Eastern Massasauga Rattlesnake Low-Effect Habitat Conservation Plan Mid-Michigan Pipeline Replacement Project

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Executive Summary

Consumers Energy (CE) aims to replace a natural gas pipeline spanning 55.8 miles across Clinton, Livingston, Shiawassee, Ingham, and Washtenaw Counties, Michigan. The two-phase project, beginning in 2023, will replace a preexisting 20-inch pipeline with a 36-inch pipeline to increase the safety and efficiency of the infrastructure. The existing and proposed future pipeline corridor includes several sections containing potential habitat and observations of the Eastern Massasauga Rattlesnake (EMR), a federally protected species. To comply with the Endangered Species Act, CE and Herpetological Resource and Management (HRM) will design and implement a Low-Effect Habitat Conservation Plan to minimize the risk of incidental *take* of EMR.

HRM conducted pre-construction inventory surveying in the 2021 field season to evaluate habitat condition, potential presence, and possible impacts to EMR. Nineteen (19) Target Area (TA) locations were identified by HRM as possessing EMR priority. Six (6) TAs were identified as high priority EMR TAs. The six (6) high priority EMR TAs occurred in locations with the highest quality habitat suitable for EMR and/or possessed EMR observations. CE will utilize horizontal directional drilling (HDD) at five (5) of the six (6) high priority locations and at one (1) moderate probability location to significantly reduce the risk of *take* of EMR and impacts to high quality habitat at these locations. Based on the results of HRM's preliminary surveys and impact minimization measures utilized in previous projects, CE will implement best management practices (BMPs) at all EMR priority TAs to further reduce the potential of *take* of EMR. BMPs will include employee and contractor EMR training, wildlife barrier fencing (WBF), wildlife clearance and site walk-downs, and additional measures shown to significantly reduce the threat to EMR and other wildlife. It is the intent of CE that with the implementation of BMPs there will be minimal *take* of Eastern Massasauga Rattlesnake.

The biological goals for this Habitat Conservation Plan is to (1) conduct the project in a manner that minimizes impacts and maintains persistence of EMR within the HCP area (2) restore habitat post-construction to maintain or improve pre-existing habitat quality and function for EMR; and (3) monitor response of EMR to BMPs and restoration measures to guide and inform current and future conservation efforts. Following the construction of the project pipeline, all EMR priority Target Areas will be restored to previous or improved site habitat functionality and monitored for a two (2) year period to access post-restoration success.

Two alternatives to the proposed project are discussed, No Action and No BMP. The No Action Alternative would not allow replacement of the existing pipeline and may risk eventual pipeline failure. The No BMP Alternative would have a greater potential impact to EMR because less conservation measures would be implemented.

1.0 Project Introduction and Background

1.1 Overview

The Mid-Michigan Line 100A Project (hereinafter Project) involves replacing approximately 55.8 miles of an existing natural gas pipeline in Clinton, Livingston, Shiawassee, Ingham, and Washtenaw Counties. The original 20-inch diameter pipeline was installed in 1949 and has aged out. Consumers Energy (CE) prioritizing safety has determined that replacing the existing pipe is preferred rather than maintaining and repairing this high-risk pipeline. The Project aims to replace the existing pipeline with a new 36-inch diameter pipeline. In most areas, the proposed Project will be located in the existing right-of-way (ROW) and installed parallel on the western side of the existing pipeline, which will be abandoned upon completion of the new pipeline. The pipeline will be installed in accordance with Federal Pipeline Safety Regulations and Michigan Gas Safety Standards. Construction will be completed by CE over the course of two (2) years beginning with Phase 1 in 2023 and Phase 2 in 2024.

It is the goal and objective of the CE Project team that minimal "*take*" of EMR will result from the construction of Mid-Michigan Line 100A. CE is dedicated to stewardship of natural resources and has served as an industry leader in impact avoidance for herpetofauna utilizing novel approaches to prevent harm.

This Low-Effect Habitat Conservation Plan (LEHCP), designed by CE and Herpetological Resource and Management (HRM), has been prepared pursuant to the requirements of Section 10(a) of the Federal Endangered Species Act (ESA), as amended and corresponding regulations 50 CFR §17.22. The LEHCP provides the basis for issuance of a Section 10(a)(1)(B) permit to Consumers Energy to authorize incidental *take* of the Eastern Massasauga Rattlesnake (*Sistrurus catenatus*) (hereinafter EMR), a federally threatened species.

1.2 Permit Applicant and Permit Duration

Consumers Energy is applying to the United States Fish and Wildlife Service (USFWS) under Section 10(a)(1)(B) permit for a period of fifteen (15) years, until the year 2038, to ensure completion of the proposed Project and to cover post-construction restoration, pipeline maintenance, and potential repairs.

1.3 Permit Area

The proposed permit area, covered by this HCP, encompasses the Project Right-of Way (ROW) spanning 55.8 miles along an existing and proposed natural gas pipeline corridor in Clinton, Livingston, Shiawassee, Ingham, and Washtenaw Counties (Figures 1-6). The Project is expected to begin at the Chelsea Station (Township 2S, Range 3E, Sections 13 and 24) in Washtenaw County and end at the Ovid Station (Township 7N, Range 1W, Sections 9 and 16) in Clinton County. The Project intersects five (5) parks and wildlife areas owned publicly and by the state, including Sleepy Hollow State Park, Morris-Reichert Nature Preserve, Unadilla State Wildlife Area, Pinckney State Recreation Area, and Waterloo Recreation Area. Major roads in the area include Interstate 69, Interstate 94, Interstate 96, Michigan Highway 43, and Michigan Highway 52 east of the city of

Lansing. Other land uses along the Project corridor include significant active agriculture use and single-family residential, both high density and rural. Numerous aquatic and terrestrial habitat communities are present within the Project corridor (Photos 1-8). Construction is expected to be completed within a Right-of Way (ROW) corridor ranging in width from 75' to 120' feet. The total contiguous permit area (all workspace and travel lanes) is equal to approximately 720.66 acres. The approximate area of all wetlands impacted within the permit area is 65.83 acres.

1.4 Plan Area

The plan area will include the proposed permit area as well as the entirety of Michigan's Lower Peninsula in which the mitigation of unavoidable impacts in accordance with this HCP will be implemented. See Section 5.3.3 Mitigation of Unavoidable Impacts for more information.

1.5 Species to be Covered by Permit

The requested permit will cover the Eastern Massasauga Rattlesnake (EMR), a federally threatened species. Other federally protected species potentially located within the Project area include the Northern Long-eared Bat (*Myotis septentrionalis*) and Indiana Bat (*Myotis sodalis*). The Project is not reasonably certain to result in the *take* of listed bat species (See Appendix A: Assessment of Habitat for the Endangered Indiana Bat). Potential roost trees located within the Project corridor will be removed pre-construction during the recommended dates of October 1st to April 14th (when bats are not present). A habitat assessment determined that additional suitable roost trees are available on the eastern side of the corridor and in numerous interconnected patches of forest throughout the proposed route, so sufficient roosting habitat will remain in the area and no fragmentation of connective corridors will occur (i.e., no indirect take). See Appendix A: Assessment of Habitat for the Endangered Indiana Bat for more information.

See Section 6.2 Changed Circumstances of this HCP for potential additional species under consideration for federal protection that may occur within the Project area. Proposed measures being implemented for the EMR are also expected to benefit and reduce harm or threat to state protected species and species currently under review by the USFWS.

1.6 Legal and Regulatory Framework

1.6.1 Federal Endangered Species Act

The federal Endangered Species Act (ESA) prohibits the *take* of any fish or wildlife species that is federally listed as threatened or endangered without prior approval pursuant to either Section 7 or Section 10(a)(1)(B) of the ESA. The ESA defines *take* as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1973). Federal regulation 50 CFR 17.3 further defines the term *harm* to mean any act that actually kills or injures a federally listed wildlife species, including significant habitat modification or degradation.

Under Section 10(a) of the ESA, a process for obtaining an incidental *take* permit (ITP) exists, which authorizes non-federal entities to *take* federally listed wildlife or fish incidentally. This *take* is subject to certain conditions under the ESA. *Incidental take* is defined in the ESA as *take* that is

"incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1973). A HCP is a requirement for all Section 10(a)(1)(B) permit applications to mitigate the potential impacts resulting from a permitted activity.

The USFWS conducts a project review and have the authority to consider the option of a Low-effect Habitat Conservation Plan (LEHCP). A LEHCP is considered where minor or negligible effects on federally listed, proposed, or candidate species may result. To qualify for a LEHCP, projects must also have minor or negligible impacts to other environmental values or natural resources. The determination of whether a HCP qualifies as "low-effect" is based on the activities proposed and potential impacts the proposed project will have on target species and the environment prior to any avoidance, minimization, or mitigation measures being implemented. The purpose of the LEHCP is to expedite HCPs for projects with relatively low proposed impacts to federally protected species.

Consumers Energy believes that based on previous projects and proposed measures to limit and minimize impacts that the Project meets the requirements for a Low-Effect Habitat Conservation Plan. This designation demonstrates that the proposed project will have minor or negligible effects on the federally listed EMR and other natural resources. As previously stated, it is the intent of Consumers Energy and their Project team to minimize all natural resource impacts and to significantly reduce the risk of *take* of EMR.

1.6.2 National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to examine the environmental impacts of their actions and provide for public participation. Issuance of an ITP is a federal action subject to NEPA. To comply with NEPA, the FWS must conduct analyses of all direct, indirect, and cumulative impacts of issuing the permit on the human environment, not just on the covered species or resources. If the agency determines that issuance of the permit, as conditioned by the agreed-upon conservation measures to be incorporated into the ITP, does not have significant impacts, then the agency will issue a Finding of No Significant Impact (FONSI). If the agency determines that the permit issuance is likely to have a significant impact, then the agency will issue a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS), which involves a more detailed evaluation of the effects of the Federal action and alternatives to mitigate these effects. FWS must complete and document their decision in accordance with NEPA, CEQ regulations, and Department of Interior (DOI) regulations.

1.6.3 National Historic Preservation Act (NHPA)

The National Historic Preservation Act (NHPA) directs federal agencies to take into account the effect of their actions on historical, architectural, archeological and cultural resources. Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment before making decisions potentially affecting such properties. Historic properties means "any prehistoric or historic district, site, building, structure, or object included in,

or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the U.S. Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to a Native American tribe or Native Hawaiian organization and that meet the National Register criteria" (36 C.F.R. § 800.16).

The Fish and Wildlife Service determined issuance of an ITP under Section 10(a)(1)(B) of the ESA is an undertaking subject to compliance with Section 106 of the NHPA. Therefore, prior to issuing Consumers Energy's requested incidental take permit, the FWS will consult with State Historic Preservation Officers (SHPO), Tribal Historic Preservation Officers (THPO), and any federally recognized Native American Tribes and consider each group's comments on the effects of issuing the permit on historic properties.

1.6.4 Michigan's Natural Resources and Environmental Protection Act of 1994

Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, MCL 324.36501 to 324.36507 (Part 365), prohibits take of plants and animals listed as threatened and endangered. Part 365 defines "*take*" of fish and animals as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect or attempt to engage in any such conduct" and for plants as "to collect, pick, cut, dig up, or destroy in any manner." Michigan Department of Natural Resources (MDNR) is required to take steps necessary to protect, conserve, and restore species listed as threatened and endangered. The MDNR has discretion to permit *take* in some circumstances but must do so in a way that minimizes adverse impacts and considers all reasonable alternatives. All federally-listed species in Michigan are also protected by state law (MCL 324.36505). Michigan typically defers to FWS for federally-listed wildlife species, thus this HCP provides a mechanism for compliance with Michigan law on Covered Species.

2.0 Project Description/Activities Covered by Permit

2.1 Project Description

Consumers Energy is preparing to replace approximately 55.8 miles of its existing 20-inch-diameter natural gas pipeline, with a new 36-inch-diameter natural gas pipeline, as part of its two-year Mid-Michigan Pipeline Project. Construction will be completed in two phases. Phase 1, slated for 2023, comprises approximately 30 miles of pipeline in Washtenaw and Livingston counties, with endpoints near Chelsea and Williamston, Michigan. Phase 2, slated for 2024, comprises approximately 25 miles of pipeline in Livingston, Ingham, Shiawassee and Clinton counties, with endpoints near Williamston and Ovid, Michigan (Figures 1-6). There will also be construction at existing and new aboveground facilities along the utility corridor. Apart from pre-construction activities, such as surveying, environmental studies, etc., CE anticipates actual construction activities each year will begin in May, and be completed in November. There will likely be multiple areas that will require additional restoration during the summer following each phase of construction. See Table 1 for the Mid-Michigan Pipeline Project's tentative timeline including approximate dates for

pre-construction inventory, active construction best management practices (BMPs) implementation, and post-construction restoration monitoring.

CE will utilize standard pipeline construction techniques as described below, which typically involve the following sequence of operations: survey and staking; clearing; grading; stringing and bending; trenching, lowering-in and backfilling; horizontal directional drilling; hydrostatic testing; restoration; and pipeline maintenance and repair.

2.2 Activities Covered by Permit

2.2.1 Survey and Staking

Prior to any construction activities, survey crews will clearly mark, with lath and color-coded flagging, the outside limits of approved workspace areas, the centerline of the pipeline trench, and the outside limits of any approved, non-public access lanes to the construction corridor.

2.2.2 Clearing

CE will remove all oak trees and potential bat-habitat trees within the approved workspace, during the winter preceding each phase of construction, in order to avoid potentially propagating oak wilt disease, and to avoid potential impact to roosting bats during the spring and early summer when these trees would otherwise be felled. Then, largely during the subsequent May and June, CE's pipeline contractor will cut-down all remaining (non-potential bat roost) trees, extract tree stumps from upland areas, and brush hog all small trees, brush and other vegetation within the workspace. The only exception to this is at streambanks. Apart from careful woody vegetation removal (e.g. with chainsaws) and bank disturbance necessary for temporary construction-bridge installation, streams are not disturbed until the pipeline is installed. Cleared woody debris will either be burned on site, as authorized by burn permits and EMR protocols (see Section 5.3.1.2 Winter Vegetation Clearing) as applicable, or chipped and hauled away.

2.2.3 Grading

The construction corridor must be fairly level, from side to side, for construction equipment to safely handle the heavy pipeline. The grading crew will first strip topsoil in non-forested upland areas, except from the edge of the workspace where topsoil will be stockpiled. Wetland and forest topsoil is segregated later, as part of pipeline trench excavation. An exception to this is in forested areas where grading is required to provide a level workspace, topsoil will be stripped before bulldozers move the subsoil. Topsoil piles are left alone until restoration activities begin near the conclusion of the project.

2.2.4 Stringing and Bending

The contractor will transport by truck many 40- to 80-foot-long sections of pipe to the construction corridor, and place each on a small arrangement of shout timbers to prevent the pipe from moving. A small team follows stringing to bend the pipe to match the land contours.

2.2.5 Trenching, Lowering-in and Backfilling

The next crew will excavate the pipeline trench deep enough to provide at least the required minimum depth of cover. This crew will first strip any remaining topsoil from where the trench will

be excavated (i.e. in forested and wetland areas), and pile it along the edge of the workspace, then dig the pipeline trench. The lowering-in crew, working closely behind, will lift the welded pipeline, lower it into the bottom of the trench, and backfill the excavation with the stockpiled subsoil.

2.2.6 Horizontal Directional Drilling

Horizontal directional drilling (HDD) is a construction technique that foregoes open-cut trench installation and utilizes a tunnel drilled underneath the ROW corridor to install the pipeline segment. The underground tunnel travels in an arc line from the entry point, underneath the specified crossing, and to the surface of the opposite side. Advanced technology and highly trained technicians guide the drill head and resulting path electronically to maintain precise angle, depth, and exit point to adhere to environmental and engineering protocols. During the drilling process, a bentonite clay mixture (natural, non-toxic substance) is utilized to lubricate the tunnel and remove drill cuttings. Once the underground tunnel is complete, the pipeline segment can be pulled through the arched tunnel to the opposing side to be welded to the rest of the pipeline system. See Appendix B: Horizontal Directional Drilling Sequence and Contingency Measures for more information.

2.2.7 Hydrostatic Testing

The completed pipeline will be hydrostatically tested to verify its strength prior to going into service. Before the pipeline is filled for pressure testing, however, the contractor will propel thousands of gallons of freshwater and cylindrical-shaped squeegees through the pipeline, to scrape and flush-out any dirt that might have accumulated inside the pipe. This rinse water will be filtered and discharged to the ground in a well vegetated upland area outside of identified EMR habitat and approximately 500 feet from potential nearby wetlands or watercourses. Discharge locations will be screened for native mussel communities and must be in accordance with soil erosion measures following Michigan Department of Environment, Great Lakes, and Energy (EGLE) permit requirements. Following discharge, the contractor will temporarily withdraw fill water to pressure test the pipeline from sizable surface waters (e.g. a river) through a large, floating, screened intake basket to avoid uptake of sediment, fish or vegetation. Upon completion of the approximately 8-hour pressure test, the contractor will filter the water as it's released from the pipeline, to meet or exceed EGLE water-quality standards, and return it back to the water source from where it was drawn.

2.2.8 Restoration

Cleanup begins soon after the pipeline is lowered-in and backfilled. The first step is to remove temporary silt fence, portable toilets, construction debris, etc. from the workspace. Secondly, any remaining subsoil piles (i.e. from temporary grade cuts) are graded-out and smoothed to restore pre-construction contours and drainage patterns. Then, the contractor spreads the stockpiled topsoil evenly across the workspace where needed, blending the edges to match the ground surface adjacent to the workspace. At this point, any long and/or steep slopes will be fortified with permanent erosion-control measures, such as waterbars (aka diversion berms). Once the earthwork is complete, the contractor will spread fertilizer (if specified), sow seed, and blow & crimp straw mulch. Steeper slopes will be stabilized with closely pinned, non-plastic-containing erosion-control blanket instead of mulch. Permanent post-construction environmental controls are

sometimes augmented with additional temporary BMPs, such as well-install silt fence and/or biologs, which CE will remove once permanent vegetation is sufficiently established. See Appendix C: Consumers Energy Mid-Michigan Pipeline Project Restoration Activities and Appendix D: Consumers Energy Mid-Michigan Pipeline Project Wetland and Stream Restoration and Mitigation Plan for more information.

2.2.9 Pipeline Maintenance and Repair

Routine inspections occur every 7 years and are undertaken to comply with the Department of Transportation rule 49 CFR Part 192, "Pipeline Safety: Pipeline Integrity Management in High Consequence Areas (Gas Transmission Pipelines)". The rule requires operators of gas transmission pipelines to perform ongoing assessment of pipeline integrity, to improve data collection, integration, and analysis, to repair and remediate the pipeline as necessary, and to implement preventative and pipe remediation actions. The rule addresses statutory mandates, safety recommendations, and conclusions from accident analysis's, all if which indicate that coordinated risk control measures are needed to improve national pipeline safety.

3.0 Natural Resources and Herpetofauna Community

3.1 Vegetation Communities and Habitat Types

Vegetation communities were identified in the project area based on aerial photo interpretation and field investigation. Several terrestrial and aquatic habitat community types are present within the Project area. Communities were evaluated based on "Natural Communities of Michigan: Classification and Description" (Kost, Albert et al. 2007) and a modified community designation to account for habitat communities associated with more disturbed, agricultural, or urban landscapes (Mifsud 2014). Upland habitats include Dry Southern Forest, Dry-mesic Southern Forest, Mesic Southern Forest, Conifer Plantation, Dry-mesic Prairie, Old Field, Grassland, Fallow Agriculture, and Active Agriculture. Aquatic communities include Emergent Marsh, Submergent Marsh, Open Water, Southern Wet Meadow, Wet Prairie, Wet-mesic Prairie, Prairie Fen, Inundated Shrub Swamp, Southern Shrub-Carr, Floodplain Forest, Southern Hardwood Swamp, and Vernal Pool.

3.2 Eastern Massasauga Critical Habitat

The USFWS can designate "critical habitat" for a species. These are areas of habitat believed to be essential to the species' conservation. The USFWS has not designated any "critical habitat" for the EMR.

The USFWS did conduct habitat analysis and species occurrence modeling to determine occupied (Tier I) and high probability of presence (Tier II) habitats based on known occurrence data. These designations do not preclude the potential presence of EMR outside of Tier I or Tier II locations, and due diligence is necessary in areas of potential EMR habitat, but where EMR were not determined based on Tier I and Tier II habitats.

3.3 Permitted Covered Species: Eastern Massasauga Rattlesnake

3.3.1 Species Description and Range

The EMR is a medium-sized, thick-bodied pit viper that averages two to three feet in length as an adult (Harding and Mifsud 2017)(Photo 9). The species currently ranges across eight (8) states in the United States of America, including New York, Pennsylvania, Ohio, Indiana, Michigan, Illinois, Iowa, Wisconsin, as well as the province of Ontario in Canada. Historic populations also occurred in Minnesota and Missouri in the United States, although these populations are currently presumed to be extirpated. Range-wide, there has been an over 40% reduction in the extent of EMR occurrence (U.S. Fish and Wildlife Service 2016). Populations are typically isolated and can be genetically distinct even if they are within 50 kilometers of each other (Gibbs, Prior et al. 1997). Though populations often have a patchy distribution across the landscape, corresponding to remnant suitable habitat, they are widespread across the Lower Peninsula of Michigan. One study found that 145 EMR populations occur within the southern Lower Peninsula of Michigan, with varying levels of viability (Lee and Enander 2015). To be viable and self-sustaining, an EMR population needs to contain at least 50 adult females, have a stable or increasing growth rate, and have at least a 0.9 probability of persistence (Szymanski, Pollack et al. 2015). Population viability of EMR in Michigan is most significantly affected by risk factors such as adult female mortality rate, although reproductive output and neonate survival are also important factors (Bradke, Bailey et al. 2018). Szymanski et al. estimated that 84% of Michigan EMR populations face at least one highly detrimental risk factor, such as habitat loss, while 63% face multiple risk factors (Szymanski, Pollack et al. 2016).

In 2016, the EMR was listed as a federally threatened species by the USFWS under the Endangered Species Act of 1973 (U.S. Fish and Wildlife Service 2016). The EMR is also listed as a species of special concern in Michigan and is protected from *take* in accordance with MDNR Fisheries Division Order 224.16. The order states that *take* from the wild or possession of any such species is prohibited except as authorized under a Scientific Collector's Permit (Michigan Department of Natural Resources 2016). The primary threat to EMR as a species is habitat loss through human development or vegetative succession (U.S. Fish and Wildlife Service 2016). Additional threats include habitat fragmentation, road mortality, alteration of hydrology including drought, persecution, collection, detrimental habitat management, and disease (Szymanski, Pollack et al. 2015). Disease is also a factor in decline of EMR with this species susceptible to various debilitating and lethal pathogens (Tetzlaff, Allender et al. 2015).

3.3.2 Natural History and Ecology

3.3.2.1 Habitat

In Michigan, EMR are associated with a variety of early-successional vegetative communities, such as Emergent Marsh, Southern Wet Meadow, Wet Prairie, Wet-mesic Prairie, Prairie Fen, Fens, and Upland Grassland and Old Field habitat. These habitats are especially well-suited to EMR when they are interspersed with shrubs and adjacent to mesic grasslands or lowland forests (Szymanski 1998; Tennant and Salmon 2003; Wynn and Moody 2006). Habitat use of EMR is temporal and varies not only seasonally, but also by sex (male vs female) and female reproductive status (gravid,

i.e. carrying eggs, vs nongravid) (Szymanski 1998; Parent and Weatherhead 2000; Harvey and Weatherhead 2006; Marshall Jr, Manning et al. 2006).

While EMR are typically associated with both wetland and upland vegetative communities, it is the structural characteristics of sites, rather than vegetative composition that is the main determinant of habitat suitability (Harvey and Weatherhead 2006; Moore and Gillingham 2006). Three habitat characteristics are consistent among sites supporting EMR. These include locations that are largely open and sunlit, but which have available shade and cover for predator avoidance and thermoregulation. EMR also typically occur in locations where the water table is near the surface, which aids in thermoregulation while overwintering in cold climates. The species also occurs on landscapes with variable topography and consisting of a mosaic of wetland and upland habitat areas (Szymanski 1998; Harding and Mifsud 2017).

EMR hibernate individually or in small groups, usually in or near the same location from year to year (Johnson 1995; Harvey and Weatherhead 2006; Smith 2009). Overwintering may occur in open-canopy sites such as grasslands, or in more forested areas (Johnson 1995; Harvey and Weatherhead 2006; Kowalski 2007; Smith 2009). Overwintering sites in southern Michigan are most commonly crayfish burrows, but sphagnum hummocks, small mammal burrows, and tree roots may also be used (Johnson 1995; Seigel, Sheil et al. 1998; Szymanski 1998; Harvey and Weatherhead 2006; Smith 2009; Harding and Mifsud 2017) (Photo 10). A water table at or near the surface that does not freeze is the common element in all reported overwintering locations (Maple and Orr 1968; Reinert and Kodrich 1982; Johnson 1995). Investigations have shown that it is common for snakes to be nearly entirely submerged underwater in these burrows during overwintering (Smith 2009).

EMR often stay very close to their overwintering locations following spring emergence and typically return to the same area to hibernate annually (Harvey and Weatherhead 2006). Individuals likely do not move away from overwintering sites until conditions are consistently warm, returning to their hibernacula during inclement spring weather.

During the active season, which varies year to year, generally extending from March to October in Michigan, individuals may use a variety of aquatic and terrestrial habitat types (Johnson 1995; Harvey and Weatherhead 2006; Kowalski 2007; Harding and Mifsud 2017). Warming spring temperatures trigger EMR to move away from overwintering sites into grassland habitats. During the active season, EMR may use Old Fields, Prairies, Fens, and wetland areas used during overwintering (Johnson 1995; Johnson and Leopold 1998; Kingsbury, Marshall et al. 2003; Tennant and Salmon 2003; Wynn and Moody 2006).

The home ranges of EMR vary widely based on location, habitat condition, and quality. In general, males typically have the larger home ranges (10.95 ha mean in MI) and make more frequent and longer movements than non-gravid females (4.95 ha mean in MI) (Bissel 2006; Moore and Gillingham 2006; DeGregorio, Manning et al. 2011; Bailey, Campa et al. 2012). Females have smaller home ranges, with gravid females moving the least and using the smallest home ranges during gestation (1.13 ha mean in MI), which expands after they give birth in late summer.

3.3.2.2 Diet and Foraging

EMR are opportunistic predators, feeding largely on small mammals such as shrews, voles, and deer mice. They will also consume frogs, birds, eggs, and other snakes (Harding and Mifsud 2017). Tetzlaff et al. reported adult Massasaugas in Michigan, feeding on Eastern Garter Snakes (*Thamnophis s. sirtalis*), Northern Red-bellied Snakes (*Storeria o. occipitimaculata*), and American Red Squirrel (*Tamiasciurus hudsonicus*) (Tetzlaff, Allender et al. 2015).

3.3.2.3 Reproduction

EMR are ovoviviparous, meaning that eggs hatch within the mother and offspring are born alive. While annual reproduction has been reported, biannual reproduction may be more typical. The frequency of reproduction is thought to be a result of habitat condition, prey availability, and latitudinal differences affecting the length of the active season (Harding and Mifsud 2017).

Mating activity peaks in late summer and early autumn, though individuals may mate at any time during the active season if they encounter a member of the opposite sex. Females store sperm in their oviducts until the following spring when it is used to fertilize oocytes (Ernst and Ernst 2003; Kowalski 2007).

Throughout their range, EMR give birth from late July to early September (Ernst and Ernst 2003; Harding and Mifsud 2017). Gestation and birthing often takes place near the mothers' overwintering sites (Kowalski 2007). The females and their offspring often remain together at the birthing site for several days, though there is no evidence of direct parental care. Several days following birth, the young snakes shed their skin for the first time and then disperse (Johnson, Kingsbury et al. 2000). Following the dispersal of offspring, the mothers may move long distances, possibly to move to habitats with larger prey bases as they shift to foraging behavior (Kowalski 2007).

3.3.3 Threats

3.3.3.1 Habitat Loss, Degradation, and Fragmentation

The destruction and conversion of habitat used by the EMR has been the greatest driver in population declines (Szymanski 1998; Szymanski, Pollack et al. 2016). Over 70% of Michigan's original wetlands have been lost since European settlement and a larger proportion of the state's original grassland and prairie habitats have been lost than any other habitat type (Michigan Department of Environmental Quality 2015; Environmental Protection Agency 2016). In addition to habitat loss, vegetative community succession can result in degradation and overall loss of function.

The vegetative succession of EMR habitat from an open canopy herbaceous-dominated system to a more woody-dominated forested system is a significant threat to several populations. These changes result in reduced thermoregulatory opportunities, a requirement for ectothermic species like EMR. This alteration also likely alters the prey base available and perhaps predator detection. Holman identified the EMR as a secondary post glacial reentrant, better demonstrating the relative specialization and need for habitat heterogeneity (Holman 2012).

Habitat fragmentation, caused primarily by roads, coupled with the direct loss of habitat may be the biggest threat to EMR and other rare species. This fragmentation disrupts gene flow and metapopulation dynamics and exposes individuals who attempt to migrate to threat of predation and increased rate of road mortality (Mifsud 2014).

3.3.3.2 Invasive Species

Invasive plant species accelerate vegetative succession and overall degrade existing EMR habitat by converting areas to thick monocultures lacking ecosystem heterogeneity required for species function and success. Invasive species like Glossy Buckthorn (*Rhamnus frangula*) have increased evapotranspiration rates and could affect water tables, negatively impacting groundwater hydrology and populations of burrowing crayfish that EMR rely on in southern Michigan. In addition to Buckthorn, the Common Reed (*Phragmites australis*) rapidly creates monocultures of tall vegetation not only eliminating habitat for EMR but for numerous species. While problematic, Reed Canary Grass (*Phalaris arundinacea*), is less damaging and EMR will use landscapes where this species is, when necessary, though long-term population viability in these locations is unknown.

3.3.3.3 Land-management Activities

Land management activities such as prescribed burning and mowing are frequently used as methods to restore habitat. These methods, when conducted during peak activity of rare herpetofauna including EMR, can have a significant negative impact on survival (Mifsud 2014; Cross, Root et al. 2015). EMR are particularly vulnerable to increased mortality from these activities due to their behavioral ecology. EMR tend to congregate at overwintering sites, making a large proportion of the population vulnerable to fire and mowing activities seasonally. The EMR's ectothermic physiology requires the snake to thermoregulate in order to regulate its body temperature and carry out its life history (Harding and Mifsud 2017). Basking within open, exposed sun-lit locations or seeking refugia from elements within certain structures prone to disturbance can lend the EMR more vulnerable to human-managed landscapes. In addition, EMR have evolved to not flee from approaching danger and rather remain motionless and rely upon their camouflage (Parent and Weatherhead 2000; Lipps 2005; Mifsud 2014). Mortality associated with mowing, burning, and tilling/disking of fields has been well documented (Durbian 2006; Mifsud 2014; Bales, Hyman et al. 2015; Cross, Root et al. 2015).

3.3.3.4 Predators and Persecution

Despite being venomous, EMR are vulnerable to several predators, with birds of prey and wild turkey as key predators. Other species that will consume EMR include raccoons, striped skunks, coyotes, mink, and Virginia opossums. Populations of many mesopredators have greatly increased in Michigan, and globally, over the past century, likely due to a lack of large predators such as wolves and cougars caused by a human-influenced landscape (Harding and Mifsud 2017).

Historically, persecution of the EMR was widespread and common due to its venomous nature. The current role of persecution in population declines is likely greatly reduced, however illegal collection for the pet trade and traditional Asian medicine continues, though it is difficult to assess the degree of threat to this species.

3.3.3.5 Disease

Snake Fungal Disease (SFD) is a recently described disease of free-ranging snake populations resulting from infection by the fungus *Ophidiomyces ophiodiicola* (Allender, Raudabaugh et al. 2015). Typically presenting as skin lesions near the head and neck, SFD consistently results in morbidity or mortality and may cause severe localized population declines in EMR (Allender, Dreslik et al. 2013). In Michigan it is believed to be widespread though somewhat localized within isolated EMR populations. Other diseases, such as Ranavirus (family *Iridovirdae*), can cause severe infections in several amphibian and reptile species (Gray, Duffus et al. 2017). Ranavirus can have a mortality rate of 90%-100% and has been linked to mass die offs of amphibians and reptiles (Gray, Duffus et al. 2017).

4.0 Potential Impacts of the Project on Eastern Massasauga Rattlesnakes

4.1 Direct and Indirect Impacts

The Project area will transect several areas with records of EMR, including locations designated as USFWS Tier I and Tier II EMR habitat. Multiple aspects of this Project may present temporary risk to EMR occurring in or near the corridor. Pre-construction inventory surveying conducted by HRM in 2021 and 2022 identified nineteen (19) EMR priority Target Areas (TA), or areas that have the potential to support EMR that would be impacted by the effects of the Project (Table 2) (Figures 7-24). HRM confirmed Eastern Massasauga Rattlesnake presence in one (1) Target Area, with two (2) occurrences recorded within TA 88 in 2021. The nineteen (19) TAs identified as EMR priority are characterized as either possessing a moderate or high probability of supporting EMR and associated habitat that will be impacted by the effects of the Project.

High and moderate priority EMR Target Areas were determined based upon habitat quality directly within the Project corridor, quality of habitat adjacent to the corridor, connectedness of the surrounding landscape, and observed presence of EMR. Target Areas that possessed high quality habitat for EMR within the Project area corridor and/or had EMR observations recorded by HRM were considered to be high-priority. Target Areas that did not possess high quality habitat for EMR within the Project area corridor or EMR observations, but adjacent high quality habitat connected to the corridor was present were considered moderate-priority. Of the nineteen (19) Target Areas, six (6) have been identified as high priority EMR TAs. The remaining thirteen (13) locations have been identified as moderate priority EMR TAs. Table 3 summarizes the area of EMR habitat in each TA that will be temporarily impacted by the Project activities.

The impacts of the Project and their cumulative effects are evaluated and summarized in Table 4 and are compared to the threats contributing to the overall decline of Eastern Massasauga Rattlesnake populations. Impacts to EMR as a result of the Project are limited to temporary habitat alteration (indirect effects) as well as a minimal risk of direct impact or *take* during construction activities due to crushing individuals with equipment. Temporary habitat alteration will be relatively short term and range between 1 to 6 months, or one full growing season, from the time construction activities begin until site restoration is in effect. The construction activities of the Project, consisting

of clearing the ROW of woody vegetation and herbaceous plants, grading/stripping topsoil from the ROW, and trench excavation in preparation for pipeline installation, can be a source of direct mortality to EMR.

Clearing crews that remove vegetation from the ROW typically utilize equipment that removes vegetation near ground level. If an EMR is unable to evade the equipment, it can be killed or injured. To prevent this, winter vegetation clearing will be conducted during cold weather months (November through early April) while EMR are dormant in EMR Target Areas. This will reduce the risk of EMR encounters since they are inactive at the time of clearing. Possible threats of winter vegetation clearing would include collapsing crayfish chimneys where EMR have the potential to overwinter. While some crayfish chimneys and other potential EMR hibernaculum are present within the Project area, no evidence of these structures being utilized as EMR overwintering habitat has been detected. In general, the highest quality habitat and overwintering sites are located to the east or north of many EMR Target Areas outside of the permit area. In the event vegetation within the ROW must be cleared outside of winter months while EMR are potentially active, BMP measures will be implemented to minimize the risk of *take* including wildlife barrier fence (WBF) placement, wildlife clearance and site walk-downs, USFWS-approved vegetation cutting devices, and vegetation cut-height restrictions.

WBF is three-foot-tall soil erosion fabric that will be erected along all EMR priority Target Areas. Installation of WBF is typically done through the use of machinery trenching a channel that the fence is then placed into and backfilled. During this brief period, an EMR may be harmed from the trenching equipment, fence installation, or backfilling. This is a minor overall impact as the equipment is monitored by HRM trained staff to ensure the safety of EMR and other wildlife within the impacted area. Once WBF has been erected at all EMR Priority TAs, HRM will conduct wildlife clearance within each TA in advance of pipeline installation to relocate potential EMR and other wildlife from each enclosed EMR TA within the Project corridor. Pipeline installation will require trench excavation along the majority of the Project ROW. Without proposed wildlife clearance and site walk-down efforts, EMR and other herpetofauna can be killed by construction equipment or become entrapped within impacted areas and unable to escape. Wildlife clearance and site walk-downs pre-construction will greatly reduce the risk of direct *take* of EMR. WBF will reduce the risk of direct *take*, but may have indirect effects by limiting dispersal while construction activities are being conducted.

As a substitute for open-cut trench installation, a portion of the pipeline will be installed using horizontal directional drilling (HDD) at several ecologically sensitive areas. Five (5) of the six (6) high priority EMR TAs and one (1) moderate priority EMR TA will be installed using HDD (Table 5) (See Appendix E: Horizontal Directional Drilling Target Area Locations and Profile). This process has a significantly reduced impact on the landscape because it minimizes impacts on the area above the drill. There are no direct or indirect impacts to EMR along the path of the HDD as no existing habitat or potential hibernaculum is temporarily impacted and no EMR are likely to be injured or killed. When possible, the entry and exit points of the drill are positioned in locations that

do not possess suitable habitat for EMR. To ensure minimal risk of *take* of EMR, HRM will conduct wildlife clearance prior to the placement of the HDD equipment at the entry and exit points. Associated equipment will be contained within WBF if within an EMR Target Area to prevent EMR from entering the workspace. The bentonite clay mixture (natural, non-toxic substance) used for lubrication in the drilling process can, on rare occasion, appear on the surface resulting from fractures in the sub-surface geology. Safeguards are in place real time to observe, monitor, prevent, and respond to an inadvertent mud release (IMR).

After the pipeline's installation, the ROW will be restored with native aquatic or terrestrial vegetation depending on the pre-construction community type. Invasive species management will be incorporated in wetlands to reduce the risk of invasive vegetation colonizing the recently disturbed ROW. During the restoration process, WBF is often removed to obtain proper grading. During this time EMR may reenter the construction site. CE will implement proper sequencing of activities and coordination with contractors to grade to the maximum extent possible while WBF is still in place to reduce the threat or harm to EMR. HRM staff will remain on site to monitor and address any potential encounter with EMR to prevent harm.

4.2 Cumulative Impacts to Eastern Massasauga Rattlesnake

Section 7 of the ESA defines cumulative impacts as regulations including the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the permit area. Effects of future federal actions that are unrelated to the proposed action are not considered cumulative impacts. Repairs and pipeline maintenance will be necessary over time and are to be covered throughout the issuance of the incidental *take* permit. Future projects unrelated to pipeline maintenance or repair in the permit area that would result in *take* of listed wildlife species would require *take* authorization from the USFWS and, therefore, are not considered under cumulative effects. The presence of gas pipeline facilities precludes development of land occupied by the existing gas pipeline easement and no cumulative impacts are anticipated to result from vegetation removal activities.. The Project corridor is primarily an easement, which does not alter or restrict the land use by the private land owner, and therefore impacts may occur without our knowledge or control, and are therefore unknown at this time and not considered a cumulative impact.

With existing land use taken into consideration, the proposed Project is not expected to contribute to significant cumulative impacts that might threaten the existence of Eastern Massasauga Rattlesnake. Threats to the species are summarized in Table 4.

4.3 Anticipated Take of Each Covered Wildlife or Fish Species

The Project is anticipated to result in the direct *take* in the form of mortality of no more than two (2) Eastern Massasauga Rattlesnakes given the likelihood of EMR presence within the Project corridor and impact of the Project's activities. The Project is not anticipated to result in population level impacts of EMR through incidental *take* and is expected to have a negligible effect on habitat to be restored post-construction (Table 3). Rather, several BMP measures being implemented may provide greater habitat availability and overall connectivity after the completion of restoration activities within the permit area.

4.4 Effects on Critical Habitat

There is currently no designated critical habitat for Eastern Massasauga Rattlesnake. Therefore, there will be no effects on critical habitat. The Project does however intersect USFWS designated Tier I and Tier II habitat for the species. The extent of EMR habitat area impacted by the Project activities is summarized in Table 3.

4.5 Low-Effect HCP

An HCP qualifies for a categorical exclusion under the National Environmental Policy Act (NEPA) if it satisfies "low-effect" criteria and does not fit any category of exceptions from categorical exclusions. Low-effect criteria are defined in the U.S. Fish and Wildlife Service Habitat Conservation Planning Handbook and are based on having minor or negligible direct or cumulative impacts on federally protected species or other environmental values or resources. Appendix C of the USFWS Habitat Conservation Planning Handbook itemizes "low-effect" criteria and shows that the proposed project meets all the criteria.

5.0 Conservation Program

5.0 Responsibilities

Consumers Energy shall be responsible for implementing all the BMPs, avoidance, minimization, and mitigation measures identified in the HCP in accordance with the specifications for monitoring, reporting, and funding described herein and in the resulting permit. CE and their herpetological experts, HRM, will work closely with the USFWS and communicate updates and progress of the Project on a weekly basis via email and other methods as preferred by USFWS.

5.1 Biological Goals

Section 10(a)(2)(A) of the Act requires that an HCP specify the measures that the applicant will take to minimize and mitigate to the maximum extent practicable the impacts of the taking of any federally listed animal species as a result of activities addressed by the plan.

As part of the "Five Point" Policy adopted by USFWS in 2000, HCP's must establish biological goals and objectives (65 Federal Register 35242, June 1, 2000). The purpose of biological goals is to establish that the following conservation program stated in the HCP is consistent with the current conservation and recovery goals established for the species. Biological goals for this HCP are:

- Goal 1: Conduct the Project in a manner that minimizes impacts and maintains persistence of EMR within the HCP area.
- Goal 2: Restore habitat post-construction to maintain or improve pre-existing habitat quality and function for EMR.
- Goal 3: Monitor response of EMR to BMPs and site restoration to guide and inform current and future conservation efforts.

5.2 Biological Objectives

To achieve the aforementioned biological goals, the following biological objectives will be met as they relate to each goal (e.g., Goal 1 is achieved by Objective 1a-g):

- Objective 1a: Minimize impact through reduced workspace in sensitive habitats from 120 foot-wide easement to 75 foot-wide.
- Objective 1b: Eliminate surface impacts to high quality habitats through the use of horizontal directional drilling (HDD) in high priority EMR TAs.
- Objective 1c: Conduct winter vegetation clearing within all non-HDD EMR TAs.
- Objective 1d: Install WBF all EMR TAs.
- Objective 1e: Perform wildlife clearance and site walk-downs within EMR TAs and provide HRM staff on site during the extent of construction activities through restoration.
- Objective 1f: Provide EMR contractor training to all personnel working within EMR TAs.
- Objective 1g: Place EMR signage within all EMR TAs.
- Objective 2a: Return all impacted high priority EMR TAs to their pre-construction habitat quality and functionality for EMR.
- Objective 2b: Ecologically enhance all impacted moderate priority EMR TAs to provide increased habitat functionality for EMR post-restoration.
- Objective 2c: Restore 100% of impacted EMR habitat using high quality native aquatic and terrestrial vegetative seed mixes approved for use.
- Objective 3a: Establish photo monitoring points for EMR TA locations to compare pre-construction and post-restoration conditions.
- Objective 3b: Monitor restoration to assess post-restoration EMR presence, spatial distribution, and available habitat.
- Objective 3c: Utilize the state of Michigan Herpetological Habitat Assessment Tool (Herp HAT) to compare pre-construction and post-restoration conditions for EMR and other rare herpetofauna.

5.3 Best Management Practices: Avoidance, Minimization, and Mitigation Measures

Implementing carefully planned best management practices (BMPs) can be an effective strategy for preventing injury or mortality to amphibians and reptiles during construction activities involving the placement and maintenance of natural gas pipelines (Mifsud 2014). These proactive measures are critical where imperiled, sensitive, and long-lived species are known to occur. CE shall implement the following recommendations at the nineteen (19) EMR priority TAs prior to and during construction activities for the Project to minimize risk of injury or mortality to herpetofauna and reduce the risk of *take* of EMR (Table 6). If the following minimization measures cannot be implemented or deviations are required to a conservation measure as described below, the applicant will get prior written approval from the USFWS.

5.3.1 Avoidance

5.3.1.1 Wetland Avoidance

The proposed Project alignment has been adjusted to reduce impacts to sensitive natural resources within construction workspaces and eliminate them in temporary workspaces outside the ROW. There are many small temporary workspace areas throughout the corridor that were moved outside of wetlands and other high quality natural areas to decrease the overall impact to EMR habitat.

5.3.1.2 Winter Vegetation Clearing

CE shall remove herbaceous groundcover, dense brush, and other ground-obscuring vegetation within EMR TAs only during cold-weather inactive months (November through early April) while EMR are dormant. EMR dormancy will be determined and ensured utilizing the ground temperature inversion method to avoid *take* of active individuals (Hileman 2016). Dormant season vegetation removal shall be as low to the ground as practicable, and shall not create a mat of vegetative cuttings/woodchips more than one inch thick. If groundcover must be removed outside of the dormant season while EMR are potentially active, the following measures will be implemented: (1) wildlife barrier fencing (WBF) must be in place; (2) HRM staff will thoroughly inspect the area within a day prior to clearing activities, and will be on site during clearing activities, surveying the TA within a safe distance of the clearing equipment; (3) vegetation will be cut with a weed whacker, brush cutter, sickle bar, disk mower, or another USFWS-approved implement that does not create a vacuum, and (4) groundcover may not be lower than 4 inches above the ground, unless approved on a site-by-site basis by HRM staff. After ground-obscuring vegetation has been cut and WBF has been installed, HRM staff will conduct wildlife clearance and site walk-downs within each EMR TA to relocate potential EMR and other herpetofauna. Burning of woody material is not allowed in EMR Target Areas or if necessary, the wood must be inspected and relocated prior to burning to avoid the potential of EMR being injured in the fire.

5.3.1.3 Winter Burrow Avoidance

Potential hibernaculum for EMR was not observed in EMR TAs during extensive pre-construction inventory surveys conducted in 2021 and 2022. While likely not present, if overwintering habitat is discovered within an EMR TA, HRM staff will flag active burrows within that EMR TA during winter vegetation clearing. In the event temperatures are unseasonably cold at the beginning of construction activities in late April to early May and EMR are determined to likely still be in hibernation, HRM will scope any potential crayfish burrows at the risk of being impacted using fiber optic camera equipment to assess for potential presence of overwintering EMR. All vacant burrows will be backfilled, collapsed and/or securely plugged. If a burrow contains an EMR, HRM will implement the "EMR Encounters" protocol noted below to carefully extract and relocate the specimen to the nearest identified burrow located outside of the ROW.

5.3.2 Minimization

5.3.2.1 Reduction of Wetland Impacts

The proposed Project workspace has been reduced to a width of 75 feet in most wetland and upland wooded areas as opposed to the standard 120-foot-wide construction corridor to reduce impacts on wetlands and wooded upland habitat for EMR.

5.3.2.2 Horizontal Directional Drilling

Consumers Energy will cross all high priority EMR TAs, with the exception of one Target Area (TA88), using the HDD construction method to decrease the likelihood of *take* and impacts to sensitive natural resources (Table 5) (See Appendix E: HDD Target Area Locations and Profile). In addition to eliminating impact to EMR, the use of HDD in high priority EMR TAs will greatly reduce the impacts to the wetlands and waterbodies in those locations. Additional precautions will be taken when conducting HDD to avoid inadvertent mud release (IMR) of the bentonite clay mixture used for drilling, particularly when used under sensitive habitats, waterways, and areas of concern. The use of this non-toxic substance has little to no direct impact when contained within the drill path; however, if unintentionally released into wetlands or waterways due to fractures in sub-surface geology, wildlife including benthic invertebrates, aquatic plants, fish and their eggs, mussels, and all life stages of herpetofauna species can be smothered by the fine particles. An environmental contingency plan that includes protocols for monitoring and preventing IMR as well as organized, timely, and "minimum impact" response in the unlikely event of a release during HDD activities will minimize the risk to sensitive ecological areas (See Appendix B: Horizontal Directional Drilling Sequence and Contingency Measures).

5.3.2.3 Wildlife Barrier Fencing

To prevent EMR from entering the construction zone, orange WBF will be installed around EMR priority Target Areas, either: (1) after ground-obscuring vegetation has have been removed during the dormant season, or (2) before any construction activities occur while EMR are active, except carefully removing a narrow strip of vegetation as needed where the WBF will be installed under close inspection of HRM staff. In addition to enclosing each EMR TA, WBF must be installed along both edges of the ROW, for a distance of at least 100 feet, where the construction corridor enters and leaves each of the EMR Target Areas. Each terminal end of WBF will have a "J-hook" that forms a curve facing away from the construction site. The radius of J-hook curves will be at least 3 feet. This will help deflect wildlife traveling along the fence away from the Project area. WBF will also be installed around the equipment workspace at the entry and exit points of EMR Target Areas utilizing HDD if within EMR habitat. Construction personnel will inspect EMR WBF for holes, tears, and other gaps or damage. Any deficiencies must be repaired, and a walk-down performed, before any vehicles or equipment may operate within the EMR TA. HRM will notify Project leadership for signage to be posted "Entry Prohibited" signs at each end of the TA until WBF repairs are complete, and walk-downs verify absence of EMR. At this time, signs will be removed, and construction activities within the site may resume. Vehicles and equipment may not go outside WBF at any EMR TA. WBF will remain in place and be properly maintained until construction and restoration activities are complete to the maximum extent possible.

5.3.2.4 Wildlife Clearance and Site Walk-downs

Wildlife clearance and site walk-downs is the act of rescuing or removing wildlife from the construction corridor and relocating the individuals to suitable habitat nearby outside or the Project area. HRM staff will conduct wildlife clearance and site walk-downs in teams of 2-6 individuals at each of the identified EMR TAs after WBF is installed, and also immediately prior to vegetation clearing, to ensure all potential EMR and other herpetofauna are relocated outside of Project corridor. Only HRM staff permitted by USFWS and trained in the natural history, behavior, and handling of EMR are authorized to participate in the rescue and relocation efforts. In the event WBF is damaged within an EMR Target Area, HRM staff will complete an immediate site walk-down before vehicles or equipment are allowed to continue operating within the EMR TA. Periodic wildlife clearance and walk-downs will also be conducted throughout the duration of construction activities to relocate additional herpetofauna and wildlife and to verify the TA remains vacant of EMR.

5.3.2.5 Artificial Cover Objects

To help increase the detection and successful relocation of EMR during wildlife clearance and site walk-downs, HRM will deploy five to ten artificial cover objects (ACO) (e.g. pieces of corrugated sheet metal approximately 3'x5') in each EMR Target Area after WBF has been installed (Photos 11-13). Locations of ACOs will be recorded using GPS, and each location will be clearly marked to avoid disturbance. Artificial cover objects will be removed during site walk-downs conducted by HRM prior to any further clearing or construction activities. ACOs will also be used to aid in the detection of EMR during post-restoration monitoring.

5.3.2.6 EMR Encounters

If an EMR is encountered during wildlife clearance and site walk-downs, HRM staff will immediately relocate the animal to an identified safe and suitable location outside of the Project limits. If an EMR is discovered within the Project area while HRM is not on site, all activity in the area shall cease until HRM is contacted and relocates the EMR to safety. Per USFWS guidelines, the EMR will be relocated a maximum of 200 meters (656 feet) from the capture point to reduce stress or harm from translocation. If an EMR must be moved beyond the 200-meter zone, HRM will contact USFWS for prior discussion and authorization. Snake-handling activities shall be conducted in compliance with HRM's USFWS and Michigan Department of Natural Resources (MDNR) permits. Any EMR sighting will be reported to USFWS and MDNR within 24 hours. If a specimen that appears suspect for SFD, through a visual examination of SFD signs, is encountered, HRM will contact USFWS and MDNR to determine if additional measures are necessary, including submitting a tissue sample, or the whole animal for treatment or necropsy.

5.3.2.7 EMR Take

Should a *take* occur, USFWS staff, CE representatives, HRM senior staff, and environmental inspectors will follow all permit conditions regarding notification. USFWS, CE, HRM, and the environmental inspectors will evaluate details of the *take* to ensure all actions were consistent with the issued 10(a)(1)(B) permit.

5.3.2.8 EMR Contractor Training

In addition to other potential training as applicable, all on-site personnel will receive project-specific EMR training before entering the construction area, which shall include discussion about EMR habitat, behavior, identification, avoidance, and requirements; and steps to implement if an EMR is observed within or near the Project area. Everyone who completes EMR training will receive an EMR-training sticker for his/her hardhat to verify participation.

5.3.2.9 EMR Signage

HRM created placards that provide the following EMR information: species identification, habitat, expectations for pre-construction walk-downs, and actions to take if an EMR is encountered. CE will post these placards at the entrance and exit of each EMR TA, and along the edge the workspace where needed to identify nearby EMR habitat that is outside the workspace. Placards will be installed prior to the proposed start of construction in any specific EMR habitat area. Signage shall be maintained as needed, and remain in place until all construction activities are complete.

5.3.2.10 Construction Debris and Timber Piles

Temporary piles of timber, brush, rock, and other construction debris shall not be stored overnight in any EMR Target Area to discourage EMR from seeking refuge within the piles and being harmed during removal. EMR protocols do not prohibit the contractor from piling timber adjacent to the workspace corridor in EMR TAs, provided each specific timber-pile location is inspected by HRM staff immediately prior to timber placement, and is monitored by HRM throughout timber-piling activities. Once established, these log piles may not be moved by project personnel unless authorized by the USFWS.

5.3.2.11 Pipe and Pipe-Cradles

Except as necessary to actively work on or handle the pipe itself, all pipe-ends will be kept covered (e.g. pipe cap, secured plastic, etc.) in EMR Target Areas to prevent EMR from seeking refuge and becoming entrapped within the pipe. HRM staff will inspect each stack of timbers (aka "skids"), which cradle the pipe until it's lowered into the ground, immediately before skid piles in EMR Target Areas are moved or removed from the workspace corridor.

5.3.2.12 Portable Jobsite Toilets

The contractor will be encouraged to locate portable jobsite toilets outside of EMR TAs. However, Union rules and other circumstances may require toilet placement in some EMR TAs. For any such toilet, the following steps must be implemented before it is moved: (1) HRM staff must be on site to monitor activities; (2) the toilet will be gently leaned-over to facilitate under-toilet inspection; and (3) if an EMR is under the toilet, it must be removed by HRM staff before the toilet is moved. A toilet in an EMR TA may be moved after HRM staff verifies there are no EMR underneath.

5.3.2.13 Overnight Parking

Project personnel will be encouraged to move vehicles and non-stationary equipment outside of EMR TAs for overnight parking whenever practicable. Circumstances may arise, however, when this is not feasible. In each such occurrence, HRM staff shall inspect beneath every vehicle or mobile equipment, which was parked overnight in the TA, prior to engine start-up or moving. If an EMR is discovered, the vehicle or equipment must remain non-energized and stationary until HRM staff relocates the animal outside of the workspace.

5.3.2.14 Speed Limit

All vehicles and equipment will travel less than 10 mph within the Project area and access roads. Vehicles and equipment must yield to EMR and other wildlife.

5.3.2.15 EMR Target Area Equipment Cleaning

Efforts will be made to avoid the spread of invasive species into EMR TAs by implementing equipment cleaning protocols. This includes inspecting and cleaning all equipment prior to entering the job site; and power-washing all clearing and topsoil-stripping equipment. In wetlands identified as containing potential EMR habitat, new construction mats will be used to reduce the potential risk of spreading invasive species and pathogens. Boot washing stations will be provided for contractors to clean boots before entering EMR TAs. In addition, HRM staff will maintain strict biosecurity protocols for cleaning and decontaminating field equipment with a 10% bleach solution.

5.3.2.16 Site Restoration

Restoration of the Project permit area including all EMR priority TAs will be completed in accordance with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) approved plans and specifications included in Consumers Energy's EGLE permit and restoration plan. See Appendix C: Consumers Energy Mid-Michigan Pipeline Project Restoration Activities and Appendix D: Consumers Energy Mid-Michigan Pipeline Project Wetland and Stream Restoration and Mitigation Plan for more information.

5.3.2.17 Erosion Control Blanket

Some common erosion control products can entangle wildlife and pose a threat to EMR. To avoid this, wildlife-friendly materials will be used. Erosion control blankets at all EMR priority TAs will have leno weave (or equivalent) top and bottom netting, containing no monofilament-type material, so openings can and will expand in size by an accidentally entrapped animal. Netting will be natural fiber, with openings no larger than 1 inch in any direction. Blanket contents will be weed-free, natural materials (e.g. straw, coir, etc.), and approximately ¼ inch thick.

5.3.3 Mitigation of Unavoidable Impacts

Mitigation measures in an HCP are to be based on the biological needs of covered species and should be designed to offset the impacts of the *take* from the covered activities to the maximum extent practicable. The mitigation of this HCP will offset the short-term impacts of temporary habitat alteration and minimal *take* of EMR through the Project's covered activities. In addition to mitigation, as part of the Conservation Strategy for the HCP, Consumers Energy will make an additional investment in EMR recovery through multiple non-profit organizations

dedicated to the conservation of EMR throughout Michigan's Lower Peninsula. See Table 7 for estimated HCP implementation funds.

Mitigation for Project Impacts:

- The amount of $50,000 will deposited in The Conservation Funds' EMR Pooled Fund or directly to another entity for an alternative mitigation project as approved by the USFWS. The EMR Pooled Fund provides an option for Authorized Users to provide Compensatory Mitigation for unavoidable impacts to EMR and its habitat in the State of Michigan. Authorized Users pay EMR Mitigation Payments to TCF for placement into the EMR Account, and aggregated EMR Mitigation Payments are used to implement approved Mitigation Projects that offset the impacts caused by their Actions. The Conservation Fund through an agreement with USFWS established guidelines, responsibilities, and standards for the use and operation of pooled funding.

Additional Investment in EMR Recovery:

- The Leelanau Land Conservancy in an amount of $40,000 towards EMR inventory, monitoring, and the development of habitat restoration measures targeting EMR and other imperiled herpetofauna. Projects will occur within several nature preserves owned and managed by Leelanau Land Conservancy where EMR are likely or have historically occurred within Leelanau County.
- The Michigan Amphibian and Reptile Conservancy (MARC) in an amount of $35,000 focused on community engagement and training workshops across the Lower Peninsula centered on identification, documentation, and preservation of EMR and other rare herpetofauna. Efforts will also be directed at preservation and restoration techniques that minimize harm and disturbance to EMR and other protected Michigan herpetofauna.
- The Stewardship Network in an amount of $10,000 towards workshop programs to promote EMR conservation in Michigan. Programs will be directed towards professionals engaged in management activities to educate and inform upon practices used minimize harm or *take* of EMR and ways to manage and restore landscapes to benefit EMR and other protected species.

The funds will directly benefit the EMR through proactive measures to minimize threat and harm, educate the public and engage citizens and community members in the understanding of the importance and role EMR play in ecosystems. The funds will also encourage the contribution of observations to help build more robust databases with greater understanding of current species extent and spatial distribution, and provide much needed resources to inventory and restore EMR habitat.

5.4 Monitoring

Monitoring will be implemented to ensure compliance and/or determine if the biological goals and objectives of the HCP are being met.

5.4.1 Impact Monitoring

In conjunction with wildlife clearance and site walk-downs, HRM will monitor and document impacts of the Project throughout the course of construction activities within all EMR priority TAs. All herpetofauna relocated during wildlife clearance and site walk-downs within the Project corridor will be documented. Documentation will consist of field notes, photographs, and GPS point locations.

5.4.2 Restoration Monitoring

Following each of the two (2) Project phases of construction, two (2) years of monitoring will be conducted along the Project corridor at all EMR priority TAs. Monitoring will be focused upon EMR and CE's contractor, HRM, will utilize the most current and accepted methods for monitoring the response of EMR to restoration activities and their overall status within the select locations. The currently accepted survey method for EMR include visual encounter surveys (VES) coupled with the use of artificial cover objects (ACO) to aid in detection. VES is particularly effective when EMR are first emerging from their overwintering sites, as vegetation is low and EMR spend a great deal of time basking. Methods for conducting VES vary, though generally involve meandering along an established line transect within the Project area surveying habitat suitable for EMR.

HRM will also utilize photo monitoring of restoration sites to compare overall habitat quality to that of pre-construction. Photo monitoring, or utilizing multiple fixed spatial point-of-views to capture, record, and compare photographs before, during, and after construction, is an effective tool to visually gauge restoration success in the context of herpetofauna habitat.

5.4.3 Monitoring Decontamination Procedures

The Michigan Department of Natural Resources requires the implementation of basic disinfecting procedures designed to prevent the unintended spread of pathogens between sites. Individuals conducting herpetofauna field activities including pre-construction inventory, wildlife clearance and site walk-downs, and restoration monitoring must adhere to the biosecurity requirements. All field equipment (i.e., boots, waders, rubber gloves, nets, traps, hooks, buckets, etc.) that comes into contact with EMR or habitat within an EMR Target Area shall be washed and disinfected. All debris and mud must be scrubbed off prior to disinfectant application, because organic matter and soil can reduce its effectiveness of bleach.

Disinfection is accomplished by a solution of approximately 4 ounces of bleach per 1 gallon of clean water to be applied to all field equipment prior to travelling to another EMR TA. The bleach solution should be allowed to evaporate from the equipment, or rinsed off after a minimum of 15-minutes of contact.

When field work is completed for the day/night, equipment and personal gear should be thoroughly washed and disinfected again. Equipment and gear should be hung and allowed to completely dry in full sun. In many cases, drying serves as a means of inactivating pathogens.

5.4.4 Monitoring Data Collection

The following information shall be collected as part of EMR monitoring:

- Start of the survey: date, begin time, end time, and number of participants involved in the survey.
- Weather data including air temperature, substrate temperature, relative humidity, wind speed, and sky conditions.
- Location of the TA(s) being surveyed. All data will be housed and maintained in Geographic Information System (GIS shapefile and kml (Google Earth).
- Location and number of ACOs by location with corresponding location GIS shapefile or kml (Google Earth) file made from GPS coordinates taken at each ACO location.
- Summary of objective and method(s) employed (checking ACOs and/or VES).
- Representative photograph(s) of the site and vegetation.
- The number of EMR encountered (indicate captured, escaped, and total). GPS locations will be collected and latitude and longitude will be recorded in field notes.
- All herpetofauna species encountered at the site will be recorded in field notes and location recorded using GPS equipment.
- All additional state-protected species will also have latitude and longitude data recorded in field notes.
- When an EMR is encountered, the following information is recorded:
  - Location, consisting of the latitude and longitude from a GPS unit.
  - Behavior, including whether the snake was using an ACO.
  - Sex (if detectable).
  - Number of rattle segments (if detectable) and if the rattle is complete (still having the original button) or incomplete (broken).
  - Gravid or not (adult females only).
  - Color pattern: blotched/patterned or melanistic.

    Note: EMR will not be handled unless absolutely necessary

5.5 Performance and Success Criteria

Performance and success criteria for this HCP are as follows:

- Less than 2 EMR injured or killed within permit area during Project activities over the course of the fifteen (15) years (until 2038) of the issuance of the incidental *take* permit.
- 100% of all habitat impacted within EMR TAs (approximately 52.62 acres) restored to previous or improved habitat quality and function

- Presence of EMR and other rare herpetofauna or their habitat within restored EMR TAs where the species occurred prior to Project activities.
- Herp HAT analysis value at or exceeding pre-construction value within identified EMR TAs.

5.6 Adaptive Management Strategy

Adaptive management allows for changes in minimization strategies that may be necessary to achieve biological objectives of impact or reduction of *take*. This HCP provides for monitoring of performance criteria and benchmarks of success to determine if the stated goals and objectives are being achieved.

5.7 Reporting

An Annual Report will be submitted by CE's contract herpetologist, HRM. The report will include:

1. Detailed summary of Project activities that were conducted during the reporting year.
2. Project impacts (e.g., acreage of EMR habitat temporarily impacted, number of herpetofauna relocated from the Project corridor).
3. Monitoring results (e.g., EMR observations [copy of field notes, spatial data], restoration effectiveness).
4. Summary of adaptive management implementation.
5. Potential changed or unforeseen circumstances.
6. Potential major or minor amendments.

Reporting will be completed and submitted by December 31, for each monitoring year following each phase of Project completion, and for two (2) years follow up for each Phase. An annual report will be submitted to the USFWS to summarize and document Project activities completed in compliance with LEHCP requirements.

6.0 Plan Implementation

6.1 Plan Implementation

Consumers Energy is responsible for completing the proposed Project utilizing the aforementioned BMPs at all specified EMR priority TAs. The Project's tentative timeline including approximate dates for pre-construction inventory, active construction BMPs implementation, and post-construction restoration monitoring are detailed in Table 1.

6.2 Changed Circumstances

Under Section 10, regulations (69 Federal Register 71723, December 10, 2004 as codified in 50 Code of Federal Regulations (CFR), Sections 17.22(b)(2) and 17.32(b)(2)) require that an HCP specify the procedures to be used for dealing with changed and unforeseen circumstances that may arise during the implementation of the HCP. The No Surprises Rule [50 CFR 17.22 (b)(5) and 17.32 (b)(5)] describes the obligations of the applicant and the USFWS. The purpose of the No Surprises Rule provides assurances to the non-Federal landowners participating in habitat conservation planning under the ESA that no additional land restrictions or financial compensation will be

required for species adequately covered by a properly implemented HCP, in the event of unforeseen circumstances, without the consent of the permittee.

Changed circumstances are defined in 50 CFR 17.3 as changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated by plan developers and the USFWS and for which contingency plans can be prepared (e.g., the new listing of species, a fire, or other natural catastrophic event in areas prone to such event). If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and these additional measures were already provided for in the plan's operating conservation program (e.g., the conservation management activities or mitigation measures expressly agreed to in the HCP), then the permittee will implement those measures as specified in the plan. However, if additional conservation management and mitigation measures are deemed necessary to respond to changed circumstances and such measures were not provided for in the plan's operating conservation program, the USFWS will not require these additional measures absent the consent of the permittee, provided that the HCP is being "properly implemented". Potential changed circumstances within the Project area of this HCP include:

6.2.1 New Federal Listing of a Species

If a new species that is not covered by the HCP, but may be affected by activities covered by the HCP, is listed under the federal ESA during the term of the permit, the USFWS may consider this to be a changed circumstance. In such case, the HCP will be reevaluated by USFWS and the HCP-covered activities may be modified, as necessary, to ensure that the activities covered under the HCP are not likely to jeopardize or result in *take* or adverse modification of any designated critical habitat of the newly listed species. Any perceived impact for newly listed species shall be communicated to the Project by USFW and consultation on whether the HCP adequately addresses/minimizes risk.

Species currently under consideration for federal listing with the potential to occur within the Project area include:

- Blanding's Turtle (*Emydoidea blandingii*)
- Spotted Turtle (*Clemmys guttata*)
- Monarch Butterfly (*Danaus plexippus*) (currently a candidate species)
- Little Brown Bat (*Myotis lucifugus*)
- Tricolored Bat (*Perimyotis subflavus*)

6.2.2 Discovery of Additional Federally-listed Species within Project Area

Should additional inventory surveying identify the presence of other federally listed species in the Project area, Consumers Energy will notify the USFWS to determine if those species require incidental *take* coverage under this HCP or whether avoidance measures can be implemented.

6.2.3 Natural Disaster/Event

The area encompassing the Project corridor may be subject to natural disasters and events (e.g., severe storms, tornado, wildfire, flooding, unexpected product release). If a natural disaster or

event occurs within EMR or rare species priority TAs, CE will implement comprehensive preparedness plans to appropriately respond to and mitigate the issue. Given the nature of the natural gas pipeline being buried, and the surrounding topography, most natural disasters such as tornadoes, fires, and flooding will not directly impact the buried pipeline. In the unlikely event of an incident near or involving the pipeline, CE maintains response plans and implementation strategies to rapidly respond to pipeline events. The first and primary measure is proactive inspections and regular maintenance of the pipeline. Should an anomaly be detected, CE will immediately respond and repair the pipeline segment. These mitigative response activities are conducted in coordination with state and federal agencies. Should an incident such as a release event occur, emergency response procedures will be implemented, including contact with first responders, as well as CE staff and contractors who may be the first to arrive at the scene, with the basic information they need to safely handle the incident, including the potential for EMR. Areas with known or potential EMR habitat have been extensively documented by HRM through the HCP process. If a natural disaster or event occurs within EMR TAs, CE will implement response plans to appropriately respond to the issue. Should EMR habitat be impacted by a natural disaster or event, these impacts would be temporary and CE, when authorized to do so safely, will incorporate HRM staff on site to help minimize disturbance and threat to EMR and other rare herpetofauna. Areas of impact by a potential event within EMR TAs will be restored to pre-impact or improved ecological condition to provide replacement habitat for EMR and other rare herpetofauna. CE will work with FWS and MDNR through this process.

6.3 Unforeseen Circumstances

Unforeseen circumstances are defined in 50 CFR 17.3 as changes in circumstances that affect a species of geographic area covered by the HCP that could not reasonably be anticipated by plan developers and USFWS at the time of the HCP's negotiation and development and that result in a substantial and adverse change in status of the covered species. The No Surprises Rule [50 CFR 17.22 (b)(5) and 17.32 (b)(5)] describes the obligations of the applicant and the USFWS. The purpose of the No Surprises Rule provides assurances to the non-Federal landowners participating in habitat conservation planning under the ESA that no additional land restrictions or financial compensation will be required for species adequately covered by a properly implemented HCP, in the event of unforeseen circumstances, without the consent of the permittee.

If the USFWS determines that the unforeseen circumstance will affect the outcome of the HCP, additional conservation and mitigation measures may be necessary. Where the HCP is being properly implemented and an unforeseen circumstance has occurred, the additional measures required of the permittee must be as close as possible to the terms of the original HCP and must be limited to modifications within any conserved habitat area or to adjustments within lands or waters that are already set aside in the HCP's operating conservation program.

Without the consent of the permittee, additional conservation and mitigation measures shall not involve the commitment of additional financial compensation or restrictions on the use of land

or other natural resources otherwise available for development or use under the original terms of the HCP.

6.4 Amendments

6.4.1 Administrative Changes

Administrative changes are alterations in the HCP that do not affect the scope of the HCP's impact and conservation strategy. Administrative changes instead, for example, include correction of spelling errors or minor correction in boundary descriptions. The administrative change process is accomplished through an exchange of letters between the permit holder and USFWS Field Office.

6.4.2 Amendments

Amendments to the HCP and permit are changes that affect the scope of the HCP and conservation strategy, increase the amount of *take*, add new species, and significantly change the boundaries of the HCP. Amendments often require updates to the USFWS's decision documents, including the NEPA document, the biological opinion, and findings and recommendations document. Amendments will often require additional public review and comment.

6.5 Suspension/Revocation

USFWS may suspend or revoke their respective permits if a permittee fails to implement the HCP in accordance with the terms and conditions of the permits or if suspension or revocation is otherwise required by law. Suspension or revocation of the Section 10(a)(1)(B) permit, in whole or in part, by USFWS shall be in accordance with 50 CFR 13.27-29, 17.32 (b)(8).

6.6 Renewal of the Section 10(a)(1)(B) Permit

Upon expiration, the Section 10(a)(1)(B) permit may be renewed without the issuance of a new permit, provided that the permit is renewable, and that biological circumstances and other pertinent factors affecting covered species are not significantly different than those described in the original HCP. To renew the permit, Consumers Energy shall submit to USFWS, in writing:

- A request to renew the permit; reference to the original permit number;
- Certification that all statements and information provided in the original HCP and permit application, together with any approved HCP amendments, are still true and correct, and inclusion of a list of changes'
- A description of any *take* that has occurred under the existing permit; and
- A description of any portion of the project still to be completed, if applicable, or what activities under the original permit the renewal is intended to cover.

If USFWS concurs with the information provided in the request, it shall renew the permit consistent with permit renewal procedures required by Federal regulation (50 CFR 13.22). If CE files a renewal request and the request is on file with the issuing USFWS office at least 30 days prior to the permit's expiration, the permit shall remain valid while the renewal is being processed, provided the existing permit is renewable. However, CE may not *take* listed species beyond the quantity authorized by the original permit or change the scope of the HCP. If CE fails to file a renewal

request within 30 days prior to permit expiration, the permit shall become invalid upon expiration. CE does not anticipate the need for permit renewal.

7.0 Funding

Consumers Energy has allocated funding to cover the expenses associated with pre-construction inventory and assessment, as well as construction phase BMP implementation including construction wildlife clearance work. The in-lieu-fee mitigation will be made at the time the incidental *take* permit is issued. Site restoration and monitoring will be accomplished by existing subcontractors to CE, who will be paid directly by CE. HCP funding will be assured via escrow, a letter of credit, a performance bond, an annual appropriation, a certificate of deposit, or financial test and corporate guarantee depending on which measure both meets CE and FWS. This will be finalized prior to completion of the HCP and permit issuance.

8.0 Alternatives

8.1 Alternative #1: No Action Alternative

The No Action Alternative means that an HCP and incidental *take* permit would not be issued. This also means current conditions and activities that will not cause *take* of federally listed species could continue. However, the implementation of the Project requires the complete replacement of the pipeline throughout its 55.8-mile span. This alternative would thereby not allow the Project to proceed.

The current Mid-Michigan pipeline is considered to be a high-risk natural gas pipeline that has previously failed in certain locations. The No Action alternative is not a viable option. The pipeline cannot maintain long-term operations without continued events of varying threat to the infrastructure and community. The replacement of the pipeline will ensure the safe and effective transportation of natural gas throughout the state.

8.2 Alternative #2: No BMP Alternative

The No BMP Alternative means that no additional HDD installations or BMP measures would be implemented. The issuance of an incidental *take* permit would still be required.

In the implementation of this HCP, Consumers Energy will complete several BMPs that are not considered to be necessary but are utilized to ensure the proper stewardship of the natural resources within the Project and surrounding area. The No BMP Alternative is not a viable option. The implementation of BMPs will reduce the amount of *take* of federally and state protected herpetofauna species as well as reduce overall impacts to sensitive environmental features.

9.0 Tables

Table 1. Mid-Michigan Pipleline Project Pre-Construction Inventory, BMPs Implementation, and Restoration Monitoring Tentative Timeline				
	Activities	**Location**	**Duration**	**Sampling Effort Frequency**
Pre-Construction Inventory Surveying (2021 and 2022)	**Visual encounter and artificial cover object surveys; deliniation of EMR Target Areas**	Project permit area	EMR active season (April-October)	Each EMR priority Target Area will be surveyed monthly during the active season for a minimum of 40 contact hours to detect species and document spatial distribution
	Annual pre-construction assessment report	Project permit area	Annually submitted by December 31st of 2021 and 2022	-
Impact Minimization and BMPs Implementation Phase 1 (2023) Phase 2 (2024)	**Implement BMPs, including winter vegetation clearing, wildlife barrier fencing, wildlife clearance and site walk-downs**	Nineteen (19) EMR priority Target Area locations within Project permit area	Duration of construction and EMR active season (March-October); winter vegetation clearing during inactive season (November-March)	Typical work duration Monday through Saturday 10-12 hours per day; 2 to 6 HRM staff assigned to EMR priority TA throughout duration of construction
	Annual impact monitoring report	Nineteen (19) EMR priority Target Area locations within Project permit area	Annually submitted by December 31st of 2023 and 2024	-
Restoration Monitoring Phase 1 (2024-2025) Phase 2 (2025-2026)	**Visual encounter and artificial cover object surveys; evaluation of restoration success for EMR**	Nineteen (19) EMR priority Target Area locations within Project permit area	EMR active season (April-October)	Each EMR priority Target Area will be surveyed monthly during the active season for a minimum of 40 contact hours to detect species and document spatial distribution
	Annual restoration monitoring report	Nineteen (19) EMR priority Target Area locations within Project permit area	Annually submitted by December 31st of 2025 and 2026	-

Table 1. The Mid-Michigan Pipeline Project tentative timeline including approximate dates for pre-construction inventory, active construction best management practices (BMPs) implementation, and post-construction restoration monitoring.

Table 2. Mid-Michigan Pipeline Project Eastern Massasauga Rattlesnake Target Areas			
Target Area	**EMR Priority**	**HDD**	**USFWS Tier I and/or II Habitat**
14	Moderate	-	**-**
15	Moderate	-	**-**
16	High	X	**-**
17	Moderate	-	**-**
25	Moderate	-	**Tier 2**
35	Moderate	-	**-**
55	Moderate	-	**-**
57	Moderate	X	**-**
65	Moderate	-	**Tier 2**
70	Moderate	-	**Tier 1**
73	Moderate	-	**Tier 1**
79	High	X	**Tier 1**
80	High	X	**Tier 1 & II**
81	High	X	**Tier 1**
83	Moderate	-	**-**
84	High	X	**Tier 1 & II**
88	High	-	**Tier 2**
92	Moderate	-	**Tier 2**
95	Moderate	-	**-**

Table 2. High and moderate priority Eastern Massasauga Rattlesnake Target Areas, horizontal directional drilling (HDD) designations if utilized, and United States Fish and Wildlife Service (USFWS) Tier I and II EMR habitat presence within the Target Area.

Table 3. Mid-Michigan Pipeline Project Temporary Impacts to Eastern Massasauga Rattlesnake Habitat				
Target Area	**EMR Priority**	**Habitat within HDD Path (Acres)**	**Habitat within Workspace Area (Acres)**	**Habitat Impacted (Acres)**
14	Moderate	-	2.71	**2.71**
15	Moderate	-	0.32	**0.32**
16	High	0.60	0.00	**0.00**
17	Moderate	-	2.02	**2.02**
25	Moderate	-	1.55	**1.55**
35	Moderate	-	7.55	**7.55**
55	Moderate	-	2.70	**2.70**
57	Moderate	0.61	0.93	**0.93**
65	Moderate	-	2.28	**2.28**
70	Moderate	-	1.53	**1.53**
73	Moderate	-	3.50	**3.50**
79	High	0.43	0.29	**0.29**
80	High	0.66	0.00	**0.00**
81	High	0.91	0.92	**0.92**
83	Moderate	-	2.56	**2.56**
84	High	1.18	0.93	**0.93**
88	High	-	4.69	**4.69**
92	Moderate	-	4.78	**4.78**
95	Moderate	-	4.64	**4.64**
Total Moderate Priority Habitat Impacted				**37.07**
Total High Priority Habitat Impacted				**6.83**
Total Habitat Impacted				**43.90**
*EMR habitat temporarily impacted for approximately 1 month to 6 months or one full growing season				

Table 3. Area of Eastern Massasauga Rattlesnake habitat temporarily impacted by the activities of the Mid-Michigan Pipeline Project.

Table 4. Threats to the Eastern Massasauga Rattlesnake and Evaluation of Project and Cumulative Impacts				
General Threat	**Specific Threat**	**Explanation**	**Project Impact**	**Cumulative Impacts**
Habitat Alteration or Destruction	Habitat Loss	Conversion of wetland/upland habitat to development, agriculture, etc.	No long term loss of potential habitat; affected habitat will be restored	Not significant
	Habitat Degradation	Reduction of suitability of habitat for Eastern Massasauga Rattlesnake	Temporary, localized impact; altered vegetation composition and structure <1 year post-construction	Not significant
	Habitat Fragmentation	Creation of smaller and isolated patches of habitat from larger, contiguous habitat	Temporary, localized impact of wildlife barrier fence placement	Not significant
	Hibernacula Habitat Impact	Destruction of overwintering habitat (crayfish burrows)	No overwintering habitat present within Project area	Not significant
	Eastern Massasauga Rattlesnake Impact	Direct mortality of individuals	Potential to kill or injure EMR during construction activities; minimal *take* (<2 individuals)	Not anticipated to be significant
Invasive Species	Woody/Emergent Invasive Species (e.g., glossy buckthorn, *Phragmite*)	Decrease habitat functionality and value to Eastern Massasauga Rattlesnake	Invasive species elimination and control interim and post-restoration	Not significant
Land-management Activities	Prescribed burns and vegetation mowing	Direct mortality of individuals	Winter vegetation clearing during EMR dormancy will greatly reduce risk	Not significant
Predators and Persecution	Increase threats from predators or persecution	Habitat fragmentation may increase vulnerability to predation and persecution by humans	Temporary, localized impact of wildlife barrier fence placement	Not significant
Disease	Increase vectors for spread of pathogens (e.g., Snake Fungal Disease)	Disease transmission and infection either directly or indirectly causing mortality	De-contamination and equipment cleaning protocols will greatly minimize risk	Not significant

Table 4. Threats to Eastern Massasauga Rattlesnake populations and the impacts of the Mid-Michigan Pipeline Project and their cumulative significance to the Eastern Massasauga Rattlesnake.

Table 5. Eastern Massasauga Rattlesnake Target Area Horizontal Directional Drilling Locations					
Target Area	**Habitat Type**	**EMR Probablity**	**Length x Width**	**Acres**	**Dwg #**
16	Wetland 67 & Steams 15 & 16 (Vermillion Creek)	**High**	1876 ft x 30 ft	1.3	HDD-015
57	Wetland 166 & Stream 43 (Tributary to McMahon Drain)	**Moderate**	1437 ft x 30 ft	1	HDD-008
79	Wetland 219	**High**	1387 ft x 30 ft	0.95	HDD-005
80	Wetland 222 (High Quality) & Stream 64 (Tributary to South Lake)	**High**	1419 ft x 30 ft	0.98	HDD-004
81	Wetlands 225 (High Quality) & 226 (FEN)	**High**	1465 ft x 30 ft	1	HDD-003
84	Wetland 288 & Stream 67 (Tributary to Clarks Lake)	**High**	2133 ft x 30 ft	1.5	HDD-002

Table 5. Horizontal directional drilling (HDD) crossing locations of all Eastern Massasauga Rattlesnake priority Target Areas (See Appendix E: Horizontal Directional Drilling Target Area Locations and Profile).

Table 6. Mid-Michigan Pipeline Project Best Management Practices	
Best Management Practice	**Biological Goal**
Avoidance	
Wetland Avoidance	Goal 1: Limit impacts to EMR and potential habitat
Winter Vegetation Clearing	Goal 1: Limit impacts to EMR and potential habitat
Winter Burrow Avoidance	Goal 1: Limit impacts to EMR and potential habitat
Minimization	
Reduction of Wetland Impacts	Goal 1: Limit impacts to EMR and potential habitat
Horizontal Directional Drilling	Goal 1: Limit impacts to EMR and potential habitat
Wildlife Barrier Fencing	Goal 1: Limit impacts to EMR and potential habitat
Wildlife Clearance and Site Walk-downs	Goal 1: Limit impacts to EMR and potential habitat
Artificial Cover Objects	Goal 1: Limit impacts to EMR and potential habitat
EMR Encounters	Goal 1: Limit impacts to EMR and potential habitat
EMR T*ake*	Goal 1: Limit impacts to EMR and potential habitat
EMR Contractor Training	Goal 1: Limit impacts to EMR and potential habitat
EMR Signage	Goal 1: Limit impacts to EMR and potential habitat
Construction Debris and Timber Piles	Goal 1: Limit impacts to EMR and potential habitat
Pipe and Pipe-Cradles	Goal 1: Limit impacts to EMR and potential habitat
Portable Jobsite Toilets	Goal 1: Limit impacts to EMR and potential habitat
Overnight Parking	Goal 1: Limit impacts to EMR and potential habitat
Speed Limit	Goal 1: Limit impacts to EMR and potential habitat
EMR Target Area Equipment Cleaning	Goal 1: Limit impacts to EMR and potential habitat
Site Restoration	Goal 2: Restoration of habitat
Erosion Control Blanket	Goal 2: Restoration of habitat
Monitoring	
Impact Monitoring	Goal 3: Monitor response of EMR
Restoration Monitoring	Goal 3: Monitor response of EMR

Table 6. Best management practices and corresponding biological goals implemented at all Eastern Massasauga Rattlesnake priority Target Areas within the Mid-Michigan Pipeline Project in coordination with the Habitat Conservation Plan.

Table 7. Consumers Energy Funds Estimated for HCP Implementation		
Activity	**Estimated Cost**	**Funding Assurance**
Best Management Practices for Minimization and Avoidance		
Winter Vegetation Clearing	$2,500,000	Included in construction cost to be paid to contractors and suppliers
Winter Burrow Avoidance	$7,500	Included in construction cost to be paid to contractors and suppliers
Horizontal Directional Drilling (EMR Target Areas only)	$7,600,000	Included in construction cost to be paid to contractors and suppliers
Wildlife Barrier Fencing	$3,200,000	Included in construction cost to be paid to contractors and suppliers
Wildlife Clearance and Site Walk-downs	$1,000,000	Included in construction cost to be paid to contractors and suppliers
EMR Contractor Training	$7,500	Included in construction cost to be paid to contractors and suppliers
EMR Signage	$3,500	Included in construction cost to be paid to contractors and suppliers
EMR Target Area Equipment Cleaning	$2,000,000	Included in construction cost to be paid to contractors and suppliers
Total		**$16,318,500**
Inventory and Monitoring		
Pre-Construction Inventory Surveying	$700,000 over two (2) year period	Activity will be conducted by contractors directly paid by CE
Site Restoration (reseeding; invasive species control)	$400,000 over five (5) year period	Activity will be conducted by contractors directly paid by CE
Restoration Monitoring	$150,000 over three (3) year period	Activity will be conducted by contractors directly paid by CE
Total		**$1,250,000**
Mitigation - In-Lieu-Fee		
The Conservation Fund	$50,000	Payment will be made prior to or at the time of issuance of Incidental Take Permit
Leelanua Land Conservancy	$40,000	Payment will be made prior to or at the time of issuance of Incidental Take Permit
Michigan Amphibian and Reptile Conservancy (MARC)	$35,000	Payment will be made prior to or at the time of issuance of Incidental Take Permit
The Stewardship Network	$10,000	Payment will be made prior to or at the time of issuance of Incidental Take Permit
Total		**$135,000**

Table 7. Consumers Energy's estimated funding for the implementation of the Habitat Conservation Plan.

10.0 Figures

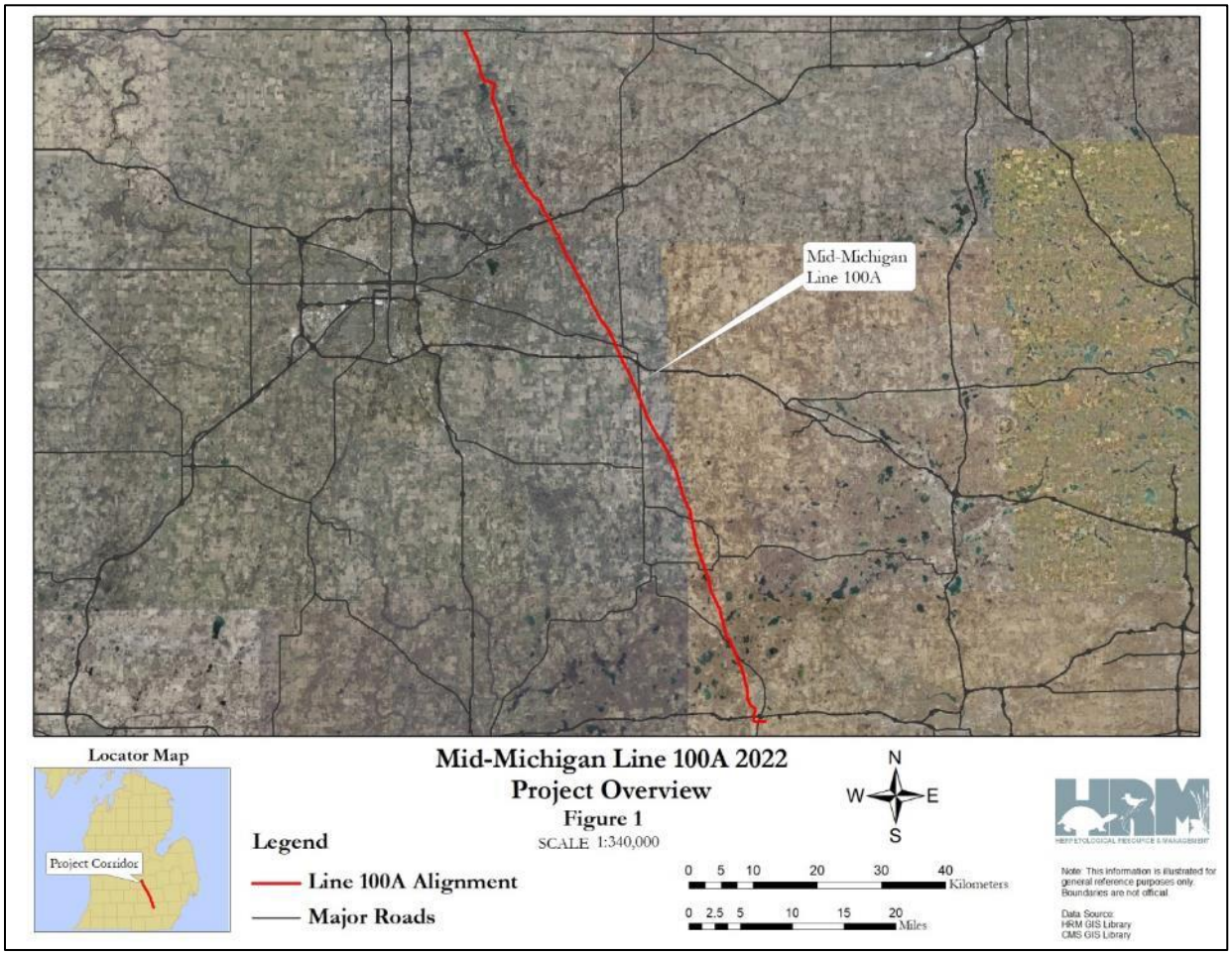

Figure 1. Overview of the Mid-Michigan Line 100A Project area.

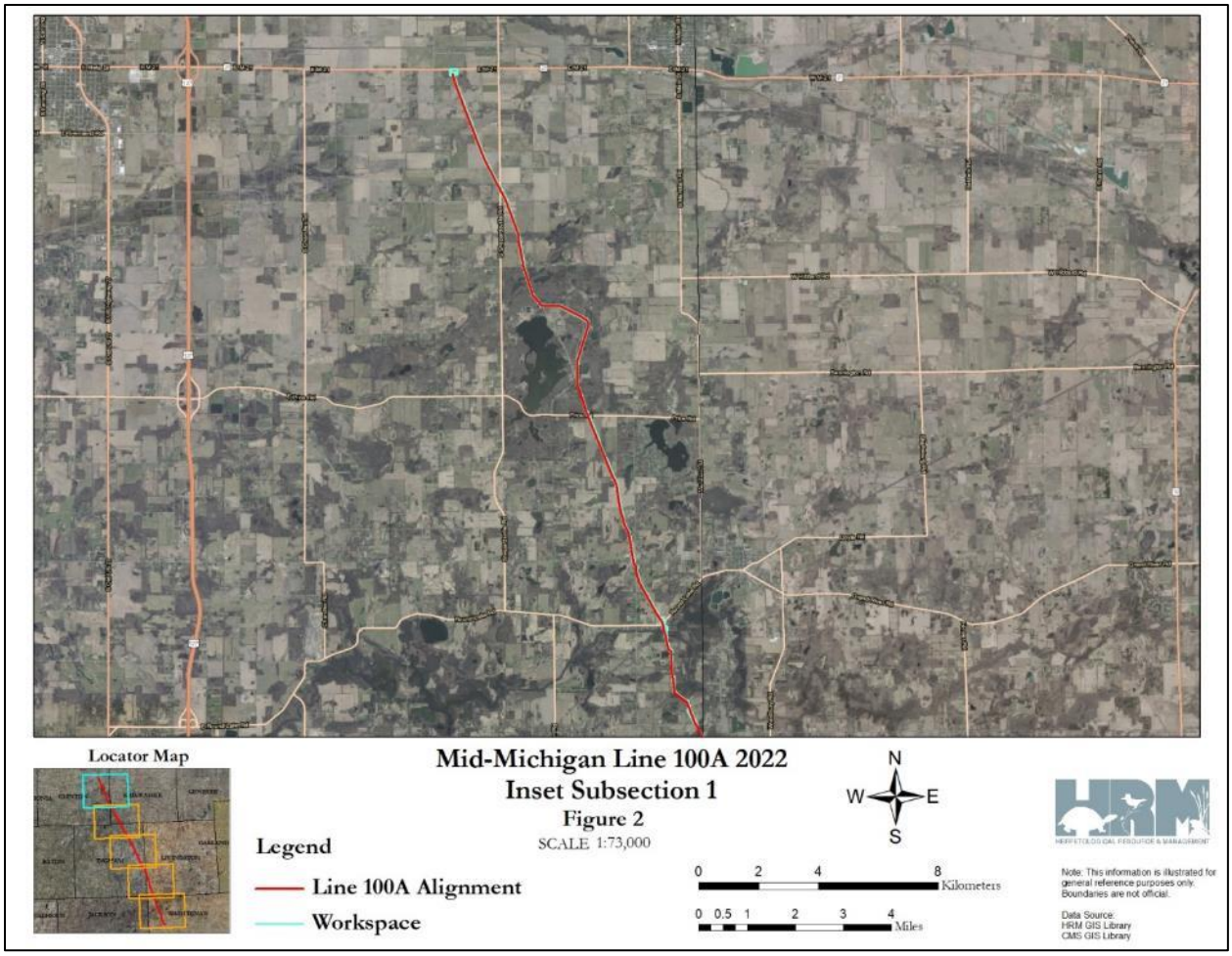

Figure 2. Subsection 1 of the Mid-Michigan Line 100A Project.

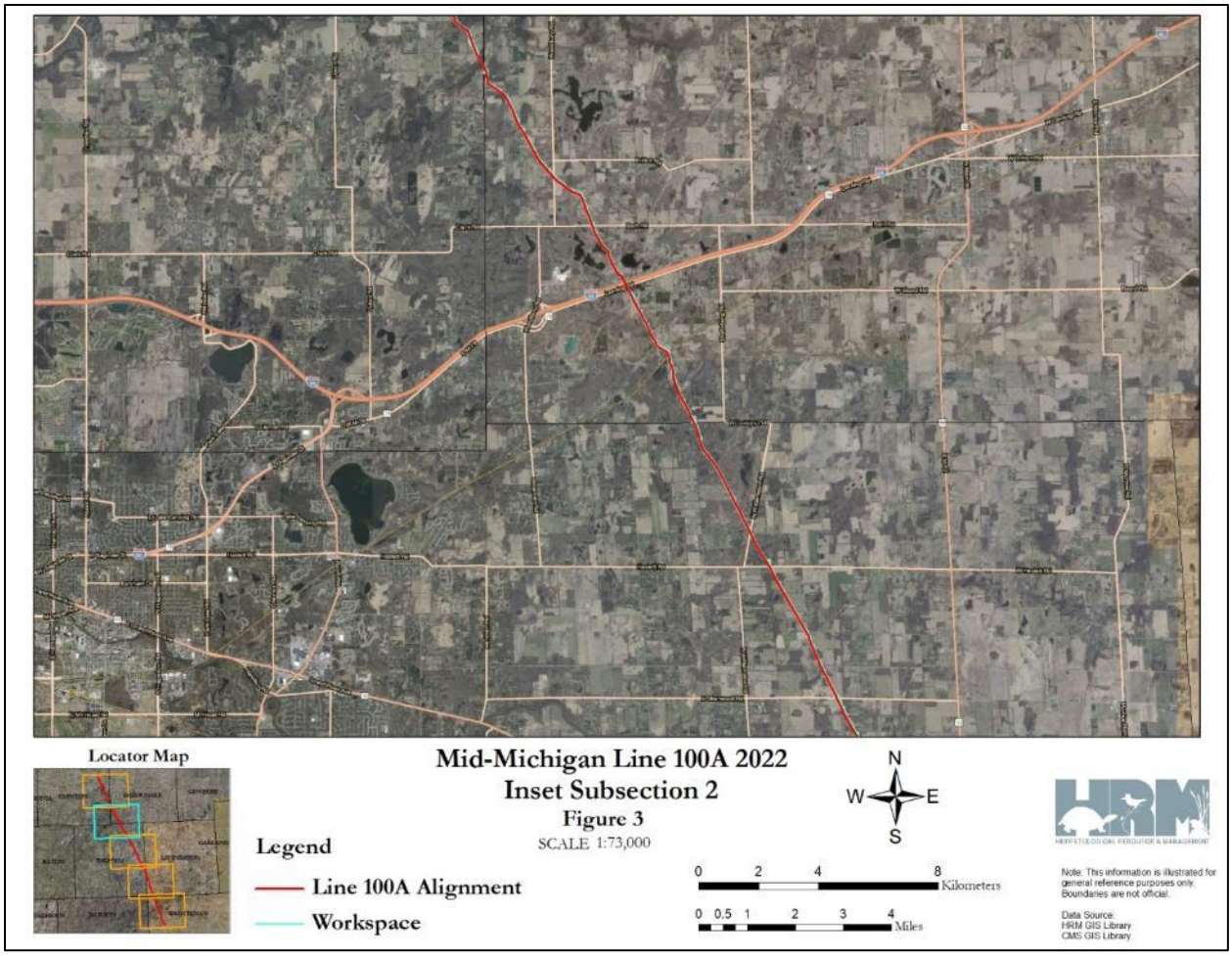

Figure 3. Subsection 2 of the Mid-Michigan Line 100A Project.

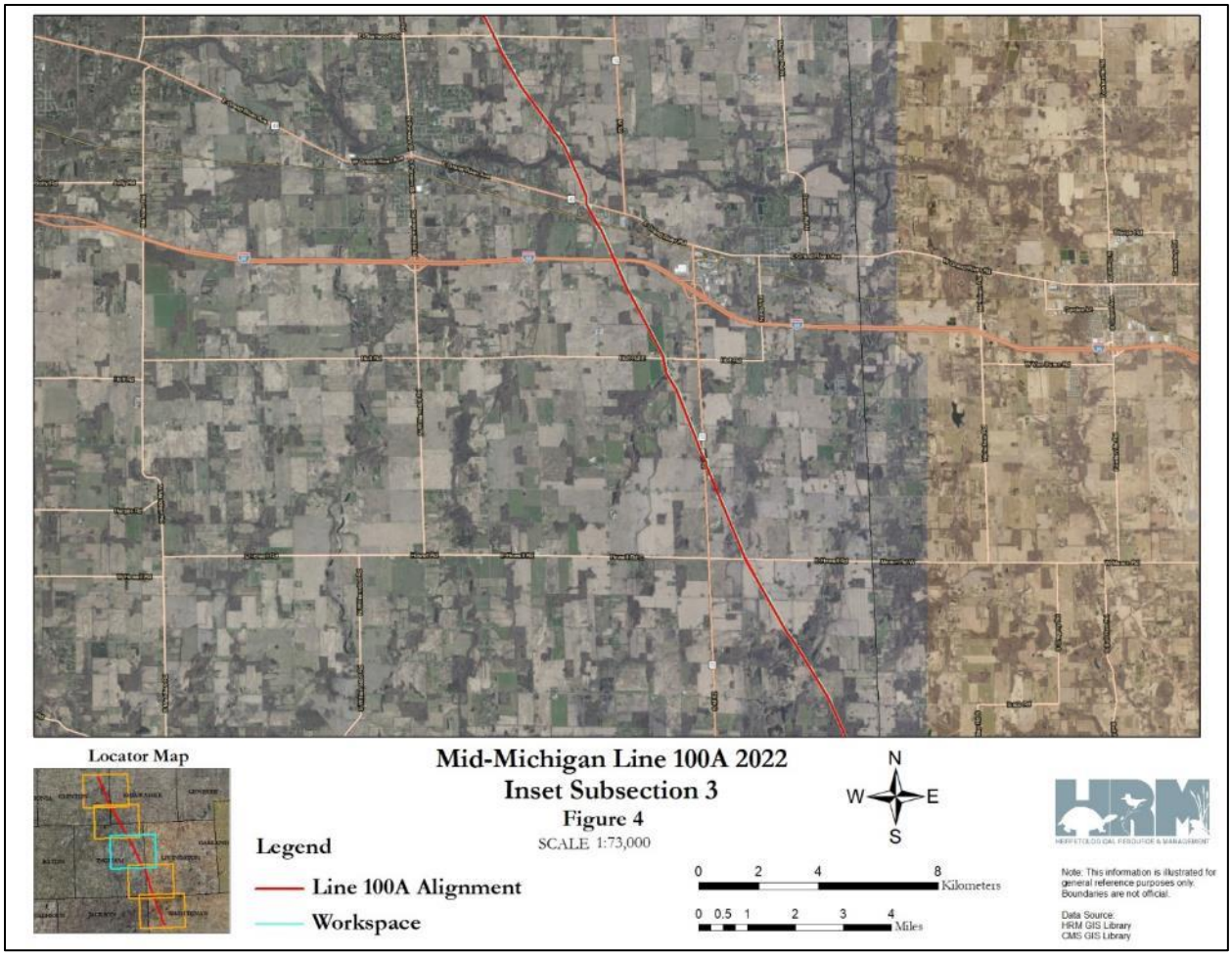

Figure 4. Subsection 3 of the Mid-Michigan Line 100A Project.

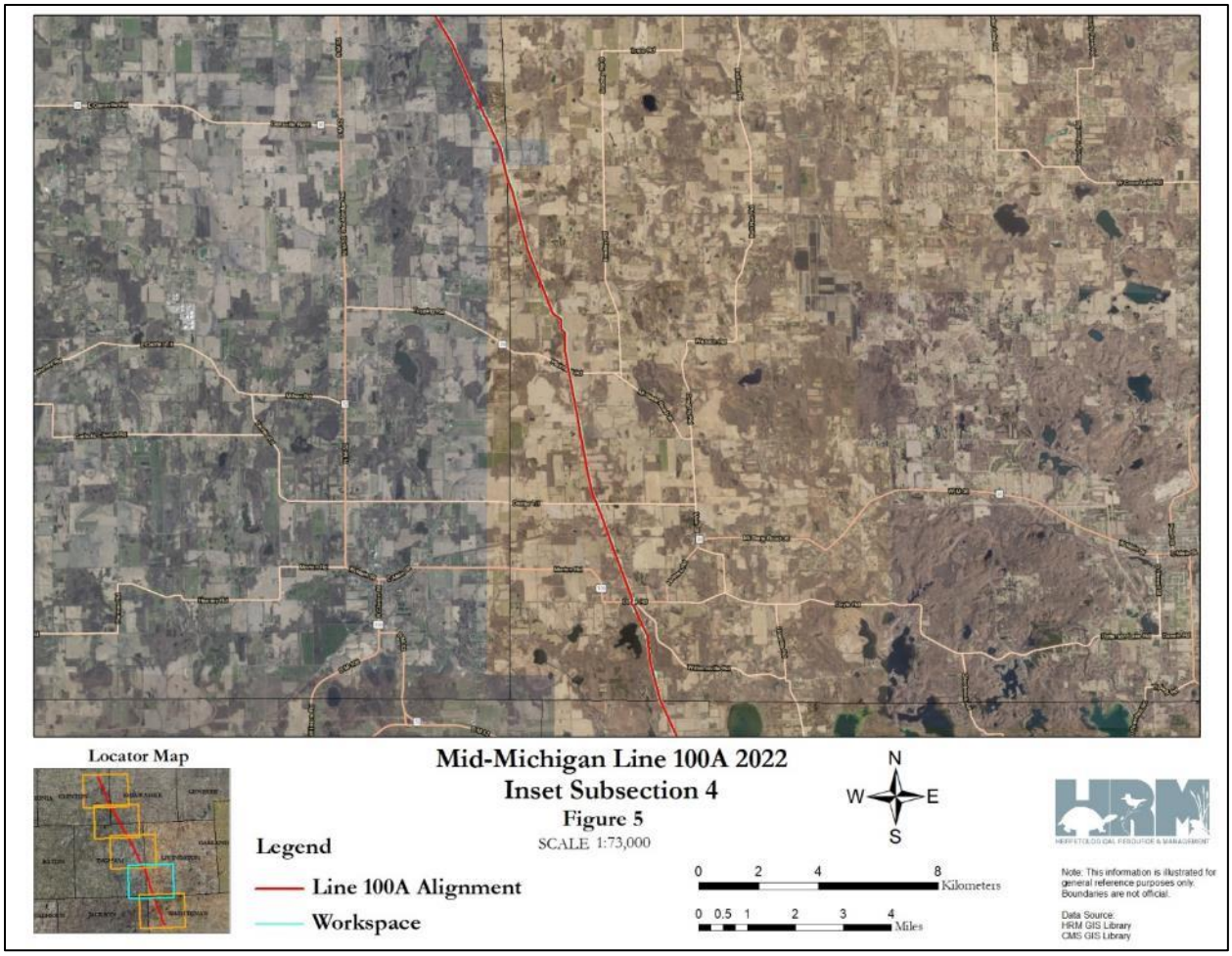

Figure 5. Subsection 4 of the Mid-Michigan Line 100A Project.

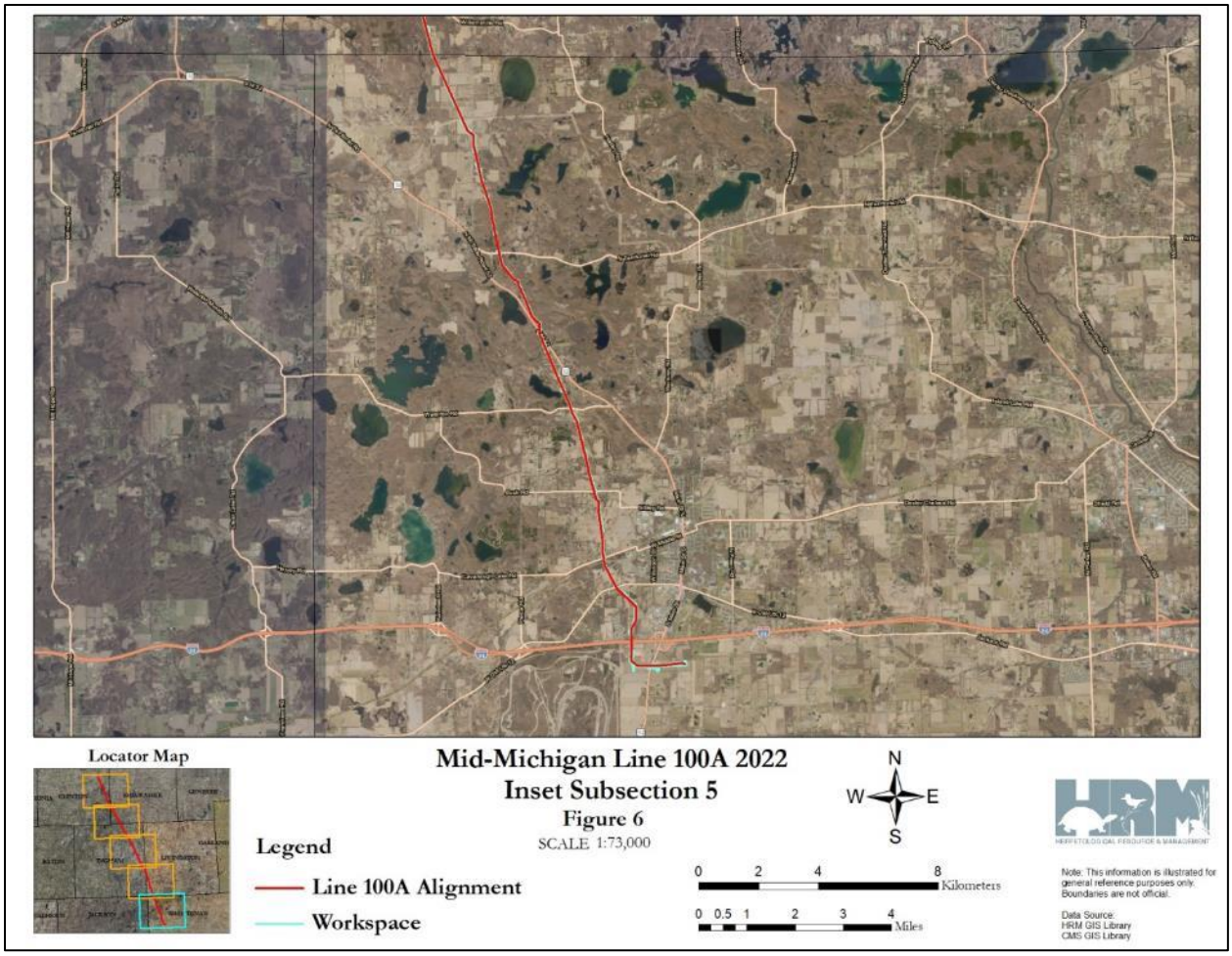

Figure 6. Subsection 5 of the Mid-Michigan Line 100A Project.

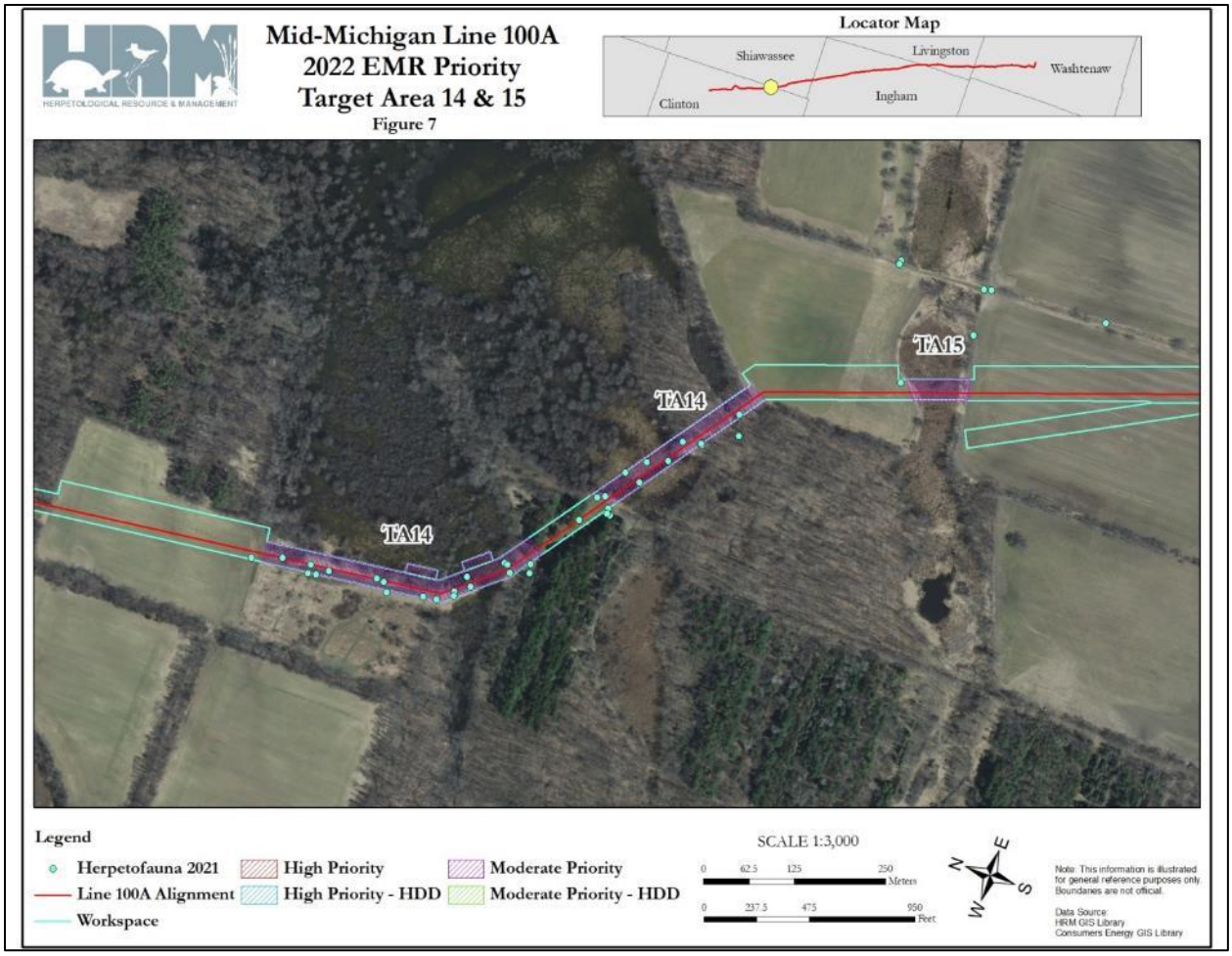

Figure 7. EMR priority Target Areas 14 and 15 within the Mid-Michigan Line 100A pipeline corridor.

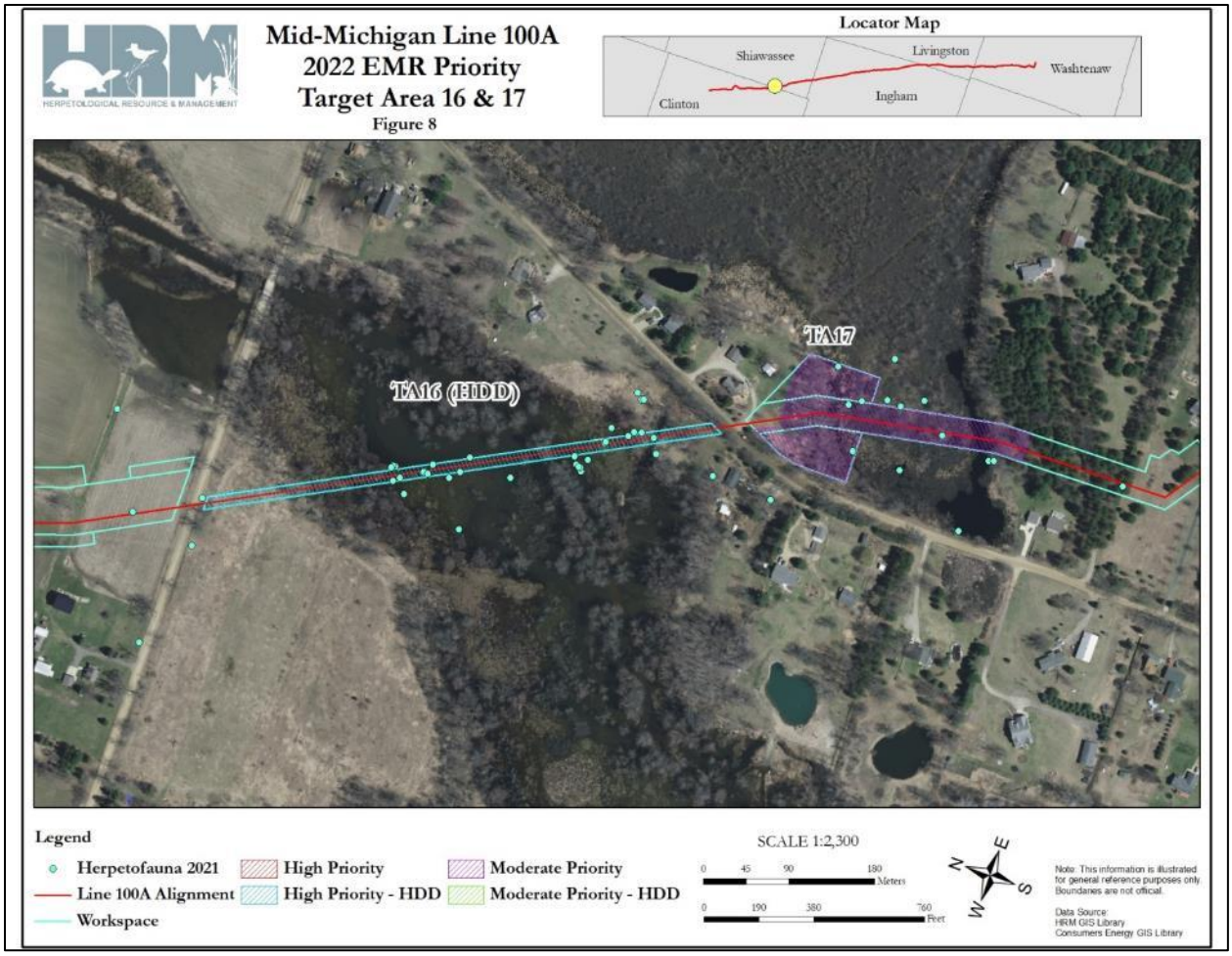

Figure 8. EMR priority Target Areas 16 and 17 within the Mid-Michigan Line 100A pipeline corridor.

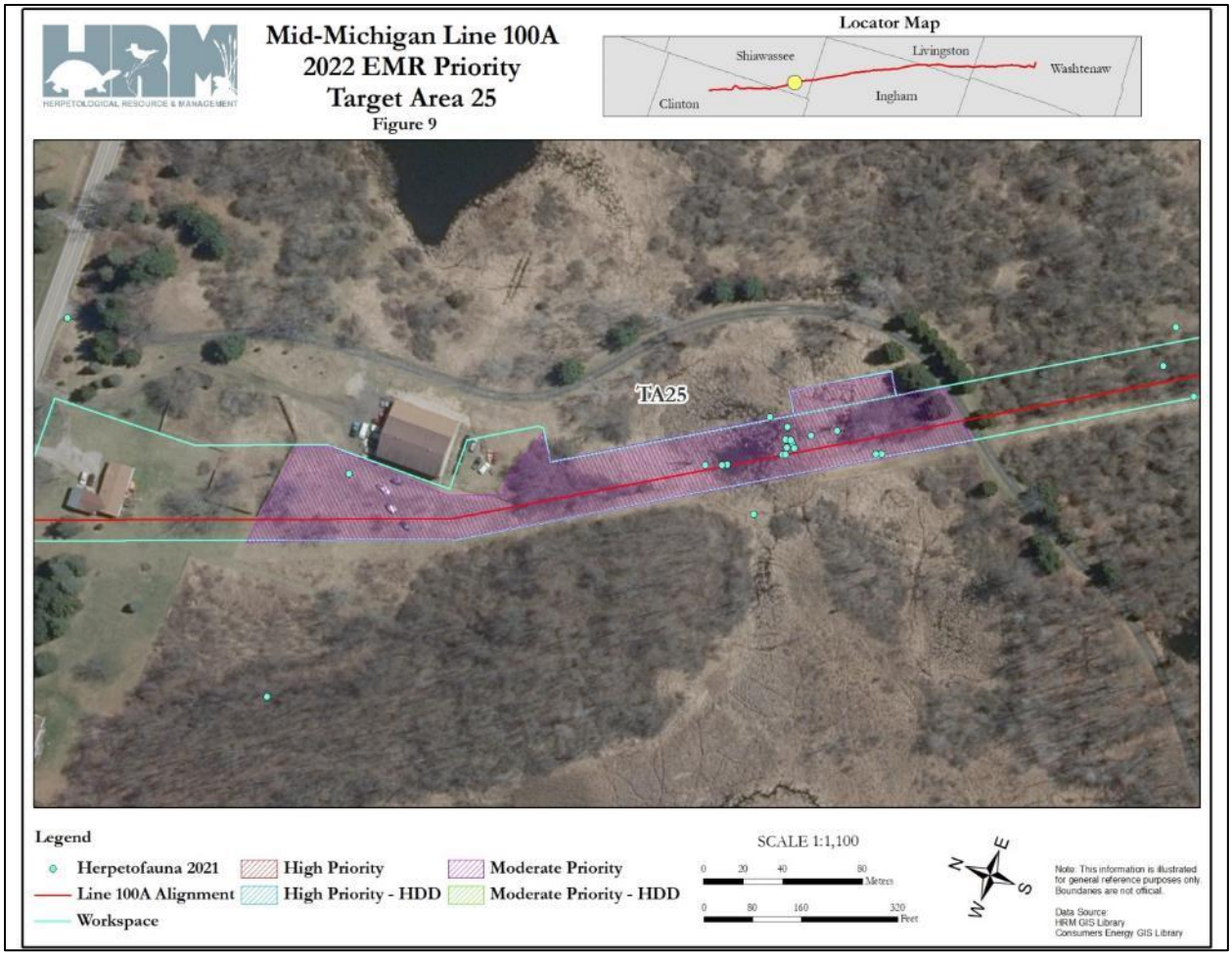

Figure 9. EMR priority Target Area 25 within the Mid-Michigan Line 100A pipeline corridor.

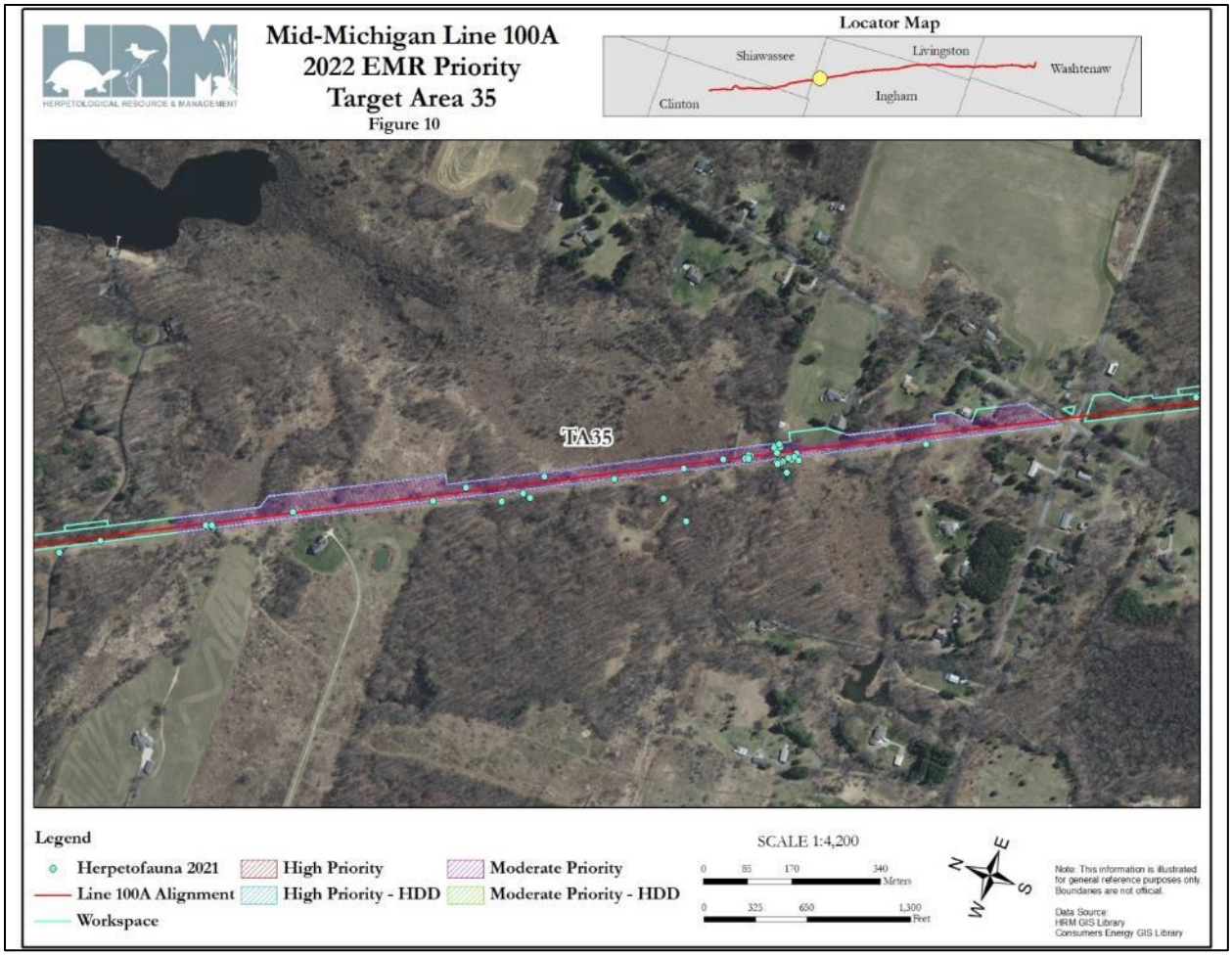

Figure 10. EMR priority Target Area 35 within the Mid-Michigan Line 100A pipeline corridor.

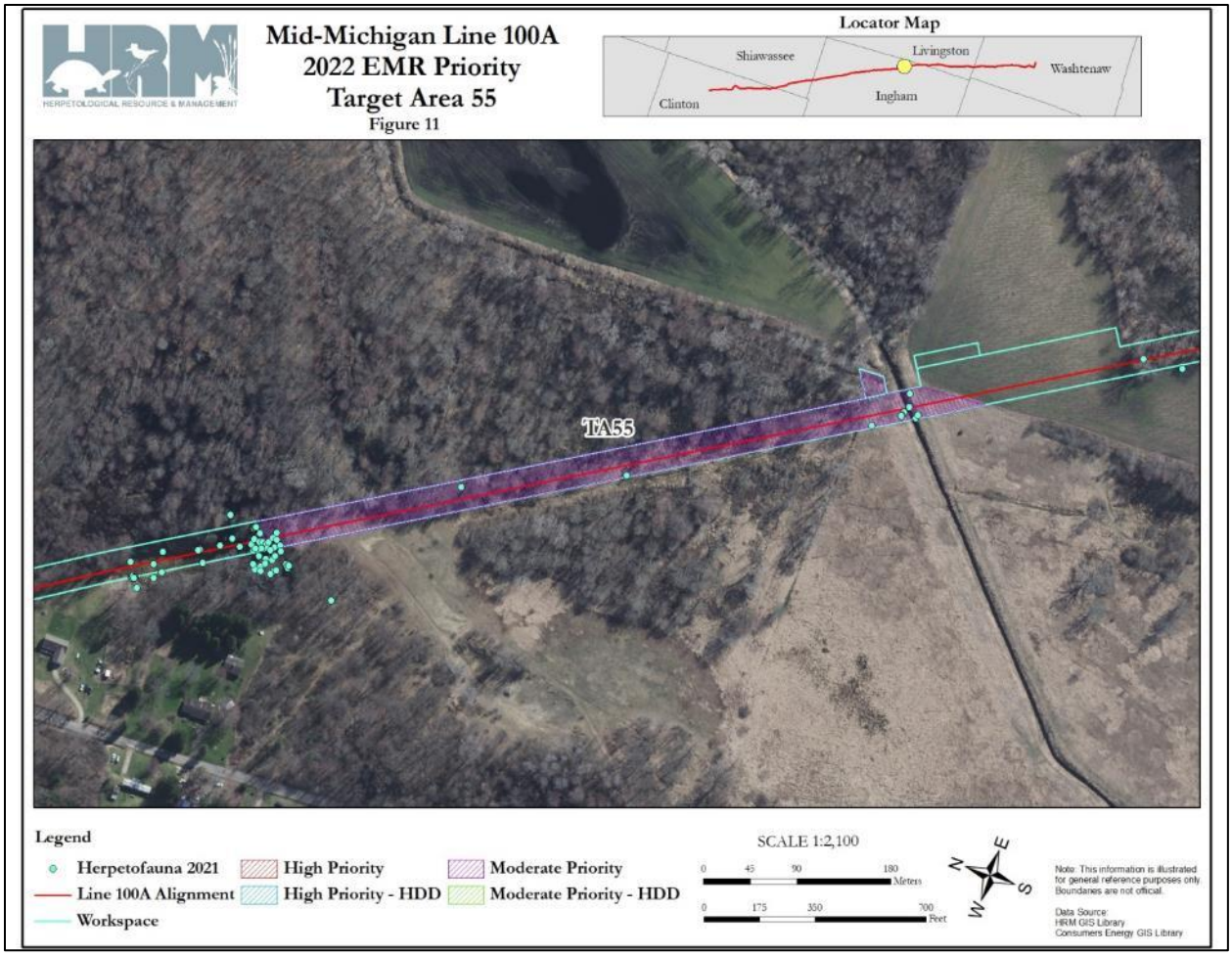

Figure 11. EMR priority Target Area 55 within the Mid-Michigan Line 100A pipeline corridor.

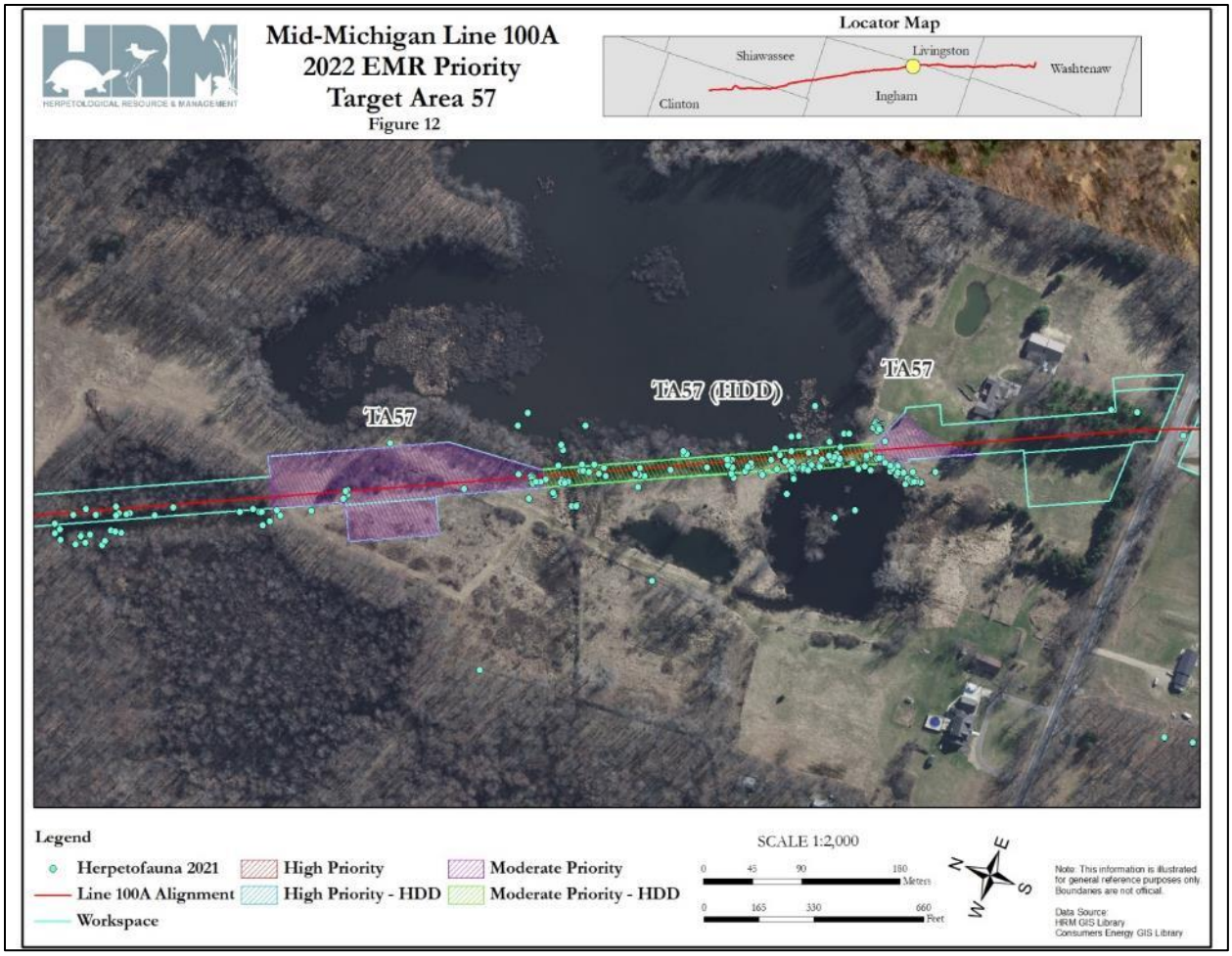

Figure 12. EMR priority Target Area 57 within the Mid-Michigan Line 100A pipeline corridor.

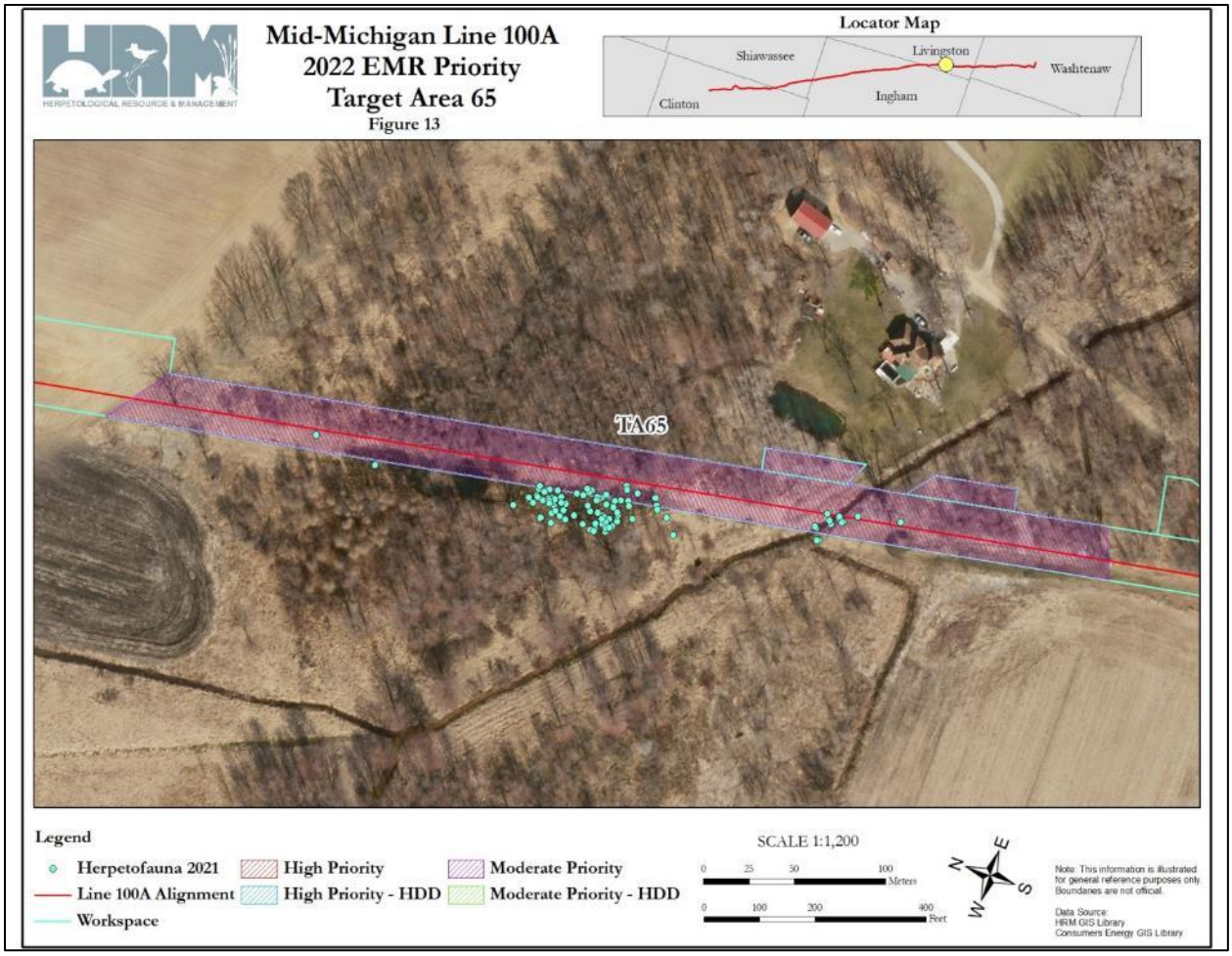

Figure 13. EMR priority Target Area 65 within the Mid-Michigan Line 100A pipeline corridor.

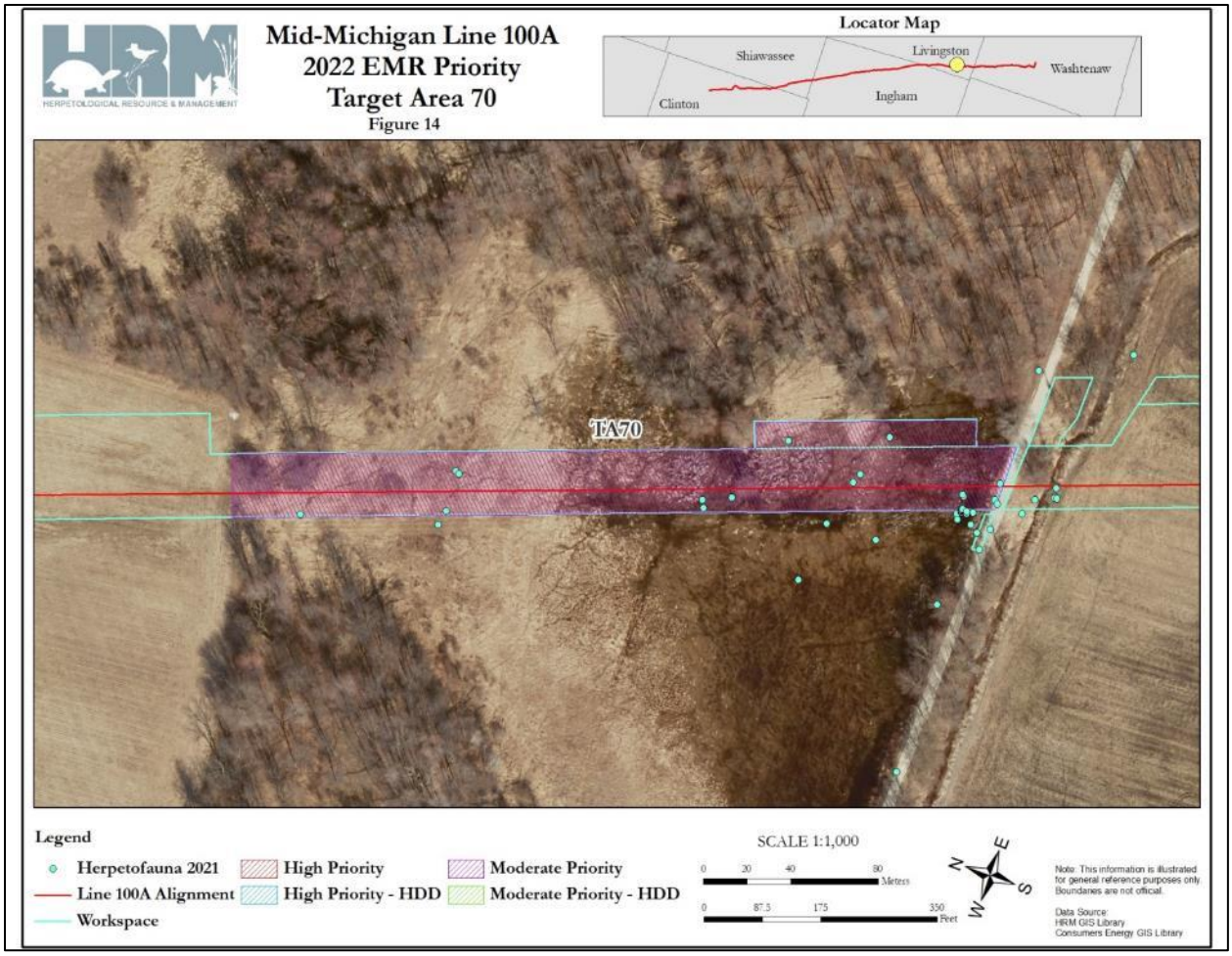

Figure 14. EMR priority Target Area 70 within the Mid-Michigan Line 100A pipeline corridor.

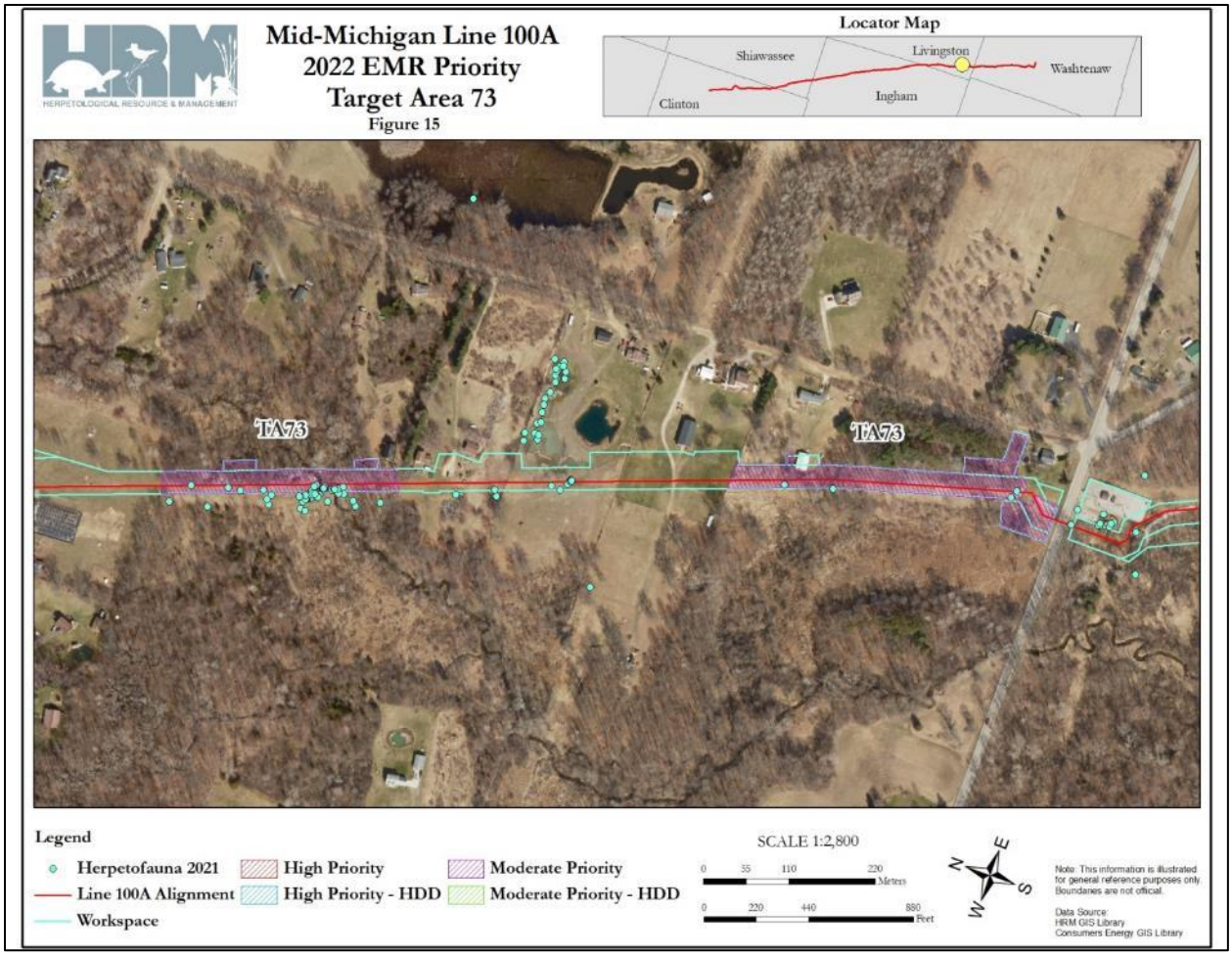

Figure 15. EMR priority Target Area 73 within the Mid-Michigan Line 100A pipeline corridor.

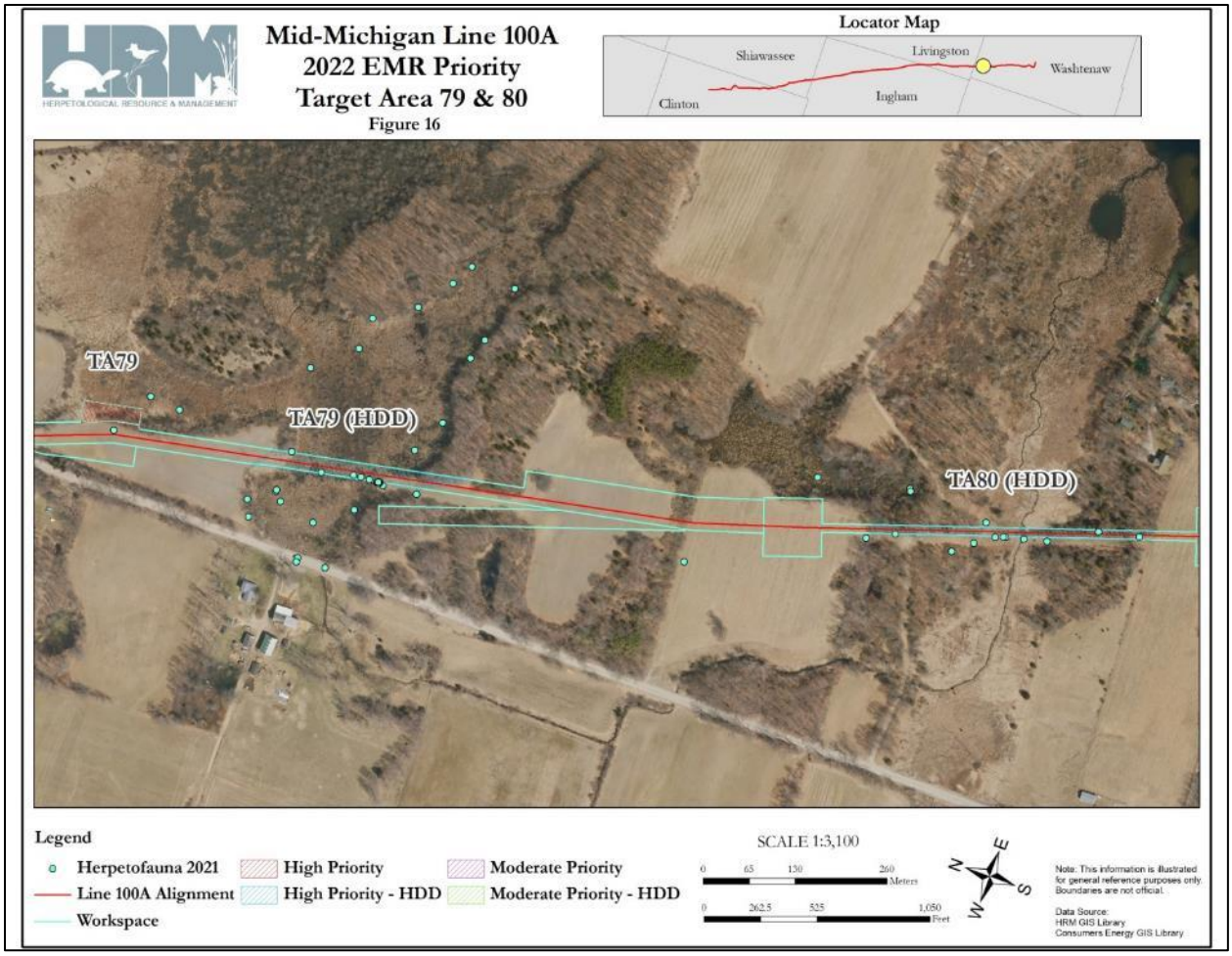

Figure 16. EMR priority Target Areas 79 and 80 within the Mid-Michigan Line 100A pipeline corridor.

Figure 17. EMR priority Target Area 81 within the Mid-Michigan Line 100A pipeline corridor.

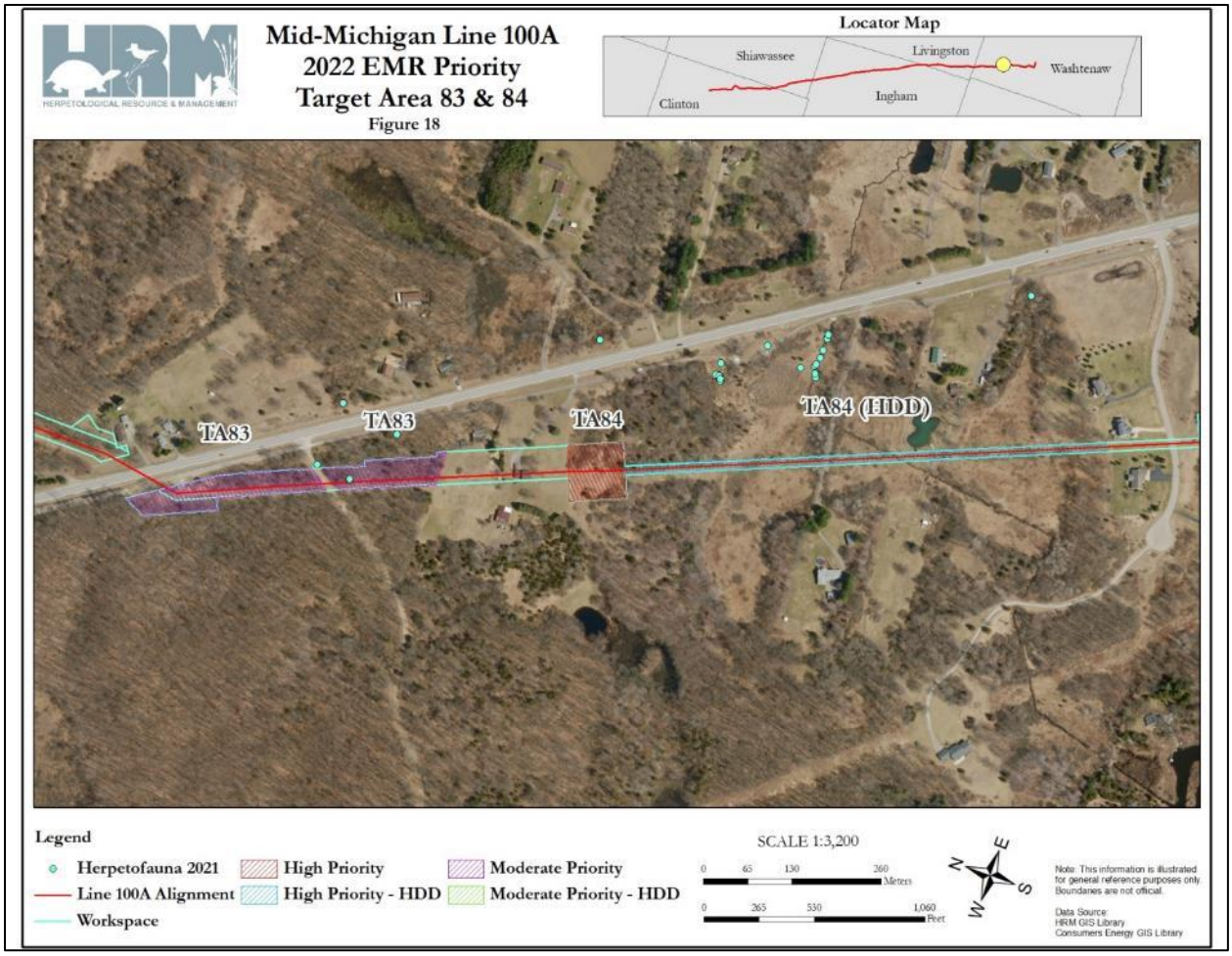

Figure 18. EMR priority Target Areas 83 and 84 within the Mid-Michigan Line 100A pipeline corridor.

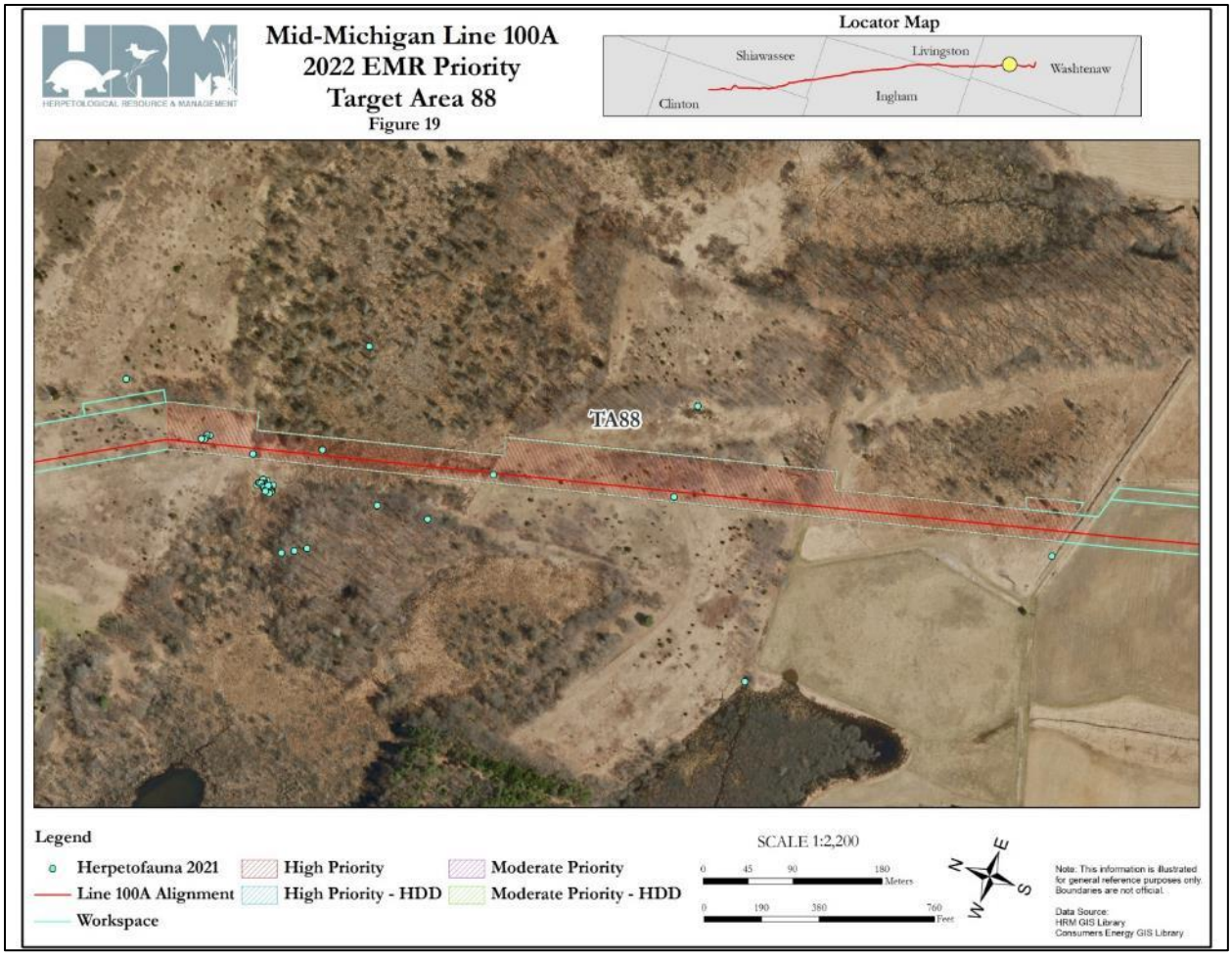

Figure 19. EMR priority Target Area 88 within the Mid-Michigan Line 100A pipeline corridor.

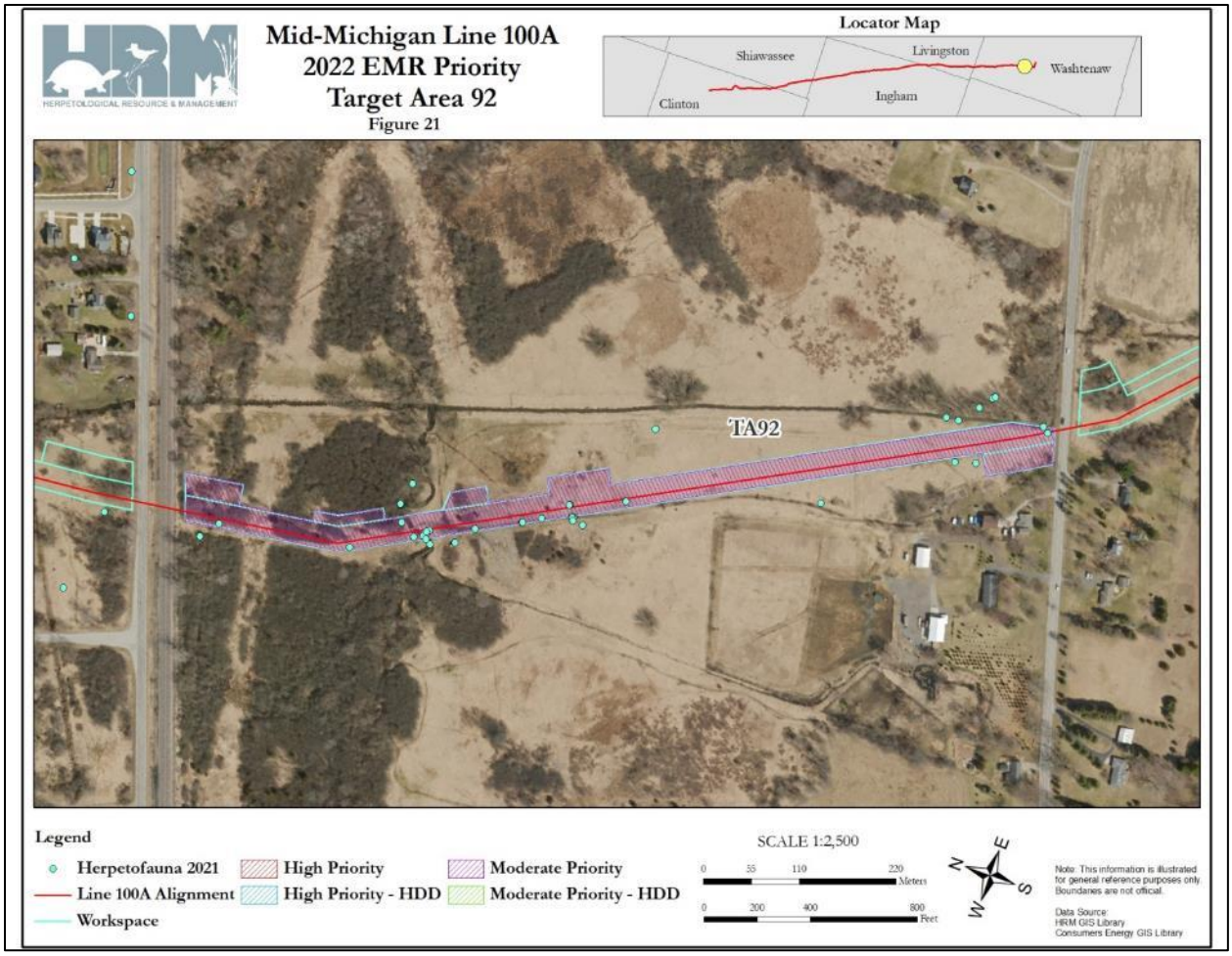

Figure 20. EMR priority Target Area 92 within the Mid-Michigan Line 100A pipeline corridor.

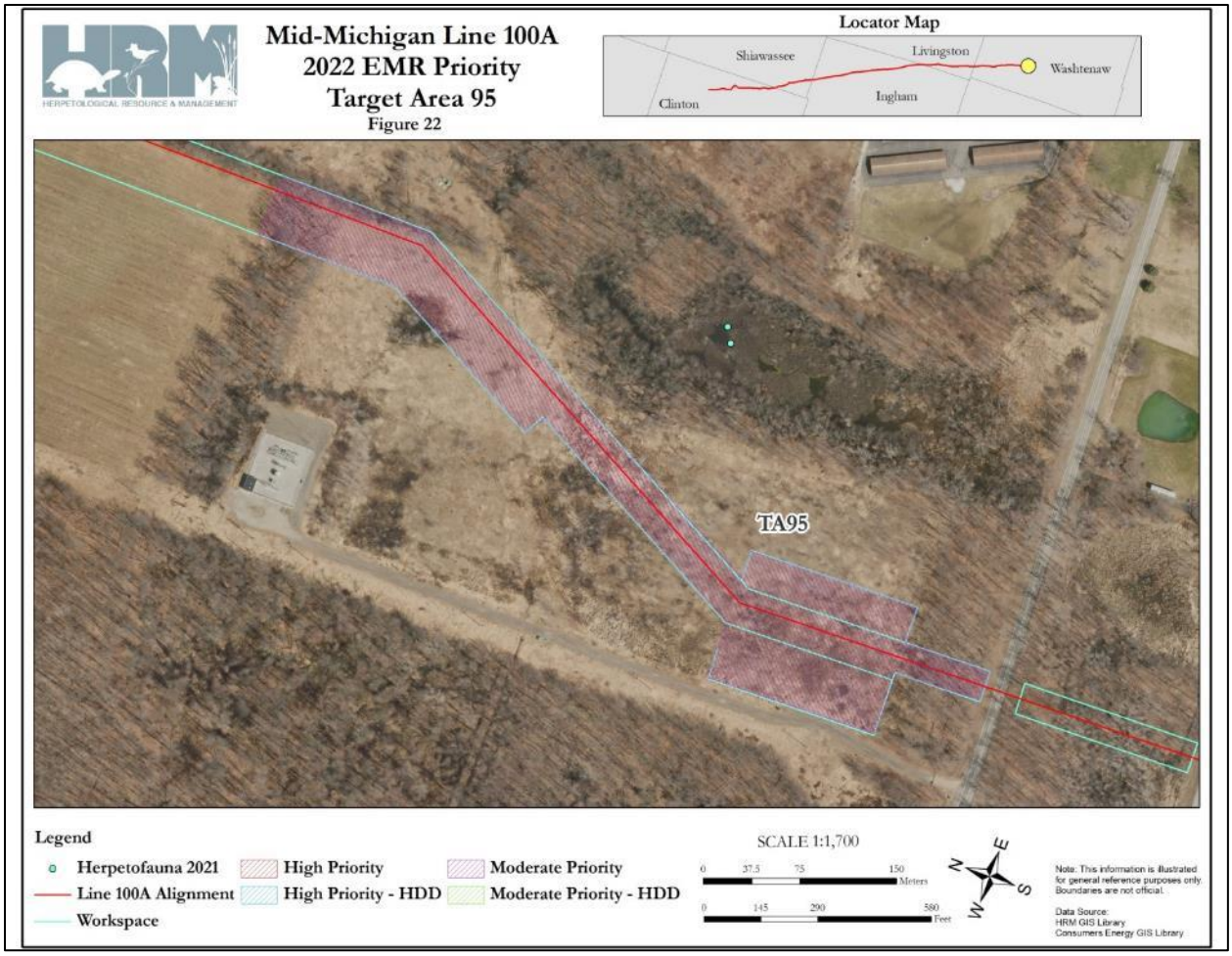

Figure 21. EMR priority Target Area 95 within the Mid-Michigan Line 100A pipeline corridor.

11.0 Photos

Photo 1. Habitat located in Target Area (TA) 23 identified as potentially supporting the Eastern Massasauga Rattlesnake (EMR).

Photo 2. Habitat present within TA 25 identified as potentially supporting EMR and other rare herpetofauna.

Photo 3. Habitat in TA 31 identified as potentially supporting the Eastern Massasauga Rattlesnake.

Photo 4. Potential EMR habitat located within TA 35 along the Mid-Michigan Project corridor.

Photo 5. Sedge dominated wetland habitat potentially supporting EMR located within TA 47.

Photo 6. Wetland mosaic habitat associated with TA 55 identified as potential location supporting the Eastern Massasauga Rattlesnake.

Photo 7. High quality fen complex associated with high EMR priority TA 81. This habitat likely supports several rare species including EMR.

Photo 8. Emergent marsh and wet meadow complex located within high EMR priority TA 88.

Photo 9. Representative photo of an Eastern Massasauga Rattlesnake. The cryptic patterning and behavior as well as its venomous nature makes the species challenging to successfully photograph.

Photo 10. Crayfish chimney observed within TA 81 during pre-construction inventory surveys along Project corridor. These structures are often used as overwintering sites by EMR.

Photo 11. HRM checking a deployed artificial cover object (ACO) within the Line 100A Project corridor.

Photo 12. An ACO deployed on the Line 100A corridor to improve the detectability of EMR and other herpetofauna.

Photo 13. Example of an Eastern Massasauga Rattlesnake detected through the usage of an ACO in a similar project within southern Lower Michigan.

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Appendix A: Assessment of Habitat for the Endangered Indiana Bat

Assessment of Habitat for the Endangered Indiana Bat, along Phase 1 of a Proposed Replacement for a Natural Gas Pipeline, in Washtenaw, Livingston, and Ingham Counties, Michigan

A Report to
Consumers Energy

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Summary

Consumers Energy is replacing about 55 miles of an ageing natural gas pipeline (Line 100A) in southern Michigan in two phases, with Phase 1 involving about 29.9 miles of corridor between Chelsea, in Washtenaw County, and Williamston in Ingham County Michigan. Michigan. Most construction will involve expansion of the western side of existing rights-of-way, as opposed to establishing an entirely new corridor. In September–October 2021, I determined the suitability of the habitat for the endangered Indiana bat along the entire route, through field surveys and examination of aerial photos

Habitat adjacent to the proposed pipeline varied from poor-quality agricultural fields (24%) in the north, to medium-quality land on the suburban frings (16%) in the south, to very good habitat with a plethora of woodlands and ponds (60%) throughout the central portion of the project. Overall, I recorded 54 trees within the construction corridor that possibly could be used as roosts by Indiana bats. Most were elms (31%), oaks (19%), poplars (11%), and maples (9%). Average (± SE) diameter of the potential roosts was 13.9 ± 0.8 inches, and 14 of these trees (25%) equaled or exceeded 18 inches in diameter, which is the average size of trees used by female Indiana bats. Seventy-four percent of the potential roosts were low quality, 24% were classified as medium quality, and only one tree (2%) was considered high quality for use as a maternity roost. Almost all potential roosts were located in the central section of the route, which was the most heavily wooded.

Removal of the 54 trees along the proposed construction corridor is not likely to have an adverse effect on Indiana bats, because many more trees suitable for roosting likely are available on the eastern side of the corridor and in the numerous interconnected patches of forest that exist throughout the central 60% of the proposed route. However, I recommend that cutting trees and other noise-generating activities associated with construction of the pipeline be limited to winter (1 November–31 March) to avoid direct take or disturbance to bats roosting nearby. If activities must be performed at other times of year, I recommend a summer survey in the better-quality habitat to document presence/absence of Indiana bats before proceeding.

Introduction

Background

The Indiana bat is a small 6–10 gram, insectivorous bat that ranges across much of the eastern United States. This species hibernates in a limited number of mines and caves, primarily in the karst regions of Missouri, Kentucky, and Indiana (USFWS, 2007). Some hibernacula contain up to 100,000 Indiana bats, and at one time, more than 90% of the known population hibernated in just three caves and one mine. Known populations declined drastically during the 1960s, because of disturbance during hibernation and because human alteration of some hibernation sites modified the microclimate (Richter et al., 1993). This lack of suitable hibernacula (critical habitat) and severe declines in size of wintering populations were the reasons that the Indiana bat was placed on the federal list of endangered species in 1967 (Humphrey, 1978; USFWS, 2007). Although the rangewide population stabilized by the early 2000s, the arrival of a fungal disease from Europe, called white-nose syndrome, negated 40-years of conservation efforts, and the population is again in decline (Blehart et al., 2009; Frick et al., 2010; Turner et al., 2012). The disease is now present throughout most of the range of this bat and disease-related declines are estimated between 25 and 84% (Cheng et al. 2021). Indiana bats may face local or regional extirpation within decades and perhaps total extinction over a somewhat longer period because of this introduced disease (Thogmartin et al., 2013).

Biology of the Indiana Bat in Summer

During warm-weather months, male Indiana bats generally are solitary, roosting in trees or perhaps caves on occasion (Carter et al., 2001; Hall, 1962). Female Indiana bats, in contrast, gather in small maternity colonies, usually including less than 100 adults, at sites where they give birth and raise their single young to maturity (Kurta, 2005; Silvis et al., 2016). Indiana bats typically roost underneath the loose bark of dead trees, but sometimes, the bark of living trees, such as shagbark hickories, is used. Maternity colonies occasionally occupy narrow crevices within the trunk of a dead tree, but unlike many other species of bat, Indiana bats do not form maternity colonies in tree

hollows (cavities) that were created by rot or woodpeckers. A colony of Indiana bats may use over 20 roost trees in a single season (Callahan et al., 1997; Carter, 2003; Kurta, 2005; Kurta et al., 1996, 2002; Silvis et al., 2016). However, one or two trees (primary roosts) usually shelter most colony members at any one time, whereas other trees (alternate roosts) are used by a few animals for only a few days at a time, before they return to the primary roost. Although roost trees most often occur in clumps, with different trees only 1 to 100 yards apart, alternate roosts may be separated by a few miles. Preferred landscapes typically are only moderately forested (Silvis et al., 2016).

Types of dead trees that are most frequently used as roosts are ashes, elms, hickories, maples, poplars (including cottonwood), and oaks (Kurta, 2005). Preferred trees are not obstructed by vines or small branches, are in early-to-mid stages of decay so that the wood is still firm and dry, and receive large amounts of sunlight, presumably creating a warm microclimate for this essentially southern species. Maternity colonies concentrate their roosting in large trees, particularly those that are greater than 9 inches (22 cm) in diameter (Gardner et al., 1991); the average diameter of trees that are used is 18 inches (45 cm; Kurta, 2005). Roosts are typically located in forests with low-to-moderate subcanopy, and are often in or near riparian woodlands or other forested wetlands (Kurta et al., 1993a, 1993b, 1996, 2002; Silvis et al., 2016). Indiana bats often use the same tree in multiple years, moving from tree to tree as once-suitable roosts lose bark, decay, and fall over (Kurta et al., 2002), Nevertheless, Indiana bats are highly loyal to their home range, and summer colonies can persist in a local area for at least 35 years, if suitable habitat remains (Mellos et al., 2014).

Data from radio-tracking and light-tagging suggest that these insectivorous bats often forage along edges, in woodland openings, and in areas of open forest, above and below the canopy, although they occasionally hunt in more open habitats (Bergeson et al., 2013; Gardner et al., 1991; Murray and Kurta, 2004; Sparks et al., 2005a, 2005b). Diet primarily consists of flies, caddisflies, moths, and beetles (Kurta and Whitaker, 1998; Murray and Kurta, 2002). Foraging areas are often 1.25 to 2.5 miles (2–4 km) from a roost tree and occasionally farther (Gardner et al., 1991; Murray and Kurta, 2004; Sparks et al., 2005a, 2005b; Silvis et al., 2016). In Michigan, Indiana bats apparently prefer not to cross large, open expanses of land and travel considerable

distances out of their way to follow wooded corridors, such as tree-lined fence rows, between roosts and other sites that are used for foraging, drinking, or roosting (Murray and Kurta, 2004; Winhold et al., 2005; Sparks et al., 2005b). Drinking water is most likely obtained on the wing, with the bat dipping its mouth into a pool of water as the animal flies (Taylor and Tuttle, 2007). About 2–4% of bats mist-netted in the southern three rows of counties of Michigan were Indiana bats (Kurta, 1980a, Winhold and Kurta, 2008), although that percentage is likely now lower in a post-white-nose-syndrome world.

Indiana bats do not overwinter in southern Lower Michigan. Instead, they migrate up to 356 miles (575 km) to suitable hibernation sites that mostly are located in Kentucky and southern Indiana (Kurta, 1980; Kurta and Murray, 2002; Rockey et al., 2013; Winhold and Kurta, 2006). The earliest seasonal observation of an Indiana bat in southern part of the Lower Peninsula occurred on 28 April, and the latest autumn record is 11 October (Kurta and Rice, 2002).

Proposed Action

Consumers Energy is modernizing its natural gas system by replacing about 55 miles of transmission pipeline (Line 100A) in Clinton, Shiawassee, Ingham, Livingston and Washtenaw counties, Michigan (Fig. 1). The two-phase project will replace ageing 20-inch pipeline from the 1940s with a new 36-inch pipe to move natural gas more efficiently. The new Mid-Michigan Pipeline will stretch from Chelsea, in Washtenaw County, to Ovid, in Shiawassee County. Phase 1 involves about 29.9 miles of corridor between Chelsea and Williamston in Ingham County (Fig. 2), whereas Phase 2 will connect Williamston and Ovid. Phase 1 is the subject of this report.

Previous Records of Indiana Bats near the Route of Phase 1

There are historical summer records of Indiana bats in all three counties involved with Phase 1—Washtenaw, Livingston, and Ingham (Fig. 3). A well-studied maternity

colony (Kurta et al., 2002) is located about 9 miles southwest of the southern end of the project in Washtenaw County, and the closest single specimen was taken at “Sylvan Pond,” presumably about 3 miles west of the pipeline in Sylvan Township, Washtenaw County, in 1947 (Kurta, 1980). Furthermore, the distance from Phase 1 to hibernacula of Indiana bats in Kentucky and Indiana is well within the migratory abilities of the species (Gardner and Cook, 2002; Rockey et al., 2013; Winhold and Kurta, 2006), so it is possible that Indiana bats live in areas of good habitat anywhere near the project area.

Purpose of Study

The project area passes through a portion of Michigan with ample records of the endangered Indiana bat, and although most of the new line will be placed adjacent to the old pipe on existing rights-of-way, Consumers must expand the width of the corridors and prepare temporary work areas to accommodate construction. Such construction requires removing some trees. Therefore, the purpose of this study was to determine whether the habitat along the pipeline was suitable for the endangered Indiana bat and whether the proposed action might have an adverse effect on that species, if it were present. The northern long-eared bat, a threatened species, was not considered, because tree-cutting is exempt under the 4(d) rule, unless the trees are near a known hibernaculum or a maternity site (USFWS, 2015). However, the closest historical hibernaculum of this species is Bear Cave, near Buchanan, Berrien County, about 125 miles southwest of the proposed Mid-Michigan Pipeline (Kurta, 2008), and the nearest documented maternity site is in Pittsfield Township, south of Ann Arbor, Washtenaw County, about 14 miles southeast of the route (Winfield, 2007).

Methods

My initial evaluation was based on aerial photographs (GoogleEarth), and my field reconnaissance involved walking along most of the route (Fig. 2). However, in the northern third of the project, the desktop assessment indicated that the line passed

through extensive agricultural fields that were devoid of trees, so these segments were not investigated in the field. In addition, horizontal directional drilling (HDD) will take place in a number of areas to avoid disrupting highways, railroads, or extensive wetlands; when HDD is used, no trees on the surface will be impacted, and consequently, these areas also were not evaluated.

I made a qualitative investigation of the overall habitat along the pipeline, based on the literature and my 44 years of experience with bats in Michigan. Factors that I considered in the overall evaluation included:

1) availability of open water (ponds, streams, etc.) at the site or nearby;
2) extent and openness of the forest;
3) availability of flight space to provide access to roosts and foraging habitat;
4) abundance of trees of species often used as maternity roosts;
5) approximate size (diameter) of trees;
6) abundance of trees suitable for roosting right now (i.e., dead with peeling bark, moderate-to-high sunlight, absence of vines and other obstructions, sufficient diameter, and/or early-to-mid stage of decay);
7) proximity and extent of additional foraging and roosting areas; and
8) degree of human-caused disturbance.

I recorded the location (± 10 feet) of each potential roost with a hand-held global-positioning unit (Garmin 76Cx), and potential roosts were marked in the field with a large X made with blue paint. I also ranked each potential roost tree as low, medium, or high in its ability to provide shelter for a maternity colony of Indiana bats, based on factors listed in #6 above. If access to a trunk by a flying bat was totally blocked by other trees, branches, and/or vines, the tree was not considered a potential roost, even if it were structurally suitable (i.e., peeling bark). Note that these estimates of quality for individual trees apply only to the time of the field survey, because the suitability of a tree for roosting changes over time and can either increase or decrease (Barclay and Kurta, 2007). The diameter of each potential roost at breast height was estimated visually to

the nearest 2 inches (5 cm). Trees with multiple trunks were considered separate trees if they diverged below a height of 4 feet above the ground, although only one GPS location was recorded in such instances. Throughout the field survey, I was accompanied by Mr. Garrett Newall of the company Wade Trim.

Results

I made a field assessment of various parts of the line on five dates between 20 September and 4 October 2021, beginning at the southern end, in Chelsea, and working north to Willamston. In addition, one small wooded area north of Columbia Road, in Livingston County, was assessed on 14 November 2021, after 8-feet-tall corn had been harvested, making it safe to cross the field during hunting season. Below, I provide an overview of the entire project area for Phase 1, followed by very brief descriptions of 12 segments of the proposed line.

Overview

The proposed pipeline will pass through four distinct habitats (Fig. 2). First, at the southern end, the corridor skirts the edge of the City of Chelsea for about 4.9 miles (16.4% of the total length), crossing major highways and going through farm fields, meadows, wetlands, residential yards, and other disturbed areas, as it weaves its way north (Figs. 4 and 6). Second, between Waterloo Road and South Lake Drive (Figs. 8 and 12), the land becomes rolling, and the line is mostly surrounded by or actually goes through forested land that is part of the Waterloo and Pinckney state recreation areas for 3.6 miles (12%). From South Lake Drive to Columbia Road, about 14.1 miles (47%), the land is a mix of farm fields, wooded fencelines, and patches of forest of varying size (Figs. 14, 16, 19, 21–23). However, from Columbia Road to the northern terminus at Grand River Avenue, about 7.2 miles or 24% of the project, the land is flat, largely devoid of trees, and covered with corn, soy, and hayfields (Figs. 24 and 26).

Overall, I recorded 54 trees that could possibly be used right now as roosts by

Indiana bats (Tables 1–2). Almost all (94%) these potential roosts were located along the 17.7 miles (59% of the overall length) of the route that was between Waterloo and Columbia roads. Most were elms (31%), oaks (19%), poplars (including cottonwoods; 11%), and maples (9%). The others included four shagbark hickories, three black cherries, three ashes, one conifer, and a few unidentified trunks. Virtually all trees (92%) were dead; the exceptions were the four shagbark hickories that were healthy and four multi-trunked trees with both living and dead sections. Seventy-four percent of the potential roosts were low quality, 24% were medium quality, and only one tree (2%) over the entire 30 miles was considered high quality. Average (± SE) diameter of the potential roosts was 13.9 ± 0.8 inches (35.2 ± 2 cm), and 14 of these trees (25%) equaled or exceeded 18 inches (45 cm) in diameter, which is the average size of trees used by female Indiana bats (Kurta, 2005).

The number of potential roosts per mile of corridor (54 trees over 29.9 miles = 1.8 trees/mile) is the lowest that I have encountered during similar projects in at least the past 10 years. Conversely, the average diameter of the potential roosts along the Mid-Michigan Pipeline is considerably higher than in those previous surveys. Over the last decade, the pool of potential roosts in many parts of southern Michigan was usually dominated by small-diameter (hence, low-quality) ash that had been attacked by the emerald ash borer. However, ashes were scarce during this most recent survey, and only three ash trees, representing 6% of the total of potential roosts, were located. I attribute both the smaller number of potential roosts and their larger average diameter to the disappearance of ash from the local forests.

The large proportion of low-quality roosts is typical of most situations in Michigan (A. Kurta, pers. obs.). The most common reasons for trees receiving a low ranking were small diameter, limited exfoliating bark (either because the tree had recently died or because most bark had fallen), and lack of solar radiation striking the tree. Although a few shagbark hickories were identified as potential roosts, all were low quality because the living branches or other trees shaded the trunks and/or made access to the trunk difficult for a flying bat. Although all potential roosts might be occupied at some time, if Indiana bats were present, low-quality trees, in general, were suitable only as alternate roosts, whereas medium- and high-quality trees could be used as alternate

roosts or as primary roosts for a maternity colony.

Overall, the density of trees, saplings, and shrubs in most woodlots was rather high and would prohibit foraging by bats in the interior. However, the frequent small size of the woodlands meant that there was a wealth of edge habitat. Furthermore, the pipeline right-of-way itself provided a convenient foraging and commuting corridor, and many woodlots contained small openings or primitive roads (2-tracks) along which bats could commute or hunt. Although woodlands tended to be small (except in the state parks), connectivity between forest patches was excellent, with wooded fencelines providing sheltered pathways between otherwise isolated sites. This connectivity was obvious throughout the proposed route, except in the northern quarter of the corridor, where trees, in general, were absent.

There were no major rivers along the corridor for drinking purposes. The largest streams were Portage Creek (Fig. 15) and Dietz Creek (Fig. 27), and after heavy rains that occurred in early October (4+ inches in <12 hours), both were only 15 feet wide at most. Most watercourses were narrow, channelized agricultural drains, often recessed 10 feet below the surrounding fields and bordered by overhanging trees, shrubs, or herbaceous vegetation that would prevent access or make it difficult for a bat in flight to obtain a drink. Nevertheless, a plethora of lakes and ponds of varying size dotted the landscape from Chelsea to Columbia Road, and many of these were within a half mile of the proposed corridor. Consequently, drinking water was readily available near the pipeline route, except, again, north of Columbia Road, where open water was much less common.

Brief Descriptions of Individual Sections of the Route

From Chelsea City Gate to Brown Drive (1.25 miles)

In the south, the route begins in the middle of agricultural fields and heads west for 0.8 mile before turning north (Fig. 4). At this point, the pipeline crosses a fenceline that is flanked by areas of dead and dying trees in adjacent wetlands (Fig. 5). Perhaps a dozen dead trees were standing; the largest, though, were only 8–12 inches in

diameter, although some appeared to be high-quality potential roosts, with easy access and abundant sunshine reaching the trunks. Nevertheless, all these trees were located outside the right-of-way, and none will be removed for construction. To place the pipeline under Interstate 94, horizontal drilling will occur for 0.25 mile, from a field south of the highway to a wetland about 225 feet north of Brown Drive.

From Brown Drive to Bush Road (2.25 miles)

This segment essentially bypasses the City of Chelsea on the west (Fig. 6), weaving its way mostly through open grassy wetlands and meadows, while passing subdivisions under construction, occupied homes, and stands of buckthorn. The right-of-way crosses the channelized Letts Creek (10-feet wide and 1-foot deep) and goes under both a busy city road (Old US-12) and the major railroad between Detroit and Chicago, before coming to Bush Road. Few trees will be removed, and only one potential roost was flagged, a medium-quality dead ash, just north of Cavanaugh Lake Road, which parallels the railroad.

From Bush Road to Highway M-52 Road (2 miles)

The leg between Bush and Waterloo roads (Fig. 7) primarily crosses a soy field in the south, pastures in the middle, and finally a shrubby wetland and scrub/shrub habitat at the north end. A wooded area in the south, between the soy and pastures, is mostly young oak (<10 inches in diameter), with autumn olive directly bordering the right-of-way; at its north end, the woodlot contains larger and more diverse trees, with elm, oak, and black cherry, from 8 to 16 inches in diameter. To the north of Waterloo Road, the pipeline passes through fields, residential yards, and young disturbed woods, with catalpa, poplar, pines, and some locust that were less than 6 inches in diameter, although extensive wooded areas, part of the fragmented Waterloo State Recreation Area, were nearby. Only two potential roosts, both low in quality, were discovered between Bush Road and M-52.

From M-52 to North Territorial Road (2 miles)

Ultimately, the pipeline parallels highway M-52 and is immediately adjacent to the newly constructed Border-to-Border Trail (B2B Trail: https://b2btrail.org/), a much-used biking/hiking trail, for about 3,400 ft. (Figs. 8–9) Nine potential roosts in two clusters were discovered along the highway, and two of these trees were rated as medium (Fig. 10). However, all these dead trees were located in disturbed sites, only 50–125 feet from M-52, and the second cluster occurred on an old residential lot, where the home had been demolished recently. Seven of the potential roosts were elms, particularly Siberian elms.

Just south of the Green Lake Access Road, the right-of-way enters Waterloo State Recreation Area, and after crossing M-52, the pipeline travels mostly through hilly terrain that is part of the Pinckney State Recreation Area (i.e., M-52 is the boundary between the parks). Consequently, this segment is one of the most heavily forested segments of Phase 1 (Figs. 8 and 11). The woods were healthy and reasonably old, with oak, maple, and black cherry, interspersed with hickory; diameters up to 22 inches were common. Although the forest was generally too dense for foraging, occasional openings occurred, and the corridor itself, the B2B Trail (which also had crossed to the east side of M-52), and a number of apparently private paths offered possible hunting habitat. Nine potential roost trees, six of which were rated medium in quality, occurred along this short stretch.

From North Territorial Road to Boyce Road (2 miles)

Most of the land between North Territorial Road and South Lake Drive is rolling and wooded (Figs. 12 and 13) and part of the Pinckney State Recreation Area. This was perhaps the nicest habitat of the project. Trees, in general, were more widely spaced, possibly allowing some foraging in the interior and definitely around the crowns of trees. Oak, hickory, and maple (up to 20–24 inches in diameter) dominated, but smaller elm also were common. Eight potential roost trees were found; one tree was considered medium, and the other was classified as high quality. As in all areas from

Chelsea northward, drinking water was readily available in nearby ponds and lakes.

From Boyce Road to M-106 (2.5 miles)

Between Boyce Road and Bowdish Road (Fig. 14), which is the boundary between Washtenaw and Livingston counties, the corridor travels mostly though hay and soy fields, as well as residential lawns, and most trees are encountered only at fenecelines separating different properties. Two potential roosts, a medium- and a low-quality oak, were found about 0.25 mile from Bowdish, near mowed lawns and two large houses.

North of Bowdish Road, lawns, extended yards, and open fields bordered the line on the east, but on the west, there was a patch of forest with mostly oak, poplar, and black cherry having diameters ≤16 inches. After passing two large houses, we entered and extensive wooded area that continued up to the small lakeside community of Williamsville. The canopy from trees on the east came very close to those on the west so that the corridor was mostly hidden in aerial photos. Typical trees were maple, oak, and lots of poplar, especially cottonwood, with diameters ≤ 14 inches. The forest was dense, and foraging inside the woods would not be possible.

As the corridor approaches Williamsville, it crosses Portage Creek (Fig. 15), which really is just a drainage connecting Williamsville Lake to other lakes farther east. The stream was about 20–25-feet wide and 3-feet deep, although recent heavy rains (4+ inches in 24 hours) had swollen the creek substantially. Trees were obviously younger and more crowded in the small floodplain of the creek than just a few hundred feet farther south. but there was a small amount of flight space above the water that would allow some foraging by bats.

After wading the stream, we passed through yards of multiple small houses on small parcels of land; trees were scattered and large (up to 20 inches) and consisted of maple, birch, black cherry, and conifers that were all alive. At the northern edge of Williamsville, another HDD began that would pass under a wetland for about 1,900 feet and return to the surface south of a valve station located on Doyle Road (M-106). Land

south of the station was quite wet, with standing water and areas of cattails; trees in the immediate vicinity were primarily small elms having diameters of only 4 inches or less, although larger (≤ 20 inches) oaks and maple began farther from the road.

From M-106 to Dexter Trail (1.6 miles)

Houses and yards were common in the southern portion of this segment, whereas cornfields (Fig. 16) dominated in the northern half. Lakeland Trails State Park, an old railroad bed, now made into an unpaved biking/hiking trail, crossed from east to west, and a private garbage dump was located just south of Van Syckle Court. The largest block of woods, was associated with the Unadilla-Stockbridge Drain, which was a few feet wide on that day, with a fast current and overgrown banks; nearby trees were mostly poplar and oak (≤ 12inches) and were more dense on the east than the west side of the right-of-way. Three potential roosts (Fig. 17), all low in quality, occurred in this stretch.

From Dexter Trail to M-36 (2.1 miles)

This leg began with a woodlot near Dexter Trail, containing oak and maple up to 18 inches in diameter, but then it traversed mostly hay fields, pastures, harvested soy up to Dutton Road (Figs. 19 and 20). North of Dutton the line again crossed the Unadilla-Stockbridge Drain. Woods associated with the drain were somewhat open (Fig. 21), and some foraging would be possible. Trees south of the drain were generally walnut, oak, and maple (12 inches), whereas north of the stream, maple up to 16 inches occurred. However, there were no trees that might be used by Indiana bats inside the proposed corridor.

From M-36 to Roberts Road (2.1 miles)

The trend toward fewer hills and increasing amounts of agricultural land was apparent in this stretch (Fig. 22), where the right-of-way passed through corn for almost 0.9 mile before turning northwest and crossed through scattered black cherry and elm in

an otherwise open grassy field; one medium-quality elm was the only potential roost tree in these 2.1 miles. North of the elm, the line continued its journey through soy and more corn, passed a woodlot and a horse pen, and then crossed 1,500 feet through open grassy fields with a large number of scattered spruce before coming to Roberts Road.

From Roberts Road to Dansville Road (2.2 miles)

North of Roberts, the land was a patchwork of small parcels with small woodlots, ponds, cattails, and grassy meadows, before turning into extensive fields of hay, harvested soy, and harvested corn south of Kane Road (Fig. 23). Midway between Roberts and Kane roads, the line traversed 600 feet of a woodlot, where one low- and one medium-quality roost were located. The proposed right-of-way intersected no trees from Kane Road to Dansville Road, a distance of almost 1 mile. Kane Road marks the boundary between Livingston and Ingham counties.

From Dansville Road to Columbia Road (2.3 miles)

Near Dansville, horizontal drilling will take place for about 1,200 feet under a wetland complex, and after that, the corridor crosses pools of water and traverses the edge of a wooded wetland (Fig. 24) for about 4,000 feet until encountering a residential plot at Iosco Road. The forest is very similar in composition along this route, with a diversity of oak, maple, hickory, and black cherry, usually 12–14 inches in diameter, along with smaller elms. The woods were too dense for any foraging by a flying bat, and quite healthy so that only one low-quality roost was encountered.

At Iosco Road, three shagbark hickories were growing in the right-of-way as it clipped a group trees associated with a house. From there the corridor crossed a freshly planted field of grass/hay, crossed a low area with a few trees and ultimately came to the McMahon Drain, which was about 4-feet wide and 3-feet deep. As usual in the northern part of the project area, the drain was about 10 feet below the level of the surrounding fields. The 2,500 feet between the drain and Searle Road alternated

between open areas associated with homes and wooded sites. Trees often were large, with some cottonwood and maple up to 22 inches in diameter. Six potential roost trees, all ranked as low in quality, occurred between the drain and Searle Road.

From Columbia Road to Holt Road (4.6 miles)

This long stretch was largely devoid of trees and had little to interest a woodland bat (Fig. 25). Two low-quality potential roosts were marked adjacent to a house near Columbia Road. One half mile into a cornfield north of Columbia Road, there was a quasi-circular patch of living trees surrounding a wet area; most trees were maples, from 6 to 12 inches in diameter, although one large cottonwood (about 45 inches) also was present. North of Howell Road, there was a small wetland with a few scattered box elder and maple less than 12 inches in diameter, but most vegetation consisted of grass and shrubs (Fig. 26).

From Holt Road to Williamston City Gate (2.6 miles)

Trees again were scarce (Fig. 27). Three-thousand feet from Holt Road, the pipeline crossed a fenceline with a single low-quality roost in a broken line of trees. At Dietz Creek (Fig. 28), just south of Noble Road, trees were scattered and small, with ash, elm, mulberry, and confiers typically 8 inches or less in diameter; all in the right-of-way were living. No other trees along this 2.6-mile-long stretch will be impacted in Phase 1. Between Noble Road and the Willamston City Gate on Grand River Avenue (M-43), two sections of horizontal drilling will occur; one under Interstate 96, and the other beneath a railroad track and a small wetland adjacent to the valve site.

Quality of Habitat

Between Waterloo Road and Columbia Road, the central 60% of the project, the habitat is high quality for a maternity colony of Indiana bats; roost are reasonably abundant, as are foraging sites and sources of drinking water; in addition, the connectivity between forested patches is very good. The section north of Columbia

Road, in contrast, is poor habitat, because of a general lack of trees, a dearth of open water, and the limited connections between the wooded sites that do exist. The southern section, near Chelsea is medium quality; woodlands and potential roosts are not as abundant as along the middle of the route and the surrounding environment is more disturbed than a few miles to the north.

Potential Effects on Indiana Bats

If Indiana bats live in the area, then removal of trees to expand the right-of-way and create the connecting spur has a reasonable probability of adversely affecting the bats. First, occupied trees may be cut, resulting in death of some bats. Second, noise associated with chainsaws or other machinery used in clearing dead trees and erecting the new line likely would disturb bats roosting in trees that might be located 10, 20, or 50 feet from the construction zone, perhaps even causing them to abandon the roost.

Recommendations

Removal of trees and restriction of construction activities to winter (1 November–31 March), when bats are not resident, would avoid the possibility of "take" through felling an occupied tree or through disturbance effects. Although cutting 54 potential roosts in winter might include some used by Indiana bats in summer, my impression is that additional dead trees suitable for roosting exist along the western side of the corridor where construction will not occur, as well as in the adjacent forests and woodlots. Indiana bats and other tree-roosting species use multiple roost trees each year, and these bats always contend with some of their homes falling over naturally or becoming unsuitable through loss of bark during winter (Barclay and Kurta, 2007). Consequently felling these 54 trees in winter would not have an adverse effect on the species. If construction activities cannot be limited to winter, then Consumers should perform a summer survey before construction begins, to determine whether Indiana bats are actually present in the area, especially in areas of high-quality habitat between Waterloo and Columbia roads.

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Table 1. List of potential roost trees. The amount of exfoliating bark on the tree, amount of direct sunlight striking the tree, ease of access for a flying bat, and an overall quality rating are assessed using three levels—low, medium, and high. For bark, I follow the definitions of Gardner et al. (1991)—high indicates a tree that had ≥25% of its surface covered by loose and peeling bark; medium signifies <25% but ≥10%; and low indicates <10%. For sunlight, high denotes a tree that receives ≥10 hours of sunlight per day; medium indicates <10 hours but ≥5 hours; and low signifies <5 hours. Trees are numbered in the order of their discovery. Trunks are considered separate trees if they diverge less than 4 feet above the ground.

List of Potential Roost Trees in Mid-Michigan Pipeline Project								
Tree #	**Species**	**Dbh (cm)**	**Living/ Dead**	**Amount of bark**	**Amount of Sun**	**Ease of Access**	**Overall quality**	**Comment**
1	Elm	20	Dead	Low	High	Low	Low	Near highway
2	Elm	25	Living	Low	Medium	Low	Low	Near highway
3	Maple	40	Dead	Medium	High	Medium	Medium	Near highway and driveway
4	?	30	Dead	Low	Low	Medium	Low	Near highway and driveway
5	Elm	60	Dead	Low	Medium	Medium	Low	Near highway
6	Elm	30	Dead	Low	Medium	High	Low	Near highway
7	Elm	30	Living	Low	Medium	High	Low	Near highway
8	Elm	15	Dead	Low	Low	Low	Low	Near highway
9	Elm	45	Living	Medium	Medium	Medium	Medium	Near highway
10	Ash	45	Dead	High	High	High	Medium	a little rotten at top
11	Black Cherry	25	Dead	Low	Low	High	Low	1 dead trunk; 3 live
12	Oak	65	Living	Low	Low	Low-Medium	Low	at corner
13	Oak	30	Dead	Low	High	High	Low	
14	Oak	40	Dead	Medium	High	Medium	Medium	vines
15	Oak	35	Dead	Medium	Medium	Medium	Medium	vines
16	Oak	35	Dead	Low	Medium	Medium	Medium	
17	Poplar	30	Dead	Medium	Low	Low	Low	
18	Elm	20	Dead	High	Medium	Medium	Medium	next to hiking trail
19	Poplar	20	Dead	High	Low	Medium	Medium	30' tall; rotten somewhat
20	Poplar	30	Dead	Medium	Low	Low	Low	
21	Oak	55	Dead	Medium	High	High	Medium	
22	?	25	Dead	Low	Low	High	Low	
23	Maple	25	Dead	High	Medium	Low	Low	many small branches
24	Maple	20	Dead	Low	Medium	Low	Low	branches
25	Oak	50	Dead	Medium	High	High	High	

List of Potential Roost Trees in Mid-Michigan Pipeline Project								
26	?	50	Dead	Low	Medium	Low	Low	
27	?	35	Dead	Medium	Medium	Low	Low	
28	Elm	25	Dead	High	Low	Low	Low	
29	Elm	25	Dead	Medium	Medium	Medium	Medium	most bark just above canopy
30	Elm	25	Dead	Low	High	Medium	Low	close to road; very little bark
31	Oak	75	Dead	Medium	High	High	Medium	
32	Oak	45	Dead	Low	Medium	Medium	Low	
33	Oak	50	Dead	Low	High	High	Low	
34	Black Cherry	30	Dead	Medium	Low	Medium	Low	
35	Poplar	30	Dead	Low	Low	Low	Low	rotten
36	Poplar	20	Dead	Low	Low	Low	Low	edge of creek/drain
37	Shagbark Hickory	50	Dead		Low	Low	Low	
38	Black Cherry	35	Dead	Low	Low	Low	Low	very little space for a bat
39	Elm	35	Dead	High	High	High	Medium	best bark below canopy
40	Elm	25	Dead	Medium	Low	Medium	Medium	vine low down
41	Elm	15	Dead	Medium	Low	Low	Low	
42	Conifer	15	Dead	Low	Low	Medium	Low	
43	?	20	Dead	Low	Low	Low	Low	25' tall
44	Shagbark Hickory	50	Living		Low	Low	Low	
45	Shagbark Hickory	50	Living		Low	Low	Low	1 gps for 45 and 46
46	Shagbark Hickory	65	Living		Low	Low	Low	1 gps for 45 and 46
47	Elm	40	Dead	Medium	Medium	Low	Low	vines
48	Ash	20	Dead	High	Medium	High	Low	
49	Ash	45	Dead	High	Medium	Low	Low	
50	Maple	55	Dead	High	Low	Low	Low	dead trunk begins at 15'
51	Elm	20	Dead	Medium	Low	Low	Low	most bark behind vine
52	Poplar	25	Dead	Low	Low	Low	Low	
53	Maple	60	Living	Medium	Low	Low	Low	dead trunk on live tree
54	Elm	25	Dead	Low	Low	Low	Low	

Table 2. Approximate locations of 13 potential roost trees.

Location of Roost Trees		
Tree #	**Latitude**	**Longitude**
1	N42.3567707	W84.0582836
2	N42.3568864	W84.0583584
3	N42.3570830	W84.0584616
4	N42.3568972	W84.0586607
5	N42.3601520	W84.0611998
6	N42.3603298	W84.0616134
7	N42.3603313	W84.0616248
8	N42.3603550	W84.0618043
9	N42.3603778	W84.0618238
10	N42.3140481	W84.0443882
11	N42.3436793	W84.0521505
12	N42.3463162	W84.0542932
13	N42.36416	W84.06346
14	N42.36408	W84.06342
15	N42.36419	W84.06336
16	N42.36419	W84.06337
17	N42.36545	W84.06421
18	N42.36812	W84.06676
19	N42.36910	W84.06724
20	N42.36929	W84.06723
21	N42.37623	W84.07272
22	N42.38165	W84.07599
23	N42.38524	W84.07684
24	N42.38523	W84.07688
25	N42.38529	W84.07689
26	N42.38531	W84.07696
27	N42.38534	W84.07699
28	N42.39068	W84.07820
29	N42.39248	W84.07892
30	N42.40454	W84.08358
31	N42.42062	W84.09332
32	N42.42076	W84.09343
33	N42.42986	W84.09712
34	N42.43148	W84.09815
35	N42.45214	W84.10661
36	N42.45273	W84.10693
37	N42.45730	W84.10925
38	N42.50913	W84.12623
39	N42.53093	W84.13772
40	N42.53096	W84.13772
41	N42.53141	W84.13788
42	N42.56663	W84.15632

Location of Roost Trees		
43	N42.41017	W84.10195
44	N42.56951	W84.15792
45	N42.56955	W84.15810
46	N42.56955	W84.15810
47	N42.57649	W84.16387
48	N42.57956	W84.16643
49	N42.58023	W84.16697
50	N42.58051	W84.16711
51	N42.58101	W84.16752
52	N42.58130	W84.16792
53	N42.58394	W84.17045
54	N42.65173	W84.21287

Figures

Figure 1. Map of Michigan showing approximate location of Phase 1 (black line).

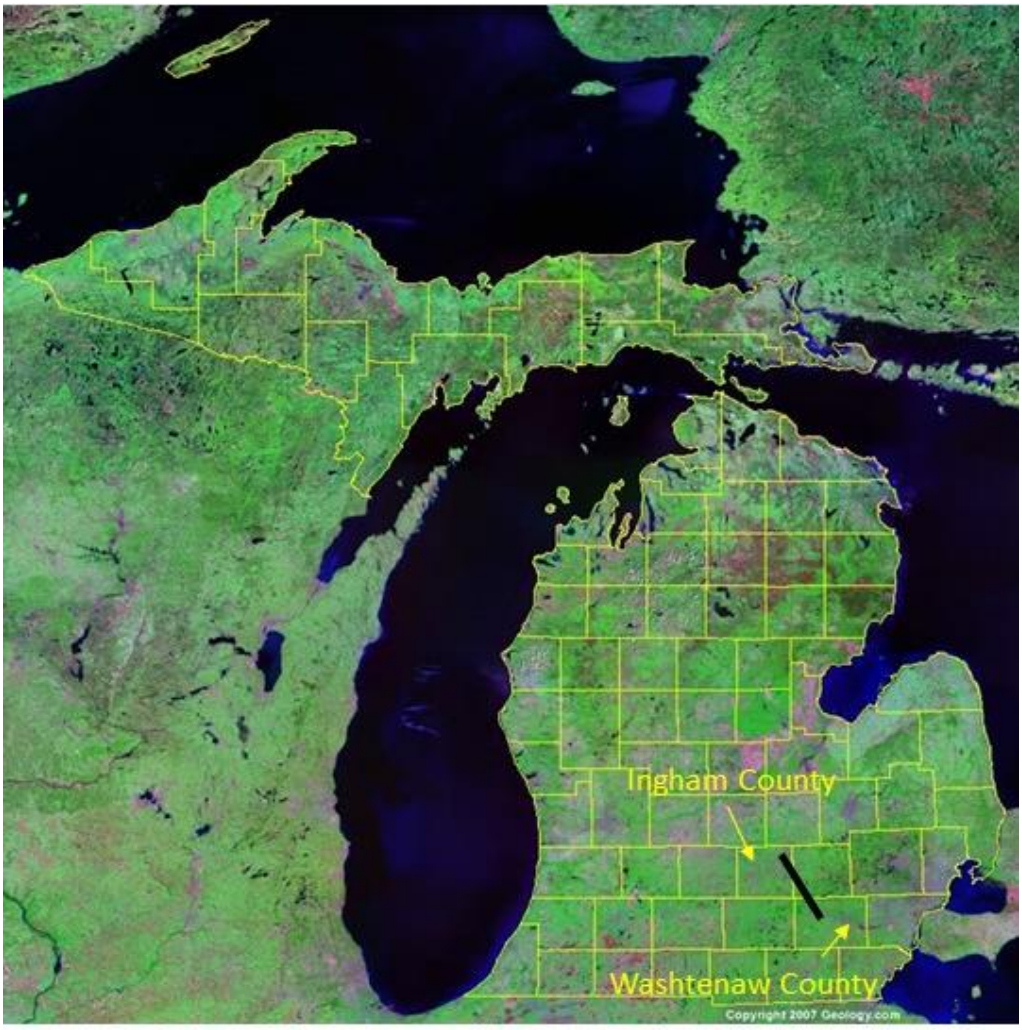

Figure 2. Regional map showing approximate location of the proposed route of Phase 1 (blue line between arrows), from Chelsea to Williamston. Total length of Phase 1 pipeline is about 29.9 miles. Numbers in yellow refer to four broad types of habitat (see Overview on p. 9).

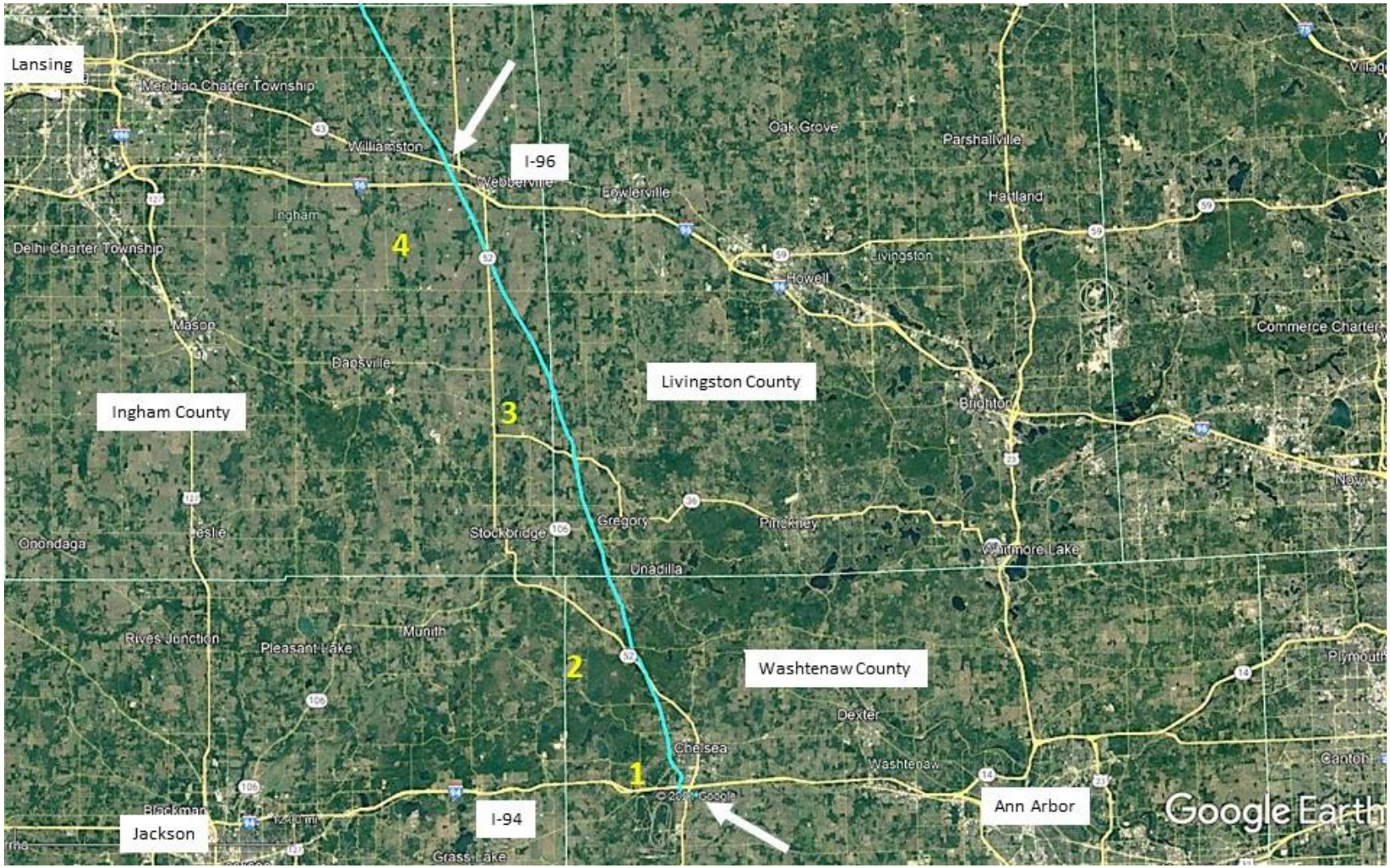

Figure 3. Records of the endangered Indiana bat near Phase 1. White = captures only; red = maternity colonies.

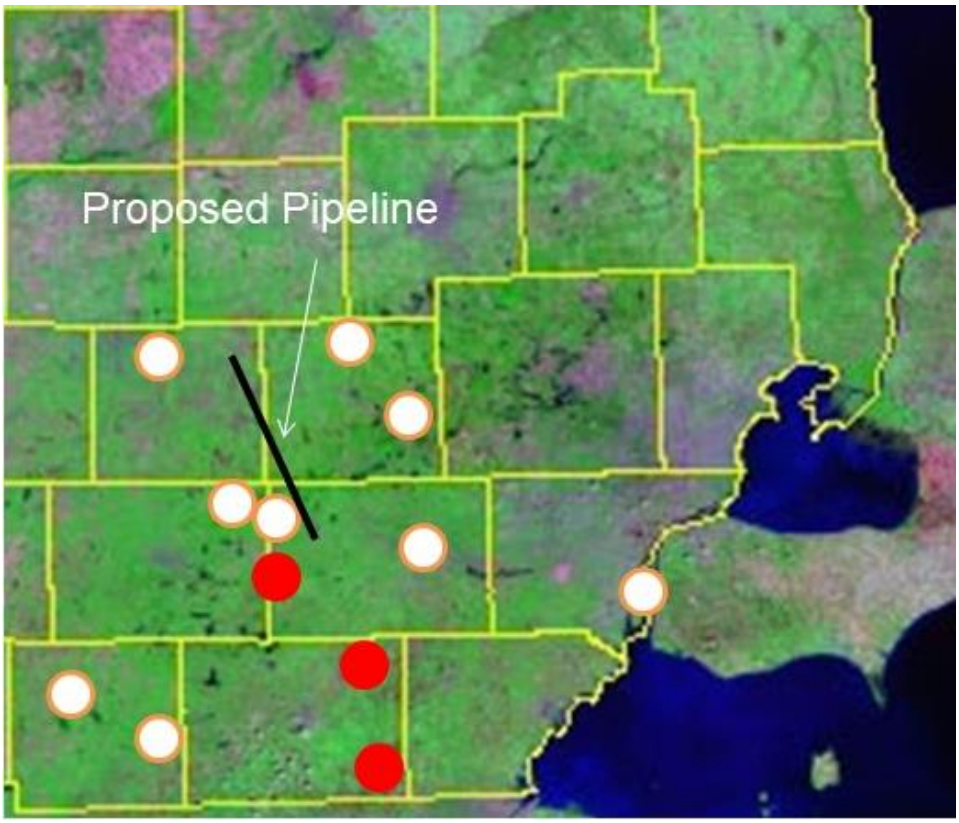

Figure 4. Southern end of Phase 1 (blue line), beginning reroute around the City of Chelsea (1.25 miles). Horizontal drilling (HDD) will take place beneath I-94 and a forested wetland on the north side of the highway.

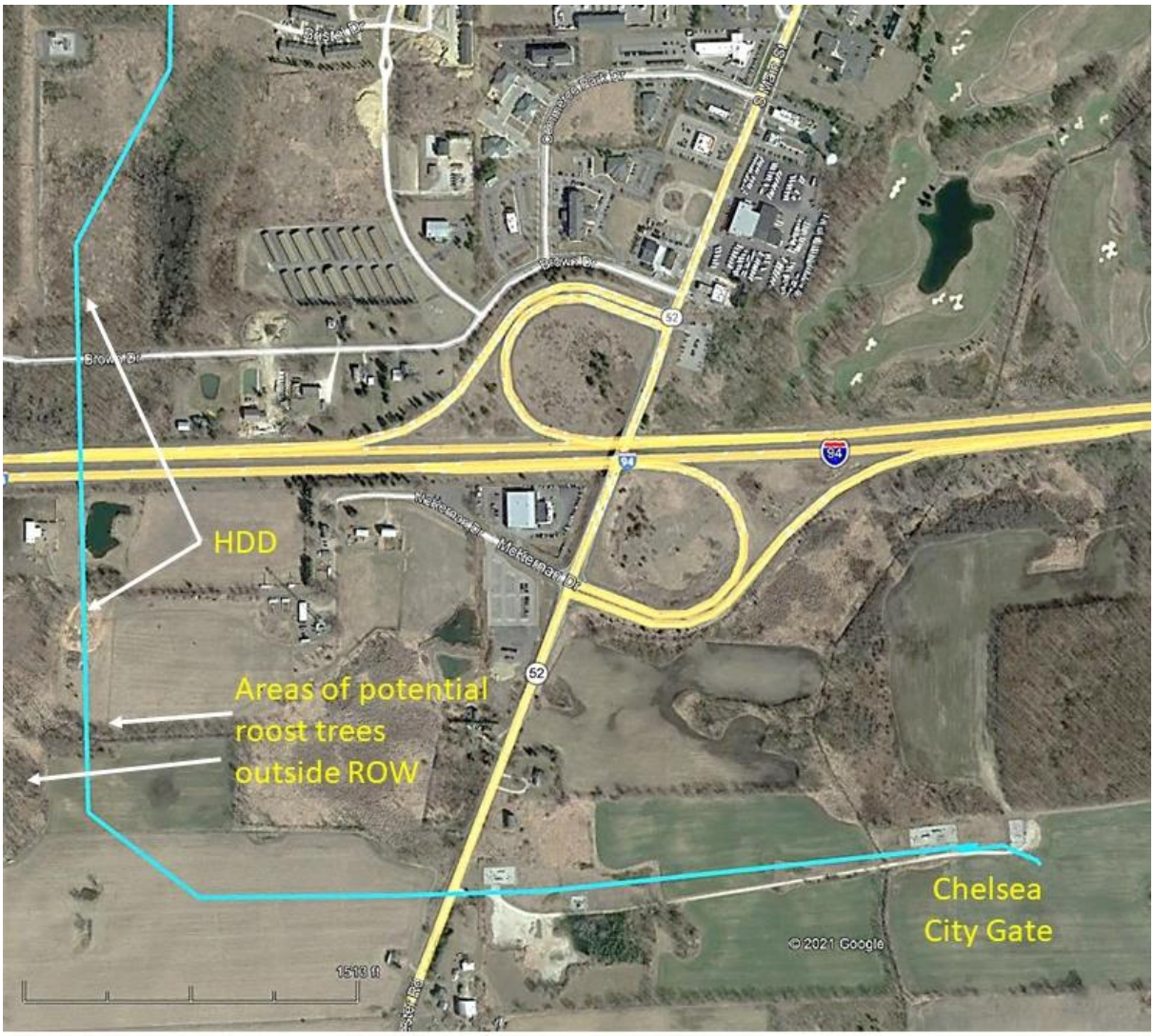

Figure 5. High-quality habitat adjacent to, but not on the proposed corridor. This was the best roosting habitat anywhere along Phase 1; none of these trees, though, will be impacted by construction.

Figure 6. Segment of Phase 1 (blue line), from Brown Drive to Bush Road, skirting the edge of the City of Chelsea (2.25 miles). Imagery from GoogleEarth.

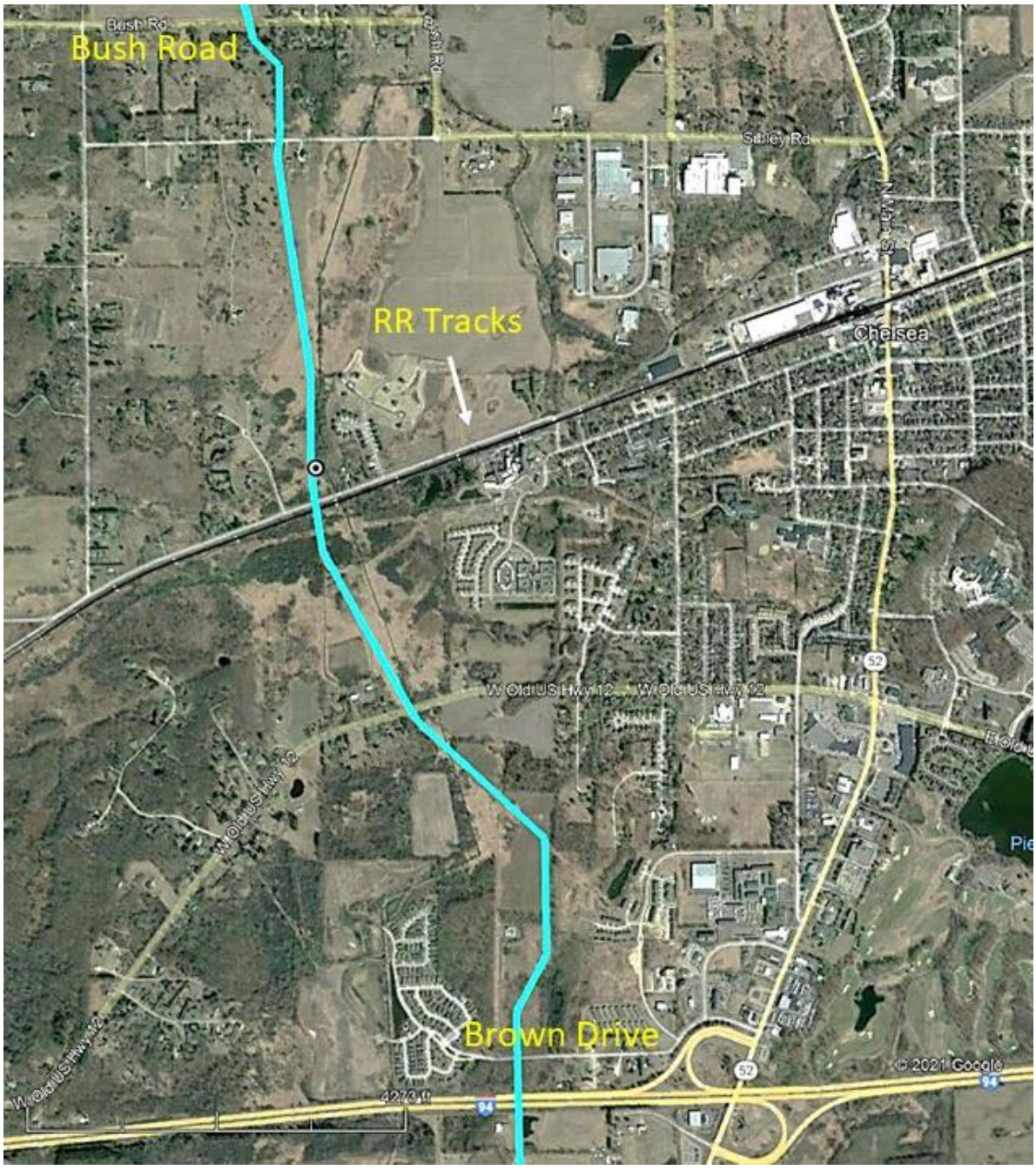

Figure 7. Segment of Phase 1 (blue line), from Bush Road to M-52 (2 miles).

Figure 8. Segment of Phase 1 (blue line), from M-52, near the Green Lake Access Road, to North Territorial Road, in the Waterloo and Pinckney state recreation areas (2 miles).

Figure 9. Highway M-52 (right) and the Border-to-Border Trail (center) parallel the proposed corridor (left) for about 3,400 feet on the west side of the highway.

Figure 10. A medium-quality roost tree near M-52. See cover photo for close-up view.

Figure 11. Typical wooded habitat east of M-52, in the Pinckney State Recreation Area.

Figure 12. Segment of Phase 1 (blue line), from North Territorial Road to Boyce Road (2 miles). The southern half is in the Pinckney State Recreation Area. Horizontal drilling will occur beneath a large wetland.

Figure 13. The good habitat in the Pinckney State Recreation Area continued north of North Territorial until South Lake Drive.

Figure 14. Segment of Phase 1 (blue line), from Boyce Road to M-106 (Doyle Road) (2.5 miles). Bowdish Road is the southern boundary of Livingston County. Horizontal drilling will occur beneath a large wetland complex between Portage Creek and a valve station at M-106.

Figure 15. Wooded habitat south of Portage Creek. Photo was taken from a residential lawn on the north side of the creek. This stream was the most substantial “river” in the southern 75% of the project area.

Figure 16. Segment of Phase 1 (blue line), from M-106 (Doyle Road) to Dexter Trail (1.6 miles).

Figure 17. A typical low-quality roost, located south of Lakeland Trails State Park. Note limited peeling bark and the many branches that inhibit access to the trunk.

Figure 18. Habitat south of Dexter Trail, showing the change to mostly open meadows and crop fields.

Figure 19. Segment of Phase 1 (blue line), from Dexter Trail to M-36 (2.1 miles).

Figure 20. Typical habitat between Dexter Trail and M-36, with alternating fields and small patches of woods.

Figure 21. Somewhat open forest that might allow foraging, located near the Unadilla-Stockbridge Drain. Such open sites were uncommon along the entire route.

Figure 22. Segment of Phase 1 (blue line), from M-36 to Roberts Road (2.1 miles).

Figure 23. Segment of Phase 1 (blue line), from Roberts Road to Dansville Road (2.2 miles). Kane Road marks the boundary between Livingston and Ingham counties.

Figure 24. Segment of Phase 1 (blue line), from Dansville Road to Columbia Road (2.3 miles). Horizontal drilling will occur under a large wetland.

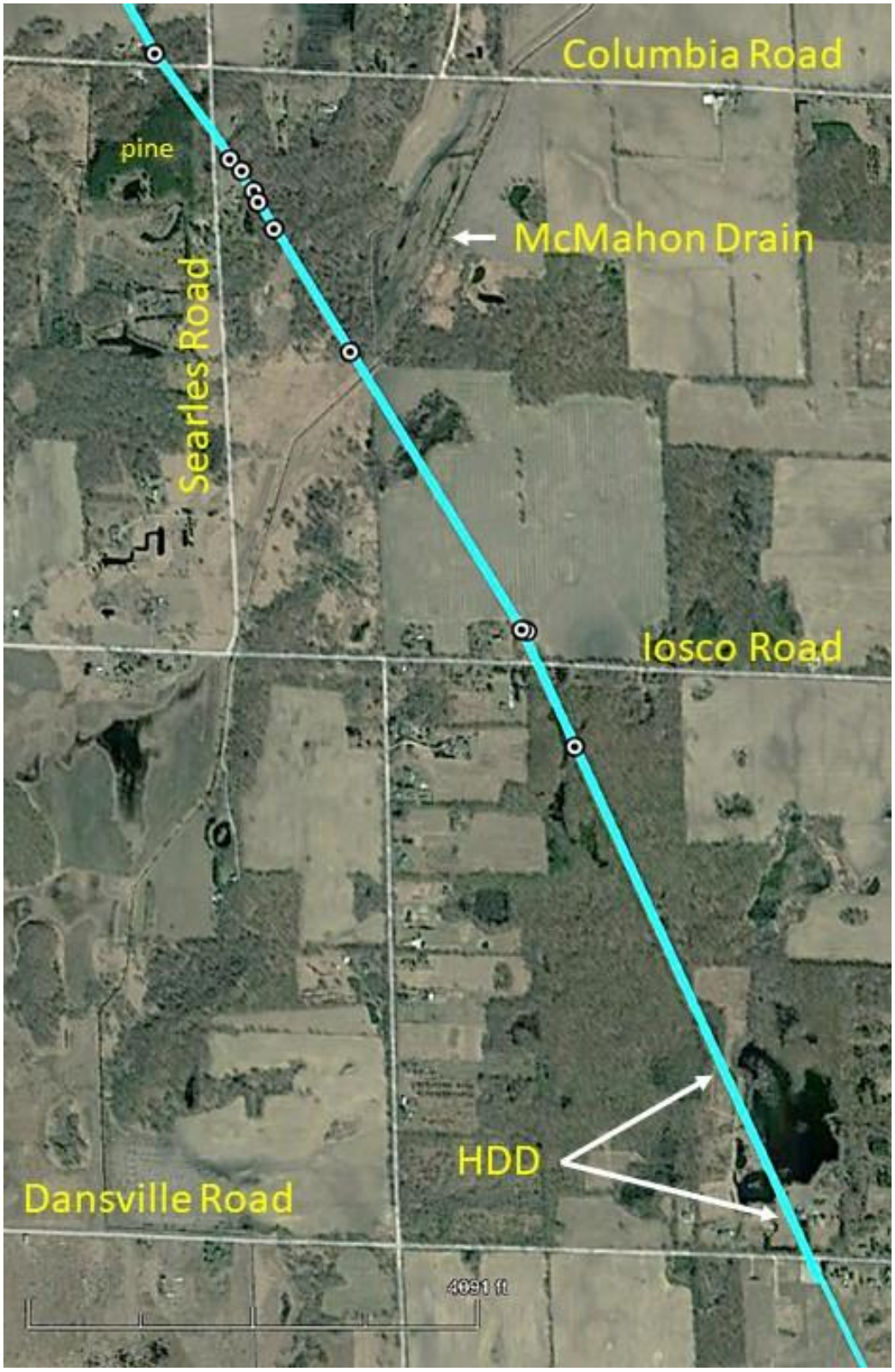

Figure 25. Segment of Phase 1 (blue line), from Columbia Road to Holt Road (4.6 miles). The route contacts very few trees.

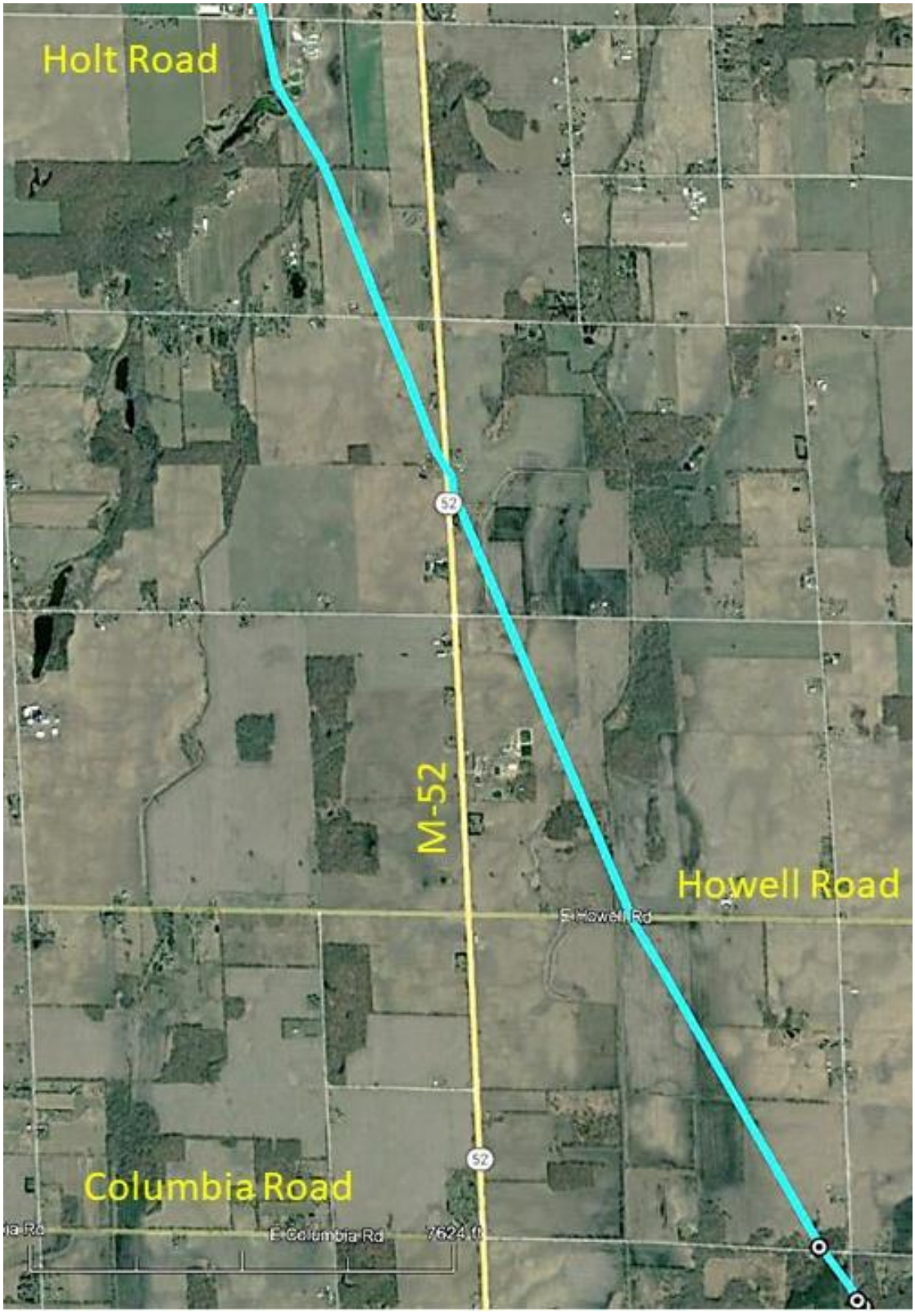

Figure 26. Small wetland north of Howell Road, one of the few “wooded” sites that was encountered in the northern part of the route.

Figure 27. Segment of Phase 1 (blue line), from Holt Road to the north end of the project at the Williamston City Gate on Grand River Avenue (M-43) (2.6 miles). Horizontal drilling will take place under a railroad track and beneath I-96.

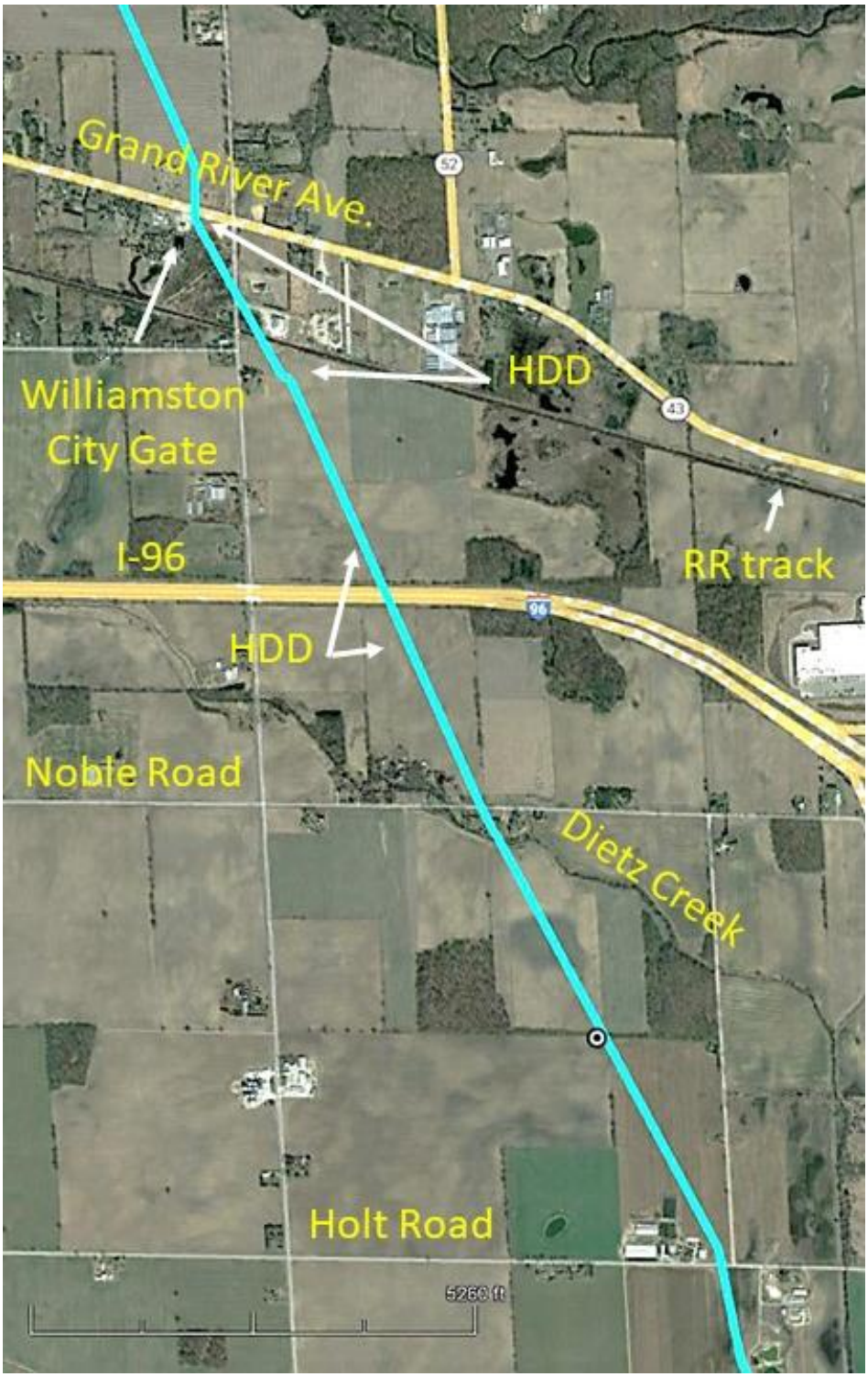

Figure 28. Dietz Creek, south of Noble Road, was the only “major” stream along the route, other than Portage Creek (Figs. 14–15). Note the dearth of trees lining the bank, which would make this poor-quality foraging or commuting habitat.

Appendix B: Horizontal Directional Drilling Sequence and Contingency Measures

Appendix B: Horizontal Directional Drilling Sequence and Contingency Measures

HDD CONSTRUCTION NARRITIVE

1.0 Pre-Construction/Survey

Prior to drilling operations, a pre-survey of the drill path will be made. The HDD superintendent or surveyor will conduct an independent One-Call for the HDD. Data will be collected by the HDD contractor survey such as topographic surface elevations, foreign lines and obstructions. Upon completion of survey, the HDD contractor will create a plan and profile (recreating client provided drawings as closely as possible). The data will then be forwarded to our CAD department for recreation in AutoCAD. Once recreated, the contractor's field survey will approve the design for submittal. At that time, the design will be sent to the owner company for approval to drill as the crossing is drawn, or make changes as needed.

2.0 Equipment Setup

Once entry and exit points are agreed upon, site specific conditions/constraints are then verified. Equipment will be moved onto the job site work space and placed accordingly. Typical preliminary site layout plans which include ingress/egress, water supply notes, and planned equipment staging areas. (See example **attached**)

All environmental and erosion control measures and structures will be installed and maintained before the start of the HDD.

3.0 Pilot Hole/ Bottom Hole Assembly (BHA)

The BHA will consist of a 26' long 6" O.D. monel drill collar with a 6' long 8" orientation sub followed by a jetting assembly with a 10 5/8" mill tooth bit attached in the front. The HDD subcontractor will have spare drilling mud motors and rock bits for contingency.

During pilot hole drilling operations, survey data will be taken on every drilled joint (approximately 31 ft.). The location of the pilot will be calculated and plotted for both horizontal and lateral alignment. This data will be compared to the design alignment/profile and adjustments made if needed to keep within owner tolerances. The survey data and calculated values will be recorded on the "Survey Tabulation" spreadsheet. A sample copy of the tabulation sheet is **attached**. All data will be available for inspection, should the owner company request it. All

data collected during the pilot phase of the crossing will then be sent to our AutoCAD department to plot for an as-built that will be provided after the crossing is successfully pulled back. While drilling the pilot phase, the HDD contractor will utilize either the Gyro, TruTrack or Paratrack steering technology, final determination of which steering tool will be used will be chosen based on the actual start date of the crossing. Should the TruTrack or Paratrack guidance system be used, the HDD contractor will lay a coil grid above ground on each side of center line to assist with the steering methods planned for this crossing. The HDD contractor will keep a daily drill log for each joint drilled during the pilot, this drill log will be supplied to the owner at the end of each shift. The drill log will be kept on file and referenced to by the HDD contractor for the remainder of the crossing during the ream, swab pass and pull phase of the crossing.

The receiving pit on the entry location will be approximately 10x10x6 feet and will hold approximately 4,500 gallons of drilling fluids. The fluids carrying out material from the hole back to this receiving pit will be pumped from a hydraulic submersible pit pump through a 6" lay flat hose and up to the mud system staged on site. The mud system will process the returns through a series of cleaning tanks, desanders, desilters and

shakers to clean out the solids, sands and silts to make the drilling fluids usable to send back downhole again. This process will be repeated throughout the duration of the crossing.

4.0 Reaming

The HDD contractor will plan to start this procedure by means of "push reaming" and will utilize an excavator on exit side of the crossing. The excavator assists in this process of reaming by keeping constant tension on the tail string. The reaming process and number of ream passes will be determined after the completion of the pilot hole based on the following criteria:

a. Formations encountered
b. Penetration rates
c. Stability of the formation
d. Length of crossing
e. Diameter of product pipe

Based on the geological information received, the HDD contractor does expect that the reaming will be at moderate speeds of 50-60 minutes per joint (31'). After the pilot has been established the hole will be enlarged in stages as follows:

1. 42" Ream Pass

The HDD contractor will keep a well-stocked inventory of reamers on site and in the lay down yard nearby to the job site to avoid any delay time waiting for new tooling to progress forward with. They will keep a daily drill log for each joint drilled during each ream pass, this drill log will be supplied to the owner at the end of each shift. The drill log will be kept on file and referenced to by the contractor for the remainder of the crossing. All previous drill logs will be referenced while reaming. Past logs will show the contractor how each joint being reamed responded to the pass prior.

The receiving pit during reaming operations will be approximately 30x15x6 feet and will hold approximately 20,000 gallons of drilling fluids. The fluids carrying out material from the hole back to this receiving pit will be pumped from a hydraulic submersible pit pump through a 6" lay flat hose and up to the mud system staged on site. The mud system will process the returns through a series of cleaning tanks to clean out the solids, sands and silts to make the drilling fluids usable to send back downhole again. This process will be repeated throughout the duration of the crossing.

5.0 Mud & Drill Process Monitoring

Numerous activities are monitored throughout the entire drilling operation. These include, but are not limited to, viscosity testing of drill mud, pH levels, sand content % by volume, monitoring of drill times, pull & push pressures, rotary torque, R.P.M., differential, type of formation, mud pressures, and GPM being pumped. By tracking all of this information, the HDD contractor has the ability to refer back to records of what worked best while drilling various formations. This makes the operation more efficient on subsequent ream passes and drills when applied. While the pilot is being drilled this information also helps the contractor monitor pump volume and pump pressure to assure that all precautions are taken to minimize the risk of inadvertent returns.

The HDD contractor will monitor drill pressures down hole on instruments inside the drill cab. Should a spike or major pressure decrease take place, the contractor will analyze and take corrective actions. The contractor will also keep visual notes of the return flow coming into the receiving pits of the bore hole. The contractor will also visually inspect the center line of the bore path a minimum of twice per day and also pay close attention to the cleaning tanks fluid levels found in the mud recycling system. If any of these mud volume problems occur the contractor will make note and stop moving forward with the drilling process by

retracting the drill head and pull the tooling back towards the drill rig; also at this time the center line of the bore path will be inspected for mud to surface up to the point before the tooling was retracted. The tooling is retracted to the drill rig to help clean any debris (cuttings) from the bore path which commonly causes the blockage of flow to the receiving pits.

6.0 Mud/Swab Pass

After the reaming operation is complete, one or more swabs will be pulled from the exit side to the entry side. Final determination of the mud pass assembly will be decided by actual drilling formations encountered during the bore hole operations. The purpose of this pass is to evacuate cuttings from the bored hole to facilitate an easier pullback. The number of swab passes will be determined by the contractor based on pull forces and rotary torques observed during the first swab pass.

7.0 Pull Back

Once the pullback commences, it will continue on a 24 hour per day schedule until the pipe is pulled into place or the pull back is stopped. The work areas will be properly illuminated on entry and exit sides. The pullback assembly for the HDD will consist of a reamer shackled to a pull swivel. All threaded connections for this assembly will have proper Make up Torque (MUT) applied. To ensure the proper MUT, the contractor will torque the connections between the reamer and pull head by adding the assembly at the drill rig. Utilizing the rig's rotary torque gauges, the contractor will torque the assembly to proper MUT. Secondly, the contractor will use the industry practice of applying the buckup/breakout wrenches and re-torque to proper MUT. The assembly will then be transported to the pipe side. On pipe side, the assembly will be added to the pull section prior to pull. At that time, using the rig from entry side, the backup will again be used to torque through the entire string. Welded straps may be added on the outside of the tool joints to help reduce the risk of unthreading. If straps are welded, proper welding procedures (pre-heat, cooling, etc.) will be to maintain the integrity of the drill steel.

Note:

8.0 Cleanup/Demobilize

Upon completion of a successful pullback of the product pipe, the HDD contractor will demobilize all equipment to a predetermined staging area and clean up and restoration of the site will take place.

9.0 Notification

The drill crew will be responsible for immediately notifying Client's Operations Coordinator (or Project Manager if the Operation Coordinator is unavailable) should any problems arise out of the ordinary on the drill site, the drill supervisor and Client will immediately assess the situation.

CONTINGENCY MEASURES

1.0 Equipment Malfunction

The HDD contractor generally carry spare motors, pumps and all the major components of the rig on-site tool van trailer. A roster, indicating major spares parts and equipment, will be maintained on-site. Once every 1-3 years each rig is overhauled by the contractor and includes members of the respective crew. Doing this allows each crew member of the rig to know the workings of the machines and how to properly repair, should a breakdown occur in the field. The maintenance involves the removal, rebuilding and replacing of all hydraulic and electrical components. All wearable items are also rebuilt and/or replaced (i.e., pins and bushing) bringing each rig to like-new condition.

2.0 Pilot Hole Deviations

The pilot hole will be drilled to agreed tolerances relating to alignment, elevation, curvature, three joint average and exit location. Survey data will be available at all times and distributed on a daily basis. Should the pilot hole data deviate from the design plans, the contractor will attempt to trip back and try to regain the hole along the proposed alignment. Should the HDD contractor be unsuccessful in aligning the pilot, the superintendent will notify the Owner and submit a variance request to determine whether the pilot location shall be deemed acceptable or the best course of action to be taken.

3.0 High Torque While Reaming

If torque builds up during the reaming phase, the reamer will be retracted from the hole until torque levels lower to acceptable levels. Often, the reamer does not need to be completely retracted from the hole. If after completely retracting the reamer, torque values are still high, a small diameter swab or jetting sub will be tripped through the hole.

4.0 Pipe Stuck During Pullback

The contractor will have a 24" Hammer with all the attachments or have one nearby for forward ramming or pipeline retraction. A lighter wall thickness pup will be welded to the end of the pipe directly in front of the hammer. This will mitigate any damage to the product pipe caused by the hammering action. The hammer will be attached to the end of the pull section with the use of segments. An excavator will hold the hammer with a heavy load strap while it is seated into the segments. The air compressor and hoses will follow the pipe as it is being pulled.

5.0 Loss of Downhole Tooling

Depending on the tooling lost downhole, the HDD contractor will have mobilized to site either a fishing tool or hook to insert downhole to the tooling location and "hook" the tool and pull it out of the hole or a magnet sub to catch the metal tooling lost downhole.

6.0 Spills involving hazardous fluids

The HDD contractor will have secondary containments under all stationary equipment. All containments will be built strategically to reduce any risk of spilled fluids onto the surface of the ground or timber mat job pad. Should ANY fluid be spilled, the contractor will immediately notify the on-site inspector and The Owner's representation. Should a spill occur, the contractor will clean and dispose of the contamination and seek approval of the clean up by the onsite Environmental Inspector or Owner Representative.

EXAMPLE SURVEY TABULATION SHEET

CUSTOMER: _____
LOCATION: _____
JOB #: _____
ENGINEER: _____
PROBE #: _____
ENTRY ELE: 0.00
EXIT ELE: 0.00
TIE-IN AWAY 0.00
TIE-IN R/L 0.00

FILE NAME:
BIT-SENSOR
VICE-ENTRY
T.F.O.
BHA
TOTAL HD
TOTAL MD
COIL FILE(S)
TIE IN STA: _____

SURVEY TABULATION SHEET

Date	Time	Jt.	Pipe Length			Inclination			Azimuth		Magnetics		Station	Pipeline	Calculated		Trutrack		Comments
						Build	Radius												
		No.	CL	MD	Raw	Per Jt.	3 Jt. Average	Status	Raw	Line	H Tot.	Dip	Away	Station	L/R	Ele.	L/R	Ele.	
		1												00+00.00					
		2				0.00				#DIV/0!				00+00.00					
		3				0.00				#DIV/0!				00+00.00					
		4				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
		5				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
		6				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
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		36				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
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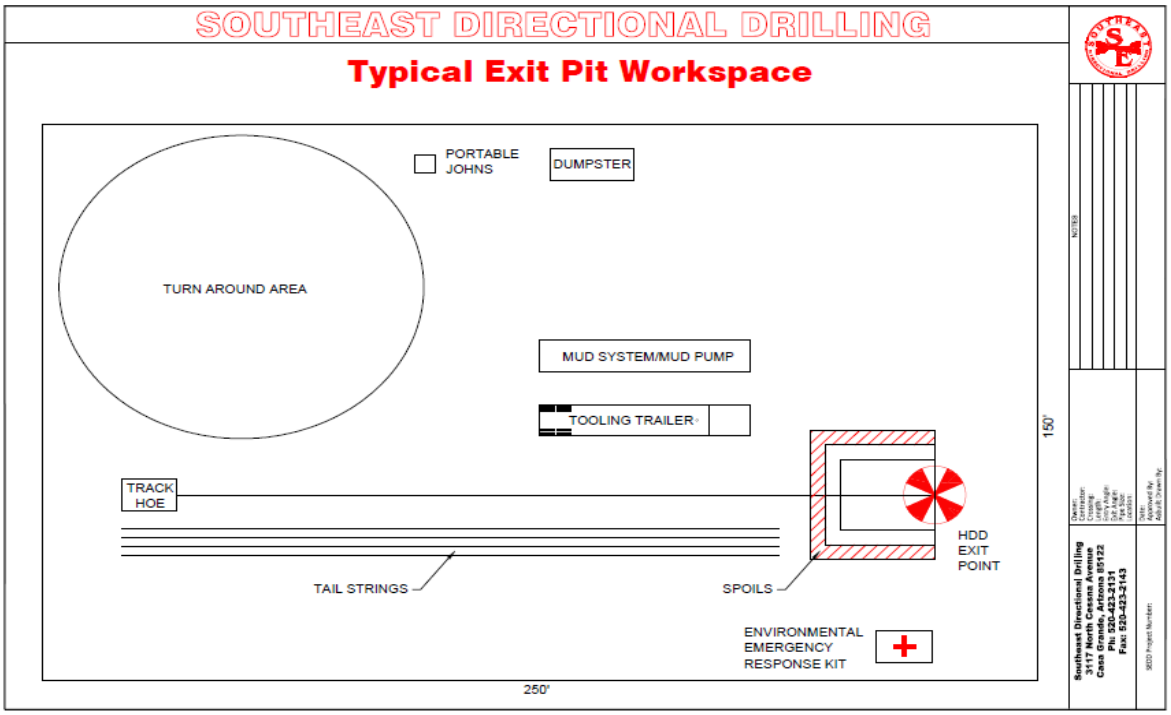
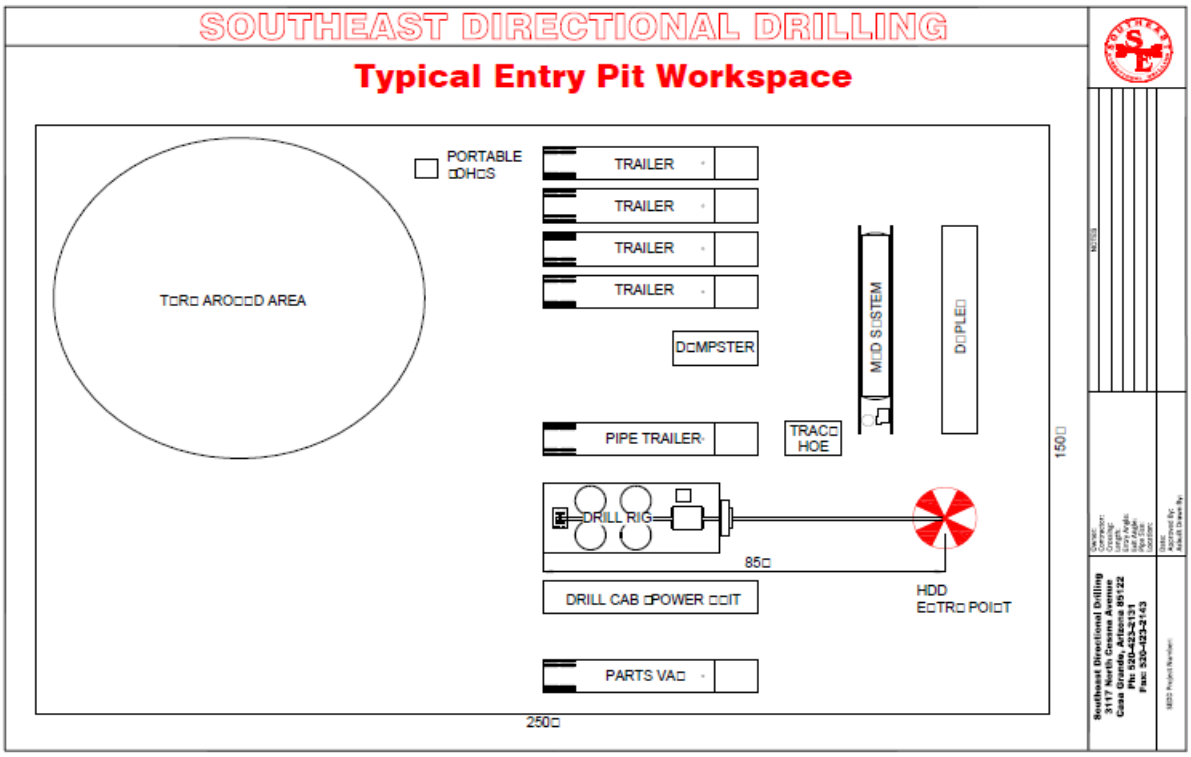
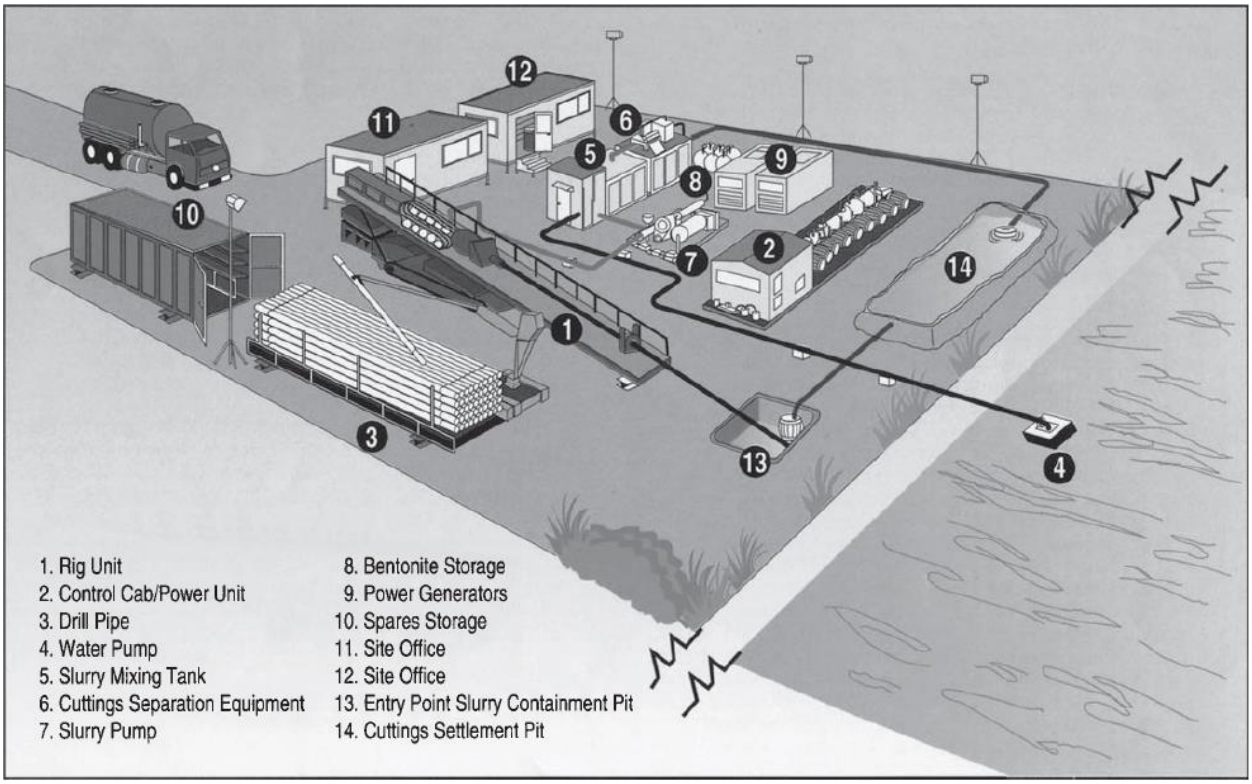
		41				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
		42				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
		43				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
		44				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
		45				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
		46				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					
		47				0.00	#DIV/0!	#DIV/0!		#DIV/0!				00+00.00					

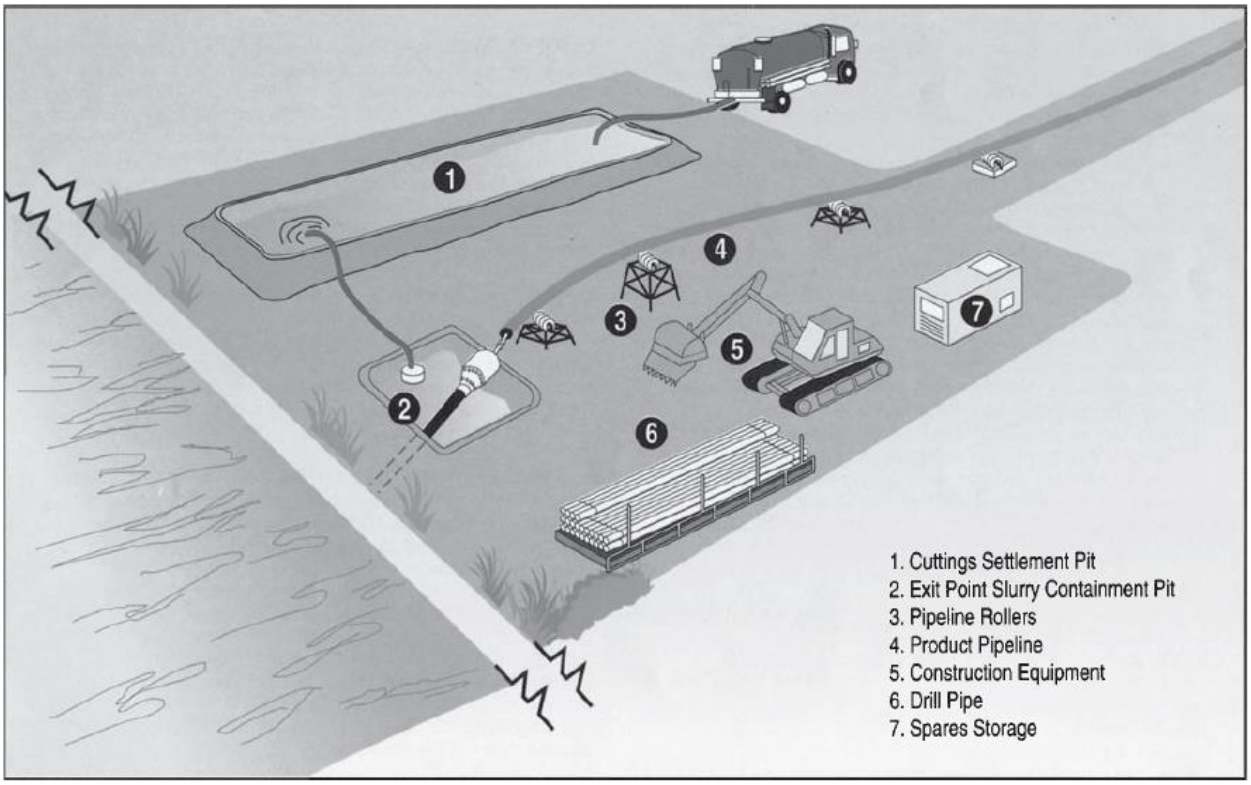
SAMPLE WORKSPACE LAYOUT





SAMPLE HDD CONSTRUCTION METHOD





Appendix C: Consumers Energy Mid-Michigan Pipeline Project Restoration Activities

Appendix C: Consumers Energy Mid-Michigan Pipeline Project Restoration Activities

General

Three components of pipeline construction, which aren't restoration activities per se, are integral to restoration success:

1. Environmental training –

Every person receives thorough environmental and safety training before they start any on-site work. Environmental training includes general requirements, such as erosion control BMPs and water-pumping practices, as well as project-specific requirements, such as State Park stipulations and Eastern Massasauga Rattlesnake protocols.

2. Equipment cleaning –

Equipment that will be used on the pipeline corridor is cleaned before it's transported to the ROW to avoid propagation of invasive species.

3. Topsoil preservation –

Ample, healthy topsoil is an important element of successful restoration. To that end, clearing activities conducted at the onset of construction are completed carefully to remove vegetation and tree stumps, while preserving topsoil integrity and minimizing the amount of vegetative debris left behind. The next crew, grading, strips all topsoil in upland areas, except from the edge of the workspace where topsoil is stockpiled. Wetland topsoil is segregated later, as part of pipeline trench excavation. Topsoil piles are left alone until restoration activities begin near the conclusion of the project.

Wetland Restoration

After completion of clearing activities and timber construction-mat placement, wetlands are only minimally disturbed (e.g. by distributing and welding pipe) until the contractor digs the trench to bury the pipeline. Then, typically within a 1- to 2-day time window, two construction crews work through any given wetland in quick succession. The first crew strips topsoil from over where the trench will be excavated, and piles it along the edge of the workspace, then digs the pipeline trench. The second crew, following closely behind, lowers the previously welded pipeline into the bottom of the trench, backfills the excavation with subsoil, and restores the topsoil. Wetlands are touched-up as needed by the final restoration crew, during which silt fence and construction mats are removed, workspace edges are blended with the adjacent ground surface, and any final smoothing or roughening of the wetland surface is completed. Uplands adjacent to wetlands are stabilized to control erosion, and the contractor's environmental crew will install temporary sediment-control measures (silt fence, and/or biologs) at upland-wetland boundaries, where needed. A series of photos illustrating Consumers' typical wetland restoration work is provided on page four (4) of this appendix.

Following soil restoration and erosion-control activities, a separate team will return, typically during the dormant seeding season, to sow a seed mix of native vegetation and forbs throughout the workspace in each wetland, and to plant where designated bare-root tree and shrub seedlings outside of Consumers' permanent easement. An example wetland seed mix used in previous Consumers restoration projects is included on page eight (8). The Michigan DNR has requested Consumers not sow seed in its wetlands, but instead allow the

exiting roots and seed stock in the topsoil to revegetate the construction workspace. Consumers will monitor wetland recovery annually for five years, to control invasive species and to sow additional seed as needed.

Upland Restoration

This appendix describes Consumers' typical upland restoration practices in non-agricultural and non-lawn areas (aka "wild areas"). Restoration begins after the pipeline is welded together, lowered into the excavation, and backfilled with the excavated subsoil. The pipeline contractor will remove all construction debris, larger rocks, silt fence, etc. from the workspace before grading subsoil as needed to re-establish the pre-construction land form. Once the subsoil is shaped correctly, the contractor will spread and smooth the stockpiled topsoil evenly across the workspace, blending the edges to match the ground surface adjacent to the construction workspace. The on-site environmental inspector will work with the foreman and/or equipment operator(s) as necessary to locate and create waterbars (aka diversion berms) where needed to control erosion on long/steep slopes.

The contractor will sow seed once the earthwork is complete. Consumers will communicate with landowners and land-management personnel (e.g. DNR officials), as applicable to determine what seed mix will be sown on each parcel. For landowners who want to mow the newly cleared area, the contractor will sow a residential lawn seed mix. Land that will go into farm production will not be seeded. Most wild areas, however, will be sown with a pollinator-friendly, native prairie wildflower mix. An example upland seed mix used in previous Consumers restoration projects is included on page nine (9).

After sowing seed, the contractor will blow & crimp straw mulch on flatter upland areas and on gentle slopes. Steep slopes will be stabilized with closely pinned, erosion-control blanket instead of mulch. The erosion-control blanket will have leno weave (or equivalent) top and bottom netting that contains no monofilament-type material, so openings can and will expand in size by a wriggling animal. Netting will be natural fiber, with openings no larger than 1 inch in any direction. Blanket contents will be weed-free, natural materials (e.g. straw, coir, etc.), and be approximately ¼ inch thick.

Permanent post-construction environmental controls will sometimes augmented with additional temporary BMPs, such as well-install silt fence and/or biologs, which Consumers will remove once permanent vegetation is sufficiently established. There will likely be multiple small areas that required additional restoration during the summer following each phase of construction. A series of photos illustrating Consumers' typical upland restoration work is provided on page five (5) of this appendix.

Stream Restoration

Except for careful woody vegetation removal (e.g. with chainsaws) and bank disturbance necessary for construction-bridge installation, streams are not disturbed until the pipeline is installed. Stream crossings are completed, from start to finish, typically in one (sometimes very long) day, by a single specialized team, called a tie-in crew. Except for HDD crossings, any water flow in a stream, at the time of pipeline construction, will be conveyed across the workspace either by sandbags and a culvert, or more commonly, by sandbags and pump(s), so in-stream work is performed in dry conditions. After the pipeline is installed and backfilled, the tie-in crew will restore the stream profile, and spread topsoil on the banks. After bed and banks are re-established, sandbags are slowly removed to gradually restore streamflow across the workspace.

Streams that don't have banks, but are flowing open water areas in wetlands, will be restored as described in Wetland Restoration.

Because stream crossings typically wrap-up afterhours, the contractor's environmental crew usually finishes stabilizing streams with banks the next morning, instead of the night the tie-in crew is done. This typically involves hand-raking the banks; cutting protruding roots and removing other obstructions that might interfere with restoration activities, sowing perennial seed plus a healthy portion of oats, or some other rapidly germinating annual cover crop; covering the banks with well-pegged, natural-fiber, erosion control blanket; and usually re-installing silt fence. Through this process, the stream is transformed from essentially undisturbed, to pipeline installed and restored in usually 1½ days. The perennial seed (native prairie wildflower mix) and erosion-control blanket used are as described in Upland Restoration.

The only exception to this is the narrow portion of the stream under the temporary construction bridge, which must remain in place until pipeline construction project is complete. Bridges are removed by the restoration crew that works behind all the other crews. When the bridge is removed, the banks will be restored and stabilized as described above. A series of photos illustrating Consumers' typical stream restoration work is provided on page six (6) of this appendix.

Agricultural Land Restoration

After subsoil contours and drainage patterns are restored on agricultural land, the contractor next alleviates any soil compaction, and removes all rock greater than 4-inch diameter from the surface of the subsoil. Then they spread the topsoil evenly across the ROW, and again remove any rock larger than 4-inch diameter. If any farm tract has potentially erosive slope(s), Consumers will request permission from the farmer to sow a temporary cover crop (e.g. oats, winter wheat, etc.) and spread straw mulch to help stabilize the soil until the farmer can plant crops the following spring; that is, unless the farmer is planning to plant an autumn crop. On steeper agricultural slopes, Consumers will also request permission form the farmer to install additional temporary erosion controls (e.g. silt fence and/or biologs) to further control erosion. Consumers will remove these BMPs the following year, shortly before the onset of spring planting. A series of photos illustrating Consumers' agricultural land restoration work is provided on page seven (7) of this appendix.

HDD Restoration

The HDD drill path should not require any restoration, however, the workspace at each end of the HDD will be restored according to the land-use of the area (e.g. upland, agriculture), as described above.

Consumers Energy Mid-Michigan Pipeline Project
Typical Wetland Restoration Photos

PHOTOGRAPHS

Pre-construction photo

After pipeline installation

Wetland restoration in progress

Wetland restoration nearly complete

Completed wetland restoration

Photo taken one year after restoration

Consumers Energy Mid-Michigan Pipeline Project
Typical Upland Restoration Photos

PHOTOGRAPHS

Clearing activities

Stripped topsoil – left side of photo

Topsoil restored after pipeline installation

Sowing seed

Crimped mulch, plus biologs on potentially erosive slope

Native grasses and forbs two years after pipeline construction

Consumers Energy Mid-Michigan Pipeline Project
Typical Stream Restoration Photos

PHOTOGRAPHS

Pre-construction photo

During pipeline installation, with dam & pump stream-flow bypass

After pipeline installation – banks restored except bridge location

Banks fully restored after bridge removal

Photo taken 3 weeks after restoration

Photo taken one year after restoration

Consumers Energy Mid-Michigan Pipeline Project
Typical Agricultural Restoration Photos

PHOTOGRAPHS

Stripping topsoil at onset of construction

Decompacting subsoil during restoration

Removing excess rock

Restoring topsoil

Restored farm field

Erosive field stabilized with CAT tracking and winter wheat

Snelson-CE.SaginawTrail - SMW - 2019
Table 6 Wetland Summary ALT9.17
9/17/2019

Grasses,Sedges, Rushes, etc.	Common Name	PLS Oz/A	Total PLS Oz.	Seeds per sq. ft.	% by weight	% by native seeds
Carex comosa	Bristly Sedge	1.16	52.00	0.80	1.79%	0.38%
Carex cristatella	Crested Sedge	2.13	96.00	2.89	3.31%	1.37%
Carex frankii	Frank's Sedge	2.18	98.00	0.85	3.37%	0.40%
Carex vulpinoidea	Fox Sedge	4.44	200.00	10.20	6.89%	4.83%
Eleocharis palustris	Great Spike Rush	0.30	13.60	0.35	0.47%	0.17%
Elymus virginicus	Virginia Wild Rye	14.00	630.00	1.35	21.69%	0.64%
Glyceria striata	Fowl Manna Grass	1.33	60.00	4.90	2.07%	2.32%
Juncus effusus	Soft Rush	1.00	45.00	22.96	1.55%	10.86%
Leersia oryzoides	Rice Cut Grass	0.50	22.50	0.39	0.77%	0.18%
Scirpus atrovirens	Dark Green Bulrush	1.00	45.00	10.56	1.55%	5.00%
Scirpus cyperinus	Wool Grass	0.75	33.75	29.27	1.16%	13.85%
Scirpus fluviatilis	River Bulrush	0.50	22.50	0.05	0.77%	0.02%
Scirpus pungens	Three square Rush	1.00	45.00	2.87	1.55%	1.36%
Scirpus validus	Soft-stem Bulrush	2.50	112.50	1.78	3.87%	0.84%
	Grasses Oz per Acre	**32.80**		**Grasses sds/sq ft**	**Total**	**Total**
	Grasses Lbs per Acre	**2.05**		**89.21**	**50.82%**	**42.21%**

Forbs, Shrubs, Vines, etc.	Common Name	PLS Oz/A	Total PLS Oz.	Seeds per sq. ft.	% by weight	% by native seeds
Acorus americanus	Sweet Flag	0.50	22.50	0.08	0.77%	0.04%
Actinomeris alternifolia	Wingstem	1.00	45.00	0.21	1.55%	0.10%
Alisma subcordatum	Common Water Plantain	2.50	112.50	3.44	3.87%	1.63%
Asclepias incarnata	Swamp Milkweed	2.50	112.50	0.28	3.87%	0.13%
Aster novae-angliae	New England Aster	0.40	18.00	0.61	0.62%	0.29%
Aster puniceus	Swamp Aster	0.25	11.25	0.46	0.39%	0.22%
Bidens cernua	Nodding Bur Marigold	2.00	90.00	0.96	3.10%	0.46%
Cassia hebecarpa	Wild Senna	2.00	90.00	0.06	3.10%	0.03%
Eupatorium perfoliatum	Boneset	1.25	56.25	4.59	1.94%	2.17%
Helenium autumnale	Sneezeweed	2.00	90.00	5.97	3.10%	2.82%
Iris virginica	Southern Blue Flag Iris	4.00	180.00	0.09	6.20%	0.04%
Lobelia cardinalis	Cardinal Flower	0.25	11.25	2.30	0.39%	1.09%
Lobelia siphilitica	Great Blue Lobelia	0.25	11.25	2.87	0.39%	1.36%
Lycopus americanus	Water Horehound	0.50	22.50	1.49	0.77%	0.71%
Mimulus ringens	Monkey Flower	1.50	67.50	79.20	2.32%	37.48%
Penthorum sedoides	Ditch Stonecrop	0.40	18.00	11.94	0.62%	5.65%
Rudbeckia laciniata	Golden Glow	0.75	33.75	0.24	1.16%	0.11%
Sagittaria latifolia	Common Arrowhead/Duck Potato	2.13	96.00	2.99	3.31%	1.41%
Sparganium eurycarpum	Common Bur Reed	4.00	180.00	0.05	6.20%	0.02%
Thalictrum dasycarpum	Purple Meadow Rue	0.10	4.50	0.03	0.15%	0.01%
Verbena hastata	Blue Vervain	1.50	67.50	3.20	2.32%	1.52%
Vernonia gigantea	Tall Ironweed	1.96	88.00	1.08	3.03%	0.51%
	Forbs Oz per Acre	**31.74**		**Forbs sds/sq ft**	**Total**	**Total**
	Forbs Lbs per Acre	**1.98**		**122.12**	**49.18%**	**57.79%**

Annuals, Temp Nurse Crop, etc.	Common Name	PLS Oz/A	Total PLS Oz.	Temp Seeds per sq. ft.
Lolium multiflorum	Annual Rye	100.00	4500.00	30.99
Avena sativa	Seed Oats	360.00	16200.00	8.26
	Temp Oz per Acre	**460.00**		**Temp sds/sq ft**
	Temp Lbs per Acre	**28.75**		**39.26**

Total PLS Lbs/Acre 'Natives'	4.03
Total Lbs/Acre 'ALL'	32.78

Total Acres	45.00
Total PLS Lbs 'Natives'	181.51
Total PLS Lbs 'ALL'	1,475.26

# of Native Grass Species	14
# of Native Forb Species	22
# of Temp Species	2

Mix 'Natives'	weight (lbs)	seeds/sq ft
Total per acre	**4.03**	**211.34**
% Forbs	49.18%	57.79%
% Grasses	50.82%	42.21%

Mix 'ALL'	weight (lbs)	seeds/sq ft
Total per acre	**32.78**	**250.59**
% Forb Spp	6.05%	48.73%
% Grass Spp	6.25%	35.60%
% Temp Spp	87.70%	15.67%

Native Connections
17080 Hoshel Rd
Three Rivers, MI 49093
www.nativeconnections.net

NOTES: Species available as listed above. All species to be adjusted to 100% PLS (Pure Live Seed).

CST Pipeline-Mix adjustments-SMW-2020
Table 2 Upland Mix Summary
4/20/2020

Grasses,Sedges, Rushes, etc.	Common Name	PLS Oz/A	Total PLS Oz.	Seeds per sq. ft.	% by weight	% by native seeds
Carex molesta	Field Oval Sedge	0.50	2.50	0.29	0.79%	0.91%
Elymus canadensis	Canada Wild Rye	16.00	80.00	1.91	25.36%	6.04%
Juncus tenuis	Path Rush	0.25	1.25	5.74	0.40%	18.15%
Schizachyrium scoparium	Little Bluestem	16.00	80.00	5.51	25.36%	17.42%
	Grasses Oz per Acre	**32.75**		**Grasses sds/sq ft**	**Total**	**Total**
	Grasses Lbs per Acre	**2.05**		**13.45**	**51.90%**	**42.52%**

Forbs, Shrubs, Vines, etc.	Common Name	PLS Oz/A	Total PLS Oz.	Seeds per sq. ft.	% by weight	% by native seeds
Asclepias syriaca	Common Milkweed	0.50	2.50	0.05	0.79%	0.15%
Asclepias tuberosa	Butterfly Milkweed	0.50	2.50	0.05	0.79%	0.16%
Aster novae-angliae	New England Aster	0.25	1.25	0.38	0.40%	1.20%
Cassia fasciculata (Chamaecrista f.)	Partridge Pea	8.00	40.00	0.50	12.68%	1.57%
Desmodium canadense	Showy Tick Trefoil	1.00	5.00	0.13	1.58%	0.40%
Echinacea purpurea	Purple Coneflower	4.00	20.00	0.61	6.34%	1.92%
Helianthus maximilliani	Maximillian's Sunflower	4.00	20.00	1.19	6.34%	3.78%
Heliopsis helianthoides	False sunflower	2.00	10.00	0.29	3.17%	0.91%
Monarda fistulosa	Wild Bergamot	0.50	2.50	0.80	0.79%	2.54%
Oenothera biennis	Common Evening Primrose	2.00	10.00	4.13	3.17%	13.07%
Petalostemum purpureum (Dalea p.)	Purple Prairie Clover	1.50	7.50	0.62	2.38%	1.96%
Ratibida pinnata	Yellow Coneflower	1.00	5.00	0.69	1.58%	2.18%
Rudbeckia hirta	Black-eyed Susan	3.50	17.50	7.39	5.55%	23.38%
Solidago ohioensis	Ohio Goldenrod	0.25	1.25	0.63	0.40%	2.00%
Verbena stricta	Hoary Vervain	0.75	3.75	0.48	1.19%	1.52%
Vernonia missurica	Missouri Ironweed	0.35	1.75	0.18	0.55%	0.56%
Zizia aurea	Golden Alexander	0.25	1.25	0.06	0.40%	0.20%
	Forbs Oz per Acre	**30.35**		**Forbs sds/sq ft**	**Total**	**Total**
	Forbs Lbs per Acre	**1.90**		**18.17**	**48.10%**	**57.48%**

Annuals, Temp Nurse Crop, etc.	Common Name	PLS Oz/A	Total PLS Oz.	Temp Seeds per sq. ft.
Lolium multiflorum	Annual Rye	48.00	240.00	14.88
Avena sativa	Seed Oats	192.00	960.00	4.41
Trifolium pratense (inoculated)	Medium Red Clover	24.00	120.00	9.37
	Temp Oz per Acre	**264.00**		**Temp sds/sq ft**
	Temp Lbs per Acre	**16.50**		**28.65**

Native Connections
17080 Hoshel Rd
Three Rivers, MI 49093
www.nativeconnections.net

Total PLS Lbs/Acre 'Natives'	3.94
Total Lbs/Acre 'ALL'	20.44

Total Acres	5.00
Total PLS Lbs 'Natives'	19.72
Total PLS Lbs 'ALL'	102.22

# of Native Grass Species	4
# of Native Forb Species	17
# of Temp Species	3

Mix 'Natives'	weight (lbs)	seeds/sq ft
Total per acre	**3.94**	**31.62**
% Forbs	48.10%	57.48%
% Grasses	51.90%	42.52%

Mix 'ALL'	weight (lbs)	seeds/sq ft
Total per acre	**20.44**	**60.27**
% Forb Spp	9.28%	30.16%
% Grass Spp	10.01%	22.31%
% Temp Spp	80.71%	47.54%

NOTES: Recommended adjustments based on 2019 observations and feedback. Species subject to availability at time of order. All species to be adjusted to 100% PLS (Pure Live Seed).

Appendix D: Consumers Energy Mid-Michigan Pipeline Project Wetland and Stream Restoration and Mitigation Plan

HERPETOLOGICAL RESOURCE & MANAGEMENT

Consumers Energy
Count on Us®

Wetland and Stream Restoration and Mitigation Plan

Consumers Energy – Mid-Michigan Pipeline Project

Washtenaw, Livingston, Ingham, Shiawassee, and Clinton Counties, Michigan

Prepared for:

Consumers Energy

Project No. 21-09-015

HOLLAND ENGINEERING

Engineering | Surveying | Pipeline | Environmental

HOLLAND ENGINEERING

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HOLLAND ENGINEERING

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1 Objectives

1.1 Resource Impacts

Consumers Energy, in the construction of the Mid-Michigan pipeline replacement, proposes to temporarily and permanently impact portions of 116 wetlands totaling 60.23 acres in Washtenaw, Livingston, Ingham, Shiawassee, and Clinton Counties, Michigan (**Figure 1**). Wetlands were delineated by Midwest Natural Resources (MNR) and Barr Engineering, and field verified and adjusted by Holland Engineering (HEI). Additional wetlands were delineated by HEI to accommodate route changes. As per construction plans, it is anticipated that a total of 6.81 acres of forested wetlands will be permanently impacted. The forested wetlands will be converted to emergent and shrub-scrub wetlands upon completion of construction and mitigated for through the purchase of wetland bank credits Emergent, shrub-scrub, and special wetland types will be permanently impacted for the permanent facilities and mitigated for through bank credits and on-site mitigation. The remaining forested, emergent, and shrub-scrub wetlands will experience temporary impacts and will be restored upon completion of construction (**Table 1-1**).

Table 1-1: Summary of Project Wetland Impacts

Wetland	Type	Acres of Impact*
PFO	Permanent/Conversion to PEM/PSS	6.81
PFO	Temporary	4.65
PSS	Temporary	7.77
PSS	Permanent/Conversion to Upland	0.34
PEM	Temporary	39.64
PEM	Permanent/Conversion to Upland	0.36
POW/Open Water	Temporary	0.64

*Rounded

1.2 Resource type, amount and functions gained at mitigation bank site

The permanent conversion impacts to forested wetlands will be mitigated through the purchase of wetland bank credits at a 1:1 ratio. The permanent impacts to emergent, shrub-scrub, and special wetland types will be mitigated through on-site mitigation and the purchase of wetland bank credits. The bank credits for the forested wetland conversion and Wetland 204 impacts will be purchased from the Gunnell Farms Wetland Mitigation Bank, Sanstone Wetland Mitigation Bank, Krummrey Wetland Mitigation Bank or one of Niswander's Huron River Watershed Wetland Mitigation Banks. In the event a sufficient number of credits are not available, EGLE staff will be

consulted and credits will be purchased from the closest wetland bank with forested credits available.

The majority of the impacts to the wetlands on the new and existing ROW will be temporary as the wetlands will be restored back to their original condition through topsoil segregation, plantings, and/or native wetland seed mixes. The forested conversion impacts will occur within the 60 to 90 feet of permanently maintained ROW. To limit wetland impacts, trees will be planted back outside of the maintained ROW, setback from the pipe, but within the construction ROW. The recommended species for plantings and/or seed mixes are based on the field surveys and what is known to occur in the county historically. If a species is not available, a suitable replacement species will be used.

Table 1-2: Summary of Wetland Mitigation

Wetland Name	Type	Acres of Impact	Mitigation Ratio
Wetland 015	Forested Conversion	0.08	1:1
Wetland 016	Forested Conversion	0.05	1:1
Wetland 017	Forested Conversion	0.03	1:1
Wetland 024	Forested Conversion	0.02	1:1
Wetland 033	Forested Conversion	0.02	1:1
Wetland 042	Forested Conversion	0.12	1:1
Wetland 046	Forested Conversion	0.02	1:1
Wetland 060	Forested Conversion	0.27	1:1
Wetland 062	Forested Conversion	0.17	1:1
Wetland 063	Forested Conversion	0.02	1:1
Wetland 076	Forested Conversion	0.05	1:1
Wetland 077	Forested Conversion	0.00	1:1
Wetland 081	Forested Conversion	0.08	1:1
Wetland 093	Forested Conversion	0.76	1:1
Wetland 094	Forested Conversion	0.16	1:1

Wetland Name	Type	Acres of Impact	Mitigation Ratio
Wetland 096	Forested Conversion	0.40	1:1
Wetland 097	Forested Conversion	0.03	1:1
Wetland 099	Forested Conversion	0.03	1:1
Wetland 104	Forested Conversion	0.03	1:1
Wetland 107	Forested Conversion	0.09	1:1
Wetland 111	Forested Conversion	0.10	1:1
Wetland 116	Forested Conversion	0.54	1:1
Wetland 126	Forested Conversion	0.02	1:1
Wetland 130	Forested Conversion	0.10	1:1
Wetland 148	Forested Conversion	0.13	1:1
Wetland 151	Forested Conversion	0.29	1:1
Wetland 152	Forested Conversion	0.50	1:1
Wetland 156	Forested Conversion	0.08	1:1
Wetland 159	Forested Conversion	0.09	1:1
Wetland 160	Forested Conversion	0.04	1:1
Wetland 161	Forested Conversion	0.002	1:1
Wetland 164	Forested Conversion	0.49	1:1
Wetland 172	Forested Conversion	0.38	1:1
Wetland 178	Forested Conversion	0.32	1:1
Wetland 185	Forested Conversion	0.39	1:1
Wetland 190	Forested Conversion	0.02	1:1
Wetland 191	Forested Conversion	0.03	1:1

Wetland Name	Type	Acres of Impact	Mitigation Ratio
Wetland 199	Forested Conversion	0.22	1:1
Wetland 204	Forested Conversion	0.07	1:1
Wetland 215	Forested Conversion	0.12	1:1
Wetland 219	Forested Conversion	0.20	1:1
Wetland 237	Forested Conversion	0.14	1:1
Wetland 238	Forested Conversion	0.10	1:1
Wetland 255	Forested Conversion	0.02	1:1
Wetland 204	PEM Conversion	0.11	1.5:1
Wetland 204	PSS Conversion	0.34	2:1
Wetland 249	PEM Conversion	0.18	1.5:1
Wetland 249	PEM (Wet prairie) Conversion	0.07	5:1

1.3 Responsible parties and responsibilities

Consumers Energy will maintain responsibility for all temporarily impacted wetlands to be restored throughout the monitoring period and the on-site mitigation site. The selected Wetland Bank will maintain responsibility for the mitigation bank site following the purchase of the wetland bank credits.

2 Physical Attributes of the Impacted Sites

The wetland survey was conducted by Midwest Natural Resources, Inc. (MNR) and Barr Engineering. HEI conducted supplemental wetland delineations of new workspace and verified and adjusted MNR/Barr wetland lines in the fall of 2021. Two hundred and sixty-three wetlands were identified within and adjacent to the project workspace. One hundred and sixteen wetlands will be impacted by the project. The wetland delineations were completed using guidance manuals and procedures set forth by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the United States Army Corps of Engineers (USACE). Methods and procedures used for this delineation are in accordance with Part 303, Wetlands Protection, of Act 451 Natural Resources and Environmental Protection Act (NREPA), as amended (1994). Each wetland had positive wetland indicators for vegetation, soils, and hydrology. **Appendix A** contains the MiRAM score tables produced by HEI for impacted wetlands.

2.1 Hydrophytic Vegetation

Dominant plant species observed within the project area were identified and the wetland indicator status for each species was determined from the National Wetland Plant List: Midwest Region (Lichivar et. al. 2016).

2.2 Hydric Soils

All wetland soils met one or more of the field indicators for hydric soils for the USACE *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*, Version 2.0 (USACE, 2011).

2.3 Hydrology Indicators

The wetland hydrology was evaluated using the field indicators from the USACE *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*, Version 2.0 (USACE, 2011)

2.4 Invasive Species

The vegetation in the impacted wetlands included invasive species such as, but not limited to, reed canary grass (*Phalaris arundinacea*, FACW), common reed (*Phragmites arundinacea,* FACW), honeysuckle (*Lonicera* sp.), glossy buckthorn (*Frangula alnus*), and multiflora rose (*Rosa multiflora,* FACU). It is anticipated these species and others throughout the impacted area will proliferate and potentially impact the wetland areas. Invasive species control through hand pulling, selective plantings, and herbicide spraying will be used during restoration and monitoring. Aggressive, less conservative native species will be used in the seed mixes to establish native plant communities that can complete long-term against the invaders.

3 Determination of Credits

Wetland mitigation bank credits will be purchased by Consumers. The permanently impacted forested wetlands will be converted to emergent and shrub-scrub wetlands upon completion of the construction. Therefore, they will be mitigated at a 1:1 wetland conversion ratio. This will result in the purchase of 6.81 acres of forested wetland mitigation bank credits. The emergent and shrub-scrub wetlands (Wetland 204) will be mitigated at a 1.5:1 and 2:1 ratio, respectively. This will result in the purchase of 0.84 acre of emergent or shrub-scrub wetland mitigation bank credits.

4 Mitigation Site

Consumers proposed to complete on-site mitigation for the permanent emergent and wet prairie impacts (Wetland 249). Wetland mitigation banks typically contain common wetland types which would not provide the same function as the impacted wetland. Wet prairies are considered critically imperiled in the state of Michigan and provide essential habitat for a number of plant and animal species including threatened and endangered species. Therefore, the creation of a wet prairie will ensure important ecosystem function is not lost. It is anticipated the wet prairie will provide habitat for numerous species of moths, bees, and butterflies which are currently experiencing high levels of population decline. Additionally, the threatened stiff gentian will be

planted in the created wet prairie along with other appropriate threatened and endangered plant species.

4.1 Site Selection

The proposed mitigation site was selected due to proximity to the existing wetlands, site accessibility, hydrology, and land ownership. The existing wet prairie and emergent wetland are north of the access road. The proposed mitigation site is located directly south and west of the existing wetlands and access road. The mitigation site would be adjacent to the existing stream and appears to have groundwater available below the soil surface. The existing access road would allow for construction of the mitigation site without impacting any additional wetlands. As Consumers owns the property, nothing would interfere with the development of the site.

4.2 Construction Plan

The site will consist of a total of 0.75 acres of wet prairie and wet-mesic prairie. The proposed mitigation site will be constructed by grading to variable depths. The proposed location will have groundwater monitoring equipment installed in the spring/summer of 2022. The groundwater depth will be used to inform the design. The grading of the mitigation site will be irregular. Minor variability in elevation is desirable for diversity in vegetation due to varying soil moisture. However, due to the high groundwater table, there cannot be a large degree of grade variation in order to avoid surpassing the 15% open water constraint.

The wet prairie seed mix has been developed for the restoration areas and will be further modified for the final site design. If possible, the topsoil from the impacted wet prairie will be used in the mitigation site. This will preserve the existing seed bank. Additionally, seed will be collected from the wet prairie in the summer of 2022. Plugs will be used to supplement the seed mix as needed.

Consumers will designate the wetland mitigation area as a Conservation Easement that will restrict further development to the area. The Conservation Easement area will consist of wet prairie, wet-mesic prairie, and an upland buffer.

4.3 Maintenance Plan

Consumers and/or their representatives will conduct routine maintenance at the mitigation site as part of the condition of the EGLE permit during the monitoring period to ensure that proper function and value of the wetland areas are conserved. Invasive species control will be assessed during the annual monitoring period. Based on this annual evaluation, invasive species will be treated and controlled within the site. Methods of control may include herbicide and hand pulling. Other routine maintenance of the site will include, but not be limited to, inspections for trash etc... Findings of the annual inspection of the site and maintenance activities will be included in the yearly monitoring reports.

5 Restoration Work Plan

The wetland will be restored upon the competition of construction. A combination of topsoil segregation, seeding, and plantings will be used to restore the wetlands.

5.1 Vegetation Establishment Plan

The open cut impacted emergent (PEM) wetlands on ROW will be topsoil segregated. The emergent wetlands impacted by timber matting will not be topsoil segregated and are expected to have very minimal impacts from the timber matting. If deemed necessary by the Environmental Inspector, decompaction methods will be used. The impacted scrub-shrub (PSS) and forested (PFO) wetlands will be seeded with a PSS seed mixture across the width of the ROW. The proposed seed and shrub species for the wetland restoration planting areas have been selected to utilize species best able to establish a wetland vegetative community. Species within the wetland seed mixes will help to maintain the diversity and functional value of the temporarily impacted wetland community. The chosen species were identified during the preliminary wetland delineations and field verifications. These areas will be restored to preconstruction grade and restored immediately after construction. They will be seeded in 2023, 2024, and 2025 with the plant species included in the tables below. In the event that a particular species is not available at the time of seeding, a suitable native alternative will be used. The forested wetland impacts for the new ROW will consist of permanent conversion to emergent and/or shrub-scrub wetland. Shrubs and trees will be planted outside the maintained easement. Due to the variability in habitat and soil types, tree species will be selected for each site from **Table 4-5**. Shrub-scrub wetlands being temporarily impacted will be planted with the shrub species listed in **Table 4-4**. In the event a particular species is not available at the time of planting, a suitable native alternative will be used.

Table 5-1: Emergent Seed Mix

Scientific Name	**Common Name**
Alisma subcordatum	Common water plantain
Avena sativa	Seed oats
Andropogon gerardii	Big bluestem
Asclepias incarnata	Swamp milkweed
Aster lateriflorus	Calico aster
Aster novae-angliae	New England aster
Aster puniceus	Swamp aster
Bidens cernua	Nodding bur marigold
Carex bebbii	Bebb's oval sedge
Carex comosa	Bristly sedge
Carex crinita	Fringed sedge
Carex frankii	Frank's sedge
Carex hystericina	Porcupine sedge
Carex stricta	Tussock sedge
Carex vulpinoidea	Fox sedge
Eleocharis acicularis	Spike rush
Eleocharis obtusa	Blunt spike rush
Eleocharis palustris	Great spike rush

Scientific Name	Common Name
Eupatorium maculatum	Joe pye weed
Eupatorium perfoliatum	Boneset
Eupatorium purpureum	Sweet joe pye weed
Glyceria canadensis	Canada manna grass
Helenium autumnale	Sneezeweed
Helianthus giganteus	Tall sunflower
Iris virginica	Southern blue flag iris
Juncus effusus	Soft rush
Juncus torreyi	Torrey's rush
Leersia oryzoides	Rice cut grass
Lobelia cardinalis	Cardinal flower
Lobelia siphilitica	Great blue lobelia
Peltandra virginica	Arrow arum
Penstemon digitalis	Foxglove beardtongue
Penthorum sedoides	Ditch stonecrop
Rumex orbiculatus	Great water dock
Sagittaria latifolia	Common arrowhead/duck potato
Scirpus acutus	Hard-stem bulrush
Scirpus atrovirens	Dark green bulrush
Scirpus cyperinus	Wool grass
Scirpus fluviatillis	River bulrush
Scirpus validus	Soft-stem bulrush
Sisyrinchium angustifolium	Stout blue-eyed grass
Solidago riddellii	Riddell's goldenrod
Sparganium eurycarpum	Common bur reed
Verbena hastata	Blue vervain
Zizia aurea	Golden alexander

Table 5-2: Prairie/Fen Seed Mix

Scientific Name	Common Name
Actinomeris alternifolia	Wingstem
Allium cernuum	Nodding wild onion
Andropogon gerardii	Big bluestem
Angelica atropurpurea	Great angelica
Asclepias incarnata	Swamp milkweed
Aster novae-angilae	New England aster
Aster puniceus	Swamp aster
Aster umbellatus	Flat-topped aster
Avena sativa	Seed oats

Scientific Name	Common Name
Bromus ciliatus	Fringed brome
Calamagrostis canadensis	Bluejoint grass
Carex bebbii	Bebb's oval sedge
Carex stricta	Tussock sedge
Carex vulpinoidea	Fox sedge
Cassia herbecarpa	Wild senna
Coreopsis tripteris	Tall coreopsis
Desmodium canadense	Showy tick trefoil
Eleocharis palustris	Great spike rush
Eupatorium purpureum	Sweet joe pye weed
Gentiana andrewsii	Bottle gentian
Helenium autumnale	Sneezeweed
Helianthus giganteus	Tall sunflower
Heliopsis helianthoides	False sunflower
Hypericum pyramidatum	Great St. John's wort
Liatris spicata	Marsh blazingstar
Lobelia siphilitica	Great blue lobelia
Ludwigia alternifolia	Seedbox
Lythrum alatum	Winged loosestrife
Monarda fistulosa	Wild bergamot
Penstemon digitalis	Foxglove beardtongue
Physostegia virginiana	Obedient plant
Pycnanthemum virginianum	Mountain mint
Ratibida pinnata	Yellow coneflower
Rudbeckia fulgida	Orange Coneflower
Rudbeckia hirta	Black-eyed Susan
Rudbeckia triloba	Brown-eyed Susan
Scirpus cyperinus	Wool grass
Scrophularia lanceolata	Early figwort
Silphium terebinthinaceum	Prairie dock
Solidago ohioensis	Ohio goldenrod
Solidago riddellii	Riddell's goldenrod
Solidago rugosa	Rough goldenrod
Sorghastrum nutans	Indian grass
Spartina pectinata	Prairie cordgrass
Thalictrum dasycarpum	Purple meadow rue
Verbena hastata	Blue vervain
Veronicastrum virginicum	Culver's root
Zizia aurea	Golden Alexander

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Table 5-3: Sedge Meadow Seed Mix

Scientific Name	**Common Name**
Actinomeris alternifolia	Wingstem
Angelica atropurpurea	Great angelica
Asclepias incarnata	Swamp milkweed
Aster novae-angilae	New England aster
Aster puniceus	Swamp aster
Aster umbellatus	Flat-topped aster
Avena sativa	Seed oats
Bidens cernua	Nodding bur marigold
Boltonia asteroids	False aster
Bromus ciliates	Fringed brome
Calamagrostis canadensis	Bluejoint grass
Carex bebbii	Bebb's oval sedge
Carex comosa	Bristly sedge
Carex cristatella	Crested sedge
Carex hystericina	Porcupine sedge
Carex scoparia	Lance-fruited oval sedge
Carex stipata	Awl-fruited sedge
Carex stricta	Tussock sedge
Carex vulpinoidea	Fox sedge
Eleocharis acicularis	Spike rush
Eupatorium maculatum	Joe pye weed
Eupatorium perfoliatum	Boneset
Helenium autumnale	Sneezeweed
Helianthus giganteus	Tall sunflower
Helianthus grosseserratus	Saw-toothed sunflower
Hypericum pyramidatum	Great St. John's wort
Iris virginica	Southern blue flag iris
Juncus effusus	Soft rush
Liatris spicata	Marsh blazingstar
Lobelia cardinalis	Cardinal flower
Lobelia siphilitica	Great blue lobelia
Ludwigia alternifolia	Seedbox
Lycopus americanus	Water horehound
Mimulus ringens	Monkey flower
Monarda fistulosa	Wild bergamot
Physostegia virginiana	Obedient plant
Poa palustris	Fowl bluegrass
Polygonum amphibia	Water knotweed

Scientific Name	Common Name
Pycnanthemum virginianum	Mountain mint
Rudbeckia hirta	Black-eyed Susan
Rudbeckia laciniata	Golden glow
Rumex orbiculatus	Great water dock
Sisyrinchium angustifolium	Stout blue-eyed grass
Solidago riddellii	Riddell's goldenrod
Spartina pectinate	Prairie cordgrass
Verbena hastata	Blue vervain
Vernonia gigantea	Tall ironweed
Zizia aurea	Golden Alexander

Table 5-4: Shrub Species

Scientific Name	Common Name
Alnus incana	Speckled Alder
Cephalanthus occidentalis	Buttonbush
Cornus amomum	Silky Dogwood
Cornus sericea	Red Osier Dogwood
Decodon verticillatus	Whorled Loosestrife
Lindera benzoin	Spicebush
Physocarpus opulifolius	Ninebark
Rosa palustris	Swamp Rose
Sambucus canadensis	Elderberry
Spiraea alba	Meadowsweet
Spiraea tomentosa	Steeplebush

Table 5-5: Tree Species

Scientific Name	Common Name
Acer rubrum	Red maple
Betula alleghaniensis	Yellow birch
Carpinus caroliniana	Musclewood
Carya cordiformis	Bitternut hickory
Carya laciniosa	Shellbark hickory
Larix laricina	Tamarack
Nyssa sylvatica	Black gum
Platanus occidentalis	American sycamore
Quercus bicolor	Swamp white oak
Quercus palustris	Pin oak
Thuja occidentalis	White cedar

5.2 Special Communities

Special communities including floodplain forest, inundated shrub swamp, Southern hardwood swamp, wet prairie, prairie fen, wet-mesic prairie, sedge meadow/southern wet meadow, and dry-sand prairie were identified within the project limits. While special community impacts were avoided as much as feasible, impacts will occur to special communities. Specific seed mixes will be used to ensure all special communities are restored. See **Tables 4-2** and **4-3** for the specific seed mixes. Seed will be collected from the special communities in 2022/2023 in accordance with the DNR Part 365 permit and will be spread during restoration. The collected species include plants listed as threatened, endangered, or special concern as well as unique fen and prairie species.

5.3 Timing/Sequencing

Seeding of the impacted wetland areas will be conducted after completion of construction. Dormant seeding will likely occur in the fall of 2023, 2024, and 2025.

6 Performance Standards

6.1 Success Criteria

The following performance standards will be used to evaluate the restored wetlands during the yearly monitoring per the condition of the EGLE permit.

Wetland Acreage and Type

At the close of the monitoring period, wetland delineations will be performed to verify the restored wetlands match the acreages and linear stream feet in the original delineation/survey and that they possess characteristics of the original wetland habitat. To satisfy EGLE permit requirements, the mitigation bank site will contain a minimum of 6.8 acres of PFO wetland.

Hydrology

Hydrology in the restored wetlands must be characterized by the presence of water at a frequency and duration sufficient to support a predominance of wetland vegetation. In order to comply with the EGLE hydrology requirements, flooding, ponding or saturation within 12 inches of the soil surface must occur for 14 consecutive days, at a minimum. It is anticipated that hydrology within the restored wetlands will be present through saturation, a high surface water table, and/or riverine bank overflow.

Soils

The matting placed in wetlands will protect the wetland soils from rutting. If necessary, decompaction methods will be used after construction. Segregated topsoil will be returned to the temporarily impacted wetlands following the conclusion of the proposed construction activities. The segregation and placement of topsoil will be photo documented as required.

HEI anticipates that the segregated topsoil in the temporarily impacted wetlands will have hydric soil characteristics by the end of the 5-year monitoring period. Evidence of hydric soil will be documented in the wetland monitoring report.

Percent Cover

Consumers will topsoil segregate all wetlands to preserve the current seed bank. Consumers will seed the forested and shrub-scrub wetland restoration areas with the seed mixes identified in **Tables 4-1, 4-2, and 4-3.** The forested wetlands outside the permanent ROW will be planted with the tree species in **Table 4-5**. Shrub-scrub wetlands in temporary workspace will be planted with the shrub species listed in **Table 4-4**. Wetland species planted in the restoration areas will be facultative (FAC) and wetter (FAC, FACW, OBL) according to the Northeast and Northcentral 2016 Regional Wetland Plant List (*Lichvar et. al 2014*). In accordance with EGLE requirements, the following percent cover performance standards will be met within the restoration area:

- Mean percent cover of native and invasive wetland species FAC and wetter in the herbaceous layer at the end of the monitoring period shall not be less than 60 percent for palustrine forested (PFO) wetland type.
- Extensive areas of bare soil shall not exceed five (5) percent of the restoration area.

For the purposes of these performance standards, “extensive refers to areas greater than 0.01 acre (436 square feet) in size”.

Invasive Species

The vegetation in the impacted wetlands on ROW included invasive species such as, but not limited to, reed canary grass (*Phalaris arundinacea*, FACW), purple loosestrife (*Lythrum salicaria*, OBL), Japanese knotweed (*Fallopia japonica*, FACU), barnyard grass (*Echinochloa crus-galli,* FAC), and multiflora rose (*Rosa multiflora,* FACU). It is anticipated these species and others throughout the impacted ROW will proliferate and potentially impact the wetland areas. Since the impacted wetlands on the pipeline ROW possess high densities of invasive species, invasive species percentages were collected and are listed in **Appendix A**. Consumers will not meet a specific maximum percentage of invasive species. Consumers will complete a maximum of 5 years of monitoring and maintenance to pre-existing condition

6.2 Monitoring Requirements

The impacted wetlands will be monitored as specified in the EGLE permit.

Monitoring Schedule, Responsible Parties, and Responsibilities

Consumers proposes that restoration within the right-of-way (ROW) be monitored for a maximum of 5 years. Monitoring will commence in 2024. The monitoring report will compile and summarize all data collected during the monitoring period from January 1 through December 31 and will be submitted to EGLE prior to January 31 of the following year. Consumers will purchase 6.80 acres

worth of forest wetland bank credits from the Wetland Bank upon approval of EGLE and issuance of the wetland permit.

Data Collection Procedures, Assessment Tools, and Methodology

Consumers or their representatives will conduct the following activities and provide the information collected in the monitoring reports:

i. Sample wetland vegetation within the restored wetlands using the transect and plot method. Data collected during monitoring will include the following: common name, scientific name, wetland indicator category from the U.S. Army Corps of Engineers 2016 National Wetland Plant List for Michigan (*Lichivar et al. 2016*), physiognomic classification, and whether the species is considered native according to the Michigan Floristic Quality Assessment (*Michigan Department of Natural Resources, 2001*).
ii. Delineate any extensive (greater than 0.01 acre in size) open water areas, bare soil areas, areas dominated by invasive species, vegetation that has been overgrazed, areas requiring trash removal, hydric soil characteristics, and areas without a predominance of wetland vegetation, and provide their location on a plan view.
iii. Provide annual photographic documentation of the development of the impacted wetlands during restoration with vegetation sampling from similar vantage points within the impacted wetlands. Photos will be labeled with the location, date photographed, and direction in the photographic log.
iv. Provide a written summary of data from previous monitoring periods and a discussion of changes or trends based on all monitoring results. This summary will include a calculation of the acres of each wetland type within the restoration sites, a plan view drawing and identification of all performance standards and whether each standard has been met.
v. Provide a written summary of all the problem areas that have been identified and potential corrective measures to address them.

Once the annual monitoring report has been submitted, EGLE will determine if the performance standards listed above have been met. Prior to final written approval of the restoration by the EGLE, the following is required to be submitted:

- A written statement that the wetland restoration is complete and request for final approval of the restoration.
- A copy of the permit.
- Completion of all monitoring requirements including the submittal of all required monitoring reports

7 References

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Appendix E: Horizontal Directional Drilling Target Area Locations and Profile