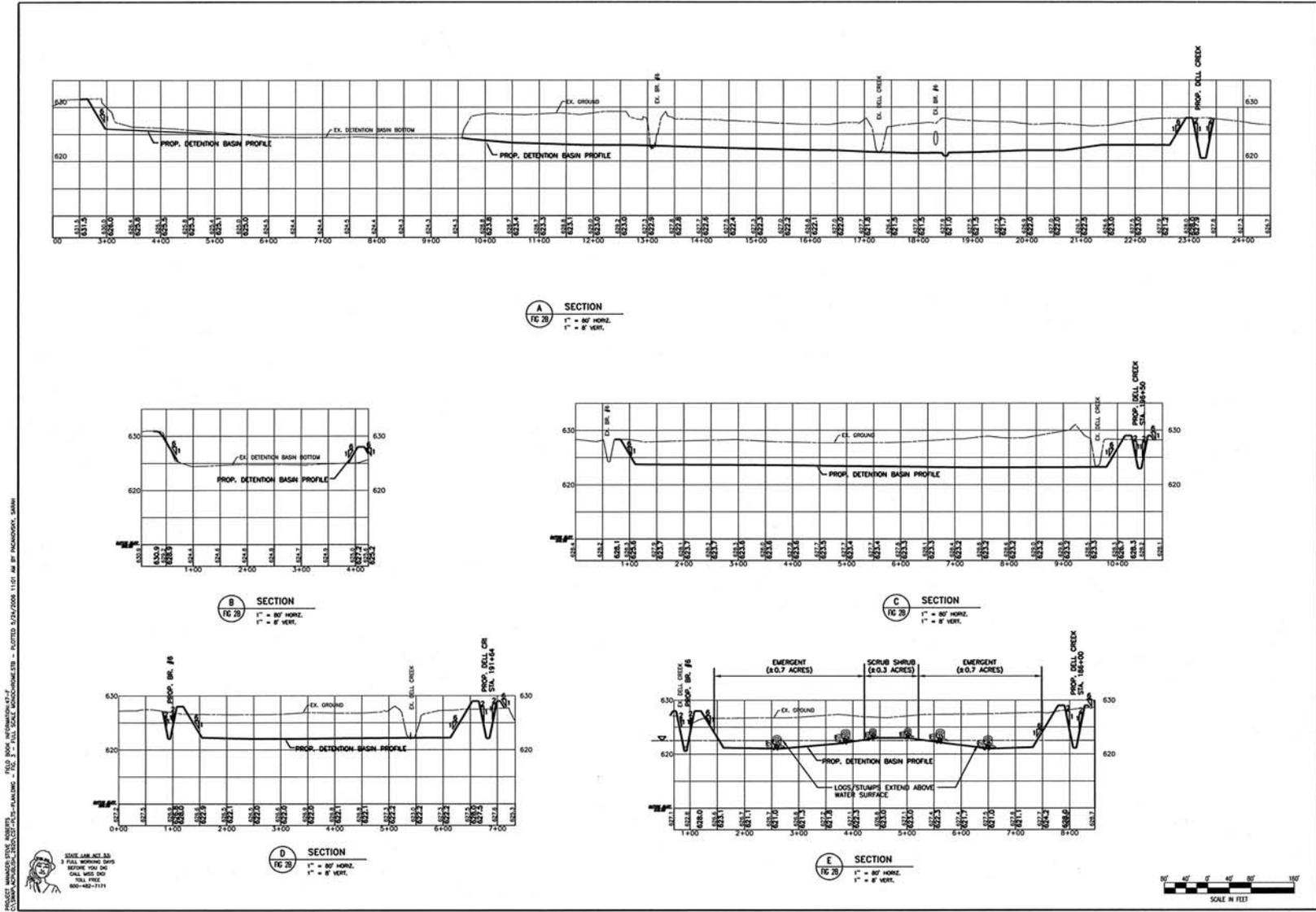
 Wetland and Coastal Resources	Wetland and Coastal Resources, Inc. 5801 W. Michigan Ave. Lansing, MI 48917	Wade Trim		MJK	FIGURE NO
		Wetland Delineation - Auburn		05-163	1
				05/12/06	



WADE TRIM
 3933 Monitor Road, PO Box 580
 Bay City, MI 48707
 989.686.3100/800.322.4500
 FAX: 989.686.4329
 www.wadetrिम.com Building relationships on a foundation of excellence

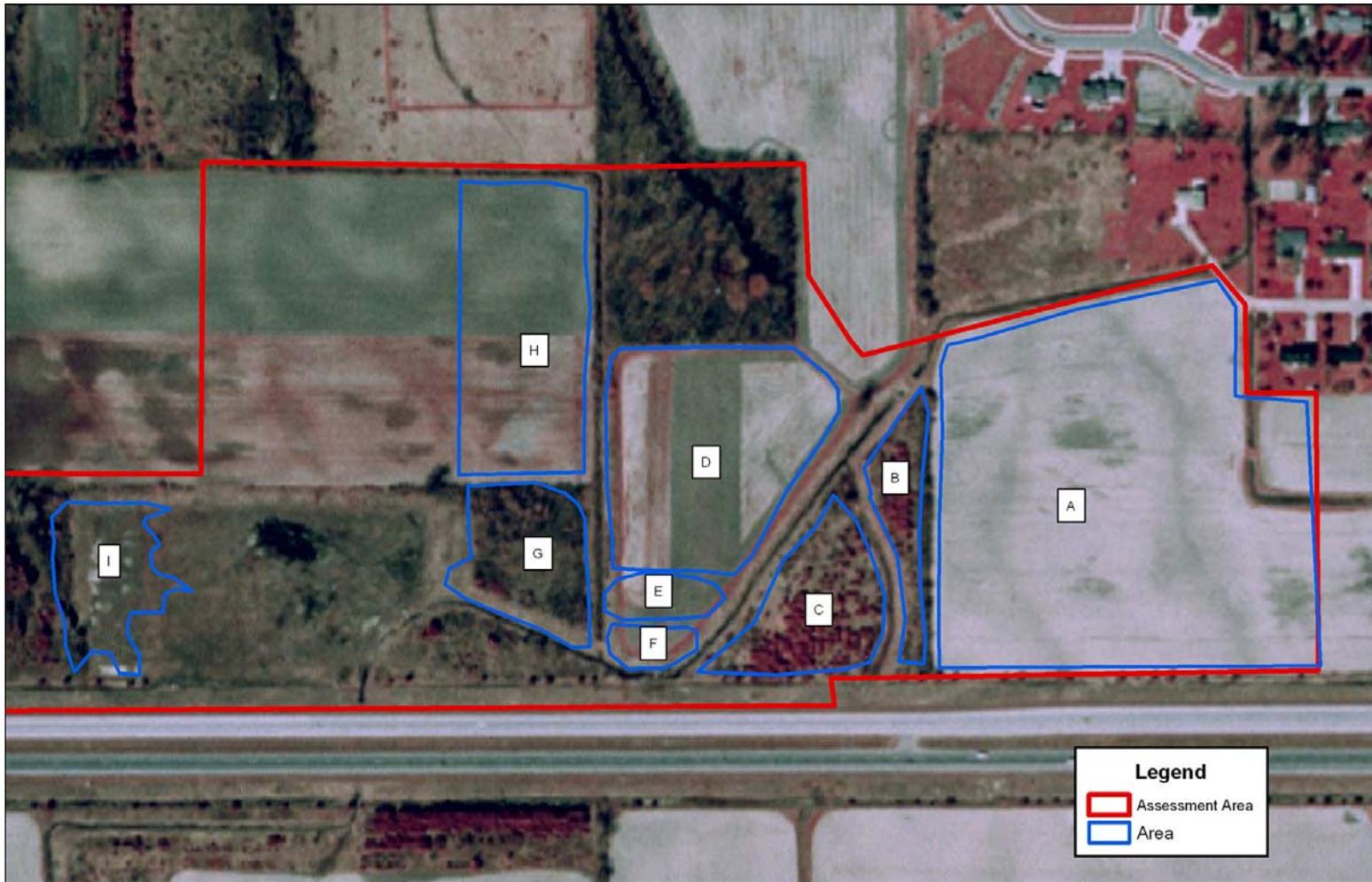
THIS DRAWING IS COPYWRITTEN
© Wade Trim Group, Inc.

FIGURE 2A



PROJECT: WADSWORTH CREEK IMPROVEMENTS - FIELD DATA AND CONSTRUCTION PLANS
 DATE: 05/20/2015
 DRAWING NO.: BDC2045-05B
 SCALE: AS SHOWN
 SHEET NO.: 5 OF 5
 PROJECT LOCATION: 515 CENTER AVENUE, SUITE 601, BAY CITY, MI 48708
 CLIENT: BAY COUNTY DRAIN COMMISSIONER
 DESIGNER: WADETRIM
 CHECKED: J. WADE
 DATE: 05/20/2015

REVISIONS NO. DATE DESCRIPTION	
WADETRIM CONSULTING ENGINEERS 515 CENTER AVENUE, SUITE 601 BAY CITY, MI 48708 (517) 865-1111 www.wadetrिम.com	
BAY COUNTY DRAIN COMMISSIONER 515 CENTER AVENUE, SUITE 601 BAY CITY, MI 48708 GARFIELD/WADSWORTH SUB. FLOOD MITIGATION PROJ. DELL CREEK DRAIN IMPROVEMENTS DELL CREEK CROSS SECTIONAL VIEW	
JOB NO. BDC2045-05B	
SHEET FIGURE 3	



0 250 500 1,000 Feet



 <p>Wetland and Coastal Resources, Inc. 5801 W. Michigan Ave. Lansing, MI 48917</p>	Wade Trim		MJK	FIGURE NO
	Wetland Delineation - Auburn		05-163	4
			05/12/06	



Insert Figure 6 – Figure showing limits of area to be placed under conservation easement

Table 1 - General descriptions and regulatory status of wetland complexes on the subject property.

Wetland Community Type	Number	State Regulated	Activity	Unregulated Wetlands		Regulated Wetlands	
				Square Feet	Acres	Square Feet	Acres
Emergent Wetland along existing drain, Branch #1	WC 1	Yes	None			946	0.022
Emergent Wetland along existing drain, Branch #1	WC 2	Yes	None			2,343	0.054
Emergent Wetland along existing drain, Main Branch	WC 3	Yes	Relocating Drain			1,125	0.026
Emergent Wetland along existing drain, Main Branch	WC 4	Yes	Relocating Drain			208	0.005
Emergent Wetland along existing drain, Main Branch	WC 5	Yes	Relocating Drain			19,670	0.452
Emergent Wetland along existing drain, Branch #2	WC 6	Yes	Relocating Drain			4,990	0.115
Forested Wetland	WC 7	Yes	None			25,341	0.582
Forested Wetland	WC 8	Yes	None			2,005	0.046
Emergent Wetland along existing drain, Branch #6	WC 9	Yes	Relocating Drain			2,753	0.063
Emergent Wetland along existing drain, Branch #6	WC 10	Yes	Relocating Drain			72	0.002
Emergent and Scrub-shrub Wetland within existing detention basin	WC 11	Yes	Basin construction, area by MDOT ROW impacted			132,621	3.045
Forested Wetland	WC 12	Yes	Small area impacted by berm			15,813	0.363
Forested Wetland	WC 13	Yes	None			35,553	0.816
Forested Wetland	WC 14	Yes	None			694	0.016
Emergent Wetland within roadside ditch	WC 15	Yes	None			109	0.003

Table 1 - General descriptions and regulatory status of wetland complexes on the subject property (continued).

Wetland Community Type	Number	State Regulated	Activity	Unregulated Wetlands		Regulated Wetlands	
				Square Feet	Acres	Square Feet	Acres
Emergent Wetland within roadside ditch	WC 16	Yes	None			1,048	0.024
Emergent Wetland within roadside ditch	WC 17	Yes	None			969	0.022
Forested Wetland	WC 18	Yes	None			252	0.006
Forested Wetland	WC 19	No	None			1,203	0.028
Forested Wetland	WC 20	No	Filled in spoil area	1,384	0.032		
Scrub-shrub wetland developed behind spoil pile	WC 21	No	None	707	0.016		
Scrub-shrub wetland developed behind spoil pile	WC 22	No	None	618	0.014		
Scrub-shrub wetland developed behind spoil pile	WC 23	No	None	154	0.004		
Emergent and Scrub-shrub Wetland	WC 24	No	Filled in spoil area	1,960	0.045		
Forested Wetland	WC 25	No	Removed due to access road	1,126	0.026		
Forested Wetland	WC 26	No	Filled in spoil area	1,197	0.027		
Forested Wetland	WC 27	No	Removed due to access road	2,887	0.066		
Scrub-shrub Wetland within existing detention basin	WC 28	Yes	Protected in Pond			1268	0.029
Forested Wetland	WC 29	Yes	Removed in Pond			4215	0.097
Old agricultural ditch; forested wetland	WC 30	Yes	Removed in Pond			2190	0.050
Proposed New Drains on Pond Perimeter							
Totals:				10,033	0.23	256,191	5.88

Table 2 - Dimensions of wetland impacts.

Wetland Community Type	WC No.#	State Regulated	Activity	Area of Regulated Wetlands		Area of Proposed Wetlands		Impacts to Existing Wetlands by Basin Construction			Wetlands Not Being Impacted by Basin Construction		Riprap	
				Square Ft	Acres	Square Ft	Acres	Existing Wetland in Berm	Existing Wetland in Basin regraded	cyd	Existing Wetland in Basin protected	Existing Wetland outside Basin	syd	cyd
Emergent Wetland along existing drain, Main Branch	WC 3	Yes	Relocating Drain	1,125	0.026			0.026		110			75	25
Emergent Wetland along existing drain, Main Branch	WC 4	Yes	Relocating Drain	208	0.005			0.005		15				
Emergent Wetland along existing drain, Main Branch	WC 5	Yes	Relocating Drain	19,670	0.452			0.078	0.374	504				
Emergent Wetland along existing drain, Branch #2	WC 6	Yes	Relocating Drain	4,990	0.115			0.014	0.101	89			25	8
Emergent Wetland along existing drain, Branch #6	WC 9	Yes	Relocating Drain	2,753	0.063			0.012	0.032	76		0.020	12	4
Emergent Wetland along existing drain, Branch #6	WC 10	Yes	Relocating Drain	72	0.002			0.002		11				
Emergent and Scrub-shrub Wetland within existing detention basin	WC 11	Yes	Basin construction, area by MDOT ROW impacted	132,621	3.045	933,950	21.441	0.272		656	2.773		200	67



Table 2 - Dimensions of wetland impacts (continued).

Wetland Community Type	WC No.#	State Regulated	Activity	Area of Regulated Wetlands		Area of Proposed Wetlands		Impacts to Existing Wetlands by Basin Construction			Wetlands Not Being Impacted by Basin Construction		Riprap		
				Square Ft	Acres	Square Ft	Acres	Existing Wetland in Berm	Existing Wetland in Basin regraded	cyd	Existing Wetland in Basin protected	Existing Wetland outside Basin	syd	cyd	
Forested Wetland	WC 12	Yes	Small area impacted by berm	15,813	0.363				0.010	37			0.353		
Scrub-shrub Wetland within existing detention basin	WC 28	Yes	Protected in Pond	1268	0.029							0.029			
Forested Wetland	WC 29	Yes	Removed in Pond	4215	0.097				0.097						
Old agricultural ditch; forested wetland	WC 30	Yes	Removed in Pond	2190	0.050				0.050						
Proposed New Drains on Pond Perimeter							35,700	0.820							
Totals:				184,925	4.25	969,650	22.260	0.41	0.66	1,498	2.80	0.37	312	104	
								1.07			3.17				

Emergent Wetland Impact: 0.779 Net gain in wetland: 18.02 acres (22.26-3.17-1.07)

Scrub Shrub Wetland Impact: 0.136 Required mitigation wetlands: 1.69 acres (0.779*1.5)+(0.136*1.5)+(0.157*2)

Forested Wetland Impact: 0.157 Additional wetlands created above required mitigation wetlands: 16.41 acres (18.02-1.61) 0.507

 Acres of wetland impact from filling and excavation of storm water detention/wetland basin

Table 3 - General descriptions of proposed crossings and drain relocations.

Existing and Proposed County Drains			Existing		Proposed		Impacts to Existing Wetland Area	Proposed Wetland Area			Fill	Cut	Riprap	
Area	Location	Sheet No.	Pipe	Length	Pipe	Length	Square Ft	Acres	Square Ft	Acres	cyd	cyd	syd	cyd
Crossing #11	North Union Rd	D1.0 & D12.0	84" RCP	38 lft	6'x9' Box	40 lft	40	0.0009			4		50	16.7
Crossing #12	Railroad	D2.0 & D12.0	90" CMP	40 lft	Clean Bottom	250 lft						50		-
Crossing #13	Sta 150+50 to 152+90	D3.0 & D12.1	Open Drain		Clean Bottom	240 lft						28	46	15.3
Crossing #13	Midland Rd	D3.0 & D12.1	3-sided Con. Culvert	39 lft	6'x9' Box								45	15.0
Crossing #14	Monica St.	D3.0 & D12.1	60"x105" Elliptical	234 lft	6'x9' Box	430 lft	3,920	0.09			482		45	15.0
	Midland Rd at sta 160+20	D4.0 & D12.1											57	19.0
Crossing #15	Stanley St.	D5.0 & D12.1	63"x96" Elliptical	45 lft	5'x10' Box	60 lft	300	0.01			567		40	13.3
Crossing #16	NW of Eddie Dr.	D5.0 & D12.1	72" RCP	25 lft	5'x10' Box	30 lft	100	0.00			167		40	13.3
Crossing #19	Eddie Dr.	D5.0	48" RCP	32 lft	36" RCP	140 lft	2,160	0.05			370		15	5.0
Subtotal for Crossing Improvements:								0.15			1,589.78	78.44	338.00	112.67

Table 3 - General descriptions of proposed crossings and drain relocations (continued).
Drains Relocated in the Proposed Basin

Area	Location	Sheet No.	Existing		Proposed		Impacts to Existing Wetland Area Square Ft	Proposed Wetland Area			Fill cyd	Cut cyd	Riprap syd	
			Pipe	Length	Pipe	Length		Acres	Square Ft	Acres				
Dell Creek Drain	Sta 174+35 to 199+92	D6.0, D7.0, D8.0, & D12.2	Open Drain	2304 lft	Open Drain	2557 lft	26,496	0.61	29,406	0.68	1,741	9,145	200	66.7
Branch #1	Sta 4+28 to 12+51	D7.0, D9.0, & D12.3	Open Drain	1319 lft	Open Drain	823 lft	-	-	9,465	0.22	190	580	15	5.0
Branch #2	Sta 189+00	D7.0, D9.0, & D12.3	Open Drain	499 lft	Open Drain	63 lft	5,739	0.13	725	0.02	68	-	-	-
Branch #6	Sta 0+00 to 20+96	D6.0, D10.0, D11.0, & D12.3	Open Drain	1612 lft	Open Drain	2096 lft	18,538	0.43	24,104	0.55	273	2,003	10	3.3
Subtotal for Drain Relocations:				5,734.00		5,539.00	50,772.50	1.17		1.46	2,272.00	11,728.00	225.00	75.00
Total for Crossings and Relocations:								1.32		1.46	3,861.78	11,806.44	563.00	187.67



Table 4. Estimate of Monitoring Costs for 5-years

Task	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Witness and photograph wetland soil placement (during construction)	8					8
Install 10 sample plots (first year only)	8					8
Install staff gages, wells (first year only)	5					5
Measure inundation/saturation monthly (Apr – Sept) * provided by local office	18	18	18	18	18	90
Sample 1 square meter plots	8	8	8	8	8	40
Sample 30-foot radius plots	2	2	2	2	2	10
Walk-through plant inventory	1	1	1	1	1	5
Delineate extensive problem areas (open water, upland, weeds, bare ground)	1	1	1	1	1	5
Delineate wetland community types	2	2	2	2	2	10
GPS survey problem areas and communities (as delineated)	8	8	8	8	8	40
Photographic documentation (structures)	1	1	1	1	1	5
Document wildlife use	1	1	1	1	1	5
Inspect site for contaminants	1	1	1	1	1	5
Photographic documentation (communities)	1	1	1	1	1	5
Compile plant lists	3	3	3	3	3	15
Compile report text	5	5	5	5	5	25
Download and rectify GPS data	3	3	3	3	3	15
Prepare report graphics	4	4	4	4	4	20
Finalize/QAQC report	1	1	1	1	1	5
TOTAL HOURS	81	60	60	60	60	321
Additional Costs	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Materials (PVC pipe, screens, sand, etc.)	75					
Mileage (dependent on federal mileage rate)	1350	1200	1200	1200	1200	
Based on hourly rates	\$9,579	\$7,458	\$7,788	\$8,118	\$8,448	\$41,391



Appendix C

Conservation Easement Description



Insert CE Description here