Table 4.10-5 Wetland Mitigation Table			
Wetland Classification (Cowardin, et al.))	**Total Wetland Impact (Acres)**	**Mitigation Ratio**	**Mitigation Required (Acres)**
Palustrine Emergent	0.08	1.5:1	0.12
Palustrine Emergent/Scrub/Shrub	2.38	1.5:1	3.57
Palustrine Scrub/Shrub	0.31	1.5:1	0.47
Palustrine Forested	0.27	2:1	0.54
Totals	3.04	--	4.70

4.10.2 Wetland Mitigation Sites

The maximum required acreage of wetland mitigation was calculated for each watershed using MDEQ regulatory replacement ratios. The wetland mitigation ratios required by MDEQ are 2:1 (mitigation-to-impact) for forested wetlands and 1.5:1 for scrub/shrub and emergent wetlands. Ratios for areas of exceptionally high quality or low quality may be adjusted on an individual basis upon review by the resource agencies during permitting. Based on the mitigation to impact ratios, 0.12 acre of emergent, 3.57 acres of emergent/scrub/shrub, 0.47 acre of scrub/shrub and 0.54 acre of forested mitigation will be required by the MDEQ for a total of 4.70 acres of mitigation.

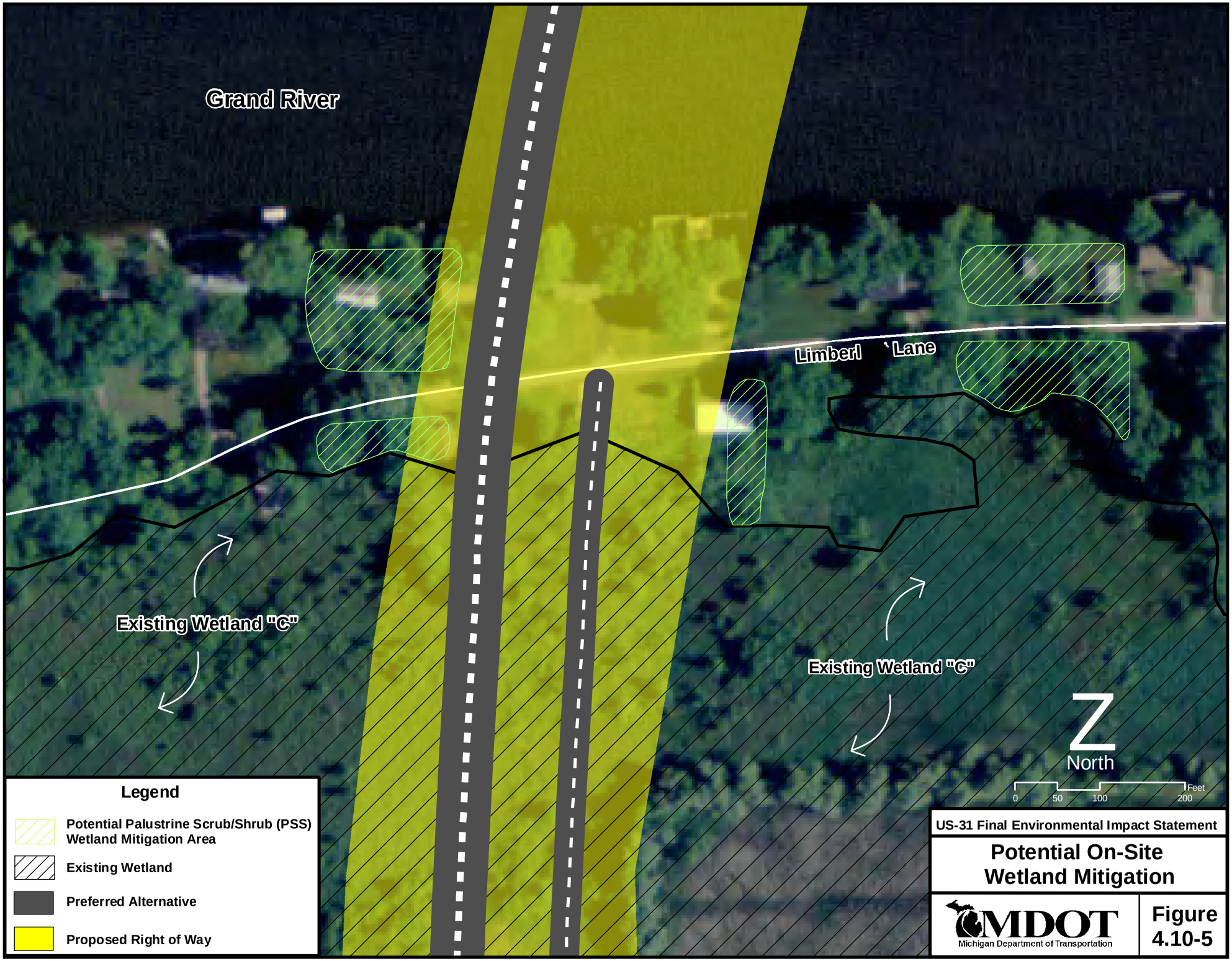
A field review of potential wetland mitigation sites within the Grand River watershed was conducted November 13, 2007 by the MDEQ, MDOT and USACE. Several criteria were used in selecting potential mitigation sites, including those provided by MDOT policy, Soils and Hydrology Data Collected in the Field, and the wetland mitigation goals for the watershed.

Potential wetland mitigation sites were preliminarily identified from aerial photographs of the study area. Soil survey maps were also consulted regarding the presence of hydric soils or soils with hydric inclusions, which generally have been identified as hydric, poorly drained or very poorly drained in the Ottawa County Soil Survey. Sites located adjacent to large drains and other waterways were considered particularly suited to wetland mitigation. Also considered were the wetland mitigation design goals determined by the wetland function and value assessment, and best professional judgment. The wetland mitigation sites were cross-referenced with historical wetland maps to determine whether restoration of drained or otherwise altered wetlands is feasible.

The overriding factor to ensure successful wetland mitigation is the presence or provision of adequate hydrology to support the wetland system so both surface water and groundwater were considered as hydrological sources for the mitigation sites. Restored or created wetlands without adequate water will often fail as wetland mitigation sites. Conversely, it is often feasible to manage excess water. Therefore, sites where it is believed that sufficient surface water can be delivered, or where adequate groundwater exists are being considered for mitigation. Redundancy of hydrology (a combination of surface water and groundwater) will be provided where possible.

The wetland mitigation sites described below vary in function and location. Some of the sites are adjacent to drains and other water bodies that will be developed so they will primarily provide floodwater attenuation, improved wildlife habitat, and water quality functions. Others are located in headwater areas that will be developed so their primary functions will be water quality protection for the watershed by treating agricultural runoff, groundwater recharge, and wildlife habitat. Downstream fisheries' habitats will also benefit from water quality improvements in the headwaters.

The following sites have been identified for wetland mitigation and are shown in **Figures 4.10-5 thru 4.10-8**. These sites provide the maximum amount that will be required within the watershed. The owners of these potential mitigation sites have expressed an interest in selling the portion of their properties desired by MDOT for mitigation.

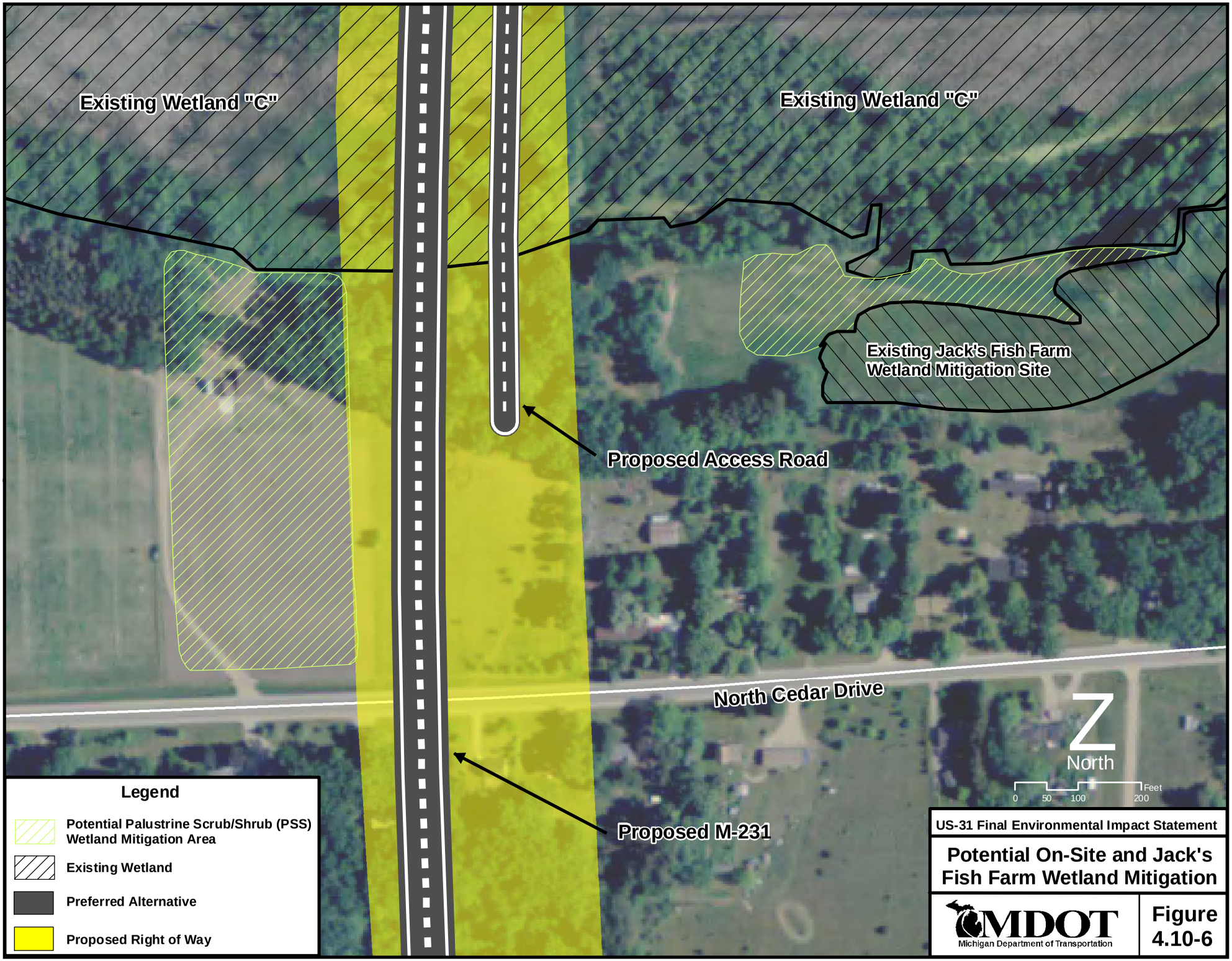


US-31 Final Environmental Impact Statement

Potential On-Site Wetland Mitigation

MDOT Michigan Department of Transportation

Figure 4.10-5

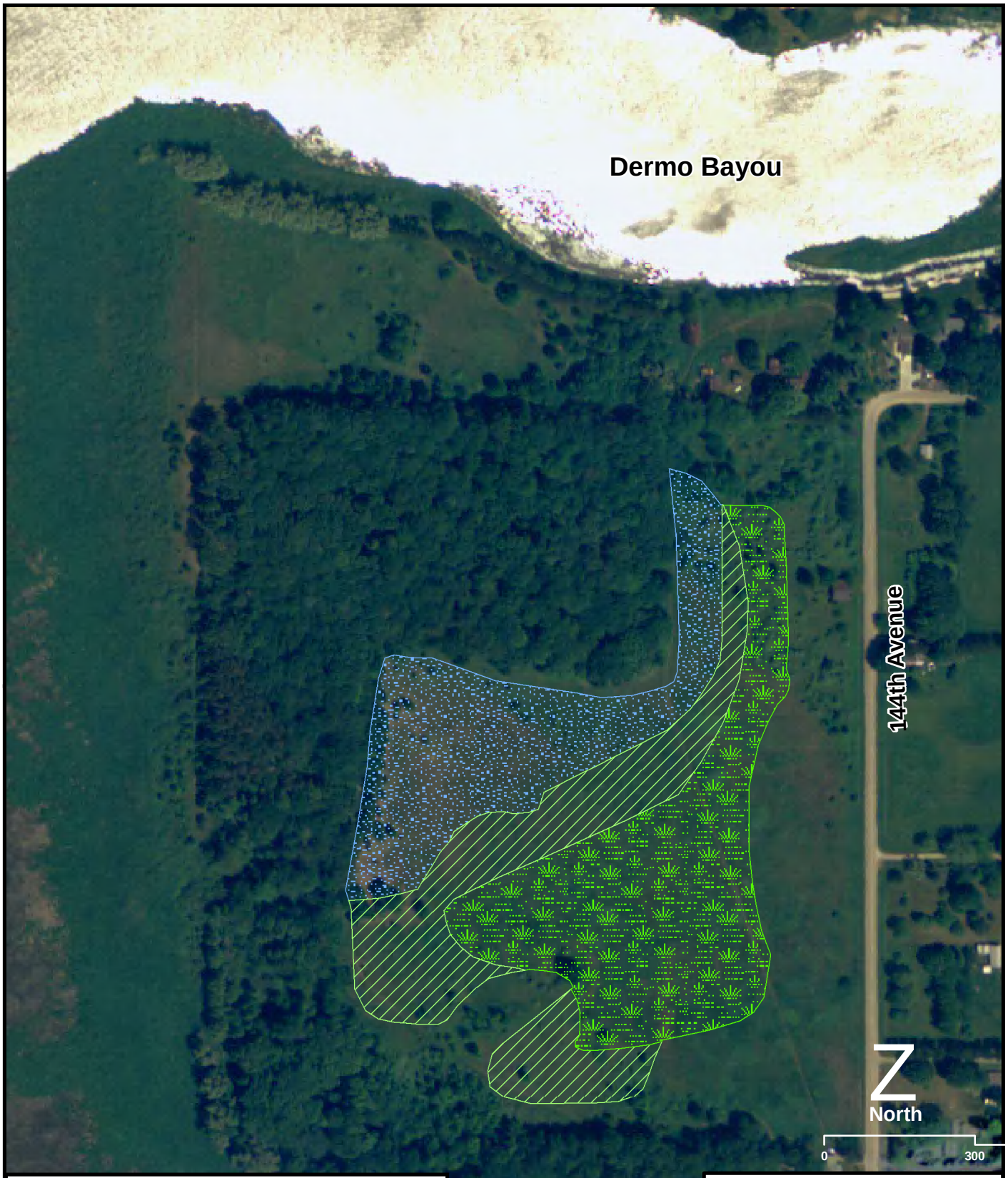


US-31 Final Environmental Impact Statement

Potential On-Site and Jack's Fish Farm Wetland Mitigation

MDOT Michigan Department of Transportation

Figure 4.10-6



Legend

Wetland Mitigation

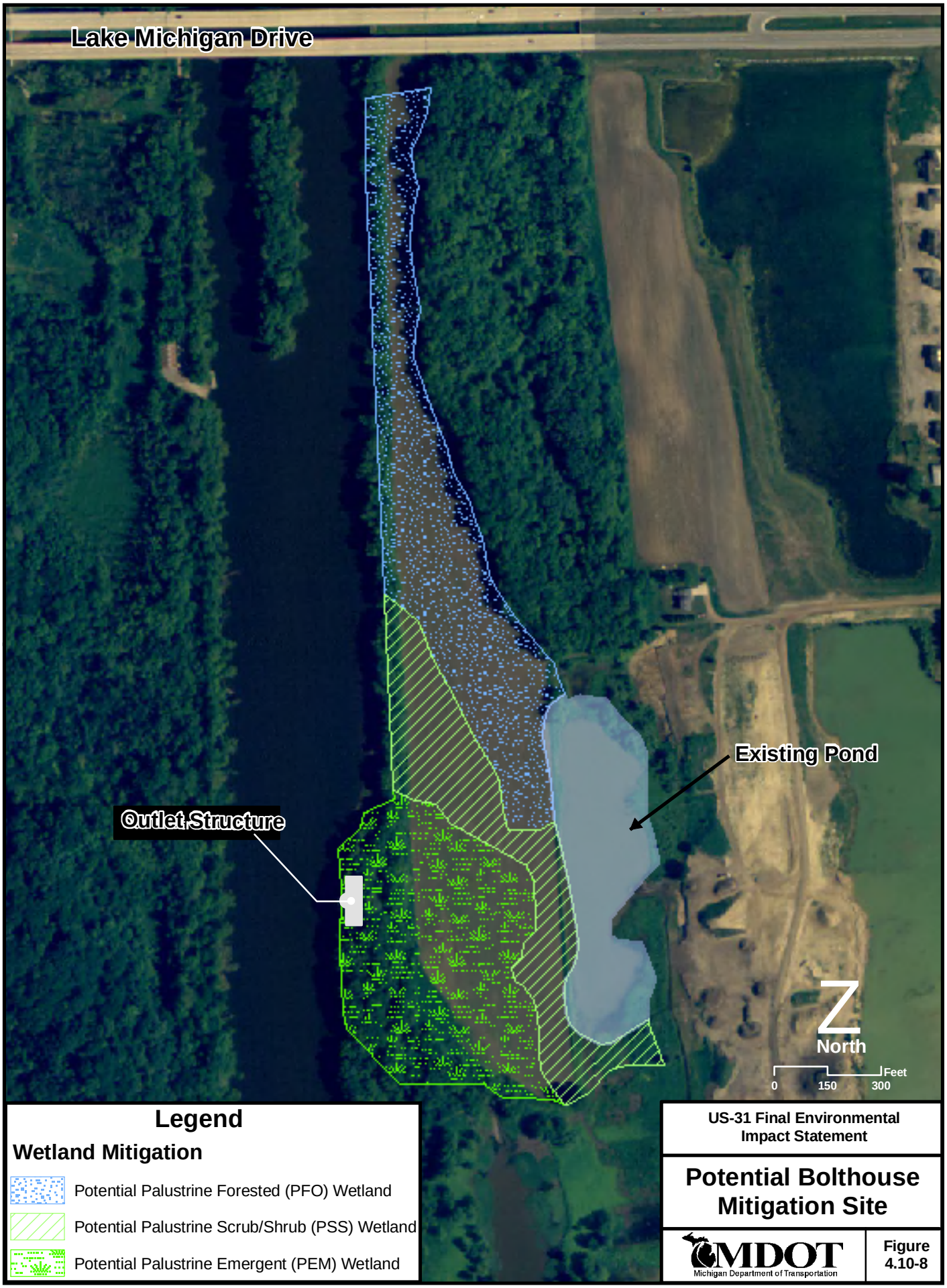
- Potential Palustrine Forested (PFO) Wetland
- Potential Palustrine Scrub/Shrub (PSS) Wetland
- Potential Palustrine Emergent (PEM) Wetland

US-31 Final Environmental Impact Statement

Potential Roger Mitigation Site

MDOT Michigan Department of Transportation

Figure 4.10-7


Lake Michigan Drive
Existing Pond
Outlet Structure
North
Feet
0
150
300
Legend
Wetland Mitigation
Potential Palustrine Forested (PFO) Wetland
Potential Palustrine Scrub/Shrub (PSS) Wetland
Potential Palustrine Emergent (PEM) Wetland
US-31 Final Environmental Impact Statement
Potential Bolthouse Mitigation Site
MDOT
Michigan Department of Transportation
Figure 4.10-8

On Site Mitigation
The first option for wetland mitigation is on-site wetland mitigation. This is generally the best place to successfully build wetlands that will replace the functions and values of the impacted wetlands. There are two potential on-site locations that are being considered. The first is on parcels owned by MDOT along the Grand River (**Figure 4.10-5**). The second possible on-site mitigation area is on a site called Jack's Fish Farm owned by MDOT just south of the Grand River (**Figure 4.10-6**). There is potential to create approximately 1.59 acres of additional wetland at this location. Mitigation at this site would be highly beneficial to the watershed given its proximity to the Grand River. The expected functions and values at this mitigation site are flood attenuation, water quality, and wildlife habitat.

Off Site Mitigation
If on-site mitigation is not an option, there are two potential off-site mitigation locations.

Rogers Property
The first off-site location is the Roger's property (**Figure 4.10-7**), an approximate 75-acre parcel located on the west side of 144th Avenue where it intersects with Garfield Road in Spring Lake Township, Ottawa County, Michigan (T8N, R16W, Section 36). The site consists of well drained Chelsea complex (CIB) soils, poorly drained Glendora Sandy Loam (GI) soils and somewhat poorly drained Shoals loam (Sh). The site is located adjacent to the Grand River floodplain and is surrounded by Dermo Bayou to the north and Indian Channel to the west, which are both connecting tributaries to the Grand River. The property consists of a sandy, upland woods dominated by mixed oak (*Quercus sp*), American beech (*Fagus grandifolia*), cherry (*Prunus sp.*), and maple (*Acer sp.*), as well as fallow farm fields. The expected functions and values at the Roger's property mitigation site are flood attenuation, wildlife habitat and recreational uses. This property also provides an opportunity for MDOT to create additional wetland mitigation for future project impacts.

This location is currently the preferred wetland mitigation site for the project, based on the information available at this time. MDOT is therefore pursuing the early acquisition of the property for this purpose. The Rogers site was one of three sites field reviewed by MDEQ and USACE. Prior to selection, MDOT staff installed groundwater monitoring wells and conducted soil borings to determine groundwater levels. It was determined that the groundwater level was sufficient to support the necessary wetland mitigation. As a result, the wetland mitigation on this site will be groundwater fed. The site was preferred by the USACE because it is located in the lower Grand River area and it is within (or is adjacent to) the floodplain of the Grand River. Additional USACE comments are addressed in Chapter 5 (P. 5-14) Other factors used for selection of this site include its location within the project study area, the availability of the property, and the capacity to accommodate mitigation for future projects.

The Public Interest Finding Statement and related correspondence between MDOT and FHWA, explaining the process, are in **Appendix G.** Additional or updated information, as needed regarding wetland mitigation activities related to this project, will be included in the Record of Decision for this FEIS.

Bolthouse Property
The second off-site location is the Bolthouse property (**Figure 4.10-8**), which is an approximately 100-acre parcel located at the southwest corner of the intersection of M- 45 (Lake Michigan Drive) and Linden Drive in Tallmadge Township, Ottawa County, Michigan (T7N, R13W, Section 19). The site consists of existing forested and scrub/shrub wetlands and farmland. Soils on the site are hydric, poorly drained Sloan loam. The entire site is within the floodplain of the Grand River that runs adjacent to the west. Other streams and water bodies nearby include Ottawa Creek, a perennial stream to the northwest and man-made lakes formed from gravel pits to the east. The site contains a floodplain forest dominated by silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), box elder (*Acer negundo*) and American elm (*Ulmus americana*); and farm fields that are currently planted with corn. Approximately 20-acres of wetland would be created at this site and the remaining acreage would be enhanced and preserved. The expected functions and values at the Bolthouse property mitigation site are water quality, wildlife habitat, and flood attenuation.

Comprehensive Wetland Mitigation and Monitoring Plan
As required under Section 303, of the P.A. 451 of 1994, MDOT will prepare and submit a comprehensive mitigation and monitoring plan to document the development of the created wetland. The mitigation and monitoring plan will specifically address mitigation goals and objectives, performance standards, monitoring procedures and long-term protection (i.e. conservation easement) of the wetland. This plan will be submitted during the permitting process of the appropriate regulatory agencies in compliance with their current standards.

4.11 AQUATIC ISSUES

4.11.1 Surface Water Quality

The study area has a wide range of surface water resources, including public drains, streams and navigable waterways (primarily the Grand River). These resources, along with known groundwater resources, have been inventoried and mapped. Existing published water quality data has been collected for the Grand River, Macatawa River, and their associated tributaries.

Macatawa River
According to MDEQ reports, Lake Macatawa and all of its tributaries are included in a list of water bodies within the state that do not attain the Michigan's desired WQS. The report states that Lake Macatawa displays the classic symptoms of a hypereutrophic lake, which includes extremely high nutrient and chlorophyll a levels, excessive turbidity, periodic nuisance algal blooms, low dissolved oxygen levels, and a high rate of sediment deposition. Monthly water quality monitoring of Lake Macatawa and its tributaries has concluded that phosphorus levels are consistently unacceptable and concentrations are extremely variable on a monthly and annual basis. Phosphorous concentrations in the river have been as high as 129 micrograms/liter, compared to the MDEQ phosphorous standard of 50 micrograms/liter.

The MACC is working to improve the quality of the Macatawa Watershed. Their effort is focusing primarily on the reduction of phosphorous. The MACC has targeted both non-point and point sources of phosphorous discharges into the Macatawa River and its tributaries, through its Macatawa Watershed Project. Sampling found that 91 percent of the phosphorous loading is from non-point sources (agricultural) and nine percent from storm water runoff and municipal and industrial discharges. The main objective of the MACC's project is to reduce the amount of phosphorous in the Macatawa River by 70 percent in the next ten years, as described in a plan finalized on September 16, 1999 entitled *Nonpoint Source Phosphorus Reduction Plan for the Macatawa Watershed, 1999-2009* (Higgins and McDonald).

Grand River
The majority of the Grand River from Lake Michigan upstream to the City of Jackson has been included on the list of water bodies that do not attain designated uses due to fish consumption advisories. Consumption of fish should be limited due to the presence of Polychlorinated biphenyl (PCBs) in the fish tissue. The Grand River in the vicinity of Walker and Johnson Parks, near Grandville, has been included on the list of water bodies that do not attain designated uses due to combined sewer overflows and elevated levels of pathogens. In addition, the Grand River near the City of Grand Haven has been included on the list of water bodies that do not attain designated uses due to levels of mercury in the water that exceed Michigan's WQS.

GVSU's Annis Water Resource Institute (AWRI) collected and analyzed water quality samples of the Grand River in August of 1990. The analyses were summarized in a Water Quality Index (WQI) that ranged from a score of 0 (poor water quality) to 100 (excellent water quality). The water quality parameters analyzed include fecal coliform, nitrate-nitrogen, pH, ammonia-nitrogen, total phosphorous, dissolved oxygen, temperature, chloride and total dissolved solids. The WQI indicated that the quality of the Grand River is quite variable, ranging from moderately good (WQI=83) near the city of Lowell, to poor (WQI=18) near the mouth of the river in the city of Grand Haven. Three of the 35 sampling locations were located near the study area. The Grand River had a WQI score of 19 near its confluence with Crockery Creek, a score of 18 three miles downstream of Crockery Creek near 138th Avenue, and a score of 27 in