Chapter 4 Environmental Impacts of Construction

Chapter 4 presents the potential environmental impacts of construction of Fermi 3. Impacts are analyzed, and a single significance level of potential impact to each resource (i.e., SMALL, MODERATE, or LARGE) is assigned consistent with the criteria that the Nuclear Regulatory Commission (NRC) established in 10 CFR 51, Appendix B, Table B-1, Footnote 3. Unless the significance level is identified as beneficial, the impact is adverse, or in the case of SMALL, may be negligible. The NRC definitions of significance are as follows:

SMALL — Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered small.

MODERATE — Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE — Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

This chapter is divided into seven sections:

- Land-Use Impacts (Section 4.1)
- Water-Related Impacts (Section 4.2)
- Ecological Impacts (Section 4.3)
- Socioeconomic Impacts (Section 4.4)
- Radiation Exposure to Construction Workers (Section 4.5)
- Measures and Controls to Limit Adverse Impacts during Construction (Section 4.6)
- Cumulative Impacts Related to Construction Activities (Section 4.7)
- Summary of Construction and Pre-Construction Activities (Section 4.8)

These sections present potential ways to avoid, minimize, or mitigate adverse impacts of construction to the maximum extent practical. For the purposes of this chapter, the site, vicinity, and region are defined in Chapter 2.

The construction activities discussed in this chapter encompass two phases. The first phase involves Fermi 2 and Fermi 1 activities that have independent utility to the Fermi 2 site, even if the Fermi 3 plant was not built. This phase is not directly associated with Fermi 3 pre-construction, but may occur prior to or concurrently with Fermi 3 construction, and is therefore evaluated in this chapter from the standpoint of potentially having a cumulative impact. New facilities will be constructed to replace some Fermi 2 facilities being removed or retired. Certain preparation activities will occur onsite to ensure that Fermi 2 personnel and functions will be separated from

Fermi 3 construction activities. A new Fermi Drive will be constructed parallel to and north of the existing Fermi Drive to provide separation between Fermi 2 operations traffic and Fermi 3 construction traffic. The buildings remaining onsite from decommissioned Fermi 1 will be disassembled and removed so that the former Fermi 1 area will be available for use.

The second phase involves the construction of Fermi 3 structures, systems, and components (SSCs). The first structural concrete is expected to be poured in 2013, at the earliest. The second phase will also include the following:

- Subsurface preparation
- Placement of backfill, concrete, or permanent retaining walls within an excavation
- Foundation installation
- In-place assembly, erection, fabrication, or testing
- Construction of main power block building/structures
- Construction of station water intake structure and pump house for Fermi 3
- Construction of Fermi 3 cooling tower and associated structures

For the purposes of Chapter 4 evaluation of construction impacts, initial site preparation is expected to begin in 2011. Construction is projected to be completed in 2020, which coincides with commercial operation.

The Limited Work Authorization rulemaking (LWA Rule) became effective on November 8, 2007. Among other things, it established a bifurcated structure for assessing nuclear plant construction consisting of “Pre-Construction” (activities for which the NRC has no jurisdictional authority), and “Construction” (activities controlled by the NRC under the Atomic Energy Act, as amended).

Pre-Construction activities include the following general types of activities:

- Preparation of the site for facility construction (including site exploration, logging, clearing of land, grading, and construction of temporary access roads and spoil areas)
- Installation of temporary construction support facilities (including such items as warehouse and shop facilities, utilities, concrete mixing plans, docking and unloading facilities, and construction support buildings
- Excavation for any structure (including dewatering for concrete placement)
- Construction of service facilities (including such facilities as roadways, paving, railroad spurs, fencing, exterior utility and lighting systems, transmission lines, and sanitary sewage treatment facilities
- Fabrication of reactor system modules, if fabricated outside the power block
- Construction of SSCs that do not prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. This could

include such items as cooling tower structures, nonsafety-related circulating water lines, nonsafety-related fire protection lines, the new switchyard, and onsite interconnections

Construction activities include the following general types of activities:

- Driving of piles
- Subsurface preparation
- Installation of foundations
- Placement of backfill, concrete, or permanent retaining walls within an excavation
- In-place assembly, erection, fabrication, or testing

This applies to any of the following SSCs and facilities:

- Safety-related SSCs, as defined in 10 CFR 50.2
- SSCs relied upon to mitigate accidents or transients or used in plant emergency operating procedures
- SSCs whose failure could prevent safety-related SSCs from fulfilling their safety-related function
- SSCs whose failure could cause a reactor scram or actuation of a safety-related function
- SSCs necessary to comply with 10 CFR 73
- SSCs necessary to comply with 10 CFR 50.48 and Criterion 3 of 10 CFR 50, Appendix A
- Onsite emergency facilities, i.e., technical support and operations support centers that are necessary to comply with 10 CFR 50.47 and 10 CFR 50, Appendix E

The development of this chapter predated promulgation of Interim Staff Guidance which provided implementation guidance for the LWA Rule. Accordingly, the chapter sections do not individually distinguish between Pre-construction and Construction impacts. However, Section 4.8 provides a tabular binning of these impacts.

4.1 Land-Use Impacts

This section describes the effects of site preparation and construction of Fermi 3 and the impacts on land use from construction. Subsection 4.1.1 describes construction impacts on land use of the site and vicinity. Subsection 4.1.2 describes construction impacts on land use along transmission lines and within transmission access corridors. Subsection 4.1.3 describes construction impacts on historic and cultural resources in the site and vicinity, along transmission corridors, and in offsite areas. The Chapter 4 introduction provides an overview of the Fermi 3 construction schedule and key construction activities.

4.1.1 The Site and Vicinity

Construction impacts on land use at the Fermi site and vicinity are discussed in this subsection. The Fermi site is located in Monroe County, Michigan, with a property boundary that encompasses

1260 acres. For purposes of the land use analysis, the Fermi 3 site is considered the same as the entire Fermi property. The vicinity is the 7.5-mile area surrounding the Fermi site, which includes mostly Monroe County, a small portion of Wayne County, and Lake Erie. The vicinity includes both United States and Canadian waters. Monroe County comprises the majority of the vicinity; therefore, it is the focus of the vicinity land use impact discussions included in this subsection.

The total new construction area anticipated to be disturbed for onsite construction activities is approximately 189 acres. Impacts will be confined to designated areas as outlined on Figure 2.1-4. About 27 acres permanent impact areas will be lost to other uses until after decommissioning of Fermi 3. The remaining 162 acres will be disturbed on a short-term, temporary basis. Most of the land that will be occupied by Fermi 3 and associated facilities was disturbed during construction of Fermi 1 and Fermi 2; however, some construction will occur in areas that have been undisturbed for longer periods of time. Figure 2.1-4 indicates the areas proposed for use during Fermi 3 construction.

The conversion of 2 acres of the Lagoona Beach Unit of the Detroit River International Wildlife Refuge (DRIWR) from wetland and forest to developed use for Fermi 3 and associated structures constitutes the main irreversible and irretrievable land use impact for Fermi 3 construction. More than 90 percent of Lake Erie coastal wetlands have been lost to development in Monroe County, emphasizing the importance of the remaining land uses of this type (Reference 4.1-1).

4.1.1.1 Site and Vicinity Land Use Impacts

Construction of Fermi 3 will result in alterations to onsite land use. Some of these alterations are unavoidable and irreversible; others are unavoidable, but are temporary. As noted above, some of the areas designated for Fermi 3 were prepared or altered during the construction and the operation of Fermi 1 and Fermi 2.

Table 2.2-1 and Table 2.2-2 list land uses on the Fermi site and in the vicinity before construction of Fermi 3. During construction of Fermi 3, there will be a slight reduction (approximately 2 to 3 acres) in wetland and forested areas and a corresponding increase in the developed area acreage attributable to permanent impacts of construction activities on the Fermi site.

The various areas potentially affected by construction of Fermi 3 and the acreage within each area are provided in Table 4.1-1; these areas are also depicted on Figure 2.1-4. The site preparation and construction activities that will involve major impacts are clearing, grading, excavation, and dewatering. Explosives may be used during excavation work for Fermi 3 construction. The major types of construction impact that could result from these activities are alteration of existing vegetation, alteration of topography, and alteration of site drainage patterns and water quality.

The planned removal of the structures formerly used for Fermi 1 will free approximately 7 acres for use during Fermi 3 construction. Note - Fermi 1 disassembly may be carried out independently or in conjunction with activities related to Fermi 3. This acreage is adjacent to the area where the Fermi 3 water intake and barge slip would be constructed.

New construction for Fermi 3 would have an impact in the construction areas because forest and wetland areas that are part of the DRIWR would be cleared for construction of several facilities and construction areas associated with Fermi 3 and the relocation of the Fermi 2 parking and warehouse area. Note - These Fermi 2 relocations may be carried out independently or in conjunction with activities related to Fermi 3.

Of the approximately 290 total acres estimated to be disturbed for the construction of Fermi 3, approximately 108 acres overlap currently developed or previously altered areas. It is estimated that approximately 12 acres would contain the permanent structure footprint associated with Fermi 3 (primarily the power block area, cooling tower area, intake area, and auxiliary structures, as shown in Figure 2.1-4). Acreage not containing permanent structures would be reclaimed after construction to the maximum extent possible and, where practicable, would be replanted or allowed to revegetate naturally. The combined Fermi 2 and Fermi 3 projected acreage for permanently affected areas (excluding temporary impacts) is approximately 243 acres. The 290 total acres of impact onsite from Fermi 3 construction and the 2 acres of land use (that would permanently change from wildlife refuge to high density development) are both substantially less than the 1235 acre threshold that the NRC considers a SMALL impact (refer to NUREG-1555, Section 4.1.1). It can therefore be concluded that the Fermi 3 land use impact during construction would be SMALL, and would not require mitigation.

As stated in Section 2.6, construction activities in support of Fermi 3 are not anticipated to adversely affect the geology of the site. Accordingly, the geological effects would be SMALL, and no mitigation measures would be needed.

4.1.1.2 Land Use Plan and Zoning Compliance

4.1.1.2.1 Local Monroe County and Frenchtown Township Land Use

The construction of Fermi 3 will comply with Monroe County and Frenchtown Township land use plans and policies and will comply with county zoning regulations and their specified uses. Monroe County land use planning documents, including the 1985 Comprehensive Plan (which is undergoing an update) emphasize county goals of retaining agricultural land uses while encouraging a strong economy. Development of the Fermi site has been consistent with county goals, leaving large portions of the natural wetland areas onsite intact while developing a power plant that provides economic benefits to the county and surrounding communities. The updated Monroe County Comprehensive Plan will not include changes to the planned use of the Fermi site or its immediate surroundings.

Michigan's local governmental structure involves land use planning and zoning authority that can be exercised by various entities. Counties, townships, cities, and villages work together and sometimes have overlapping jurisdictions concerning land use matters, as explained in Subsection 2.5.2. This is the case for the Fermi site, where the authorities of Frenchtown Township and Monroe County both apply.

As described in Section 2.2, according to Frenchtown Township zoning and existing land use maps included in the Frenchtown Township Master Plan, the Fermi site is included in an area zoned

Public Service (PS) and used for utility purposes. The Monroe County Planning Department is aware of periodic proposals for industrial businesses on a vacant property in the area north of the Fermi site; however, development of this property has not materialized. If industrial development did occur in the area just north of the site, Fermi 3 would be compatible with that development. It would also be consistent with current and planned land use as well as the property zoning designation, as Fermi 3 will comply with local land use plans and zoning. No rezoning would be required at the Fermi site for Fermi 3 because the Frenchtown Township has zoned the site for Public Service use. Surrounding properties have varied zoning, with the property off the north side of the Fermi site zoned Lake Erie Marina (adjacent to Swan Creek), the southeast and southwest adjacent properties zoned Single Family Residential, and most of the rest of the surrounding area zoned Agricultural. The area to the southwest of the Fermi site near Lake Erie has multiple residential and commercial zoning designations that begin just south of the Fermi site and follow Dixie Highway to the Monroe Power Plant area just east-southeast of the city of Monroe.

Fermi 3 may have a positive economic impact on land use in the county by encouraging industrial and economic development. Fermi 3 could be an incentive for other industries to locate in the area, which could eventually spur a land use change from Agricultural to Developed, Medium Intensity or Developed, High Intensity industrial areas in the vicinity. This same effect could also be perceived as a negative impact on the part of those wanting to maintain agricultural land uses in the vicinity of Fermi 3. An effort to retain agriculture as the predominant land use in Monroe County is underway as part of the Monroe County Comprehensive Plan update. It is unlikely that construction of Fermi 3 would cause a change in land use in the area in light of the guidance expected to be forthcoming in the updated Monroe County Comprehensive Plan.

No impacts to land use planning in Monroe County or Frenchtown Township are expected as a result of Fermi 3 construction because it will comply with all applicable land use and zoning regulations of Monroe County and Frenchtown Township; therefore, this impact would be SMALL, and no mitigation measures would be needed.

4.1.1.2.2 **Agricultural and Soil Issues**

Construction activities associated with Fermi 3 would require a construction stormwater discharge permit and Soil Erosion and Sedimentation Control (SESC) permit under National Pollutant Discharge Elimination System (NPDES) regulations. As part of the SESC permit, a detailed SESC Plan would be developed. The construction stormwater discharge permit and SESC permit and plan are discussed in more detail in Subsection 4.2.1. During construction activities, in compliance with the stormwater discharge permit and the SESC Plan, erosion control measures would be used to contain eroded soil onsite and remove sediment from stormwater prior to the water leaving the site. Design measures would be incorporated to avoid concentrated flow that has a high potential to transport sediment. Regular visual inspections of erosion control measures would be incorporated into the project to monitor the effectiveness of the control measures and to aid in determining if other mitigation measures are necessary. Mitigation measures would be incorporated into the requirements of the SESC Plan.

For some of the impacts related to construction activities, preventive measures that would be applied are referred to as best management practices (BMP). BMPs are designed to address the specific types of activities that are to be performed. Candidate BMPs used in conjunction with the SESC Plan include appropriate use of run-on flow diversion, stormwater collection ponds, silt fences, seeding, revegetation plans, and use of other surface stabilization techniques. BMPs that are used will be consistent with the practices discussed in Guidebook of Best Management Practices for Michigan Watersheds (Reference 4.1-5). As part of Reference 4.1-5, BMPs are categorized into one of eight categories:

- Construction Site Preparation
- Housekeeping
- Managerial
- Runoff Conveyance and Outlets
- Runoff Storage
- Sedimentation Control Structures
- Vegetative Establishment
- Wetlands

Each of these categories contains several BMPs that will be implemented as the conditions warrant. For each of the BMPs, Reference 4.1-5 provides more detailed information including a description of the BMP, the basis for implementing the BMP, the application of the BMP, relationship with other BMPs and how other BMPs can be used to compliment each other, considerations during the planning phase, considerations during the implementation phase and post construction considerations.

Protection of existing runoff drains from sediment loss is part of the planning process. Some stabilization and restoration methods that may be used include recontouring using heavy construction equipment; mulching, seeding, and planting; natural revegetation; pavement, rock, or gravel permanent stabilization; and installation of temporary or permanent stormwater management and erosion and sedimentation control measures.

During construction activities, disturbances to the existing ground surface would potentially increase the current sediment load through runoff to Lake Erie via the onsite wetlands, dredge disposal area, or Swan Creek. Site grading and drainage during construction would be designed to avoid erosion during the construction period and in compliance with the SESC Plan. Construction activities would be properly controlled and monitored so that erosion from improperly graded areas does not lead to the runoff of sediments offsite or to nearby surface waters. Final stabilization would consist of restoration or revegetation at final grade conditions as practical.

In addition, as described in Section 4.2, several different structural controls may be used to avoid degradation of the quality of the stormwater runoff to Swan Creek, onsite wetlands, and Lake Erie

during construction activities. The final location of these controls would be based on site conditions prior to and during construction activities.

With the use of construction equipment at the site, there is the potential for spills of gasoline, oil, and other fluids from various possible pollutant sources such as vehicle fueling stations, loading and unloading areas, vehicle equipment maintenance activities, and material storage and handling. Spill prevention, control, and response measures will be implemented as part of the Pollution Incident Prevention Plan (PIPP) for Fermi 3. A more detailed discussion of the PIPP is provided in Subsection 4.2.1. Accordingly, the impacts of hazardous material spills are expected to be SMALL, and no mitigative measures are needed.

Soil compaction will occur as construction machinery traverses the construction areas. However, many of the areas where compaction would occur will eventually be covered with permanent structures or will become areas maintained with grass cover. Those areas used temporarily and allowed to revegetate after construction completion would recover more slowly, but would be able to regenerate vegetation and forest cover despite the soil compaction. Detroit Edison plans to restore as many impacted areas as possible to the natural state they were in before construction of Fermi 3.

Aggregate and equipment storage may be located in the possible laydown area shown on Figure 2.1-4.

The excavated material from the power block and circulating water pipe runs will be processed and used as backfill and structural fill for the cooling tower and circulating water pipe run area. Other than these excavated areas, no onsite borrow pit is anticipated to be used for Fermi 3 construction. An estimated quantity of 265,000 yd^3 of excavated material is expected to be excess, which will be disposed of in onsite construction laydown and parking areas and used for filling in canals. The use of an onsite construction landfill is not anticipated.

Therefore, it is anticipated that the land use impact from excavated material will be SMALL due to the relatively small net excess of spoils materials disposed and the availability of disposal areas.

Dredged material excavated during water intake structure and barge slip or dock construction is expected to be returned to the Spoils Disposal Pond encircled by Boomerang Road, as shown on Figure 2.1-4.

According to the Natural Resources Conservation Service (NRCS), soil types that are considered prime farmland are present on the Fermi site, as discussed in Section 2.2. NRCS online soil survey data and maps show several small areas of prime farmland (Subsection 2.2.1.2.3.1) that may be temporarily or permanently affected by Fermi 3 construction (Reference 4.1-2). These small areas of prime farmland are currently on agricultural land in the west-southwest portion of the site. The northern portion agricultural land in the west-southwest portion of the site will be used for the Fermi 3 switchyard, otherwise it would be only as a surface to store construction materials. The majority of the land would be usable as agricultural cropland again after construction of Fermi 3 is complete. Land use in this area of the site would temporarily change for the duration of construction (about

five years), but would then revert to agricultural use with the exception of the approximate 10 acre Fermi 3 swithcyard area.

Besides the agricultural field in the southwest corner of the site, prime farmland likely also existed on the Fermi site previous to construction of Fermi 1 and Fermi 2. Portions of the site were farmed in the 1940s and 1950s, as is evident from historical photographs. Irreversible conversion of unique agricultural lands by Fermi 3 construction onsite would not occur because the impact to designated prime farmland areas would be temporary and reversible. Prime farmland will not be significantly impacted by construction of Fermi 3, and similar quality farmland is available throughout the vicinity.

There are four soil map units covering approximately 30 percent of the Fermi site that the NRCS categorizes as Land Capability Class II. Class II soils have moderate limitations on their use that reduce the suitable vegetation choices and require moderate conservation practices. Land Capability Class I soil, the most favorable class of soil that has few limitations on its use, is not present on the Fermi site (Reference 4.1-2).

Productivity of the land in the vicinity is high. However, the land on the Fermi site is occupied mostly by forest, wetland, and developed areas and is not productive in the agricultural sense. The farmed parcel in the southwest corner of the site contains prime farmland and may be temporarily impacted by construction laydown activities. Approximately five years of production could be lost from this parcel during construction. The farmland parcel would be able to return to productive agricultural use after the construction period (Reference 4.1-2).

Overall impacts to soils and agricultural land use are expected to be SMALL, and no mitigation measures are needed.

4.1.1.2.3 **Federal, Regional, and State Land Use Plans**

The DRIWR Lagoona Beach Unit comprises 656 acres of the 1260 acre Fermi site. The U.S. Fish and Wildlife Service (USFWS) manages the DRIWR and has published a Comprehensive Conservation Plan for the refuge (Reference 4.1-3). The Comprehensive Conservation Plan states that there are several options for acquisition of land for the refuge other than outright purchase of land. One of these alternative methods, a cooperative agreement, was used for acquisition of the Lagoona Beach Unit of the DRIWR on Fermi property (Reference 4.1-3). Detroit Edison has a 2003 Cooperative Agreement with the USFWS for the onsite portion of the DRIWR that allows Detroit Edison and the USFWS to share management of the refuge areas, but that allows Detroit Edison to retain ownership and control of those areas. The agreement allows Detroit Edison to withdraw from or revise the agreement at any time. Detroit Edison expects to revise the agreement to reflect the approximately 534 acres expected to be available for inclusion in the refuge after construction. This revision in the size of the Lagoona Beach Unit of the DRIWR is consistent with the 2003 Cooperative Agreement, the Comprehensive Conservation Plan, and land acquisition procedures for the refuge. Even though Fermi 3 will reduce the acreage that can be included in the DRIWR, Fermi 3 construction would be compatible with the plans and agreements governing the DRIWR. Therefore, construction impacts on land use plans would be SMALL, and no mitigation measures are needed.

The Coastal Zone Management Act authorizes states like Michigan to develop Coastal Zone Management Plans to protect and ensure the reasonable use of coastal areas. As stated in Section 2.2 and shown on Figure 2.1-2, the Fermi site and part of the vicinity are in the coastal zone. A coastal zone consistency determination from the Michigan Department of Environmental Quality (MDEQ) will be obtained for Fermi 3 construction work in conjunction with other permits and authorizations from MDEQ, as listed in Section 1.2. Construction of Fermi 3 would impact a very small portion of the coastal zone in Monroe County and the surrounding areas, and many of the impacted areas would be restored to natural vegetation after construction. Restoration and the re-establishment of vegetation in these areas of the Fermi site would assist in protecting coastal lands from erosion and pollution concerns. Therefore, construction impacts on the Lake Erie coastal zone are expected to be SMALL, and no mitigation measures are needed.

As described in Section 2.8, no current or proposed Federal projects are expected in the region. As stated in Section 2.2, Native American land use plans do not apply to the Fermi site or the vicinity.

Regional and state land use plans do not contain measures that apply specifically to the Fermi site, and these plans would not be affected by Fermi 3 construction. Fermi 3 construction would occur in compliance with all applicable land use plans.

4.1.1.3 Transportation and Rights-of-Way

Existing onsite roads would be used for construction traffic along with a new access road that will be constructed onsite (new Fermi Drive). It is anticipated that the new Fermi Drive (parallel and just north of the existing Fermi Drive) will be constructed from Dixie Highway to the west Fermi property boundary. The new road will continue through the site to the new personnel access gate as shown on Figure 2.1-4. Construction of the new Fermi Drive would occur during the early stages of Fermi 3 construction. Land use impacts along the new Fermi Drive corridor would be small enough that the land use acreages would not significantly change. Land use changes in the vicinity would be minimal, as Fermi 3 construction is not expected to impact any offsite areas.

To reduce the potential for erosion and siltation from road use by heavy construction vehicles, pavement may be widened or additional surface layers added to roads to support construction traffic. Otherwise, roads are not expected to need reconditioning to handle the loads from Fermi 3 construction. Subsection 4.4.2 describes the potential for increased traffic congestion during Fermi 3 construction. However, because this traffic increase is localized and centered around discrete time periods (shift changes); the effects on land use would be negligible.

Rail transport is available for the construction of Fermi 3 as needed, as described in Section 2.2. Since there are many adequate existing rail lines serving the Fermi vicinity, no construction or modification of rail lines is anticipated.

Overall, transportation impacts to land use from the construction of Fermi 3 are expected to be SMALL, and no mitigation measures are required.

4.1.1.4 Site Restoration and Management Actions

Preventive measures implemented to reduce construction activity impacts would be targeted toward erosion control, controlled access roads for personnel and vehicular traffic, and restricted construction zones. The site preparation work would be completed in two stages, the first of which would consist of stripping, excavating, and backfilling the areas needed for structures and roadways. The second stage would entail developing the site with the necessary facilities to support construction, such as construction offices, warehouses, trackwork, large unloading facilities, water wells, construction power, construction drainage, and similar facilities. In addition, temporary structures would be razed and holes would be filled. Grading and drainage work would be designed and executed with the goal of avoiding and minimizing erosion during the construction period.

The Fermi 3 site surface and subsurface features would be stabilized and restored in accordance with permit requirements and conditions after completion of construction activities. Disturbed areas would be restored consistent with existing and native vegetation. A Site Redress Plan that addresses site restoration is not required for Fermi 3 because Detroit Edison will not seek a safety-related Limited Work Authorization (LWA-2) permit. Permanently disturbed locations would be stabilized and contoured to blend with the surrounding area in accordance with design specifications. Revegetation of disturbed areas would be compliant with site maintenance and safety requirements, and stabilization and restoration methods would comply with applicable laws, regulations, permit requirements and conditions, good engineering and construction practices, and recognized environmental best management practices.

4.1.2 Transmission Corridors and Offsite Areas

As stated in NUREG-1555, Section 4.1.2:

> In some cases transmission lines may be constructed and operated by an entity other than the applicant. In such cases, impact information may be limited and the reviewer should proceed with the assessment using the information that can be obtained.

The 345 kV transmission system and associated corridors are exclusively owned and operated by ITC*Transmission*. The Applicant has no control over the construction or operation of the transmission system. Accordingly, the construction impacts are based on publicly available information, and reasonable expectations of the configurations and practices that ITC*Transmission* would likely follow based on standard industry practice. However, the information described in this subsection does not imply commitments made by ITC*Transmission* or Detroit Edison, unless specifically noted.

As discussed in Subsection 2.2.2, three new 345 kV transmission lines are proposed to serve Fermi 3. A study completed by ITC*Transmission* and Midwest ISO concluded that the existing transmission system from Fermi to the electric grid would need additional lines to sufficiently transport power produced at Fermi 3 without overloading the transmission system in the Fermi area.

Land use impacts resulting from the construction of the new 345 kV transmission lines are expected to be SMALL because the 29.4-mile route would use 18.6 miles of an established and developed portion running along a combination of corridors already used for transmission structures and lines, and would convert a short (10.8-mile) tract of an established and undeveloped section, along the route to the Milan Substation, previously characterized for utility use. Assuming a nominal 300-foot width along the entire proposed transmission corridor, a total of approximately 1069 acres could potentially be disturbed for construction activities. Laydown and other areas potentially located outside the corridors may be defined by ITC*Transmission* at a time closer to construction of the lines. Existing roads are expected to be used for access and construction traffic as much as possible, and no new access roads would be anticipated because the topography of the area is flat.

The land use impacts of construction along the proposed 345 kV transmission route are expected to be minimized by the use of existing corridors and adjacent areas, line design, and inspection and maintenance policies. Impacts to land use should be reversible, as the structures could be removed and the corridors could be restored to native vegetation or farmland at the end of the useful life of the transmission system. Agricultural activities may be allowed to continue during operation of the line, as described in Subsection 5.1.2.

Impacts of adding transmission lines in existing transmission line corridors are generally minimal. The use of available existing rights-of-way (ROW) for the new route rather than the use of a route that would convert open space to transmission use is typically the approach selected, which serves to minimize environmental impacts of new transmission development. Construction work within the assumed 300-foot wide ROW area along the undeveloped 10.8 mile portion of the route nearest to the Milan Substation is expected to be monitored by ITC*Transmission* to ensure SMALL land use impacts.

It is likely that any additionally required ROWs would be purchased, and the land then leased to the original owners at a nominal fee for productive use such as farming. Accordingly, it is anticipated that only the land around the tower bases (approximately 25 feet on each side) would be lost from productive use. The corridor areas under construction may be fenced to prevent other land uses during the construction period. New access roads should not be necessary, and existing road infrastructure is expected to be used as much as possible to access the new route. Construction of the new transmission route may result in the following potential impacts to land use:

- vegetation removal and brush piles
- soil disturbance and erosion, and
- damage to culverts, driveways, and roadways.

Land use impacts from constructing the new transmission lines are anticipated to be SMALL due to the placement of the new transmission lines and structures largely through land already used or planned for transmission and utility use. There could be impacts to forest, agricultural lands, wetlands and streams, residences, undeveloped land, and recreational uses within the assumed 300-foot corridor ROW. These construction impacts are expected to be alleviated to the extent practicable through the use of environmental stewardship, best management and industry

practices, and conformance with applicable laws and regulations pertaining to ground-disturbing activities, such as forest and wetlands protection and stormwater controls. Based on the description in Subsection 2.2.2, the transmission corridors are expected to have SMALL impacts on urban areas, state parks, and federally regulated wetland areas. The new transmission route does not cross federal lands. The land use for 0.5 miles around all transmission corridors, including the newly developed portion, is shown on Figure 2.2-3. On the figure, the new section and the 0.5-mile area around it are outlined in blue to distinguish the newly developed lines from the previously developed lines serving Fermi.

Construction practices used for construction of the new transmission lines to Milan Substation are expected to comply with, or use practices that go beyond, the requirements of local, State, and Federal environmental regulations. It is also anticipated that the best environmental practices would be observed, including continual and responsible management of wastes and chemicals to prevent and avoid pollution. It is expected that the use of chemicals and creation of wastes would be minimized as much as possible during transmission line work (Reference 4.1-4).

After completion of construction, the transmission corridor is anticipated to be restored using the following or similar techniques:

- Land restoration including discing, fertilizing, seeding, and installing erosion control devices (filter fences, hay or straw bales, mulch).
- Cleanup and proper disposal of construction debris.
- Property damage repaired to its original condition and to landowner satisfaction.

The Fermi 3 switchyard will be separate from the Fermi 2 switchyard. The location of the Fermi 3 switchyard is shown on Figure 2.1-4.

It is expected that many new towers and/or steel poles will be needed to support the three new 345 kV transmission lines to Milan Substation along the 10.8-mile portion of the route where there are no existing structures. Methods of new tower/steel pole construction and conductoring are expected to be in accordance with ITC*Transmission* construction standards, as well as applicable regulatory and industry standards.

Approximate acreages of land use categories located within 0.5-mile of the 345 kV transmission corridors (established and undeveloped) are reported in Table 2.2-6. Land use impacts of construction are expected to be mitigated within the assumed 300-foot wide corridor, through the use of existing access roads, implementation of measures in the associated SESC Plan and PIPP, use of best management practices, consultation with landowners along the route, and adherence to all applicable Federal, State, and local laws and regulations governing the construction of transmission lines.

Overall, transmission construction impacts to land use in the vicinity of Fermi 3 and the new transmission route are expected to be SMALL because of the use of existing and maintained corridors already dedicated to transmission use and the short-term nature of construction impacts typically seen along the corridor. Land uses present in the assumed ROW area before clearing

would be restored in large part after construction completion. Examples of the preventive measures that may be implemented are limiting construction work to the assumed 300-foot wide ROW area, placing gravel on access roads as needed and using existing access roads to the degree possible, establishing vegetation cover in disturbed areas, limiting machinery access points to reduce erosion, compensation for farmers with land damaged by the corridor work, and use of measures similar to those used in the associated SESC Plan and PIPP to avoid erosion, siltation, and potential spills.

4.1.2.1 Planning and Zoning

The new transmission route travels through and is compatible with the land use planning and zoning designations for Monroe, Wayne, and Washtenaw Counties, as described in Subsection 2.2.2.

Along its 29.4-mile length, the new transmission route will cross mostly areas that are used for agriculture, open space, and some rural residential properties, as well as various sized pockets of forested land. The new transmission lines will be constructed in areas where electrical infrastructure may be viewed as an acceptable use and where transmission use complies with local planning policies. During the planning process for the new transmission lines, county and city offices are expected to be contacted by ITC*Transmission* to determine necessary measures for compliance to zoning and planning regulations or guidance in place at that time for each county, township, or city that the route crosses.

Construction work for the new transmission route to the Milan Substation will occur largely outside the boundaries of the Fermi site. The new lines will impact mostly agricultural and forested land along the route. It is probable that adjacent farmland could continue to be used as pasture and cropland, with possible short-term, temporary disruptions of use to the portions of croplands closest to the transmission corridors during the construction work. These areas would be able to revert to agricultural use after transmission line construction is completed. Forested and other areas along the newly developed 10.8 mile portion of the corridor could be cleared to accommodate the assumed 300-foot width of the ROW. This area comprises approximately 160 acres of the 393 acres potentially affected along the newly developed 10.8 mile portion of the route, which is considered to be a minor impact in accordance with the guidance in NUREG-1555, Section 4.1.1. Therefore, the construction of transmission lines to serve Fermi 3 is expected to have a SMALL, temporary impact on agriculture in the vicinity.

Potential control actions during construction that could restrict land use along the new transmission route may include fencing the area where work is being performed. Signs indicating the presence of high voltage transmission lines may be posted along the fenced area to alert the public to electrical safety hazards that could be caused by contact with the lines.

4.1.2.2 Transportation and Rights-of-Way

Because of its length, the new transmission route will cross multiple road and railroad intersections as well as traverse a number of previously established transmission corridors and could have minor impacts on road traffic flow during the construction period. Rail traffic is less likely to be affected

because of its periodic nature. Impacts will be minimal, localized, and temporary because affected intersections and transmission corridors would be used as normal after transmission line construction is completed. Subsection 2.2.2 describes some of the features crossed by the new transmission line.

Spill prevention and response are expected to be addressed the same way along the new transmission route as they are on the Fermi site, through observance of preventive measures in the associated PIPP. It is expected that extra care will be taken during construction to avoid spills of transformer oils and fluids.

The new transmission route is likely to cross multiple pipelines carrying various materials such as petroleum and natural gas. It is expected that care will be taken to locate and avoid pipelines before excavation work is undertaken for placement of towers to support the new transmission line. Because natural gas and petroleum pipelines are underground and the new transmission line will be above ground, impacts to access or maintenance of pipelines are expected to be SMALL, and no mitigative measures are anticipated. Impacts to land use from pipelines during construction is expected to be SMALL, and no mitigative measures are expected.

4.1.2.3 Agricultural and Soil Issues

Agricultural land use is prevalent along the new transmission route and comprises about 57 percent of the area within 0.5 mile of the route while forested areas comprise approximately 23 percent of the route environment. Activities performed to construct the transmission lines may disturb the use of small portions of adjacent properties for a short time until work on the corridor is complete. Potential impacts given in this subsection focus on the 10.8-mile portion of the corridor that has no existing transmission towers or lines. That portion would likely be subject to the greater adverse impacts as compared to the 18.6-mile portion of the corridor that uses existing towers and that has been impacted to a greater extent in the past.

The newly developed section of the route will impact, to a large extent, agricultural land along with small portions of land with various other uses. Compared to the available acreages of agricultural land available for cultivation within the counties along the new transmission route, the route itself will affect a very small portion. Although dimensions of prime farmland along the route vary, prime farmland soils and soils of local agricultural importance are present within some areas of the new transmission route (Reference 4.1-2). The new transmission route impacts could be minimized by keeping the clearing and construction within the assumed 300-foot wide corridor. However, it is expected that observance and implementation of BMPs to those described in the associated SESC Plan, use of existing access roads to the extent possible for the new route, and limiting the area disturbed to the minimum dimensions necessary will keep impacts to agriculture and soils SMALL, and no mitigative measures are anticipated.

There are several soil map units covering approximately 23 percent of the area including and around the new transmission route to Milan that the NRCS categorizes as Land Capability Class II. Class II soils have moderate limitations on their use that reduce the suitable vegetation choices and require moderate conservation practices. Most soils in the area of the undeveloped 10.8-mile portion of the transmission line have Land Capability Class ratings of either III, IV, or V, which are

the lower ratings with the most limitations on soil uses. Land Capability Class I soil, the most favorable class of soil that has few limitations on its use, is not present along the 10.8-mile portion of the transmission route (Reference 4.1-2).

Productivity of the land in the area of the affected corridors is high. The land is agriculturally productive; however, production would not be permanently lost as a result of construction activities in the new transmission route because agricultural activities could resume under the new lines and new towers/steel poles once they are constructed. The multiple areas of prime farmland and farmland of local importance in the area of the new transmission line could be temporarily impacted by construction laydown activities if these activities take place outside the assumed 300-foot corridor (Reference 4.1-2). Agricultural lands along the transmission route are typical of the area, which features many similar high quality agricultural lands.

4.1.2.4 Corridor Restoration and Management Actions

Measures to prevent erosion and revegetate construction areas along the new transmission route are likely to be very similar to measures taken on the Fermi site, and may primarily involve recontouring of the construction area and establishment of permanent vegetative cover. Anticipated maintenance during operation is discussed in Subsection 5.1.2.

In the event that construction on the new transmission route is begun and at some point the decision made to stop construction and restore the land, disturbed areas are expected to be restored consistent with existing and native vegetation and to the contours that existed prior to transmission line construction.

In summary, impacts to land use in the transmission corridors are expected to be SMALL, and no mitigative measures are expected.

4.1.3 Historic Properties

This subsection addresses the effect of Fermi 3 construction activities on historic resources within the project area and within a 10-mile radius of the project area. Cultural resources investigations for the Fermi 3 project were carried out pursuant to Section 106 of the National Historic Preservation Act, as amended (P.L. 89-665, October 15, 1966; 16 U.S.C. 470) and its implementing regulations (36 CFR 800), which require Federal agencies to take into account their activities on historic resources that may be impacted as a result of project activities. Historic resources are those that are listed in the National Register of Historic Places (NRHP) or those that are eligible for listing in the NRHP. When assessing a resource's eligibility for NRHP listing, seven areas of integrity are considered: location; design; setting; materials; workmanship; feeling; and association. Any activity that changes any one or combination of these areas alters the historic integrity of a resource and is classified as an impact. Impacts are further classified as adverse or not adverse. In assessing impacts, the extent of the activities is considered, as is the element that will be impacted.

The value of an archaeological resource lies with its ability to contribute information on the prehistory or history of an area, i.e., to provide answers to research questions. Impacts to archaeological resources are most often assessed with regard to direct damage to a site or site

element. Impacts to archaeological sites, i.e., below-ground resources, focus almost exclusively on the impacts associated with ground-disturbing activities in locations such as excavation areas, access roads, and laydown areas.

Above-ground resources are assessed on a wider variety of impacts. Construction activities that introduce ephemeral visual or noise-related elements into the environment are often assessed as indirect effects, while demolition of all or part of an above-ground resource constitutes a direct impact. These effects are further assessed as to their severity and longevity. Construction activities such as demolition that permanently alter or destroy the historic elements of an above-ground resource are considered adverse impacts. Noise-related impacts, especially noise-related impacts to resources at some distance from the construction site, are most often classified as not adverse.

The number and location of archaeological and above-ground resources identified as a result of the cultural resources investigations are presented in Subsection 2.5.3. Subsection 2.5.3.3 discusses the consultations that have been made with the Michigan State Historic Preservation Office.

4.1.3.1 Site and Vicinity

Construction activities will occur only within the Fermi 3 project area. The archaeological area of potential effect (APE) is situated entirely within the project area and, thus, construction impacts to archaeological resources would occur only within the archaeological APE. The above-ground resources APE includes the entire Fermi 3 project area and cultural resources identified outside of the site boundary; therefore, construction impacts are possible both within and without the Fermi 3 project area boundary. Impacts to resources within the Fermi 3 project area could be subjected to both direct and indirect impacts as a result of construction activities. Impacts to resources outside of the Fermi 3 project area would be limited to indirect impacts such as noise-related and visual impacts.

4.1.3.1.1 Archaeological Sites

The archaeological survey discussed in Subsection 2.5.3.4 resulted in the identification of seven archaeological sites (4 prehistoric, 2 historic, 1 multi-component [prehistoric/historic]) within the Fermi site and vicinity. All seven sites that we identified are located within the archaeological APE. Only two are located on Fermi-owned property. Two sites are located within the fenced portion of the Fermi 3 site, and five of the sites are located outside of that area. None of these sites is recommended eligible for listing in the NRHP.

The natural ground encountered at the Fermi 3 project site generally consists of poorly drained clay loams that are partially inundated or saturated with runoff from the higher ground to the west or from overflow from high water episodes of Lake Erie on the east. This low-lying, marshy environment reduces the overall potential for archaeological sites to be located within the Fermi 3 project area. Naturally occurring rises or open beachfront zones provide the highest probability for containing prehistoric and historic sites. Within the Fermi 3 project area, only one site was identified in the state site files, 20MR702. This site is listed simply as a prehistoric lithic scatter along the Lake Erie shore.

Subsection 2.5.3 describes the archaeological findings on the site. Since no NHRP-eleigible archaeological resources are evident on the site, the expected construction impacts would be SMALL, with no mitigative measures needed.

Site files maintained at the Office of the State Archaeologist (OSA) were consulted to identify previously recorded sites that contained or had the potential to contain human remains. In addition, historic maps and atlases were reviewed to locate cemeteries and other features that had the potential to contain human remains (e.g., church properties). The Fermi 3 project APE has been historically low and wet; and, therefore, considered to exhibit a low potential for containing human remains. Nonetheless, Detroit Edison considers it prudent that controls be implemented during construction excavation to ensure compliance with the Native American Graves Protection and Repatriation Act.

4.1.3.1.2 **Above-Ground Resources Sites**

No above-ground resources within the Fermi 3 project area have been assessed as to NRHP eligibility; therefore, Fermi 3 construction activities would have no impact on resources that are listed in the NRHP or that have been determined eligible for listing in the NRHP. Section 2.5.3.5 states: An assessment is in progress to determine Fermi 1 NRHP eligibility. The plan to deconstruct Fermi 1 as part of the Phase 1 construction activities is dependent, in part, upon a decision by the SHPO as to whether Fermi 1 is NRHP eligible (see Subsection 2.5.3.5)

Thirteen NRHP-listed and nine NRHP-eligible above-ground resources occur within a 10-mile radius of the Fermi 3 project area. In addition, the above-ground resources survey identified one four-building district and 19 individual properties within the above-ground resources APE that are possibly eligible for listing on the NRHP. One NRHP-eligible property, the house at 5046 Williams Road, Frenchtown Township, is located within the above-ground resources APE. The construction activities associated with Fermi 3 that would impact these sites are limited to the introduction of a permanent visual element, the cooling tower, into the viewshed. Since two cooling towers currently exist within the viewshed, this impact would not substantively alter any of these characteristics that contribute to the eligibility of any of these resources for the NRHP; therefore, impacts to historic above-ground resources within a 10-mile radius of Fermi 3 are considered SMALL, and no mitigation is required.

4.1.3.2 **Transmission Corridors and Offsite Areas**

Preliminary investigations of the transmission line route from the Sumpter-Post Road junction (near Haggerty and Arkona Roads) to the Milan Substation indicate a moderate to high potential for encountering archaeological resources. Any further fieldwork and evaluation to make a determination of NRHP eligibility would be the responsibility of ITC*Transmission*.

The preliminary field view of the built environment along the transmission line route revealed few above-ground resources that meet the minimum age requirement for listing on the NRHP or that retain enough integrity for listing. The significance of the area above-ground resources remains unevaluated, and further investigations may be conducted by ITC*Transmission* in accordance with applicable regulatory and industry standards to assess impacts.

ITC*Transmission* practices, policies, and standards with regard to cultural resources are not created by, implemented by, or monitored by the Applicant. However, it would be anticipated that ITC*Transmission* would conduct applicable cultural resource surveys consistent with applicable State and Federal regulatory requirements.

4.1.4 References

4.1-1 U.S. Fish and Wildlife Service, Midwest Region, Detroit River International Wildlife Refuge, "65 Acres at the Mouth of Swan Creek Added to Detroit River International Wildlife Refuge," press release, http://www.fws.gov/midwest/detroitriver/documents/FixRelease2007.pdf, accessed 8 October 2007.

4.1-2 U.S. Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/, accessed 14 April 2008.

4.1-3 U.S. Fish and Wildlife Service, Division of Conservation Planning, "Detroit River International Wildlife Refuge Comprehensive Conservation Plan," Appendix K, 2005, http://www.fws.gov/midwest/planning/detroitriver/, accessed 14 April 2008.

4.1-4 International Transmission Company (ITC*Transmission*), Environmental, http://www.itctransco.com/app.php?id=19, accessed 29 April 2008.

4.1-5 Michigan Department of Environmental Quality, Technical Manuals, MDEQ – BMP Design Manuals, http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3714-118554--,00.html, accessed 29 April 2008.

Table 4.1-1 Acreage Affected by Various Facilities Associated with Fermi 3

	Area Acres
Total Site	1260[2]
Current Fermi 2 Total Developed Area	209
Nuclear Training Center and Nuclear Operations Center	1.5
Spoils Area (surrounded by Boomerang Road)	12
Decommissioned Fermi 1 Area	7
Transmission Line Corridors (onsite 345 kV and 120 KV)	45 (to western site boundary)
(all lines offsite along Fermi Drive to Dixie Highway)	54 (western site boundary east to Dixie Highway)
New Construction Areas Affected	
Fermi 3 Power Block (Fabrication Area, Construction Offices, and Batch Plant included in this area)	101
Fermi 2 New Parking and Warehouse	5
Fermi 3 Construction Parking	36
Possible Construction Laydown Area	119
Fermi 3 Switchyard	10
Fermi 3 Meteorological Tower	1
Fermi 3 Simulator, Administrative Building	7
Total Onsite New Construction Areas Affected (not including Fermi 2 developed area)	189
Newly Developed Offsite Transmission Corridor[3]	1069

Notes:

1. Acreages given are approximate based on Figure 2.1-4.
2. Acreages in this table do not total 1260 because most of the remaining acreage is occupied by the undeveloped areas of the Detroit River International Wildlife Refuge.
3. New transmission line acreage overestimated by assuming a 300-foot corridor would be impacted along the entire 29.4 mile route. Actual impacts are likely to be much less because 18.6 miles of the new corridor will largely use existing structures.

4.2 Water-Related Impacts

This section describes site preparation activities, plant water supply, hydrological alterations that could result from Fermi 3 construction activities, and the physical effects of hydrological alterations on other water users. Subsection 4.2.1 addresses hydrologic alterations, and Subsection 4.2.2 addresses water use impacts of construction activities and impacts to water quality. The Chapter 4 introduction provides an overview of the Fermi 3 construction schedule and key construction activities.

4.2.1 Hydrologic Alterations

This subsection identifies and describes the hydrologic alterations that could result from the construction of Fermi 3.

Water-related impacts from the construction of a nuclear power plant are similar to those from any large construction project. Large construction projects can, if not properly planned, result in impacts to groundwater, physical alterations of local streams and wetlands, and impacts to downstream water quality as a result of erosion and sedimentation, or spills of fuel and lubricants used in construction equipment. Because construction activities have the potential to harm surface water and groundwater resources, a number of permits must be acquired, and site-specific pollution prevention/spill control plans developed prior to initiating construction. Effluent discharged during construction activities is monitored under the National Pollutant Discharge Elimination System (NPDES) requirements.

Detroit Edison will comply with hydrological mitigation standards, regulations, and industry practices during construction of Fermi 3. The U.S. Army Corps of Engineers (USACE), the MDEQ, and other appropriate agencies will be consulted, and permits and approvals will be obtained, as necessary.

The State of Michigan Construction Stormwater Program requires industrial facilities that discharge water from construction activities that would disturb more than 5 acres of land to obtain an NPDES Stormwater Construction Permit governed by Rule 323.2190. In order to obtain an NPDES Stormwater Construction Permit, Detroit Edison will obtain a Soil Erosion and Sedimentation Control (SESC) permit and submit a notice of coverage. As part of the application of the SESC permit, Detroit Edison will also prepare and submit a copy of the SESC Plan. The SESC Plan will be one component of the overall site plan. The SESC Plan considers physical characteristics of the site and determines the best approach(es) to minimize and control erosion and sedimentation. At a minimum the SESC Plan will include:

- Site location,
- Proximity to lakes, streams, wetlands and other predominant land features,
- Description of site soils,
- Existing and proposed elevations including slope description,
- Physical limits of earth changes,

- Description of existing and proposed drainage and dewatering facilities,
- Timing and Sequencing of earth change activities and implementation of SESC measures,
- Description and location of proposed temporary and permanent SESC control measures,
- Proposal for continued maintenance of permanent SESC measures,

Proposed temporary and permanent SESC control measures will be selected based on providing effective means to minimize erosion and offsite sedimentation. Inspections will be performed to ensure that control measures are installed and maintained per the approved SESC Plan.

In addition to the SESC Plan and permit, Detroit Edison will also develop a Pollution Incident Prevention Plan (PIPP) pursuant to Part 5 administrative rules pursuant of Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act. At a minimum, the PIPP will include:

- Information regarding polluting materials stored or used onsite in quantities exceeding prescribed limits, including chemical name, product name, and Material Safety Data Sheets (MSDS).
- Appropriate information shown on Site Plans regarding polluting materials stored or used onsite in quantities exceeding prescribed limits, including location of tanks, drainage paths, loading and unloading areas, sumps, onsite water supply, containment structures.
- Specific information regarding secondary containment structures for liquid polluting materials in quantities exceeding prescribed limits, including design and construction data, how spilled materials will be captured and removed, provisions for physical security (signage, gates and fences, barriers, other), precipitation management, and inspections and maintenance procedures.
- Spill response procedures, including notification procedures to outside entities, spill control and clean-up procedures (inventory and location of spill control and clean-up equipment, spill response and clean-up and procedures for characterization and disposal of recovered materials).

Inspections will be performed to ensure that control measures are installed and maintained per the PIPP.

4.2.1.1 Surface Water Bodies and Groundwater Aquifers

Subsection 2.3.1 describes the physical characteristics of the surface water bodies and groundwater aquifers in the vicinity of the site, which are further summarized in this section.

The most prominent body of water in the environs of Fermi 3 is Lake Erie. Rivers and streams entering Lake Erie within a 7.5-mile radius of the site are shown on Figure 2.1-2. The Fermi site lies between Swan Creek to the north and Stony Creek to the south. In addition, there are four existing minor water bodies on the site, as shown on Figure 4.2-1. The site also contains the Quarry Lakes, located approximately 0.6 miles southwest of Fermi 3, that were established following rock quarry operations in support of site development activities for construction of Fermi 2. There are no

significant impoundments, reservoirs, estuaries, or oceans located in the region that need to be considered when analyzing the water impacts on the construction of Fermi 3. The North and South Lagoons are discussed in Subsection 4.2.1.4.

The uppermost hydrogeologic unit present at the site is the shallow overburden. Several different geologic materials with varying properties comprise the overburden, and the groundwater is unconfined. The bedrock aquifer lies beneath the overburden at the site, and is generally confined. The upper bedrock unit at the site is the Bass Islands Group, which is underlain by the Salina Group. There are no sole source aquifers on the site or in the vicinity.

4.2.1.2 Construction Activities

This section identifies construction activities that could result in impacts to the hydrology at the Fermi 3 site. Fermi 3 construction is anticipated to disturb approximately 290 acres, which includes the Fermi 2 developed area. Figure 4.2-1 shows the various areas that will be affected by construction. The following construction activities are identified:

- Clearing additional land at the project site and constructing infrastructure such as roads and stormwater drainage systems
- Construction of new buildings (reactor containment structures, turbine building, cooling tower, electrical substation, and other related structures)
- Construction of additional parking lots and roads that will support the construction and operation of Fermi 3
- Construction of both the station water intake structure for water withdrawn from Lake Erie and the discharge pipe for water discharged to Lake Erie
- Construction of docking facilities for barges/vessels that will be used to bring in materials and machines
- Temporary disturbance of existing vegetated areas to establish construction laydown areas, concrete batch plants, sand/soil/gravel stockpiles, and construction worker parking areas
- Backfilling of onsite water bodies with excavation materials or materials brought in from offsite
- Dewatering of foundation excavations during construction
- Installation of underground piping such as sanitary, stormwater, and fire protection piping
- Installation of underground piping to the cooling tower, the discharge piping from the cooling tower to the intake groins area, and makeup water piping from the intake to the circulating water system

4.2.1.3 Construction Water Sources

The main water source utilized during construction will be Lake Erie. Due to its large volume, it will have sufficient capacity to meet construction water needs. Construction activities at Fermi 3 are expected to require water amounts of approximately 350,000 to 600,000 gallons per day for

concrete batch plant operation, dust suppression, and sanitary needs. Due to Lake Erie's vast capacity, the withdrawal of construction water will have a SMALL impact on the water level of the lake. Minor use of groundwater may occur during construction, as described in Subsection 4.2.2.3.

4.2.1.4 Water Bodies Receiving Construction Effluents

Figure 2.1-3 and Figure 2.1-4 show the post-construction conditions of the local water bodies impacted by the construction of Fermi 3. Lake Erie will be the main water body to receive construction effluent for Fermi 3. The Spoil Disposal Pond, currently used by Fermi 2, will handle construction related effluents prior to discharge into Lake Erie. Effluents from the Spoil Disposal Pond are monitored under NPDES Permit No. MI0037028. The discharge is limited to a maximum of 450 million gallons per year. Total suspended solids (intake, discharge, and net discharge) and pH are also monitored. During construction of the station water intake structure, a local portion of the Lake Erie shoreline will have a cofferdam installed. The cooling tower outfall area shown on Figure 4.2-1 will also require dredging prior to construction of the discharge pipeline for the Fermi 3 cooling tower. Water and dredge material are expected to be diverted to the Spoil Disposal Pond where sedimentation will occur prior to discharge into Lake Erie. Approximately 200 gallons per minute of flow from dredge material is anticipated from construction efforts at the location of intake structure. Due to the sedimentation capacity of the Spoil Disposal Pond, discharges resulting from construction will have SMALL impacts on Lake Erie, and no mitigative measures are needed.

Four waterbodies are shown on Figure 4.2-1, part of an overflow canal, two onsite ponds, and a drainage canal. These waterbodies receive stormwater from onsite surface runoff. The onsite ponds are currently planned to be completely dewatered and backfilled and the overflow and draingage canals will be partially dewatered and backfilled in accordance with the final construction grading plan for Fermi 3. They will be filled either partially or completely with excess fill waste material or with fill hauled in from offsite. Backfilling these onsite water bodies may impact stormwater runoff flowing to the North and South Lagoons, potentially causing a small increase of sediment loading into Lake Erie. The NPDES Stormwater Construction Permit will be implemented during construction. As discussed above, as part of the NPDES Stormwater Construction Permit, a Soil Erosion and Sedimentation Control (SESC) Plan will be implemented. As part of the SESC Plan, actions will be implemented to alleviate the potential of increased sediment loading. Therefore, backfilling the four water bodies will have a SMALL impact on Lake Erie sediment loading, and no mitigative measures are needed. Apart from its environmental impact, the backfilling of these four water bodies poses the most significant hydrological alteration resulting from construction of Fermi 3.

Fermi 2 currently releases stormwater discharge via the North Lagoon to the mouth of Swan Creek. Swan Creek, due to its location, has the potential for elevated sediment loading caused by increased runoff during construction. As discussed above, the only potential impact on Swan Creek from the construction of Fermi 3 is the backfilling of onsite water bodies, which may impact stormwater runoff. As discussed above, as part of the SESC Plan measures will be implemented to alleviate the potential for increased sedimentation in Swan Creek (and other nearby rivers and streams). Therefore, the potential impact of increased sediment loading on Swan Creek (and other nearby rivers and streams) is SMALL, and no mitigation measures will be needed.

Water used for construction is not heated or cooled. The temperature and velocity of construction effluents to water bodies are dependent on the temperature of Lake Erie and the precipitation received at the site during construction activities. Runoff from precipitation events occurring during construction activities is discharged and managed under the SESC Plan. Because precipitation events can not be predicted, it is not possible to precisely determine the temperature and/or velocity of the resulting runoff that is discharged to receiving water bodies. However, it is expected that the temperature impacts will be SMALL, and no mitigative measures are needed.

Swan Creek, due to its location, has the potential for elevated sediment loading caused by increased runoff during construction. Accordingly, the SESC Plan will alleviate the potential for increased sedimentation in Swan Creek and other nearby rivers and streams. Therefore, the potential impact of increased sediment loading on Swan Creek and other nearby rivers and streams is SMALL, and no mitigation measures are needed.

The specifics of the dewatering plan will be determined during final geotechnical design of the site. Groundwater removed during dewatering will not be utilized for any onsite purpose. The effluent from dewatering wells at the perimeter of the construction area will be discharged to the overflow canal located north of the Fermi 3 site. Detroit Edison plans to discharge the dewatering effluent under Michigan's Dredging Dewatering General Permit Number MIG690000 (Reference 4.2-6). Accordingly, the handling of removed groundwater will have a SMALL environmental impact, and no mitigative measures are needed.

4.2.1.5 **Effects of Dewatering**

The geology and hydrogeology of Fermi 3 are addressed in Section 2.3 and Section 2.6. The Fermi 3 dewatering approach will use barriers to minimize the flow of water entering the excavation. Water in the shallow fill layer is excluded from the excavation by barriers such as reinforced diaphragm concrete walls, sheet piles, or freeze walls extending through the imported fill to the top of the glacial till. Groundwater flow from the Bass Islands Group aquifer into the excavation will be minimized using methods such as:

1. A reinforced diaphragm concrete wall at the perimeter of the excavation combined with a grouting program below the excavation. The reinforced diaphragm concrete wall extends from the ground surface to below the base of the excavation.
2. A grout curtain in the bedrock at the perimeter of the excavation combined with a grouting program below the excavation. The grout curtain extends from the top of the bedrock to below the base of the excavation.
3. A freeze wall in the bedrock at the perimeter of the excavation combined with a grouting program below the excavation. The freeze wall extends from the ground surface to below the base of the excavation

It is anticipated that by using approaches such as these, groundwater inflow into the excavation will be sufficiently minimized to allow dewatering to be performed using sumps within the excavation.

The dewatering impact of the Fermi 3 excavation was evaluated using a published U.S. Geological Survey (USGS) MODFLOW (Reference 4.2-3 and Reference 4.2-4) regional steady-state

groundwater model. Modifications to the model incorporated the Fermi 3 excavation and the hydraulic barrier options. The Groundwater Modeling System software (Reference 4.2-5) was used to simulate groundwater flow with the barrier alternatives. For the purpose of the model, it was assumed that the hydraulic barrier conditions of the grout curtain and freeze wall (Options 2 and 3 above) would be similar; therefore, these two options were represented with a single simulation. The reinforced diaphragm concrete wall option will provide a more impermeable barrier; consequently, it was represented with a unique simulation.

Groundwater within the imported rock fill and glacial till will be effectively cut-off using a reinforced diaphragm concrete wall or equivalent technique as discussed above. Therefore, dewatering impacts are primarily confined to the Bass Islands Group aquifer. Modeled drawdown contours in the Bass Islands Group aquifer associated with construction dewatering using Option 1 and combined Options 2/3 are shown on Figure 4.2-2 and Figure 4.2-3, respectively. The area of influence, as defined by the 1-foot drawdown contour, is greater for the Option 2/3 simulation, because these barrier types tend to allow more water to pass through compared with a reinforced diaphragm concrete wall.

Figure 4.2-2 and Figure 4.2-3 show locations of wells registered with the MDEQ as of October 2007. The largest drawdown of the potentiometric surface in an offsite well for any of the modeled simulations is approximately 2 ft. In comparison, the annual variation of the potentiometric surface in the Bass Islands Group aquifer is generally on the order of 4 ft, based on the hydrograph for USGS Well G-16, located approximately 3.2 miles west-southwest of the project site (Figure 4.2-4). The Fermi site wells have displayed similar magnitudes of seasonal water level fluctuations. Therefore, the maximum water level decline of offsite wells associated with temporary construction dewatering will be less than the typical annual potentiometric head variation. Accordingly, the impact on nearby wells due to dewatering will be SMALL, and does not warrant mitigative measures. Water level monitoring will continue during construction. If local well users are affected during Fermi 3 construction, Detroit Edison will ensure that water is supplied to meet the well users' needs.

The Quarry Lakes, located southwest of the project site, are excavated through the overlying shallow overburden zone into the Bass Island Group; therefore, the water levels in these bodies of water may be impacted by the decreased potentiometric surface associated with construction dewatering. Under the Option 1 simulation, the aquifer water levels beneath the Quarry Lakes will be lowered less than 1 ft (0.3 m). Under the Option 2/3 simulation, the water levels beneath the Quarry Lakes will be lowered approximately 2 ft. This drawdown is also less than the typical annual potentiometric head variation and will therefore cause a SMALL impact to the Quarry Lakes.

The USGS regional groundwater model does not explicitly represent the glacial deposits. Accordingly, this model was not used to evaluate wetland impacts. Figure 2.4-19 delineates the wetland areas on the Fermi site. The hydrology of the palustrine emergent marsh areas is controlled primarily by the elevation of surface water in Swan Creek and Lake Erie. The surface water in Swan Creek to the north and Lake Erie to the south of the existing units is directly connected to the palustrine emergent marsh areas on the Fermi site. Additionally, there are four sets of large diameter culverts that connect the majority of the inland palustrine emergent marsh

areas west of Doxy Road with the palustrine emergent marsh areas that are directly connected with Swan Creek and Lake Erie. These culverts allow free flow of surface water throughout the interconnected palustrine emergent marsh areas. Therefore, the surface water level in the majority of the palustrine emergent marsh areas is directly controlled by the surface water elevation of Lake Erie and Swan Creek, rather than groundwater levels, so dewatering will not impact the palustrine emergent marsh areas.

Palustrine forested and palustrine shrub-scrub areas on the Fermi site are for the most part contiguous with the palustrine emergent marsh areas. Therefore, these areas are hydraulically connected with the palustrine emergent marshs, so the groundwater level in these areas is influenced by the surface water levels in Swan Creek and Lake Erie.

Figure 2.3-36 provides hydrographs from June 2007 to May 2008 for monitoring wells and piezometers at the Fermi site. Monitoring Wells MW-381S, MW-388S, and MW-393S monitor the groundwater in the overburden and are located away from the palustrine emergent marsh areas near the palustrine forested and shrub-scrub areas. At MW-381S and MW-393S the groundwater level in the shallow wells varied approximately 5 to 7 feet, while at MW-388S the groundwater level varied approximately 4 feet over the year of measurements, with all three wells showing the same fluctuation trend. During this time no improvement or deterioration in the palustrine forested and shrub-scrub areas was reported. This 4 to 7 foot natural variation in the groundwater level in the overburden indicates that groundwater level variations do not negatively impact the palustrine forested and shrub-scrub areas, rather precipitation is likely the dominant water component for the palustrine forested and shrub-scrub areas.

The modeled estimated drawdowns in the bedrock aquifer potentiometric surface beneath the palustrine forested and shrub-scrub areas range from less than 1 foot to approximately 3 feet, as shown on Figures 2.3-41 and 2.3-42. A slug test in clay at Piezometer P-389 yielded a horizontal hydraulic conductivity estimate of 0.13 feet/day. Laboratory test results for (vertical) hydraulic conductivity in samples of clay collected from P-385S, MW-387S, and MW-384S are 5.8E-5 feet/day, 6.2E-5 feet/day, and 3.7E-5 feet/day, respectively. These vertical hydraulic conductivity values for the clay overburden are lower than the hydraulic conductivity in the bedrock. It is anticipated that the lower hydraulic conductivity glacial/lacustrine soils will buffer any drawdown within the bedrock aquifer, resulting in less drawdown in the overburden than in the bedrock. The lowered potentiometric level in the bedrock aquifer in the wetland areas will result in more surface water infiltration to the bedrock than would otherwise occur; however, based on earlier discussion, any groundwater impacts associated with dewatering are not anticipated to significantly impact the wetlands. Accordingly, impacts to wetlands in the site vicinity will be SMALL, and no mitigative measures are needed.

4.2.1.6 Transmission Facilities

Subsection 3.7 describes the three new 345 kV transmission lines proposed to serve Fermi 3. The 29.4-mile route of the new 345 kV transmission lines would use 18.6 miles of an existing route running along a corridor already used for transmission structures and lines. Additionally, a short (10.8-mile) tract of an existing undeveloped corridor would be used along the route to the Milan

substation. Assuming a nominal 300-foot width along the entire proposed transmission corridor, a total of approximately 1069 acres could potentially be disturbed for construction activities. Laydown and other areas potentially located outside the corridor may be defined by ITC*Transmisssion* at a time closer to construction of the lines. Use of existing roads are expected for access and construction traffic as much as possible, and no new access roads are anticipated because the topography of the area is flat.

Table 2.2-6 shows the land uses within 0.5 miles of Fermi associated with the existing corridors, including the proposed transmission routes. Table 4.3-4 shows the vegetation communities along the 10.8 mile undeveloped portion of the route to the Milan substation, including the impacted areas. These tables show that open water and wetland areas comprise a relatively small portion of the total area both within the transmission corridors and within the impacted areas.

Due to the minimal acreage of open water and wetlands along the proposed route, hydrological impacts resulting from the new transmission line route are expected to be minimal. ITC*Transmission* plans to use available existing rights-of-way (ROW) for the new route rather than using a route that would convert open space to transmission use. This plan will aid in minimizing the environmental impacts of the proposed new transmission infrastructure.

4.2.1.7 **Floodplains and Wetlands**

Figure 2.3-16 shows the Federal Emergency Management Agency (FEMA) flood map for the Fermi site. As shown, the location for Fermi 3 is located in Zone X, which represents areas outside the 500-year flood zone. As shown in Table 2.3-1, based on the IGLD 1985 datum, the 10-year flood level is 576.3 feet, the 50-year flood level is 577.4 feet, the 100-year flood level is 577.9 feet and the 500-year flood level is 578.8 feet. All of these flood levels are less than the current site grade elevation of approximately 581.5 feet. Therefore, based on design and configuration, the site is adequately protected from flooding during construction.

Wetlands and Open Waters comprise approximately 60 percent of the area within the Fermi site (see Figure 2.4-19). The majority of the Fermi site that is not developed is included as part of the DRIWR at the time of this COL application. The DRIWR encompasses a 656 acre portion of the site. Of the 7.5 mile vicinity, about four percent is comprised of wetlands. Figure 2.2-1 depicts land use of the vicinity.

Dewatering is confined to the confined Bass Islands Group aquifer and will, therefore, have a minimal effect on wetlands, as described in Subsection 4.2.1.5. Appropriate permits and procedures will be used per State and Federal guidelines and regulations, as required, for specific construction activities affecting wetlands.

4.2.1.8 **Groundwater and Surface water Users**

During construction, potable water is planned to be supplied by the Frenchtown Township water supply system. Water for temporary fire protection, concrete batching, and other construction uses is expected to be withdrawn from Lake Erie. Minor use of groundwater may occur during construction, as described in Subsection 4.2.2.3.

Consumptive surface water use is discussed in Subsection 2.3.2. The Great Lakes Basin has nine main sectors of water consumption: Public Water Supply, Self-Supply Domestic, Self-Supply Irrigation, Self-Supply Livestock, Self-Supply Industrial, Self-Supply Thermoelectric (Fossil Fuel), Self-Supply Thermoelectric (Nuclear), Hydroelectric, and Self-Supply Other. Consumptive use for each sector is listed in Table 2.3-29. According to the MDEQ, the main sectors of water consumption regarding the region of influence from the construction and operation of Fermi 3 are the following: Power Generation (Nuclear), Power Generation (Fossil Fuel), Public Water Supply, Agricultural Irrigation, Self-Supply Industrial, and Golf Course Irrigation. Flow rates and total water use concerning these sectors is provided in Table 2.3-34. Yearly consumptions and water withdrawals for the entire Lake Erie is listed in Table 2.3-30 through Table 2.3-33. Given its vast size, construction water withdrawal will have a SMALL impact on the availability of water from Lake Erie for consumptive use.

Fermi 2 will be the only surface water user potentially impacted by the construction of Fermi 3. A portion of the intake area used by Fermi 2 will be disturbed during construction; however, the degree of disturbance will not affect Fermi 2 operations. The area of this impact is shown on Figure 4.2-1.

Figure 4.2-2 and Figure 4.2-3 show well locations near the Fermi site, including those in the area of influence of dewatering. These wells are classified as household wells, irrigation wells, unclassified wells, or other wells. The drawdown expected in these wells will be minor, especially when compared to the normal potentiometric head variation shown on Figure 4.2-4. Consequently, as discussed in Subsection 4.2.1.5, groundwater users of these wells will be subjected only to SMALL capacity impacts due to the construction of Fermi 3.

A recommended planning number for potable water consumption for workers in hot climates is 3 gallons per day for each worker. Based on the maximum estimated construction worker population of approximately 2900 workers, about 8700 gallons per day of drinking water will be consumed. Potable water for Fermi 3 will be distributed from the Frenchtown Township Water supply, which has a capacity of 4 million gallons per day. Accordingly, the impact to municipal water supply users is expected to be SMALL, and no mitigative measures are required.

4.2.1.9 Hydrologic Alteration Best Management Practices and Measures

This section describes BMPs and measures to minimize potential impacts of hydrologic alterations or effluent discharges. These activities are in compliance with hydrologic regulations, standards, and practices of the proper state agencies. These practices also comply with Michigan Department of Environmental Quality BMPs (Reference 4.2-1 and Reference 4.2-2).

Impacts from construction of Fermi 3 will be minimized by the following practices, as appropriate:

- Hand-clearing of trees and brush located within approximately 100 feet of a stream or ditch with running water discharging to Lake Erie
- Removing material approximately three inches and above in diameter from the buffer zone and leaving material less than three inches undisturbed

- Limiting the disturbance of soil within an approximate 100-foot buffer zone around streams and ditches
- Crossing creeks and streams at right angles in one location on the corridor using culverts, temporary bridges, or larger aggregate stone
- Performing work related to stream crossings in accordance with state standards and specifications
- Removing materials from temporary stream crossings at the completion of the project
- Removing logs, trimmings, or brush form ditches, creeks, and drains

In addition, impacts from the construction of structural foundations and structure erection activities will be alleviated by the following measures:

- Evaluation of the site with respect to earth disturbance and erosion potential
- Stabilization of the work site prior to moving to the next location
- Restoration of areas damaged during foundation construction and structural erection activities to approximate original grade, and installation of erosion and sedimentation control measures
- Maintaining temporary erosion and sedimentation controls until permanent stabilization is achieved

4.2.2 Water-Use Impacts

This subsection describes the water-use impacts on the surface water and groundwater environments during the construction phase of the project. Measures to eliminate or reduce construction impacts are discussed in Subsection 4.2.1.9.

4.2.2.1 Construction Activities Potentially Impacting Water Use

Subsection 4.2.1.2 lists the proposed construction activities that have the potential to affect nearby surface water and groundwater. Subsection 4.2.1.4 and Subsection 4.2.1.5 describe the principal hydrologic alterations that will occur. The western basin of Lake Erie is the main water body that could potentially be affected by these construction-related hydrologic alterations. In addition to the impacts described in those sections, construction of the intake structure will involve dredging which may temporarily result in increased turbidity in Lake Erie. As discussed in Subsection 4.2.1.5 and Subsection 4.2.1.8, dewatering during excavation may impact nearby wells and the two Quarry Lakes. Also, as discussed in Subsection 4.2.1.4, backfilling of onsite water bodies will impact stormwater runoff to Swan Creek.

A primary concern with runoff from a construction site is the loss of soil and the impact of soil on water quality. Lake Erie has the greatest potential to experience runoff effects due to its shoreline being approximately 1300 feet away from Fermi 3. The SESC Plan will address practices to minimize this concern. MDEQ and NPDES guidelines for the installation of the discharge pipe will be followed during construction. Additionally, construction of the intake structure and associated

dredging operations have potential to impact surface water quality. Details about these issues are described in Subsection 4.2.1.

4.2.2.2 Water Quality of Bodies Receiving Construction Effluents

The physical impacts from construction activity effluents are considered to be SMALL, as concluded in Subsection 4.2.1. Water is withdrawn from Lake Erie in sufficient quantities to produce concrete, provide dust suppression water for roads, and provide for other construction activities as needed. The water withdrawn is essentially consumed with no free-flowing streams or runoff generated from these activities.

Backfilling the onsite water bodies, as described in Subsection 4.2.1.4, may impact stormwater runoff. Slight increases in stormwater runoff are to be expected from new impervious areas at Fermi 3. This impact is minimal due to the relatively small area of the Fermi 3 developed area within the Swan Creek Watershed. Although a small increase in sediment loading into Lake Erie through Swan Creek's discharge is expected from filling-in the onsite water bodies, the implementation of the SESC Plan will prevent sediment loading from becoming a problem during construction.

Water and dredge materials from Lake Erie are expected to be diverted to the Spoil Disposal Pond for settling prior to discharge back to Lake Erie. Water discharges will be monitored in accordance with applicable NPDES requirements and State water quality standards at the time of construction.

Applicable permitting required by Federal, State and local regulations will be obtained prior to the commencement of construction. Appropriate regulatory permits are obtained for construction in wetland areas. In 1984, Michigan received authorization from the federal government to administer Section 404 of the Clean Water Act in most areas of the state. A State administered 404 program must be consistent with the requirements of the Federal Clean Water Act and associated regulations set forth in the Section 404(b)(1) guidelines. Contrary to other states, where users must apply to the USACE and a state agency for wetland permits, applicants in Michigan generally submit only one wetland permit application to the MDEQ.

In sum, the impact on water quality of waters receiving construction effluents (Lake Erie and Swan Creek) is expected to be SMALL, and no mitigative measures are needed.

4.2.2.3 Water Quantity Used and Quantity Available to Other Users

Subsection 4.2.1.8 describes the surface water and groundwater users potentially impacted by the Fermi 3 hydrologic alterations. The amount of water needed during construction does not affect water levels in Lake Erie or existing or future water rights and allocations and does not require rationing of any existing water uses. Primary water needs for construction of Fermi 3 are for concrete batch plant operations, watering of roads for dust suppression, and watering of disturbed areas to establish new cover vegetation. Because most of the water needed for construction is expected to be withdrawn from Lake Erie, there should be no effects to the water quality or detrimental impacts that would affect any other user's consumption. Accordingly, these impacts are projected to be SMALL, and no mitigative measures are needed.

There are no current plans to use groundwater for construction. However, it is possible that groundwater may be supplied to certain outbuildings as potable water. This water use would be expected to be minimal, thus the only impact on nearby wells from construction activities will be due to dewatering of the excavation. The drawdown experienced by nearby wells due to dewatering activities is minor and is not expected to affect nearby users of groundwater. As discussed in Subsection 4.2.1.5, the impacts to groundwater are projected to be SMALL, with no mitigative measures needed.

4.2.2.4 Water Quality Changes Due to Substratum Exposure

Subsection 2.3.3 provides a summary of the existing water quality of Lake Erie and the surrounding surface water and groundwater. The U.S. Environmental Protection Agency (EPA) has conducted extensive domestic and aquatic ecosystem studies on Lake Erie. Data is stored in the Great Lakes Environmental Database (GLENDA). The EPA continues to monitor the ecological health of the water within Lake Erie, including the area around Fermi 3.

The NPDES permit addresses discharge limits from the Spoil Disposal Pond for water quality. Construction impacts to the intake and discharge areas are local and transient. Large areas are not expected to be affected, and the locally affected areas are expected to recover rapidly. Measures to eliminate or reduce construction impacts are discussed in Subsection 4.2.1.9.

The Pollution Incident Prevention Plan (PIPP) will provide approved measures to prevent fuel, oil, and other chemicals associated with construction from contaminating the surface water or the groundwater. The PIPP is described in more detail in Subsection 4.2.1. In sum, only very localized and transient impacts due to substratum exposure are anticipated and are considered SMALL, and no mitigative measures are needed.

4.2.2.5 Effects of Alterations on Other Water Users

Consumptive surface water use is discussed in Subsection 2.3.2. According to the MDEQ, the main sectors of water consumption regarding the region of influence from the construction and operation of Fermi 3 are the following: Power Generation (Nuclear), Power Generation (Fossil Fuel), Public Water Supply, Agricultural Irrigation, Self-Supply Industrial, and Golf Course Irrigation. Flow rates and total water use concerning these sectors is provided in Table 2.3-34. Yearly consumptions and water withdrawals for the entire Lake Erie can also be viewed on Table 2.3-30 through Table 2.3-33. Construction activities for Fermi 3 are anticipated to have negligible, if any, impacts on water quality or its current uses. Short-term increases in turbidity from new construction at the Fermi 3 site are not expected to impact water supplies for these uses. Accordingly, the effects on consumptive water use are expected to be SMALL, and no mitigative measures are needed.

Figure 4.2-2 and Figure 4.2-3 show well locations near the Fermi site, including those in the area of influence of dewatering. These wells are classified as household wells, irrigation wells, unclassified wells, or other wells. The drawdown expected in these wells will be minor, especially when compared to the normal potentiometric head variation shown on Figure 4.2-4. Consequently,

groundwater users of these wells will be subjected only to SMALL impacts due to the construction of Fermi 3.

4.2.2.6 Proposed Practices to Control Water-Use Impacts

The use of proven construction methods, exercising minimal land disturbances for new construction activities, and developing and implementing BMPs associated with the site-specific SESC Plan, PIPP, and NPDES permit requirements should eliminate or reduce the potential for any water-use impacts. Measures to eliminate or reduce construction impacts are discussed in Subsection 4.2.1.9.

4.2.3 References

4.2-1 Michigan Department of Transportation, "Chapter 9, Stormwater Best Management Practices," Revised January 2006, http://www.michigan.gov/documents/MDOT_MS4_Chap_91740_7._09_Drainage_Manual.pdf, accessed 28 April 2008.

4.2-2 Michigan Department of Environmental Quality, Technical Manuals, MDEQ – BMP Design Manuals, http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3714-118554--,00.html, accessed 29 April 2008.

4.2-3 McDonald, M., and A. Harbaugh, "A Modular Three-Dimensional Finite-Difference Ground-Water Flow Model," Techniques of Water-Resources Investigations of the United States Geological Survey, Book 6, Chapter A1, 1988.

4.2-4 Harbaugh, A.W., E.R. Banta, M.C. Hill, and M.G. McDonald, "MODFLOW-2000, The U.S. Geological Survey Modular Ground-Water Model – User Guide to Modularization Concepts and the Ground-Water Flow Processes," U.S. Geological Survey Open-File Report 00-92, Reston, Virginia, 2000.

4.2-5 Brigham Young University Environmental Modeling Research Laboratory, "Groundwater Modeling System Tutorials," Version 6.0, Vols. I, II, and III, October 20, 2005.

4.2-6 State of Michigan Department of Environmental Quality, NPDES, "Dredging Dewatering Water," Permit No. MIG690000, (9 October 2006), http://www.deq.state.mi.us/documents/deq-water-npdes-generalpermit-MIG690000.pdf, accessed 16 May 2008.

Figure 4.2-1 Construction Affected Areas

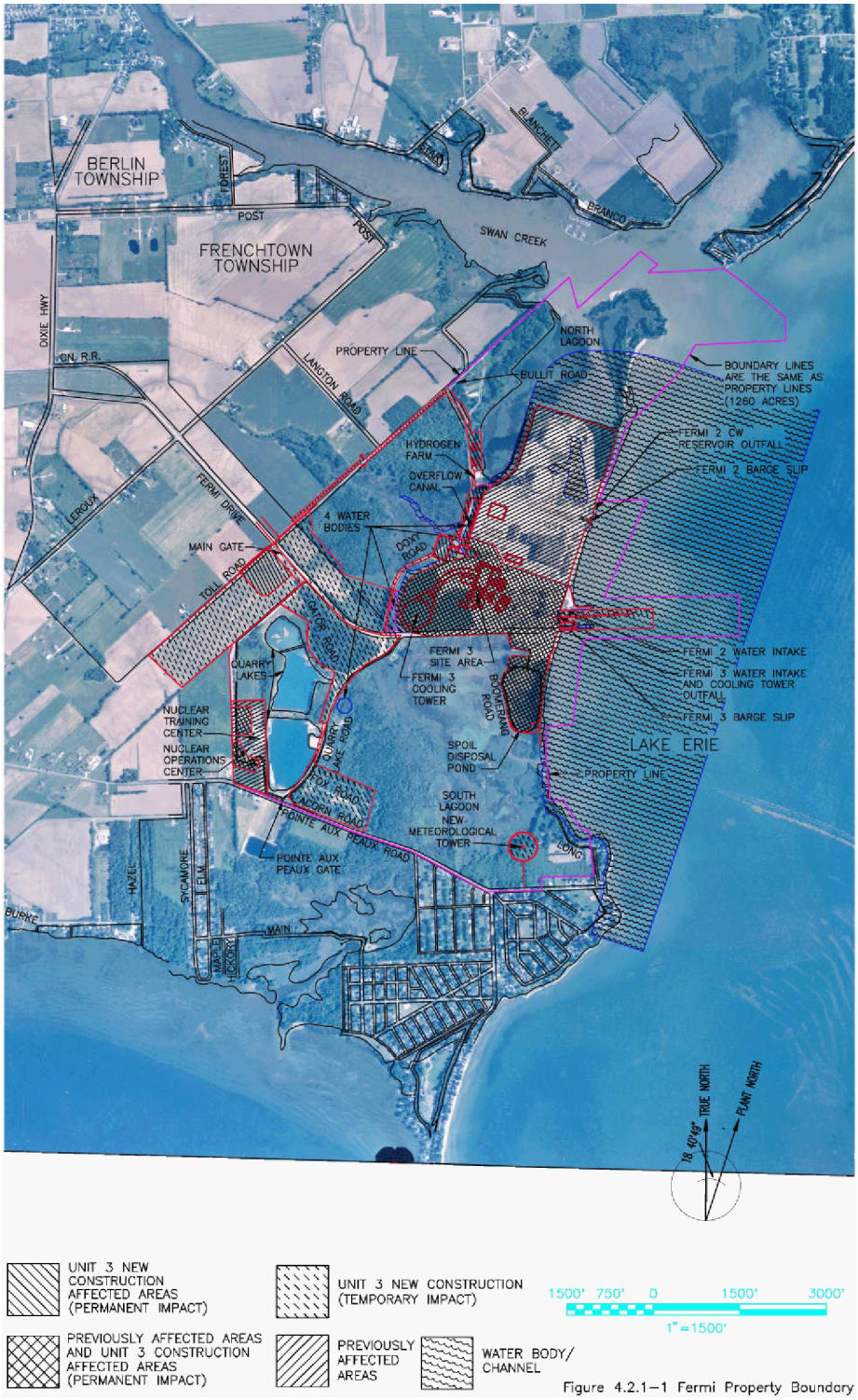


Figure 4.2-2 Dewatering Bass Islands Group: Potentiometric Surface Contours – Reinforced Cement Slurry Wall with Grouted Base Combination

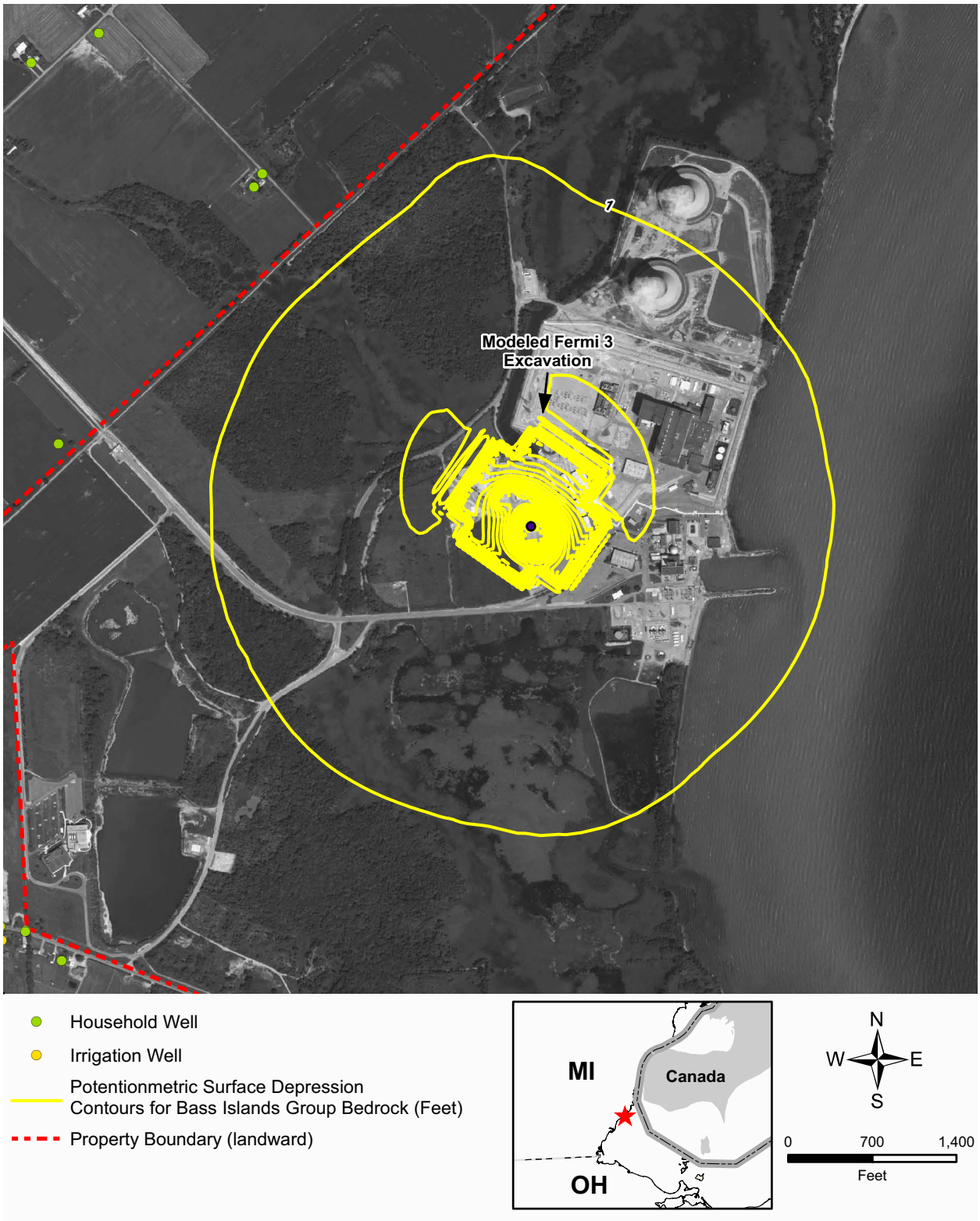


Figure 4.2-3 Dewatering Bass Islands Group: Potentiometric Surface Contours – Grouted Base with a Grout Curtain or Freeze Wall Combination

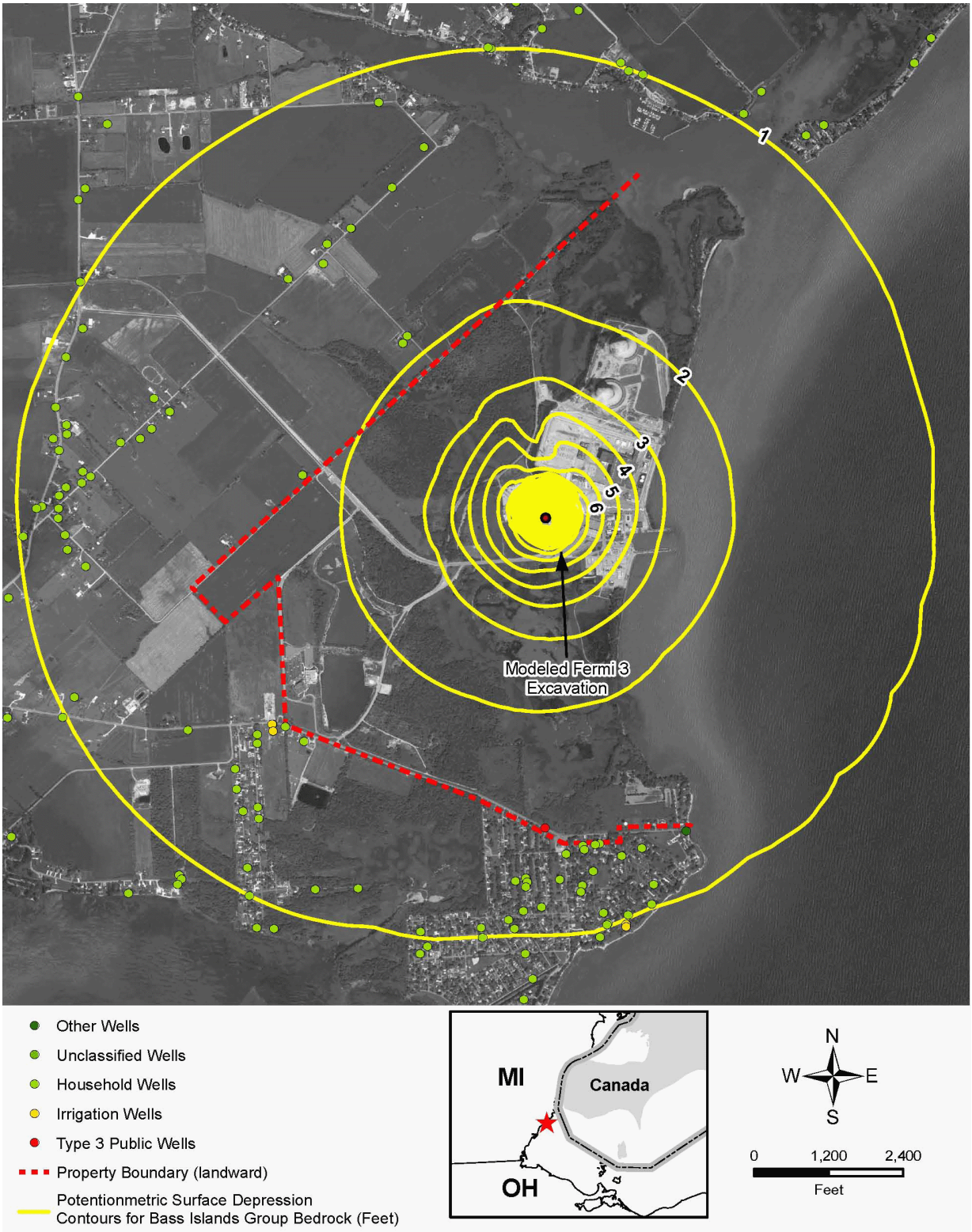
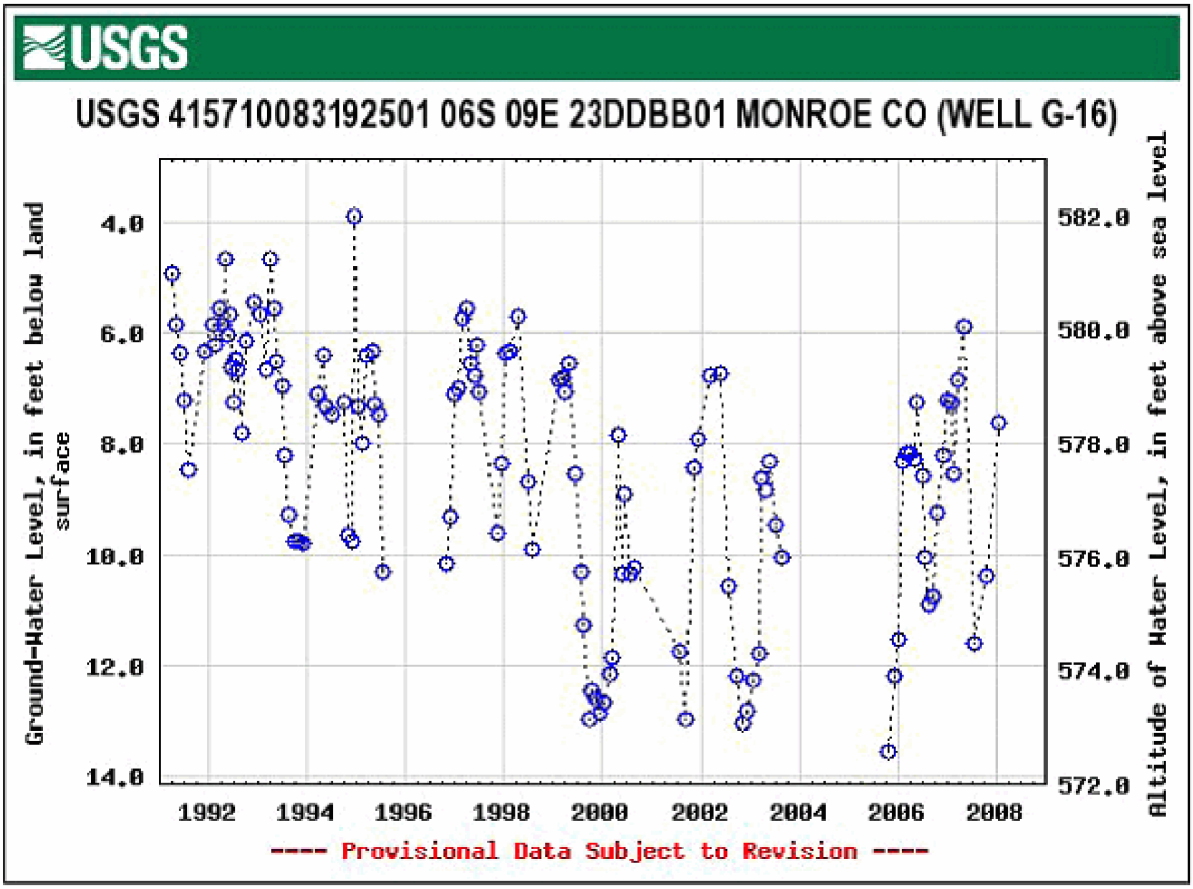


Figure 4.2-4 USGS Well G-16 Hydrograph



4.3 Ecological Impacts of Construction

This section describes the potential impacts from the construction of Fermi 3 on the ecological resources at the Fermi site and in the vicinity and those associated with the transmission corridor construction activities. The vicinity considered includes a 7.5 mile radius area around the Fermi site (Figure 2.2-1). The section is divided into two subsections: Terrestrial Ecosystems and Aquatic Ecosystems. For purposes of characterization, wetlands are principally described as terrestrial ecosystems. The subsections summarize relevant information from field studies and other existing data in accordance with the guidance in NUREG-1555 and Regulatory Guide 4.2, Revision 2. The Chapter 4 introduction provides an overview of the Fermi 3 construction schedule and key construction activities.

During construction, several activities will be directed at protecting the terrestrial and aquatic environment, including using BMPs to reduce the risk of stormwater runoff, erosion, and pollutant spills, as outlined in the SESC Plan and the PIPP for the Fermi 3 site. The requirements for the SESC Plan and the PIPP are described in more detail in Subsection 4.2.1. BMPs that are used will be consistent with the practices discussed in Guidebook of Best Management Practices for Michigan Watersheds (Reference 4.3-1). As part of Reference 4.3-1, BMPs are categorized into one of eight categories:

- Construction Site Preparation
- Housekeeping
- Managerial
- Runoff Conveyance and Outlets
- Runoff Storage
- Sedimentation Control Structures
- Vegetative Establishment
- Wetlands

Each of these categories contains several BMPs that will be implemented as the conditions warrant. For each of the BMPs, Reference 4.3-1 provides more detailed information including a description of the BMP, the basis for implementing the BMP, the application of the BMP, relationship with other BMPs and how other BMPs can be used to compliment each other, considerations during the planning phase, considerations during the implementation phase and post-construction considerations.

4.3.1 Terrestrial Ecosystems

This subsection describes the impacts of construction on the existing terrestrial ecosystem as described in Subsection 2.4.1. Figure 4.3-1 shows the undeveloped areas that would be impacted by the construction of Fermi 3. The site layout for Fermi 3 is shown in Figure 2.1-4. The total impact area for Fermi 3 is 290 acres, which includes the aquatic area impacts, as discussed in Subsection 4.3.2. Fermi 3 construction would disturb approximately 189 acres of terrestrial habitat

on the Fermi site. The terrestrial habitats impacted are illustrated in Figure 4.3-2. Of this 189 acres area, permanent impacts are expected to occur to approximately 27 acres and temporary impacts to approximately 162 acres. Temporarily disturbed sites are to be replanted following completion of construction.

The Fermi 3 site layout has been designed to minimize terrestrial ecosystem impacts to the greatest extent possible. Currently developed and previously disturbed grounds are used wherever possible. Unavoidable impacts to wetlands are anticipated, but have been minimized as much as possible. No Federally-listed threatened or endangered species under the Endangered Species Act would be impacted. Four Michigan-listed species, two plants and two animals, may be affected, and preventative measures are provided to ensure the continued existence of these species in the state (see Subsection 4.3.1.2.1).

4.3.1.1 Terrestrial Communities

The following sections discuss the potential impacts to vegetation and wildlife related to construction of Fermi 3.

4.3.1.1.1 Vegetation on the Site and in the Vicinity

Construction activities would result in the permanent clearing and grubbing of portions of the impact area shown in Figure 4.3-1. No impacts are expected in the site vicinity, with the exception of those areas associated with the transmission system, as discussed in Subsection 4.3.1.5. Permanent and temporary impacts to plant communities on the Fermi site are summarized in Table 4.3-1. New development would affect approximately 27 acres of undeveloped land; 27 acres would be permanently impacted and 162 acres would be temporarily impacted. The overall and cumulative impacts of Fermi 3 construction activities to terrestrial vegetative communities are considered SMALL, and no further mitigation measures are warranted.

Notwithstanding the above conclusion, it is Detroit Edison's intention that about 86 percent, or approximately 162 acres, would be restored by re-vegetation using species native to the Fermi vicinity. Areas available for restoration are shown in Figure 4.3-2 and labeled as temporary impact areas. The restoration would alleviate any adverse impacts to these communities by planting species native to the region and appropriate for the area being re-vegetated. The restored habitat is expected to provide improved species composition in the plant communities and enhanced wildlife habitat by providing both improved forage and shelter for wildlife in the area. Other activities directed at protecting the environment will include using BMPs to reduce the risk of stormwater runoff, erosion, and pollutant spills, as outlined in the SESC Plan and the PIPP for the Fermi 3 site. The requirements for the SESC Plan and the PIPP are described in more detail in Subsection 4.2.1.

Following is a brief discussion of each terrestrial community that would be impacted, based on the information provided in Subsection 2.4.1.

<u>Coastal Emergent Wetland (Vegetated)</u>

Approximately 2.3 acres of this community would be permanently impacted. This represents one percent of the 238 acres of the community present onsite and less than 0.2 percent of the 1550

acres found in the vicinity. Approximately one acre could be permanently impacted by the construction of the new meteorological tower. Most of these areas are located at the periphery of the impact area. The boundaries of these areas are identified on Figure 2.4-19. Whenever possible, construction activities will be restricted in these areas to further minimize permanent impacts to these important habitats. The impact areas along the west and south edge of the current spoils disposal area (adjacent to Lake Erie) are not expected to be impacted due to soil disturbance but may receive secondary impacts from alterations in water discharges from the spoils area. These impacts are discussed in Subsection 4.3.2. The project impacts to this community are considered SMALL, and no mitigative measures are needed.

Grassland: Right-of-Way

This community includes 29 acres located on the Fermi site, of which approximately 26 acres will be temporarily impacted by use as construction worker parking during Fermi 3 construction. This area represents slightly more than 2 percent of the 1209 acres present in the project vicinity. Although the area includes mostly native plant species, the area is artificial in the sense that it was planted, as discussed in Subsection 2.4.1.1.1. Because this is a planted area and the area is small compared to what is present in the vicinity, the project impacts to this community are considered SMALL, and no mitigative measures are needed.

Grassland: Idle/Old Field/Planted

Approximately 19 acres of this community present onsite would be impacted, 11.5 acres permanently and 7.3 acres temporarily. Onsite there are about 75 acres of this community present. The majority of the permanent impacts are associated with the power block and cooling tower construction. Temporary impacts are primarily associated with the Fermi 3 construction parking area and will be re-vegetated following construction. As discussed in Subsection 2.4.1.1.1, these grassland habitats occupy mostly land that was previously disturbed and are composed of early succession and often non-native plant species. In addition, these grasslands provide poor quality wildlife habitat, primarily due to a lack of forage species. About 6,932 acres of this community occurs in the vicinity. The permanent loss of 11.5 acres represents about 0.2 percent of the community in the vicinity. The project impacts to this community are considered SMALL, and no mitigative measures are needed.

Grassland: Row Crop

Approximately all of 70 acres of this community present onsite would be impacted, representing less than one-half of one percent of the 23,465 acres present in the vicinity. Approximately 10 acres of row crop would be permanently impacted by the construction of the new switchyard. Portions of the area would be graveled for parking or equipment and materials storage during construction. Following construction, the area could be used once again for crop production. Since this impact is temporary, effects on a project basis are considered SMALL, and no mitigative measures are needed.

Shrubland

Approximately 30 percent of this community present onsite would be impacted, approximately three acres permanently and 31 acres temporarily. This is an early succession community that has developed on lands that were previously disturbed (cleared or filled) during the construction of Fermi 2 as discussed in Subsection 2.4.1.1.1. While some wildlife utilizes the area for shelter, other habitats in the immediate and surrounding vicinity provide opportunities for shelter and perhaps better foraging. On the Fermi site, 113 acres of this community were mapped during site visits. The onsite acreage of Shrubland habitat is unclear because of inconsistencies between USGS data and onsite observations. USGS data indicate 95 acres of Shrubland in the vicinity (refer to Table 2.2-2), which is less than the observed habitat (113 acres). One possible explanation is that USGS data were collected before subsequent expansion of Shrubland had occurred, resulting in the recent larger estimate. However, because this is an early succession community, the project impacts to the community are considered SMALL, and no mitigation measures are needed.

Thicket

Approximately 26 percent of the 23 acres (i.e., approximately 6 acres) of this community present onsite would be temporarily impacted. This is an early succession community that has developed on lands that were previously disturbed (cleared or filled) during the construction of Fermi 2 as discussed in Subsection 2.4.1.1.1. Wildlife use of the area is mostly for shelter. Temporarily impacted areas are primarily associated with construction parking areas and will be re-vegetated following construction. Due to the small area of temporary loss and early succession character of this community, the project impacts to the community are considered SMALL, and no mitigative measures are needed.

Forest: Lowland Hardwood

Approximately 25 acres of this community present onsite would be temporarily impacted. As described in Subsection 2.4.1.1.1, this is a natural community and probably represents the most mature plant community on the Fermi site. Wildlife use the community for shelter, and some foraging is available due to the presence of mast producing species, mostly oaks. The area to be temporarily impacted is associated with the construction laydown areas. This same area will be re-vegetated following construction. The temporary loss to the community from the project is considered SMALL based on the amount of similar community in the vicinity, and no mitigative measures are needed.

Forest: Woodlot

Approximately 117 acres of this community are present onsite. Of this total , 5 percent (i.e., approximately 6 acres) would be temporarily affected by Fermi 3 construction. As described in Subsection 2.4.1.1.1, this community occurs entirely on previously cleared and/or filled land. The plant species present are mostly not representative of native forested areas in the region but local wildlife do utilize the area for shelter and limited foraging. The temporarily impacted areas, those associated with the Fermi 3 construction parking area, would be re-vegetated following

construction. Due to the early succession character of this community, the project impacts to the community are considered SMALL, and no mitigative measures are needed.

Forest: Coastal Shoreline

The Coastal Shoreline Forest plant community encompasses about 47 acres of land or 3.7 percent of the Fermi site. None of this area would be directly impacted by Fermi 3 construction, with the possible exception of noise within 600 feet of any active nests during the breeding season. This is a dynamic plant community composed of opportunistic, early succession (pioneer) species. The area is dominated by cottonwoods and willow, some quite large. Shrub growth varies from dense to sparse depending on lake exposure and the extent of ponding that occurs. The habitat value of the area is primarily limited to roosting or nesting by birds, notably bald eagles. Because of the nesting eagles, measures to avoid disturbance near this habitat during April to June, including excessive noise, will be used to limit impacts to bald eagles. Because none of this habitat will be affected directly and preventive measures to avoid indirect impacts will be in effect, the project impacts to the community are considered SMALL, and no mitigation measures are needed.

4.3.1.1.2 **Wildlife on the Site and in the Vicinity**

The footprint for Fermi 3 is designed to utilize developed and previously disturbed areas to minimize the impact to wildlife. Potential impacts to wildlife from construction activities could include:

- Takes or displacement of wildlife
- Fugitive dust and equipment emissions
- Bird collisions with elevated construction equipment
- Pollutant spills
- Noise

Takes or Displacement of Wildlife

The normal movement of equipment, clearing and excavation are expected to result in some takes of small wildlife but mostly the displacement of certain wildlife. To benefit wildlife, Detroit Edison will adhere to permit conditions that may restrict the timing of certain construction activities, such as avoiding primary nesting periods for birds, such as the bald eagle that is discussed in Subsection 4.3.1.2.1. Mortality is expected to be limited to the least mobile wildlife, such as small mammals and reptiles. Larger mammals and birds will leave the area when there is disturbance. The wildlife disturbed is expected to be primarily common species that readily adapt to changing environments, such as raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), and skunk (*Mephitis mephitis*). The wildlife is expected to move outward from the impact area to neighboring habitats both onsite and offsite, making the impact to wildlife SMALL with no mitigative measures needed.

Fugitive Dust and Equipment Emissions

The impact of fugitive dust is expected to be negligible as access roads and construction sites will be watered as necessary. Emissions from heavy equipment are expected to be minimal because of regularly scheduled maintenance procedures and therefore, the impacts to terrestrial wildlife is SMALL, and no mitigative measures are needed.

Bird Collisions with Elevated Construction Equipment

There is limited published literature regarding bird collisions with elevated construction equipment, such as cranes. However, the NRC states in Section 4.3.5.2 of NUREG-1555, in reference to cooling towers, that "the significance of the [bird] mortality ….is determined by examining the actual numbers and species of birds killed and comparing this mortality to the total avian mortality resulting from other man-made objects and with the abundance of bird populations near the towers." With regard to elevated construction equipment, there is no available data, and therefore, no direct comparisons are possible. The lack of data suggests that an impact of this type during construction has not been a significant issue in the past and is probably not a significant issue at present. NUREG Section 4.3.5.2 further states that avian mortality resulting from collisions with cooling towers is of small significance. This considered, it is reasonable to extrapolate that if significance is small for a fixed and permanent object like a cooling tower, then the presence of elevated construction equipment for a short term would also be considered of SMALL significance, and no mitigative measures are warranted. Bird collisions with permanent elevated structures (e.g., cooling towers) during operation of the facility, are discussed in Subsection 5.3.3.

Pollutant Spills

Pollutant spills associated with construction activities could impact terrestrial wildlife but is of a greater concern to aquatic organisms as discussed in Subsection 4.3.2. As discussed in Subsection 4.2.1, a PIPP will be implemented, which addresses actions to be taken in the event of such spills. Accordingly, impacts from a spill occurrence are expected to be SMALL, and no mitigative measures are needed.

Noise

Noise generated by construction activities, including workers and equipment, can affect wildlife. Effects may include physiological changes, abandonment of nests or dens, curtailed use of foraging areas, and other behavioral modifications. Since most of the noise associated with the construction is in close proximity to the existing Fermi structures, most of the wildlife in the area will have presumably already adapted to facility noise levels. It is therefore expected that the overall impact of construction noise on wildlife is SMALL, and no mitigative measures are needed. Potential effects on the bald eagle, which is a State threatened species, are discussed in Subsection 4.3.1.2.1.

4.3.1.2 Important Terrestrial Species and Habitats

Subsection 2.4.1 describes the important terrestrial species and habitats located within the Fermi 3 site and vicinity, and transmission corridors. No Federally protected plant or animal species or

designated critical habitat listed by the USFWS under the Endangered Species Act (Reference 4.3-2) would be impacted. The Michigan Department of Natural Resources (MDNR) stated that while there are no occurrence records for these species in the vicinity, terrestrial species may occur in the vicinity. Field studies in 2007 identified one animal and one plant that are State listed that occur on the Fermi site. Table 4.3-2 provides a list of the protected species occurring or potentially occurring on the Fermi site. Following are discussions of the State protected species and important habitats.

4.3.1.2.1 **Important Species**

Bald Eagle

The bald eagle is a Michigan threatened species. Three nests occurred on the Fermi site in the winter of 2007-2008 in the Coastal Shoreline Forest immediately adjacent to Lake Erie. Two nests were located north of Fermi 2, and one nest was south of Fermi 2. Normally one pair of eagles will occupy one of the three nests each winter. In May 2008, the nest south of Fermi 2 was gone, apparently blown out of the tree during winter storms. One nest, approximately 750 feet east of the Fermi 2 cooling towers, was occupied.

Formerly listed as an endangered species, the bald eagle nationwide (except in parts of Arizona) was federally de-listed in 2007, but continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. MDNR eagle management guidelines impose activity restrictions within a one-quarter mile radius around active nests from mid-March to the end of June, if young are in the nest. However, because bald eagles are abundant in Michigan, the MDNR is in the process of de-listing the species for Michigan. When the state de-listing process is complete, the MDNR will follow USFWS guidelines for bald eagle management. These guidelines suggest a radius of 660 feet around the nest during the breeding season (Reference 4.3-4). The restricted area is imposed because bald eagles are extremely sensitive to human activity during the first 12 weeks of the breeding season. These guideline limitations will be adhered to during Fermi 3 construction.

American Lotus

The American lotus (a Michigan threatened species) is a wetland plant common in moderately shallow areas of the South and North Lagoons on the Fermi site. Although the species reaches a northern limit of its distribution in southeast Michigan, healthy populations are scattered throughout this portion of the state. American lotus grows from thick and creeping underground tubers that make it impossible to determine how many plants are actually present in a given area. The plants, however, are hardy and relatively easy to transplant.

Construction activities are not expected to affect the North Lagoon and, therefore, no American lotus in this area should be affected. American lotus occurring along the west edge of the south lagoon may be temporaily affected by the construction and utilization of the laydown area southeast of the Fermi 3 cooling tower area. Because state populations of American lotus are healthy, MDNR endangered species specialists have indicated that plants expected to be impacted by Fermi 3 construction activities should be transplanted to other areas of the lagoons on the Fermi site or

possibly offsite to minimize adverse impact. Detroit Edison intends to engage in further consultation with the MDNR in developing the appropriate mitigation strategy that will ensure that the impact to this species will be SMALL.

Arrowhead

The arrowhead (a Michigan threatened species) has not been observed on the Fermi property. Subsection 2.4.1.2.2.2 provides life history and distribution information about the species. Most of the habitat that might have been suitable for the species has been invaded by common reed (*Phragmites australis*). Therefore, impacts from Fermi 3 activities are anticipated to be SMALL, and no mitigative measures are needed.

Eastern Fox Snake

The eastern fox snake (a Michigan threatened species) was sighted two times on the Fermi property, in June 2008. The Michigan Natural Features Inventory has recorded nine occurrences for Monroe County, with the most recent report in 2007 (Reference 4.3-5). The snake was found along the cattail marshes or wetland shorelines around woody debris. The life history of the eastern fox snake is discussed in Subsection 2.4.1.2.2.1. Fermi 3 construction activities are primarily located away from potential habitat for the eastern fox snake and the snake would be expected to move away from these activities. Therefore, the impact to this species from the project is considered SMALL, and no mitigative measures are needed.

4.3.1.2.2 **Important Habitats**

Important habitats for the Fermi site are described in Subsection 2.4.1.2.3 and include the DRIWR and areas of wetlands as discussed below.

Detroit River International Wildlife Refuge

The DRIWR Lagoona Beach Unit is located entirely within the Fermi property and includes a total of 656.4 acres (Figure 2.4-6). The Fermi 3 construction impact area includes approximately 61 acres, or about 9 percent of the Lagoona Beach Unit as illustrated in Figure 4.3-3; 2 acres would be permanent impacts and 59.3 acres temporary impacts. The area of each section of the Lagoona Beach Unit and the area of that unit to be impacted is provided in Table 4.3-3. The agreement between Detroit Edison and the USFWS that established the wildlife refuge allows for modifications to the agreement (such as Fermi 3) by either party at any time (Reference 4.3-6). The construction impacts of reducing the effective area of the DRIWR are principally land-use impacts, which discussed in Subsection 4.1.1.1. The importance of DRIWR as an ecological habitat is principally due to it being a wetlands area. Accordingly, the construction impacts are bounded by the overall wetlands impacts, as discussed below.

Wetlands

Detroit Edison conducted a wetlands investigation to delineate wetland boundaries and assess functions and values of the wetlands present on the Fermi property. The results of the wetland investigation are summarized in Subsection 2.4.1.2.3. Impacts to approximately 49.47 acres of

wetland and open water habitat regulated by the MDEQ and USACE are anticipated within the construction impact area at the Fermi property (see Figure 4.3-5). This acreage includes 13.32 acres of emergent marsh (PEM), 17.37 acres of forested wetland (PFO), 4.10 acres of scrub-shrub wetland (PSS), and 14.68 acres of open water. Of this acreage, approximately 39.44 acres (80 percent) are temporary impacts that would be restored following construction. Characteristics of these wetlands are discussed in Subsection 2.4.1.2.3. Delineation data from the wetland investigation will be submitted to the MDEQ and USACE for a Jurisdictional Determination (JD) of the wetlands. In sum, the construction impacts are projected to be MODERATE. Accordingly, Detroit Edison will prepare a mitigation plan for Fermi construction activities that will be submitted to the MDEQ and USACE.

Impacts to wetlands as part of Fermi 3 construction activities are a matter that must be carefully considered due to the importance of these habitats. Measures are taken to first avoid impacts and when that is not possible, impacts are minimized to the greatest extent possible. Work in areas adjacent to wetlands, such as the parking lot construction, would utilize silt fencing to protect the wetland from siltation and entry by construction equipment. Other BMPs would apply as appropriate. Wherever possible, disturbed areas would be revegetated as soon as possible following disturbance to avoid impacts from stormwater runoff. Plantings will be of tree species or seed mixes of grasses and forbs appropriate for the Fermi region.

4.3.1.3 Other Projects within the Area with Potential Impacts

No major projects have been identified in the vicinity that would add cumulatively to the impacts associated with the construction of Fermi 3. This includes consideration of terrestrial communities, important species and habitats, and other terrestrial resources considered in Subsection 4.3.1.

4.3.1.4 Regulatory Consultation

Affected Federal and State agencies were contacted or consulted regarding potential impacts to the terrestrial ecosystem resulting from the construction of Fermi 3. The USFWS, the MDNR Natural Heritage Program (Reference 4.3-2), and the Michigan State University Extension Michigan Natural Features Inventory program (Reference 4.3-7) were consulted in 2007 regarding Federal and State protected species and sensitive habitats.

The MDEQ and USACE will be consulted regarding wetlands. A wetland investigation, including a wetland delineation was completed for the Fermi property in May and June 2008. A summary of the wetland report is provided in Subsection 2.4.1.2.3. The results of the delineation will be submitted to the MDEQ and USACE with a request for a JD of wetlands on the Fermi site. The JD will be the basis from which impacts to wetlands and the need for mitigation will be determined. Federal and State permit applications for working in wetlands will be submitted to these agencies at a later date, but prior to any construction activities.

4.3.1.5 Transmission Corridors and Other Offsite Areas

As stated in NUREG-1555, Section 4.1.2:

In some cases transmission lines may be constructed and operated by an entity other than the applicant. In such cases, impact information may be limited and the reviewer should proceed with the assessment using the information that can be obtained.

The 345 kV transmission system and associated corridors are exclusively owned and operated by ITC*Transmission*. The Applicant has no control over the construction or operation of the transmission system. Accordingly, the construction impacts are based on publicly available information, and reasonable expectations of the configurations and practices that ITC*Transmission* would likely follow based on standard industry practice. However, the information described in this subsection does not imply commitments made by ITC*Transmission* or Detroit Edison, unless specifically noted.

Transmission corridor construction activities includes the installation of three new transmission lines in an assumed 300-foot wide corridor 29.4 miles long between the Fermi site and the Milan Substation, located near Milan, MI. The route is illustrated and described in Subsection 2.4.1.9. The three 345 kV lines for Fermi 3 will run in a common corridor, with transmission lines for Fermi 2, to a point just east of I-75. From the intersection of this Fermi site corridor and I-75, the three Fermi-Milan lines will run west and north for approximately 12 miles in a corridor shared with other non-Fermi lines within the assumed 300-foot wide right-of-way (ROW) in which the vegetation has been managed to exclude tall woody vegetation. The western 10.8 miles of the corridor is currently undeveloped, and no transmission infrastructure exists. Where vegetation is present, the maintenance has been minimal, except to keep tall woody vegetation removed. It is assumed that the Milan Substation may expand from its current size of 350 by 500 feet to an area of approximately 1,000 by 1,000 feet to accommodate the new transmission lines to Fermi 3. There are no other offsite areas associated with Fermi 3 construction.

Construction impacts in the existing eastern 18.6 miles of corridor are expected to be minimal, since the reconfiguration of existing conductors would largely allow for the use of existing infrastructure to create the new lines, access for installing additional lines is good, and the ROW is maintained. Impacts from construction are primarily limited to the western 10.8 miles of the corridor where both tower and steel pole installation could occur and some clearing will be required.

4.3.1.5.1 **Vegetation**

Vegetation communities occurring along the transmission corridor are illustrated and tabulated in Subsection 2.4.1.9.1. Impacts to vegetation in the eastern section of the corridor is expected to be negligible, since construction access is currently adequate and there are no expectations that the current maintenance practices will change. The level of vegetative maintenance within the western 10.8 miles of the corridor will likely increase due to the installation of transmission structures. Access is sufficient throughout this section that the construction of new access roads should be minimal, and only if deemed necessary. Clearing will likely be necessary in areas of Deciduous Forest and Forested Wetlands. Shrub/Scrub and open communities should remain in their existing condition. Table 4.3-4 provides an accounting of the vegetative communities/land use within the 10.8 mile undeveloped portiion of the corridor. Table 4.3-4 also provides a comparison of the quantity of the community types within the 10.8 mile undeveloped portion that would be impacted

by the transmission line to that found within the region (50 mile radius around Fermi). Since ITC*Transmsission* will determine the type of structures used (as well as quantity) at a time closer to construction of the new lines, the placement is not known at this time. Therefore, the type of habitats impacted cannot reasonably be determined. However, since the habitats along the western portion of the corridor are mostly previously disturbed, impacts to vegetation are expected to be SMALL when compared to cover types existing in the region (Table 2.4-17), and no mitigative measures are expected.

4.3.1.5.2 **Wildlife**

Wildlife occurring in the vicinity of the transmission corridor is similar to that discussed in Subsection 2.4.1.9.2 and the impacts to these similar to that discussed in Subsection 4.3.1.1.2. Construction in the eastern portion of the route is expected to have negligible effect on wildlife as this area contains existing transmission infrastructure. The western portion of the route follows a minimally maintained ROW that will require some clearing to accommodate the anticipated tower and steel pole construction. Habitat along this section is dominated by disturbed vegetative communities, cropland, and developed areas. Most wildlife present is expected to be sufficiently mobile and will move to avoid construction activity. Because of existing levels of activity in the area, wildlife is expected to return to the ROW and adjacent lands following construction. The impact to terrestrial wildlife resources from transmission system construction is considered SMALL, and no mitigative measures are anticipated.

4.3.1.5.3 **Important Terrestrial Species**

Important species potentially occurring in or along the transmission corridor are considered in Subsection 2.4.1.2 and Subsection 2.4.1.9.3. No Federal protected plant or animal species or designated critical habitat listed by the USFWS will be impacted. There are no known occurrences of State-listed species but potential exists for the occurrence of the eastern fox snake which is discussed in Subsection 4.3.1.2.1. The impact to important terrestrial species from transmission system construction is considered SMALL, and no mitigative measures are expected.

4.3.1.5.4 **Important Habitats**

Important habitats are defined in Subsection 2.4.1.2 and discussed for the transmission system in Subsection 2.4.1.9.4. Wetlands are the only resource considered an important habitat that is found within the transmission ROW. The locality of these wetlands is illustrated in Figure 2.4-8. No wetlands will be impacted in the eastern section of the route, since towers to accommodate new lines are already present. No wetlands are present at the Milan Substation site. The western section could require the placement of towers in wetlands that are longer than 900 feet and cannot be spanned. The total potential permanent impact to wetlands from installation of the towers is expected to be approximately 0.5 acres. Clearing ROW wetlands is discussed in Subsection 4.3.1.5.1. The impacts to wetlands from the construction of the transmission system are considered SMALL. Any mitigation required for the impacts are expected to be determined by ITC*Transmission* in consultation with applicable regulatory agencies, including the USACE, at the time permit applications are submitted.

4.3.1.5.5 Other Projects within the Area with Potential Impacts

No major projects have been identified in the vicinity of the transmission corridor that would add cumulatively to the impacts associated with the construction of Fermi 3. This includes consideration of terrestrial communities, important species and habitats and other terrestrial resources.

4.3.1.5.6 Regulatory Consultation

Regulatory consultation with USFWS and MDNR is noted in Subsection 4.3.1.4. These agencies as well as the MDNR Natural Heritage Program and Michigan State university Extension Natural Features Inventory program were consulted in 2007 and 2008 regarding Federal and State protect species and sensitive habitats.

4.3.2 Aquatic Ecosystems

This subsection provides an assessment of the potential temporary and permanent impacts that Fermi 3 construction activities will have on the aquatic ecosystems associated with Lake Erie, onsite impoundments, and streams adjacent to and within the Fermi site (see Figure 2.4-3 and Figure 2.4-4).

As described in Subsection 2.3.1 the following surface water bodies are located adjacent to and within the Fermi site:

- Man-made overflow and drainage canals, circulating water reservoir, and drainage ditches
- The Quarry Lakes and other water bodies and wetlands within the DRIWR
- Swan Creek
- Stony Creek
- Lake Erie and its associated bays

Permanent loss of aquatic habitat is limited to the areas affected by the construction of the station water intake structure, barge slip, parking garage, and the EF2/EF3 common warehouse (Figure 4.3-4). The station water intake structure is located within the existing intake bay for Fermi 2 and will require additional dredging and construction of bulkheads within the intake bay resulting in potential loss of aquatic habitat. The barge slip will also be constructed within the existing intake bay for Fermi 2. However, the area does not support established aquatic habitat (i.e. vegetation, structure) and species diversity within the area is generally low; therefore, impacts will be small.Additional construction impacts to aquatic habitats will result from dredging of the existing barge slip and station water intake embayments. Dredging of the barge slip and intake structure embayment will result in the temporary loss of benthic biota due to disturbance of substrate, physical impacts to individuals, as well as short-term declines in phytoplankton productivity and zooplankton density due to increased turbidity. Additional discussion of these impacts is provided in Subsection 4.3.2.2.

Construction of the parking garage and the EF2/EF3 common warehouse will include completely filling in the isolated central canal and portions of the north and south canals. Impacts from filling in

these areas will result in the loss of aquatic communities and aquatic organisms that currently reside in these areas. These include the loss of fringing wetland habitats, aquatic vegetation, fish and benthic species as well as reptile and amphibians. Impacts to the isolated central canal are considered SMALL due to the isolated nature of aquatic organisms living there. This system has no hydrological connection with the other on-site waterbodies and supports a low diversity and low abundance of organisms. The partial filling of the north and south canal systems will result in mostly habitat loss along the canal banks. Loss of aquatic organisms will be SMALL due to their ability to leave the affected area into other portions of the north and south canals, Swan Creek and the southern lagoon.

Indirect impacts to aquatic systems, such as increases in sedimentation and water flow throughout onsite and adjacent water bodies are also expected. These indirect impacts are accounted for in the temporary impacts identified on Figure 4.3-4. These effects could cause temporary losses to benthic habitat and biota due to siltation, as well as short-term declines in phytoplankton productivity and zooplankton densities in the immediate area affected by construction.

Recolonization of affected water bodies is expected. These water bodies are expected to be colonized by native species common to the surrounding habitats. These common species are further discussed in Subsection 2.4.2.

To reduce sediment loading and effluent runoff into onsite water bodies, a construction SESC plan and PIPP will be developed and in place prior to the start of construction. All applicable BMPs will be incorporated into appropriate construction plans and procedures.

4.3.2.1 Impacts to Impoundments and Streams

The greatest potential for adverse impacts to fisheries resources during construction comes from increased sedimentation and turbidity due to construction-related erosion and temporary discharges that will potentially impact important aquatic habitats. Activities that contribute to increased sediment/silt loads into onsite impoundments, surface drainages, and to adjacent streams include increased road traffic (dust from traffic settling into water bodies; increased traffic causing minor road erosion), site clearing and grading, loss of vegetated buffer zones that trap sediment and silt, and site dewatering which collectively lead to increased sedimentation and siltation of the water bodies.

Siltation caused by increased sedimentation could result in the temporary loss of benthic habitats and biota associated with the onsite drainage systems and canals. Increased turbidity from the runoff could limit phytoplankton productivity and decrease zooplankton densities within these water bodies, as well. While this may temporarily reduce food resources for forage fish species, these effects will be limited in duration and temporary in nature, terminating upon the completion of Fermi 3 construction.

Vegetation, associated with the onsite drainage systems, canals, and wetlands, functions as filters and barriers that trap silt and sediment (refer to Subsection 4.3.1 for vegetation listing). Plants growing in these types of habitats thrive in high nutrient conditions, making these areas ideal buffer zones for sediment and silt runoff. The filtering capacity of these plants also aids in the removal of

potentially harmful nutrients from construction effluents and run-off. Effects to the aquatics of the onsite drainage systems and canals would be similar to those naturally occurring to this system during periods of heavy inundation and flooding, and therefore impacts would be expected to be SMALL.

Wetland and coastal habitats, such as those identified within the DRIWR, routinely experience habitat changes associated with heavy rains and flooding events. These episodic events are representative of those expected as a result of surrounding construction activities (erosion, increased sedimentation and turbidity). The aquatic biota found in these types of habitats are highly adapted to survive in dynamic aquatic regimes, and therefore can be expected to recover from these effects quickly without significant decreases in overall health and sustainability. Wetlands are further discussed in Subsection 4.3.1.2.2.

Historically, onsite aquatic resources have been subjected to heavy sediment deposition associated with clearing of adjacent lands for agricultural purposes as well as with the construction of Fermi 2. Increased erosion and turbidity in and around the identified water bodies likely occurred as a result of these activities. The presence of established aquatic communities in these water bodies (described in Subsection 2.4.2) demonstrates the ability of these resources to recover from such perturbation. Because of the highly adaptive nature of the onsite aquatic system, impacts to aquatic resources at the Fermi site due to construction activities are expected to be SMALL.

Construction activities associated with Fermi 3 Construction as well as transferal of Fermi 2 structures will permanently impact approximately 2.75 acres of wetland and 7.28 acres of open water habitats (see Figure 4.3-5). This acreage includes 2.23 acres of emergent marsh (PEM), and 0.52 acres of forested wetland (PFO) In addition, construction may lead to soil erosion and sedimentation into onsite drainage systems, canals, Swan Creek, and other waters within the DRIWR. Erosion and sedimentation may cause some temporary disruption and modification of the onsite drainage systems and may provide a surface conveyance of silt and sediment to aquatic habitats. This input of materials will be minimized and controlled through the use of BMPs established in the SESC Plan. BMPs include the utilization of silt fencing, hay bales, turbidity curtains, and sediment traps. BMPs are discussed in more detail in Section 4.3. These measures will be installed prior to the start of construction activities and will be maintained on a routine basis. Accordingly, impacts to these habitats will be SMALL,

Excess material excavated during construction will be placed in a designated spoils area. Stormwater runoff from the spoils area and other areas of disturbed soil will be controlled by BMPs established in the SESC Plan. These practices may include use of silt fences and hay bales to prevent silted runoff from indirectly impacting the onsite drainage systems and canals. Areas subjected to sediment deposition during local precipitation periods will likely return to pre-construction conditions upon completion of construction.

Permanent construction–related losses to aquatic biota are expected to be limited to portions of the DRIWR associated with construction of the NDCT and filling in of certain onsite water bodies. Construction impacts on the DRIWR are discussed in Subsection 4.3.1.2.2.

4.3.2.2 Impacts to Lake Erie

The western basin of Lake Erie is characterized by shallow water, wind driven seiche currents, and varied substrates. Relatively warm water temperatures and shallow depths make it a highly productive biological system.

These same characteristics also make the western Lake Erie system particularly susceptible to variations associated with wind and current patterns that change habitats, as well as dynamic conditions resulting from nutrient runoff and accelerated eutrophication. Such conditions require a diverse and resilient assemblage of aquatic organisms with the ability to adapt and survive such perturbations. Since the 1950s, Lake Erie has experienced numerous environmental events that have been detrimental to the overall health and stability of aquatic populations. The most infamous of these events was the increased eutrophication and anoxia prevalent in the lake from the 1950s through the 1970s. This period was characterized by fish kills, significant losses in mayfly populations, and increased algal blooms, particularly cladophora. In the 1980s and 1990s, the zebra and quagga mussels, as well as round and tubenose gobies, were introduced into the lake system via ship ballast water, causing significant habitat changes, alteration of the natural food chain, and competition with many native species. In the mid 1990s, increased levels of cyanobacteria were documented, and carbon and nitrogen were identified as limiting factors in ecosystem health in Lake Erie. Recently, there has been a transition toward improvement in the Lake Erie system. Important indicator species, such as the mayfly and walleye, have been recovering, and are currently documented to have fair to good status. Current environmental regulations that limit nutrient runoff into Lake Erie are believed to have been responsible for the system's recovery and will be a significant contributor to the increased health and future stability of Lake Erie.

Construction activities associated with Fermi 3 will be restricted almost entirely to the existing plant property. However, the construction of the Fermi 3 intake structure, the barge slip, and discharge line to Lake Erie will require (1) temporary construction dredging and operational maintenance dredging of the existing water intake bay and (2) construction of the intake structure and associated components. Construction of the intake structure and barge facility will benefit from ongoing maintenance dredging of the area between the groins. No dredging in addition to that which is routinely completed is anticipated for installation of those structures. Construction of the discharge pipeline will extend approximately 200 feet beyond the area routinely dredged for Fermi 2 maintenance. Therefore, construction of the above structures will result in a minimal permanent loss of benthic habitat associated with the intake structure. Impacts to other aquatic species associated with the station water intake structure are considered to be SMALL.

Dredging activities for the barge slip and the intake embayment are expected to be performed as part of ongoing operations and maintenance (O&M)[1] dredging activities utilized to maintain the existing intake embayment under an existing USACE permit and include increased turbidity, siltation, and temporary loss of benthic habitat and associated biota (see Subsection 2.4.2 for

1. Maintenance dredging for the Fermi 2 intake embayment has been performed every 4 years. Approximately 22,000 yd^3 of material is removed from the intake embayment during these activities (permit allows for removal of up to 25,000 yd^3 of material each year for five years).

benthic biota speciation). Therefore, impacts to the biota are expected to be temporary, consistent with activities to which local populations of organisms have adapted.

Dewatering associated with the construction of Fermi 3 includes dewatering the excavation site for the reactor unit including portions of the onsite canals. The Groundwater Modeling System software (Reference 4.2-5) was used to simulate groundwater flow with two barrier alternatives. Option 1 is a reinforced diaphragm concrete wall, and Option 2 represents a grout curtain or freeze wall. Under the Option 1 simulation, the aquifer water levels beneath the Quarry Lakes will be lowered less than 1 ft. Under the Option 2 simulation, the water levels beneath the Quarry Lakes will be lowered approximately 2 ft (Subsection 4.2.1.5).

Construction activities conducted on Lake Erie are not expected to significantly impact surface water biota (see Subsection 4.3.2.4.2).

4.3.2.3 Impact to the Transmission Corridors and Offsite Areas

Transmission corridor construction activities are expected to include the installation of three transmission lines in an assumed 300-foot wide corridor, 29.4 miles long between the Fermi site and the Milan Substation, located near Milan, MI. The route is illustrated and described in Subsection 2.4.1.9. Vegetative communities and land use along the corridor are illustrated in Figure 2.2-3. ITC*Transmission*, which owns and operates the transmission system in southeastern Michigan, will be responsible for the construction and maintenance of the new transmission infrastructure. The three 345 kV lines for Fermi 3 will run in a common corridor, with transmission lines for Fermi 2, to a point just east of I-75. From the intersection of this Fermi site corridor and I-75, the three Fermi-Milan lines will run west and north for approximately 12 miles in the corridor shared with other non-Fermi lines within an assumed 300-foot wide right-of way (ROW). The western 10.8 miles of the ROW is undeveloped, with no lines or towers erected. Where vegetation is present, the maintenance has been minimal, except to keep tall woody vegetation removed. It is assumed that the Milan Substation may require an expansion from its current size of 350 by 500 feet to an area approximately 1,000 by 1,000 feet to accommodate the three new transmission lines from Fermi 3. There are no aquatic resources in this assumed expansion area.

Construction impacts to aquatic resources along the eastern 18.6 miles of the transmission corridor are expected to be SMALL, since the reconfiguration of existing conductors would largely allow for the use of existing infrastructure to create the new lines, and access for installing additional lines is good (as the plant life has been managed to exclude tall woody vegetation). Existing aquatic habitats in this portion of the corridor will be spanned and best management practices will be used to protect aquatic habitats crossed by the new lines. This includes, but is not limited to, the use of silt fencing, hay bails and similar practices to ensure the protection of aquatic habitats in close proximity to construction activity.

The western 10.8 miles of the transmission corridor is undeveloped. Potential impacts to aquatic resources in this portion of the corridor are discussed in the subsections that follow.

4.3.2.3.1 Aquatic Communities and Principal Aquatic Species

Aquatic communities and principal aquatic species are described in Subsection 2.4.2.9. Construction impacts to aquatic communities and principal aquatic species described in Subsection 2.4.2.9 are expected to be SMALL. The creeks and ditches occurring in the western corridor are mostly narrow and could be avoided by using tower spans of 700-900 feet. Numerous roads in the vicinity are expected to provide sufficient access to this region of the corridor without the need for construction of new access roads.

4.3.2.3.2 Important Aquatic Species

Important aquatic species potentially occurring in or along the transmission corridor are considered in Subsection 2.4.2.9.2. No Federal or State protected species or designated critical habitat listed by the USFWS will be impacted. Therefore, SMALL impacts to important aquatic species are expected from the transmission system construction, and no mitigative measures are expected.

4.3.2.3.3 Important Habitats

Important habitats are defined in Subsection 2.4.1.2 and discussed for the transmission system in Subsection 2.4.1.9.4. Wetlands are the only resource considered an important habitat that is found within the transmission ROW. Wetlands are discussed in Subsection 4.3.1.5.4. The impacts to wetlands from the construction of the transmission system are considered SMALL.

4.3.2.3.4 Other Projects within the Area with Potential Impacts

No major projects have been identified in the vicinity of the transmission corridor that would add cumulatively to the impacts associated with the construction of Fermi 3, including the transmission system. This includes consideration of aquatic communities, important species and habitats, and other aquatic resources.

4.3.2.3.5 Regulatory Consultation

Regulatory consultation with USFWS and MDNR is noted in Subsection 4.3.1.4. These agencies as well as the MDNR Natural Heritage Program and Michigan State University Extension Natural Features Inventory program were consulted in 2007 and 2008 regarding Federal and State protect species and sensitive habitats. It is expected that ITC*Transmission* will consult with these and other appropriate agencies prior to initiating construction of the transmission system.

4.3.2.4 Impact on Important Aquatic Species

4.3.2.4.1 Threatened and Endangered Species

A general review of threatened and endangered species located in Michigan, Ohio, and Ontario, Canada identified a number of species as having the potential to occur near the Fermi site. More in-depth discussions of life history and habitat utilization of each of these species can be found in Subsection 2.4.2 and Table 2.4-15.

No threatened and endangered aquatic species have been observed or recorded as being located onsite. However, the presence of the American lotus is a specific case. The American lotus is a hydrophilic plant growing in open water areas on the site. Although the American lotus is listed as a

threatened species by the State of Michigan, it is prevalent throughout much of the United States, and even considered an invasive weed in some areas. However, because it's roots require soil, the American lotus is being treated as a terrestrial species and impacts associated with this species are addressed in detail in Subsection 4.3.1. In summary, the impacts to threatened and endangered aquatic species are expected to be SMALL.

4.3.2.4.2 Commercial and Recreational Aquatic Species

Potential impacts from construction activities at the Fermi site to commercial and recreational species (as referenced in Subsection 2.4.2) are minimal due to limited presence of these species within the site. Incidental impacts may occur indirectly due to interruption of fish migration and spawning and fish mortality related to accidental toxic spills. However, such events are unlikely to occur due to implementation of the appropriate spill prevention measures detailed in the PIPP. Notwithstanding, the impacts to Lake Erie commercial and recreational species are expected to be SMALL.

While it is not expected that migratory pathways would be physically barricaded during construction, increased turbidity can act to inhibit migratory cues in some fish species. Contaminants in construction effluents can also act as chemical barriers inhibiting fish migratory behavior. With the implementation of construction runoff and spill control measures detailed in the PIPP, it is unlikely that such contaminants would be present at levels that would significantly impact fish migration behavior, at least on a long-term basis.

4.3.2.4.3 Other Important Species

Water quality indicator organisms, such as mayflies, prefer to live in areas with softer sediments, which often harbor higher concentrations of pollutants in contaminated regions. These pollution-sensitive species are most abundant in shallow, productive lakes with soft, organically-rich sediment.

Construction activities may cause a temporary decline in mayfly populations in western Lake Erie and its tributaries due to a minimal increase in turbidity and the physical impacts to benthic habitat and immobile or slow-moving organisms during in-lake construction activities. Due to the temporary nature of the aforementioned construction impacts and resulting turbidity, no long-term effects on the population number and structure are anticipated.

National Oceanic & Atmospheric Administration Fisheries, regional Fishery Management Councils, and Federal and State agencies identify Essential Fish Habitat (EFH) for federally managed fish species and develop conservation measures to protect and enhance these habitats. Currently, EFH and associated species have only been identified in marine habitats and are not expected to be applicable to the aquatic ecology of Lake Erie and other habitats surrounding the Fermi site.

Accordingly, the environmental impacts on other important species are expected to be SMALL.

4.3.2.5 Summary

Construction activities that may cause erosion that could lead to deposition in aquatic water bodies would be of short duration, permitted and overseen by state and federal regulators, and guided by

an SESC Plan. Any small spills of construction-related hazardous fluid would be mitigated according to the PIPP. Impacts to aquatic communities from construction activities are expected to be SMALL.

4.3.3 References

4.3-1 Michigan Department of Environmental Quality, Technical Manuals, MDEQ – BMP Design Manuals, http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3714-118554--,00.html, accessed 29 April 2008.

4.3-2 Michigan Department of Natural Resources, Natural Heritage Program, http://www.michigan.gov/dnr/0,1607,7-153-30301_31154_31260-54441--,00.html, accessed 5 March 2008.

4.3-3 State of Michigan, "Natural Resources and Environmental Protection Act (Act 451 of the Michigan Public Acts of 1994)," Part 365 Endangered Species Act, http://www.legislature.mi.gov/(S(k3qiry55fgux1yywldqkm345))/mileg.aspx?page=getobject&objectname=mcl-451-1994-iii-1-endangered-species-365, accessed 21 March 2008.

4.3-4 U.S. Fish and Wildlife Service, "National Bald Eagle Management Guidelines," May 2007, http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf, accessed 21 March 2008.

4.3-5 Michigan State University Extension, Michigan Natural Features Inventory, Rare Species Explorer, "Pantherophis gloydi, Eastern Fox Snake," http://web4.msue.msu.edu/mnfi/explorer/species.cfm?id=11505, accessed 30 April 2008.

4.3-6 Establishment of the Lagoona Beach Unit of the Detroit River International Wildlife Refuge, "Cooperative Agreement Between Detroit Edison and U.S. Fish and Wildlife Service," September 25, 2003.

4.3-7 Michigan State University Extension, Michigan Natural Features Inventory, Monroe County, http://web4.msue.msu.edu/mnfi/data/cnty_dat.cfm?county=Monroe, accessed 7 February 2008.

Table 4.3-1 Potential Impacts to Terrestrial Communities on the Fermi Site from Construction of Fermi 3

Plant Community	Permanent Impacts (acres)	Temporary Impacts (acres)	Total Area of Community Onsite (acres)	Total Area of Community in Vicinity[1] (7.5 mile radius) (acres)	Percent of Community in Vicinity Permanently Impacted
Coastal Emergent Wetland (CEW) Open Water	0	0	35	66,520	0
Coastal Emergent Wetland (CEW) Vegetated	2.3	0.8	238	1550	0.1
Grassland: Right-of-Way (GRW)	0	25.8	29	1209	0
Grassland: Idle/Old Field/Planted (GOF)	11.5	7.3	75	6932	0.2
Grassland: Row Crop (GRC)	9.5	60	70	23,465	<0.1
Shrubland (SHB)	3.3	31	113	95 *(Note a)*	*Note a*
Thicket (TKT)	0	6.3	23	*Note b*	--
Forest: Coastal Shoreline (FCS)	0	0	47	*Note c*	--
Forest: Lowland Hardwood (FLH)	0	24.9	92	3331	0
Forest: Woodlot (FWL)	0	6.3	117	3318	0
Lakes, Ponds, Rivers (LPR)	0	0	44	*Note d*	--
Lake Erie (main body)	*Note e*	*Note e*	186	*Note d*	--
Totals	116.2[2]26.6	162.4			
Total Impacts (Permanent + Temporary) = 189acres					

1. Figures taken from Subsection 2.2.1.2.3

Notes:

a. Table 2.2-7 indicates 95 acres of Shrubland in the vicinity, while 113 acres were mapped just on the Fermi site. Based on visual observations in 2007 that many acres of this disturbed or early succession habitat are present in the vicinity but it is uncertain how the study used to produce Table 2.2-7 Table 2.2-7 categorized the community recognized herein as Shrubland. Therefore, no percent of the regional community impacted is provided.
b. Included in Shrubland based on land use breakdown in Subsection 2.2.1.2.3.
c. Included in Forest: Lowland Hardwood based on land use breakdown in Subsection 2.2.1.2.3.
d. Included in Coastal Emergent Wetland (Open Water) based on land use breakdown in Subsection 2.2.1.2.3.
e. Impacts to aquatic ecosystem are addressed in Subsection 4.3.2, therefore not included here.

Table 4.3-2 Important Terrestrial Species Potentially Impacted by Fermi 3 Construction Activities

Species	Protected Status		Comments
	Federal[1]	State[2]	
Bald eagle Haliaeetus leucocephalus	None	Threatened	Three nests onsite in January 2008; one occupied adjacent to cooling towers in March 2008
American lotus Nelumbo lutea	None	Threatened	Common in south lagoon and scattered colonies in north lagoon

Notes:

1. Listed under Endangered Species Act of 1973, 16 U.S.C. §§ 1531-1544, December 28, 1973, as amended 1976-1982, 1984 and 1988 (Reference 4.3-2).
2. Listed under the Endangered Species Act of the State of Michigan, Part 365 of PA 451, 1994 Michigan Natural Resources and Environmental Protection Act (Reference 4.3-3)

Table 4.3-3 Acreage of Detroit River International Wildlife Refuge, Lagoona Beach Unit, Impacted by Fermi 3

Refuge Unit	Area Size (acres)	Area Impacted (acres)	
		Permanent	Temporary
NE	161.7	0	0
NW	161.1	1	32.9
SE	311.2	1	4
SW	22.4	0	22.4
Totals	656.4	2	59.3

Table 4.3-4 Vegetation Communities Occurring along the Transmission Corridor[1]

Plant Community	Acres in Corridor	Percentage of Acres in Region Impacted	Acres in Region[2]
United States			
Open Water	0	0	725,910
Developed	68	0.006	1,089,795
Barren Land	0	0	10,346
Deciduous Forest	209	0.07	282,046
Evergreen Forest	0	0	6717
Mixed Forest	0	0	5765
Shrub/Scrub	6	0.19	3179
Grassland/Herbaceous	38	0.09	41,308
Pasture/Hay	110	0.05	219,241
Cultivated Crops	465	0.04	1,217,689
Woody Wetlands	108	0.08	128,090
Emergent Herbaceous Wetland	13	0.02	56,711
Canada			
Open Water	0	0	678,492
Urban	0	0	60,749
Woodlot	0	0	22,173
Agriculture	0	0	413,285
Wetlands	0	0	6826

Notes:

1. Information within Table 4.3-4 is specific to the 10.8 mile tract of existing undeveloped corridor along the route to the Milan substation.
2. The plant communities and acreages of communities present in the 50-mile radius (region) of the Fermi site in this table is taken from Table 2.2-7.

Figure 4.3-1 Fermi 3 Impacts to Undeveloped Areas (yellow lines) on Fermi Site (red line)

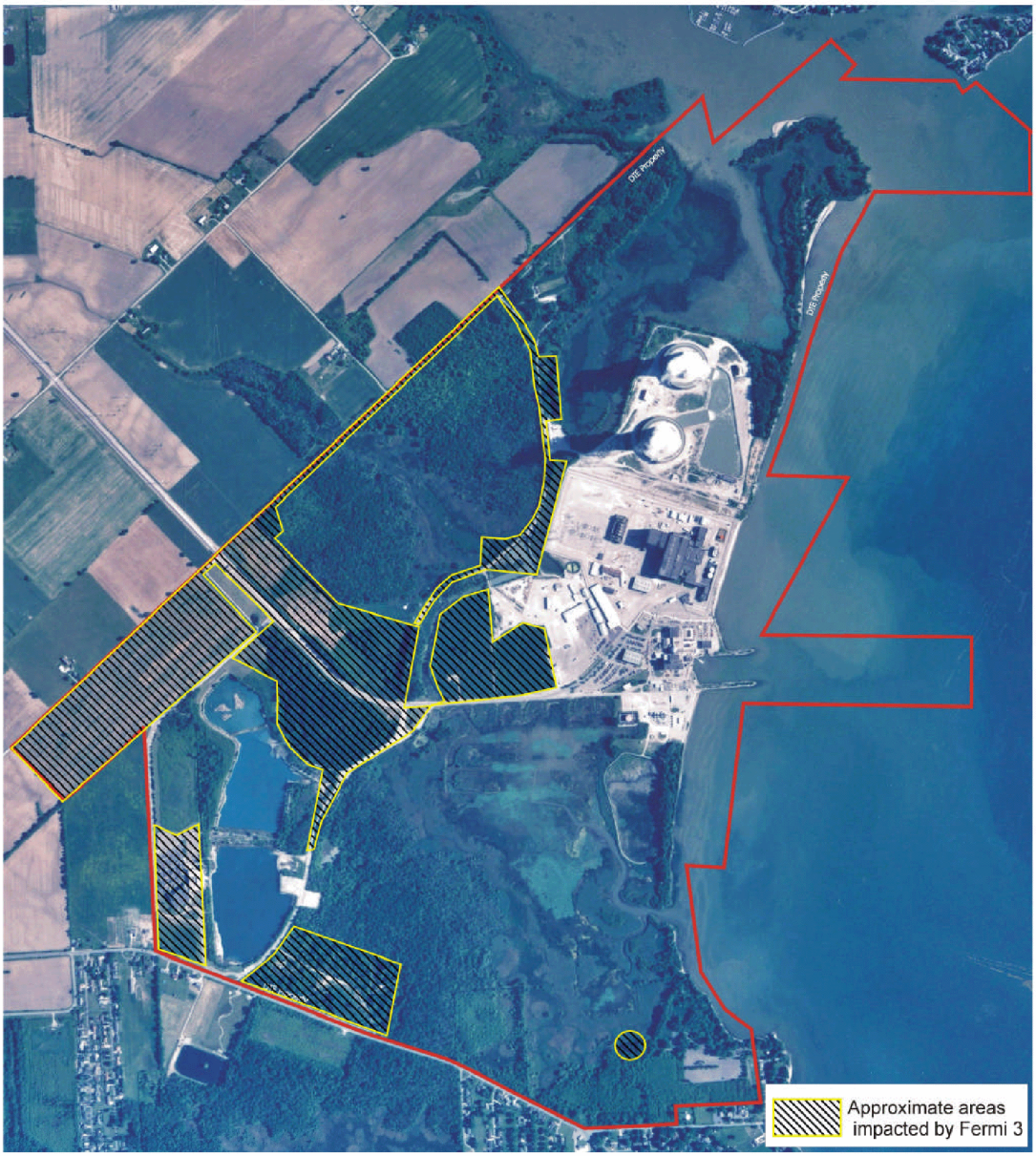


Figure 4.3-2 Permanent and Temporary Impacts to Undeveloped Areas from Fermi 3 Construction Overlaid on Existing Terrestrial Communities

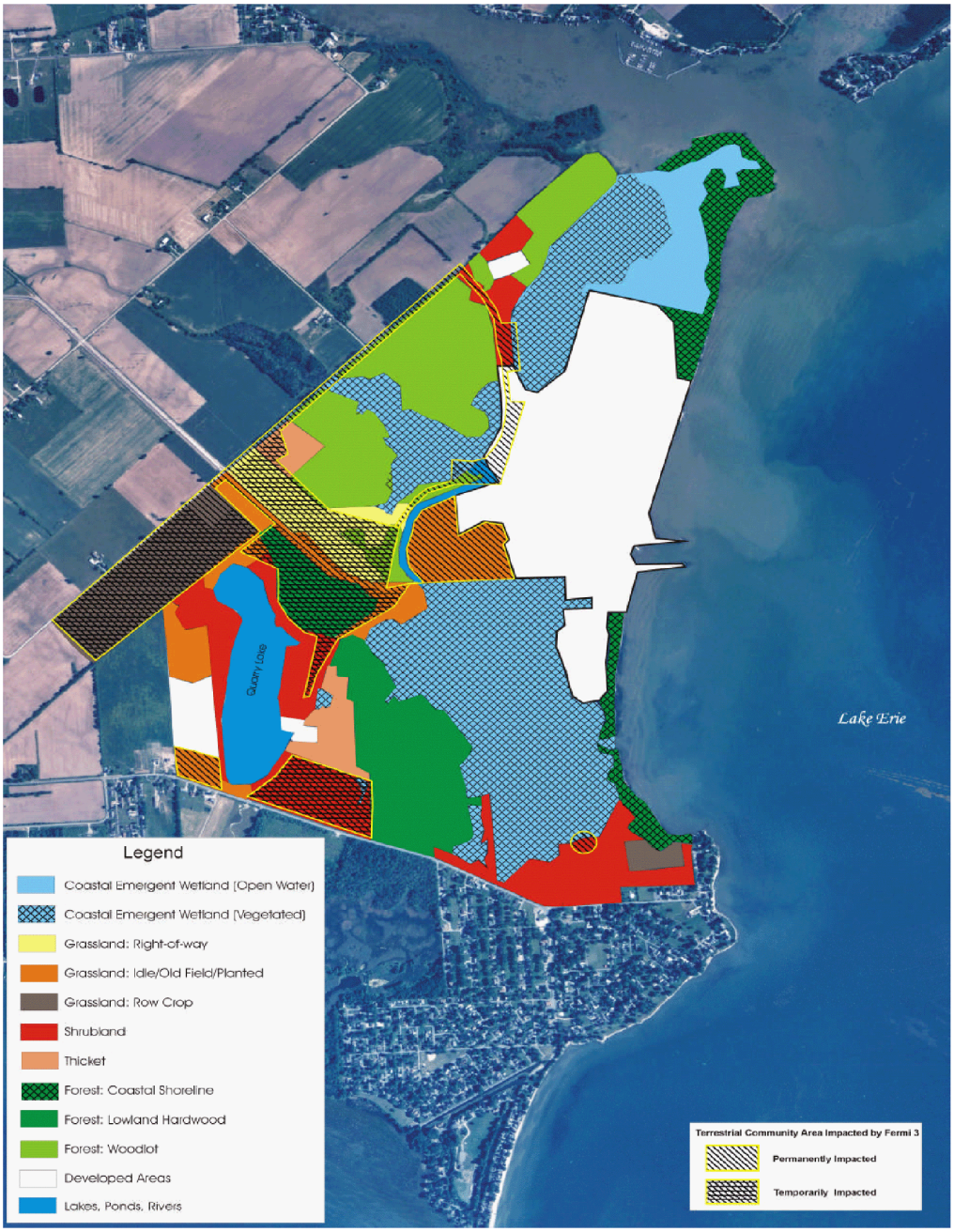


Figure 4.3-3 Permanent and Temporary Impacts to DRIWR, Lagoona Beach Unit from Fermi 3 Construction Overlaid on Existing Terrestrial Communities

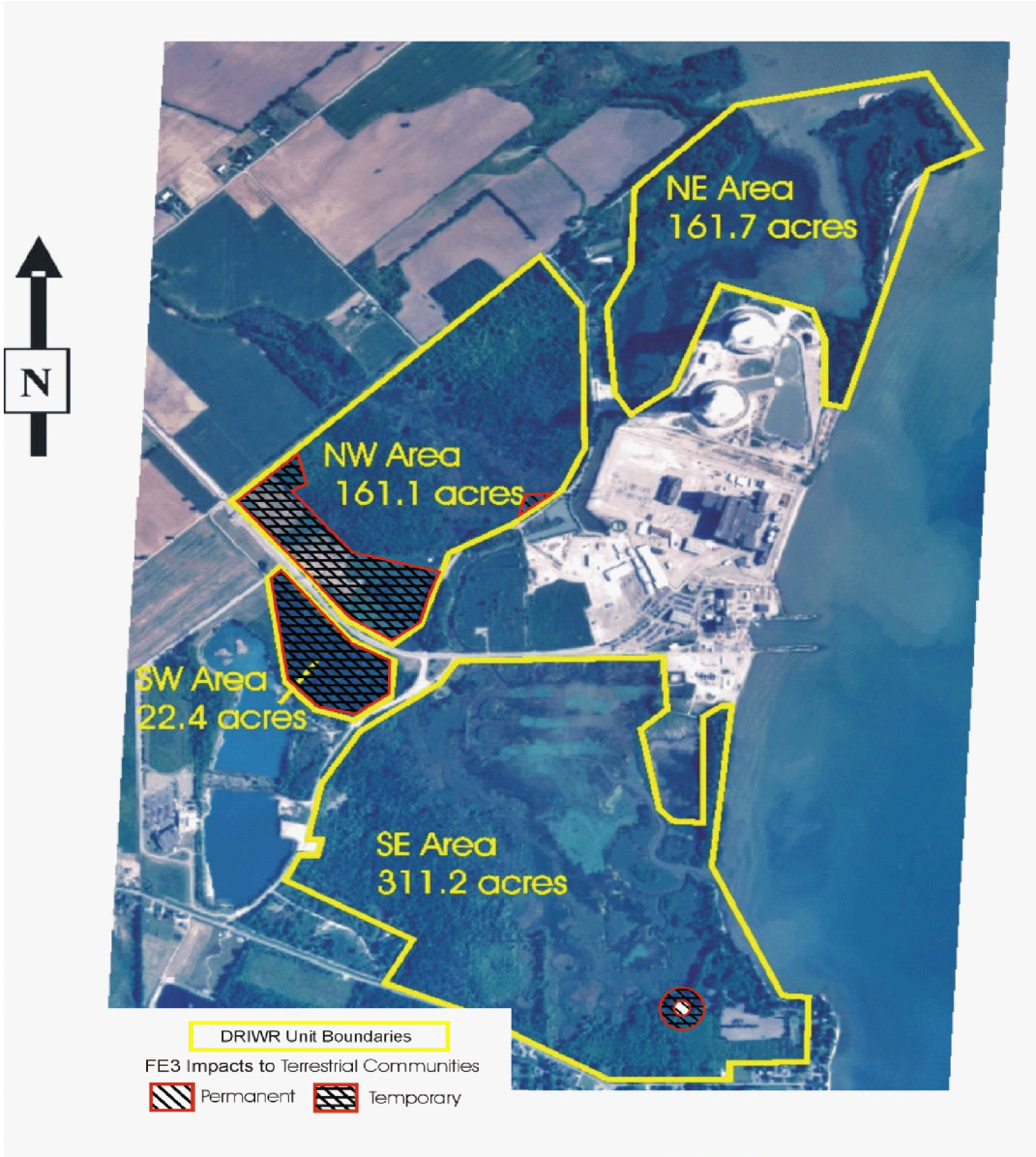
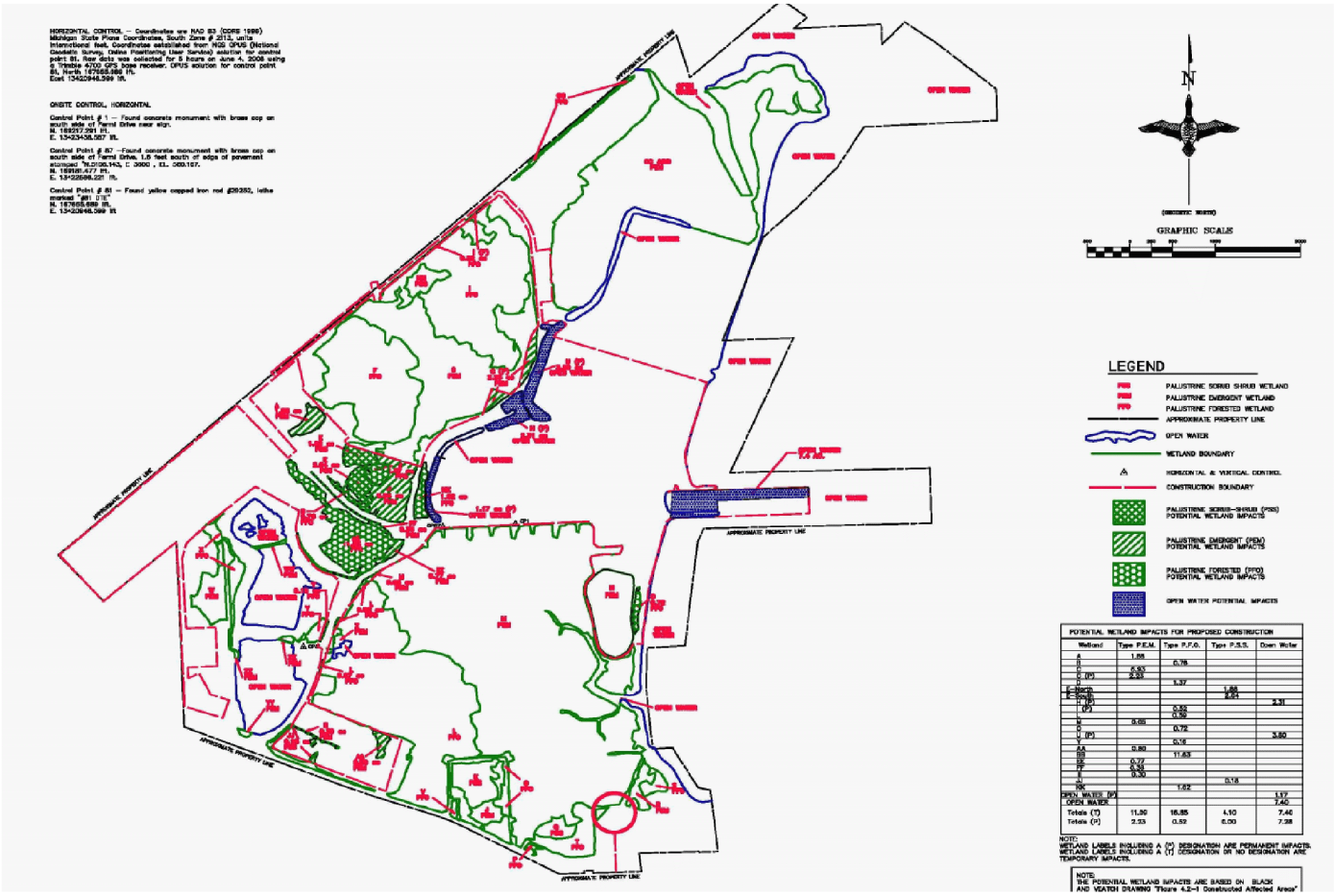


Figure 4.3-4 Permanent and Temporary Impacts to Undeveloped Areas of the Fermi Property (red line) Overlaid on Existing Aquatic Communities

* Note that due to the nature of wetlands as a transition from aquatic to terrestrial communities, some impacted areas outlined on this figure overlap with those in Figure 4.3-2.

Figure 4.3-5 Potential Wetlands Construction Impacts



POTENTIAL WETLAND IMPACTS FOR PROPOSED CONSTRUCTION				
Wetland	Type P.E.M.	Type P.F.O.	Type P.S.S.	Open Water
A	1.66			
B		0.76		
C	0.63			
C (P)	2.53			
D		5.37		
E-North			1.66	
E-South			8.04	
H (P)				2.31
(P)		0.52		
L		0.32		
N	0.65			
O		0.72		
U (P)				3.80
Y		0.16		
AA	0.80			
BB		11.63		
DD	0.77			
FF	0.50			
I	0.30			
GG			0.18	
HH		1.62		
OPEN WATER (P)				1.17
OPEN WATER				7.40
Totals (T)	11.20	16.85	4.10	7.46
Totals (P)	2.33	0.52	8.00	7.38

NOTE:
WETLAND LABELS INCLUDING A (P) DESIGNATION ARE PERMANENT IMPACTS. WETLAND LABELS INCLUDING A (T) DESIGNATION OR NO DESIGNATION ARE TEMPORARY IMPACTS.

NOTE:
THE POTENTIAL WETLAND IMPACTS ARE BASED ON BLACK AND WATCH DRAWING "Figure 4.2-1 Distributed Affected Areas"

4.4 Socioeconomic Impacts

This section discusses the potential for socioeconomic impacts resulting from the construction of Fermi 3. The information is organized as follows: Subsection 4.4.1 describes the physical impacts of construction on the area, Subsection 4.4.2 describes the social and economic impacts of construction, and Subsection 4.4.3 describes environmental justice issues within the region. Refer to Subsection 2.5.1, Subsection 2.5.2, and Subsection 2.5.4 for the baseline socioeconomic information upon which these construction impact assessments are made.

Generally, the social and economic impacts of power plant construction are a function of the size of the construction workforce, wages paid, and the number of relocating workers relative to the available community facilities and services. While precise estimates of these key variables are not yet available, reasonable assumptions appropriate for evaluating the socioeconomic impacts on the region can be made and are described below.

The construction duration will be lengthy and, including the relocation of certain facilities related to Fermi 2, should last approximately 10 years. For purposes of this analysis, the assumed construction dates are 2011 through 2020, with the peak construction employment occurring in 2017. The Chapter 4 introduction provides an overview of the Fermi 3 construction schedule and key construction activities.

4.4.1 Physical Impacts

Construction activities can cause temporary and localized physical impacts such as noise, odors, vehicle exhaust, fugitive dust, and vibration and shock from blasting. This section addresses these potential physical construction impacts that may affect people and buildings. Impacts on roads, aesthetics, and recreational opportunities are discussed in Subsection 4.4.2.

4.4.1.1 Noise

4.4.1.1.1 Applicable Regulations and Criteria

Fermi 3 is located in unincorporated Frenchtown Township, in Monroe County. There are no extant city, county, or state regulations regarding construction noise emissions. Detroit Edison intends to comply with NRC and EPA guidance for implementing the Noise Control Act of 1972, as amended, and the Quiet Communities Act of 1978.

Human response to sound is highly individualized. Annoyance is the most common issue regarding community noise. The percentage of people claiming to be annoyed by noise will generally increase as environmental sound levels increase. Various references (Reference 4.4-1 through Reference 4.4-4) discuss the subjectivity of changes in sound level. Based on these, a 3 dB change in a continuous broadband noise is generally considered "just barely perceptible" to the average listener. A 5 dB change is generally considered "clearly noticeable" and a 10 dB change is generally considered a doubling (or halving) of the apparent loudness.

4.4.1.1.2 Construction Activities

Major construction phases will consist of site preparation, excavation and foundation construction, building and equipment erection, and site clean-up/facility start-up. Noise emissions will vary with each phase of construction depending on the construction activity and the associated construction equipment required for each phase. Site preparation will require the use of heavy diesel-powered earth moving equipment. Examples of this equipment include bulldozers, scrapers, dump trucks, graders, and front end loaders. Noise emissions during site preparation will be dominated by the diesel engine noise. Foundation construction primarily will involve concrete handling equipment such as concrete trucks, mixers, vibrators, pumps, and pile driving equipment. Some earth moving equipment will also be required to backfill the foundations. Foundation construction activities will primarily be centered at the power block equipment area. The equipment and building installation will involve diesel-powered earth moving equipment, mobile cranes, equipment delivery, impact wrenches, saws, drills, and air compressors. Again, these activities will primarily be centered at the power block equipment area. Site cleanup and facility startup will generally result in lower noise emissions than the preceding construction phases.

4.4.1.1.3 Construction Equipment Noise Emissions

The variable nature of construction noise is best represented by an average sound level. The average sound levels account for the type and quantity of equipment, the typical usage of each piece of equipment, and typical sound levels of the equipment used during each phase of construction. The typical types of equipment, equipment usage, and equipment noise emissions (at a distance of 50 feet) for each phase of construction are listed in Table 4.4-1. Estimates of the construction equipment usage and noise levels are based on information provided in Reference 4.4-5 through Reference 4.4-7.

4.4.1.1.4 Potential Impacts

The variable nature of construction activity makes it difficult to predict construction noise emissions. While the average noise level is representative of construction activities, certain activities will produce temporary elevations in the noise level. Contrastingly, decreased noise emissions will occur during reduced construction activities. The closest distance between site construction areas along the west boundary of the facility and the nearest noise-sensitive receptors is approximately 1000 feet. The estimated sound levels from construction equipment at a distance of 1000 feet are provided in Table 4.4-1.

The estimated overall average sound level (excluding pile driving noise) and the maximum sound level (including pile driving noise) are also included in Table 4.4-1. The overall average and maximum sound levels are based on the conservative assumption that all the equipment listed in Table 4.4-1 is operating simultaneously at a distance of 1000 feet from the nearest receptor. Simultaneous operation of all equipment listed in the Table 4.4-1 would be an infrequent occurrence. Additionally, many major areas of construction, such as the reactor building area and the NDCT area, are located at distances greater than 1000 feet from the nearest receptor. Construction sound levels at the nearest receptor on a typical construction day would be expected to be below 64 dBA.

Although the cumulative sound level of construction activities has the potential to cause an adverse impact, not all of the noisiest activities listed in Subsection 4.4.1.1.2 will take place in the construction areas closest to noise-sensitive receptors. Moreover, noisier activities are expected to be limited to daytime hours to minimize the noise impact. Accordingly, it is concluded that while there will be certain periods during construction that MODERATE impacts to the nearest noise-sensitive receptors to the site would be expected, the net noise impact during the course of construction is anticipated to be SMALL.

In the area of noise control, standard control measures for construction equipment, such as the use of silencers on diesel powered equipment exhausts, are expected to be employed to limit the noise emissions from station construction. Additionally, administrative measures will be employed to mitigate construction noise impacts. These administrative measures include limiting the types of construction activities during nighttime and weekend hours, notifying all affected neighbors of planned activities, and establishing a construction noise monitoring program.

The overall noise impacts on the surrounding areas (including effects on people and buildings) due to Fermi 3 construction activities will be temporary and are expected to be SMALL.

4.4.1.1.5 **Blasting**

As explained in FSAR Subsection 2.5.4.5.3.2, controlled blasting will be used onsite. Methods will include cushion blasting, pre-splitting and line drilling. Blasting techniques are designed and controlled (by use of blasting curtains, for example) to prevent damage to existing structures, equipment, and freshly poured concrete.

4.4.1.1.6 **Buildings**

Construction activities would not impact any offsite buildings because of distance to any such structures. The nearest full-time residence is approximately 660 feet from the Exclusion Area Boundary (EAB). In the event that pile-driving is necessary, the building(s) most vulnerable to shock and vibration would be those within the Fermi site boundary. Onsite buildings have been constructed to safely withstand possible impacts, including shock and vibration, from construction activities associated with the proposed activity.

Table 4.4-1 presents data on attenuated noise levels expected from operation of construction equipment. Applying the inverse-square law to the highest level listed in Table 4.4-1 (89 dBA at 50 feet) for the heavy construction to be performed in the power block, a decrease in noise levels of over 30 decibels would be expected at the EAB. Noise at this level does not adversely affect building structures.

As discussed in Subsection 2.5.3, there are cultural resources located within the 10-mile radius of the site, but none are located adjacent to the Fermi site. Also, there are no listings on the NHRP occurring on the Fermi site, and no impacts on historical landmarks due to vibration or shocks from construction activities would be expected.

The effects of physical impacts to buildings from construction activities would be SMALL, and would not warrant mitigation.

4.4.1.2 Air Quality

The Fermi site is located in the northeastern part of Monroe County and along the western shoreline of Lake Erie. Air quality at the Fermi site is heavily influenced by the Detroit and Toledo metropolitan areas and surrounding emission sources. The MDEQ evaluates the air quality in the Detroit metropolitan area with a network of monitors mostly located in Wayne County, north of the Fermi site. The MDEQ routinely monitors the USEPA criteria pollutants of NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}, and ozone. Monroe County and the counties that include the Detroit metropolitan area are designated by USEPA as a non-attainment areas for annual $PM_{2.5}$ standard and a maintenance area for the 8-hour ozone standards (Reference 4.4-8). The USEPA, as of March 12, 2008, strengthened the definition of ozone non-attainment areas as those that record a 3-year average of the fourth highest daily maximum 8-hour average ozone concentration levels of 0.075 ppm or higher (Reference 4.4-9). For PM2.5 the USEPA considers areas in violation of the standard when the 3-year average of the weighted annual mean $PM_{2.5}$ concentration is equal to or exceeds 15 $\mu g/m^3$. Subsection 2.7.2 provides further details about the historical air quality in the Fermi vicinity.

Some increase in air pollution from criteria pollutants will arise during construction due to construction activities, including engine exhaust from worker vehicles and machinery. The vehicles and machinery will comply with applicable government standards during construction, including the Clean Air Act and the National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR 63. Detroit Edison will also obtain all air quality approvals necessary to allow for the construction of Fermi 3 from the MDEQ. The MDEQ has been delegated authority by the EPA to implement the aforementioned federal rules which are designed to be protective of air quality. Given the relatively isolated nature of the construction area from the offsite residences and facilities, the emissions during construction activities will not only have little effect on the nearby ozone maintenance and $PM_{2.5}$ non-attainment areas, but will have minimal impact on the local and regional air quality as well. The net impact on air quality during construction is projected to be SMALL, and no mitigative measures are needed.

Additionally, the various types of construction activities and equipment will also emit carbon dioxide (CO_2) during construction of Fermi 3. The expected construction activities include those from worker vehicles, heavy duty construction equipment, locomotive engines, marine engines, and operation of other miscellaneous mobile fossil-fuel combustion sources such as generators. The total estimate of CO_2 emissions resulting from Fermi 3 construction activities is 10,180 tons/year.

4.4.1.3 Dust

The State of Michigan has adopted regulatory code that provides typical control methods of fugitive emissions including dust. Portions of Rule 336.1372 are provided here that deal with dust producing activities and their typical control methods.

§Rule 336.1372

3. All of the following provisions apply to the transporting of bulk materials as a source of fugitive dust:

(b) Typical control methods for controlling fugitive emissions resulting from the transporting of bulk materials by truck may include, but are not limited to, the following:

(i) Completely covering open-bodied trucks.

(ii) Cleaning the wheels and the body of each truck to remove spilled materials after the truck has been loaded.

(iii) Use of completely enclosed trucks.

(iv) Tarping the truck when operating empty if residue has not been completely removed after emptying.

(v) Cleaning the residue from the inside of the truck after emptying.

(vi) Loading trucks so that no part of the load making contact with any sideboard, side panel, or rear part of the load enclosure comes within 6 inches of the top part of the enclosure.

(vii) Maintaining tight truck bodies so that leakages within the body will be eliminated and future leakages prevented.

(viii) Spraying the material being transported in a vehicle with a dust suppressant. The frequency of spraying shall be specified in the control program.

(ix) Restricting the speed of the vehicle which transports the material. The speed of the vehicle shall be specified in the control program.

5. The following provisions apply to roads and lots as sources of fugitive dust:

(b) Typical control methods for controlling fugitive emissions resulting from roads and lots located within industrial, commercial, and government-owned facilities may include, but are not limited to, the following:

(i) Paving roads and parking lots with a hard material, such as concrete, asphalt, or an equivalent which is approved by the department.

(ii) Mechanically cleaning paved surfaces by vacuum sweeping, wet sweeping, or flushing. The frequency of cleaning shall be specified in the control program.

(iii) Washing the wheels of every truck leaving the plant premises.

(iv) Treating the roads and lots with oil or a dust-suppressant compound which is approved by the department. The frequency of application shall be specified in the control program.

(v) Periodically maintaining off-road surfaces with gravel where trucks have frequent access. The frequency of maintenance shall be specified in the control program.

8. The following provisions apply to fugitive dust emissions from construction, renovation, or demolition activities:

   (b) Typical control methods for controlling fugitive dust emissions from construction, renovation, or demolition activities may include, but are not limited to, the following:

      (i) Spraying of all work areas with water or other dust-suppressant compound which is approved by the department.

      (ii) Completely covering the debris, excavated earth, or other airborne materials with tarpaulin or any other material which is approved by the department.

      (iii) Any other method acceptable to the department.

Construction practices for dust control will be consistent with the state requirements. In general, the amount of dust created from construction activities will be manageable due to the existence of paved roads that will lead to the parking turn-off areas, and the absence of large scale clearing and leveling of areas. Dust control measures may be appropriate in the laydown area, parking areas, site roads, or construction areas during dry weather periods, and this would be achieved through the use of a water truck sprayer. Additional dust control may also be required during the initial stages of construction as the result of any necessary site leveling and dirt work. As lay down and other areas are no longer needed as construction progresses, the areas will be re-seeded to ensure that on-going dust creation does not occur. With these preventive construction practices, the dust impacts are expected to be SMALL.

It is likely that the onsite concrete batch plant may create the largest amount of dust. However, the plant will be equipped with a dust-control system that would be checked and maintained on a routine basis, and offsite impacts should be negligible. Given the isolated nature of the plant, the location of the concrete batch plant onsite will likely result in less offsite dust impacts than if concrete were produced offsite and trucked to the construction area. Therefore, with the recommended preventive actions the impacts of the operation of a concrete batch plant is expected to be SMALL, with no mitigation measures required.

4.4.1.4 Burning controls

The MDEQ in Rule 336.1310 states that: “A person shall not cause or permit open burning of refuse, garbage, or any other waste materials.” Construction of Fermi 3 will be compliant with the applicable regulations and requirements, and waste will be taken to the nearest suitable landfill for disposal.

4.4.2 Social and Economic Impacts

The social and economic impacts associated with Fermi 3 construction are discussed in this subsection. Generally, new investment in a major construction project has a number of positive economic impacts that are driven by employment and income creation, plus increased tax revenues. If negative impacts arise, the primary categories of concern usually include short-term traffic impacts and impacts that could arise if a large workforce relocates to a region that has limited

availability of housing or inadequate community facilities and services. The key information to make this determination is the size of the relocating construction workforce relative to the availability of housing and community facilities and services.

Construction employment at the Fermi 3 site will vary significantly over the project. It is anticipated that during Phase 1, the peak employment level will be 150 workers in the second year of activity. During the two-year Phase 1 duration, an average workforce of 100 is assumed. During the Phase 2 activities, the initial workforce will be approximately 200 workers and will gradually increase to an assumed peak construction workforce of approximately 2900.

The Phase 2 construction period can be further divided into three time periods. During the early portion of the Phase 2 activities, which should last approximately 18 to 24 months, up to 90 percent of the onsite craft workforce will consist of civil and structural trades, which include laborers, carpenters, iron workers, cement masons and equipment operating engineers. The balance will consist of mechanical and electrical workers. During the mid-portion of the project, which will last from 18 months to 3.5 years, depending on the number of shifts and scheduling, approximately 50 percent of the craft workforce will consist of the mechanical trades that include boilermakers, pipe fitters, sheet metal workers, and millwrights. The remaining 50 percent of the craft workers during this phase should be divided between electrical workers and civil/structural workers. During the late stage of construction, which could last 3.5 to 4.5 years, approximately 70 percent of the craft workforce will be electrical, 10 percent will be civil and structural, 15 percent will be mechanical, and 5 percent of the craft workforce will be insulators and painters.

In addition to the craft labor, there will also be a non-craft component of the Fermi 3 workforce. The non-craft labor component consists of craft supervision, site indirect labor, quality control inspectors, nuclear steam supply vendor and subcontractor's staff, EPC contractor's managers, engineers and schedulers, owners' O&M staff, start-up personnel, and NRC inspectors.

Wages paid during construction will be linked to the prevailing wage rate for each type of skill needed. An approximate estimate of total wages to be paid can be derived using publicly available data from the U.S. Department of Energy (DOE) publication *Nuclear Power Plant Construction Infrastructure Assessment* (Reference 4.4-10). Based on the semi-annual manpower requirements projected in this DOE publication, adjusted for the anticipated peak labor requirements of 2900 at the Fermi 3 site, it is estimated that the average onsite labor (craft plus non-craft) during the 8-year construction period will be approximately 1000 workers (Reference 4.4-10). Adding for the additional labor required during the 2-year Phase 1 work (100 workers, on average, for two years are assumed), the total man-hour requirements for the Fermi 3 project are estimated to be approximately 17 million man-hours, or 8173 man-years of employment. Based on labor union surveys, it is assumed in the impact analysis that the average direct construction wage for craft workers will be $31.37 per hour and that the estimated average direct wage for non-craft workers will be $48.00 per hour (both in 2008 dollars). It is assumed that craft workers will comprise approximately two-thirds of the construction hours and that non-craft workers will comprise approximately one-third of the construction hours. As a result of these wage and hour assumptions, the total direct wages for all construction workers is estimated to be $627 million. Of this amount, and based on the assumptions set forth in Section 4.4.2.1, approximately $533 million will be

earned by workers residing in the region. These estimates include direct wages only and do not include fringe benefits accruing to the construction workforce. According to surveys of labor halls, these fringe benefits can constitute from 45 percent to 65 percent of the direct wage.

A key to projecting socioeconomic impacts is to forecast the number of relocating construction workers. Although forecasting methods are inexact, there are industry studies that can be useful in developing reasonable projections even though some date to the last period of multiple nuclear construction projects in the late 1970s and early 1980s. The studies referenced for the construction impact analysis in this section are listed below, and the abbreviated name of the study used for reference in the remainder of this section is listed in parenthesis.

- *Socioeconomic Impacts of Power Plants*, Prepared by Denver Research Institute for the Electric Power Research Institute, February 1982 (the EPRI study) (Reference 4.4-12)
- *Impacts of Nuclear Generating Plants on Local Areas*, J. Pijawka and J. Chalmers, Economic Geography, Vol. 59, No. 1, January 1983 (the Pijawka study) (Reference 4.4-13)
- *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*, Final Report, U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, NUREG-1437 Vol. 1, May 1996 (the GEIS) (Reference 4.4-18)
- *Migration and Residential Location of Workers at Nuclear Power Plant Construction Sites*, S. Malhotra and D. Manninen, Vol. 1 and 2, April 30, 1981 (the Malhotra study) (Reference 4.4-14)

4.4.2.1 **Demographics and Economics**

Estimating the number of Fermi 3 construction workers that will likely relocate from distant areas to within the region is a function of the availability of qualified construction workers that could commute to the site from their existing residences. An extremely conservative estimate, but one consistent with the definition of the Fermi 3 region, is that construction workers would be willing to commute to the site without relocating provided they reside within 50 miles of the site. On the other hand, the EPRI study of 12 large coal-fired, nuclear, and oil-fired power plant projects found that whole groups (not just a few individuals) of power plant construction workers often commute to a site even if they live more than 70 miles away (Reference 4.4-12). If this maximum distance is assumed, it results in a larger number of construction workers who could work on the project without relocating, and lessens the possibility of negative socioeconomic impacts related to housing and the demand for community facilities and services. To be conservative and yet cover the range of possible impacts, the following assessment presents results using two different commuting assumptions. The first assumes that construction workers within a 70-mile radius would be willing to work at the Fermi 3 site without relocating closer to the project site, and the second conservatively assumes a 50-mile maximum commuting distance. Both assessments include only U.S. workers.

The LandView® 6 software was used to determine the number of construction workers within 70 miles and 50 miles of the Fermi 3 site. Results in Table 4.4-2 indicate that a total of 166,473 construction workers lived within a 70-mile radius in 2000. At the 50-mile distance, there were

120,470 construction workers in 2000. As indicated in Table 2.5-26, the number of construction workers in the Detroit MSA is projected to increase by 7.7 percent from 2004 through 2014, an average annual growth rate of 0.75 percent. If this rate of annual average growth rate is applied to the number of construction workers in the 70-mile radius in 2000, then a construction workforce of 189,021 would be expected within the 70-mile radius in 2017, the assumed peak construction period. At the 50-mile radius, the construction workforce would be 136,787 in 2017.

Table 4.4-2 also indicates the percentage of the 70-mile and 50-mile construction workforce required during the peak construction period. The peak workforce of 2900 would be equal to 1.5 percent of the projected 2017 construction workforce within the 70-mile radius and 2.1 percent of the projected 2017 construction workforce within the 50-mile radius.

The percentage of the regional workforce required for Fermi 3 construction is relatively low considering the industry unemployment rate and the elasticity of the construction industry workforce (see below), yet it is probable that the existing regional workforce will not provide all project labor and that some relocation of construction workers will occur to fill positions requiring specialized skills and training. In addition, a portion of the construction management, inspector, and owner's engineer staff listed in Table 4.4-2 peak employment projection will also likely relocate to the region during construction.

The Pijawka and Malhotra studies can help bracket the percentage of the Fermi 3 construction workforce that may relocate to the primary impact area counties of Monroe, Wayne, and Lucas. The Pijawka study evaluated 12 nuclear power construction projects and quantified the percentage of the construction workforce according to those who were existing residents of the study area, those who moved into the study area for the project, and those who commuted to the plant site from beyond the study area. The study found that, on average, 17.6 percent of the peak construction workforce consisted of movers, 14.7 percent consisted of non-mover residents of the study area, and 67.7 percent were commuters from beyond the study area. (Reference 4.4-13)

The Pijawka study found that the key factor influencing the percentage of in-migrants was the location of nuclear projects within commuting distance of large metropolitan areas having a population of 50,000 or more. On average, the distance from the power plant sites to the nearest city of 50,000 or more was only 40 miles, and this proximity provided both a place for in-migrating labor to reside without significantly increasing the demand for facilities and services, as well as a source for construction labor. (Reference 4.4-13) Likewise, the EPRI study determined that "[w]here one or more significant population concentrations (communities of 25,000 or more residents) exist within 60 to 70 miles of a power plant site, such concentrations will influence the extent of the impact area. In effect, such communities are likely to be the source of significant numbers of construction workers." (Reference 4.4-13)

The Malhotra study involved 28 surveys at 13 nuclear power plant sites and covered 49,000 workers. The study also allows an estimate of the percentage of in-migrating plant construction workers for Fermi 3. In this study, a mover was defined as a construction worker who moved in order to work at the site. Results of the study indicated that the percentage of construction workers moving for work ranged from 15 to 35 percent. (Reference 4.4-14)

The Malhotra study found a higher percentage of relocating workers (a 25 percent mid-point) than the Pijawka study (average of 17.6 percent). This difference is primarily because the Pijawka study classified a relocating worker residing outside the study area as a commuter, and limited movers to those workers who relocated to within the defined study area, which was fairly small in some studies. Conversely, the Malhotra study classified all relocating construction workers as movers.

In the case of Fermi 3, the issue is to determine an appropriate estimate of the percentage of workers that would relocate to work at the Fermi 3 site. The three county primary impact area is large both geographically and from a population standpoint. These features favor the adoption of an assumption at the lower end of the Malhotra study. For example, of the 13 sites studied in the Malhotra study, five did not have a city with a population of 25,000 or larger within a 25-mile radius of the site, and the average distance to the central city of a standard metropolitan statistical area was 45 miles (Reference 4.4-14). In a similar pattern, the combined Detroit and Toledo population is larger than all of the nearby cities identified in Pijawka's study of 12 power projects. The 12 projects studied by Pijawka were also an average of 40 miles from the nearest city having a population of 50,000 or more. (Reference 4.4-13)

For purposes of the impact analysis, it is assumed that 15 percent of the Fermi 3 workers at construction peak will relocate to work at the site and 85 percent will be hired from within commuting distance. This percentage is equal to the lower range found in the Malhotra study. Based on a peak construction workforce of 2900, the 15 percent relocating assumption means that 435 construction workers would be expected to have relocated to the region at the time of peak construction, and that 2465 construction workers at peak would be hired from within the region. As indicated in Table 4.4-2, 2465 workers represents 1.2 percent of the 70-mile construction workforce projected for 2017 and 1.8 percent of the projected 50-mile construction workforce.

The employment benefits arising from the construction of Fermi 3 should have no more than minor inflationary impacts in the overall construction market, owing to the size of the construction labor force in the region and the nature of the construction industry. For example, the average unemployment rate in all Michigan industries was 6.7 percent from 2001 through 2007 (Reference 4.4-15). This unemployment rate was slightly above the 5.2 average rate for all industries nationally. In the construction industry, the national average was 8.0 percent, or 2.8 percentage points above the overall 2001 through 2007 unemployment level (Reference 4.4-16). Assuming that the relationship in Michigan and the region between the overall unemployment rate and the construction industry unemployment rate is similar to the national average, the region would have had an average construction industry unemployment rate of more than nine percent during the 2001 to 2007 time frame. If the long-term, average construction industry unemployment rate in the state and region remains even within 3 or 4 percentage points of these historical levels, then the construction industry could easily accommodate the Fermi 3 workforce requirements without initiating significant inflationary impacts on regional construction costs and without labor shortages.

The other consideration is that the size of the construction labor force has the ability to increase quickly in response to the demand for labor. For example, the average annual size of the national construction labor force (employed plus unemployed workers) in 2000 was 8.13 million, but within

the year, the size of the construction labor force varied from a high of 8.63 million to a low of 7.67 million workers. This is a difference of 958,000 workers, which represents 11.8 percent of the annual average figure. From 2000 through 2006, this variation averaged 8.3 percent for the construction industry labor force, compared to 2.1 percent for the nation's overall labor force. (Reference 4.4-17) This phenomenon occurs because not only is there significant seasonal variation in employment opportunities in the industry, but construction jobs are relatively high paying and when the demand for construction labor increases, there is a tendency for qualified workers in other industries to respond by entering the construction workforce. Thus, the elasticity of the construction industry workforce would have a softening impact on any inflationary impacts that may be created from a significant increase in demand for construction workers in the region.

The final major workforce assumption concerns the location of residence for the assumed 435 relocated workers at peak construction. A common assumption is that the settlement pattern of power plant construction workers will mirror that of the existing operating staff. The current Fermi 2 operations workforce is widely scattered and workers reside primarily in the Michigan counties of Monroe (58 percent), Wayne (19 percent), Washtenaw (3 percent), Oakland (3 percent) and Lenawee (1 percent), plus the Ohio counties of Lucas (10 percent), and Wood (2 percent). Another four percent are disbursed throughout multiple regional counties. For purposes of this analysis, it is assumed that the relocating workforce would similarly follow a disbursed settlement pattern, but will be concentrated primarily in the three counties of Monroe (45 percent of relocating workers), Wayne (25 percent), and Lucas (20 percent), with the remaining workers disbursed among other regional counties.

The counties of Monroe, Wayne, and Lucas are expected to be the selected counties of residence for most relocating workers, as the counties offer the easiest access to the site, ample housing opportunities, and will position workers to obtain follow on work after their employment at Fermi 3 is completed. Within these three counties, relatively fewer construction workers are projected to locate in Monroe County and relatively more are projected to locate in Wayne and Lucas counties compared to the Fermi 2 operating staff, based on the expectation that workers will locate, not just giving consideration to the distance of the Fermi site, but with an eye to probable follow-on job opportunities when their work at Fermi is complete. This consideration is important as the Malhotra study reported that 40 to 50 percent of a relocating construction workforce plans to remain in the area following the completion of a power plant. (Reference 4.4-14) Workers allowing for this possibility, in particular, will tend to select a residence located in or within likely commuting distance of the larger cities of Detroit or Toledo.

This expectation that the construction workforce would be more concentrated near the larger cities and would be willing to commute a longer distance than the operational workforce is supported by the EPRI study that found a difference in settlement patterns between operating and construction workers. The study noted that "the geographic extent of the impact area for permanent workers is typically much more restricted than for construction workers who appear to be willing to commute much further distances." (Reference 4.4-12). This expected relocation pattern is also supported by Pijawka's study of 12 nuclear power plants that found, for projects located less than 50 miles from a

city of at least 50,000 “a dispersed settlement pattern of movers was observed” as the larger cities became the selected residence for a large percentage of the workforce. (Reference 4.4-13)

The result of the assumed relocating percentages of Fermi 3 construction workers is that Monroe County would be expected to accommodate 196 workers, followed by Wayne County (109 workers) and Lucas County (65 workers). The remaining 65 relocating workers would be disbursed among other regional counties including Washtenaw, Lenawee, Oakland, and Wood counties.

4.4.2.2 Local Housing

While housing impacts will occur as a result of worker relocation, being that the plant will be constructed on an existing site, no families or households are likely to be displaced. Therefore, the relocation impacts include added tenants, renters, and buyers for housing units for rent or for sale. This process has the potential for both positive and negative impacts. On the positive side, the added demand for housing will have a beneficial income generating impact to the current owners of housing properties. On the negative side, a significant increase in the demand for housing could, other things being equal, tend to increase the price for housing, especially the cost of short-term rental properties.

Table 4.4-3 lists the number of vacant housing units in the three county primary impact area in 2000. The table indicates that out of 1,078,875 housing units, a total of 73,816 housing units were vacant. Thus, if each of the 435 projected relocating workers rented or purchased a vacant unit in the primary impact area, it would represent less than one percent (0.04 percent) of the total housing stock in 2000, and approximately 0.5 percent of vacant housing units in 2000, although not all vacant units would be expected to be suitable for sale or rent. The percentage share could be further reduced given the growth in the number of housing units that will occur over time.

The 2000 data tends to mask an unhealthy economic trend in the housing market that has been occurring in the Detroit MSA and, to a lesser extent, in Toledo over the past several years. As seen in Table 2.5-41, the number of vacant units in Wayne County doubled from 57,705 in 2000 to 124,280 in 2006 while, in Lucas County, the number of vacant units increased from 13,412 in 2000 to 22,938 in 2006 (in Monroe County the number of vacant units increased from 2699 to 4685 vacant units). While a vacancy rate of several percent is consistent with a healthy housing market and helps avoid demand-side pressure on housing prices, prolonged and high vacancy rates in urban areas can lead to multiple socioeconomic problems such as a negative impact on housing values, an increase in crime and vandalism, and lowered property tax revenues. Given the trends and 2006 vacancy rates in Wayne County (14.8 percent vacancy rate) and Lucas County (11.3 percent vacancy), these areas would benefit from the influx of additional householders as this could help stabilize the housing market.

The conclusion from the above is that any negative housing market impacts in the primary impact area caused by construction worker relocation would, at most, be SMALL, and temporary. What negative impacts may arise during the construction period would be expected to be primarily in Monroe County, and would most likely result from the short-term impact of major maintenance workers relocating for Fermi 2 refueling and other outages while Fermi 3 is being constructed.

Again, however, workers needing to relocate will have opportunities to reside in Detroit and Toledo if the temporary lodging in Monroe County becomes relatively scarce.

The expectation that the major metropolitan areas of Detroit and Toledo will help lessen the impacts of construction and temporary maintenance workers is supported by the EPRI study, which found that a "key variable affecting housing impacts is the proximity of the impacted area to a major metropolitan area." Where a relatively large city was nearby, workers largely chose to "live in cities and commute daily to work, rather than moving to towns in the immediate vicinity of the plant" and "housing markets in the small towns closest to the plants…were not seriously affected, while the larger cities easily absorbed the increased demand for housing." (Reference 4.4-12) Similarly, the Pijawka study reported that "[i]mpacts on the housing sector in terms of price and overcrowding were temporary and relatively unimportant." In the 12 case studies leading to Pijawka's conclusion, the demand for local housing ranged from 1.2 percent to over 25 percent of the total housing stock, a significantly higher percentage than is anticipated for Fermi 3 construction. The Pijawka study also summarized two additional studies stating that they "support the conclusion that adverse housing impacts were either short-lived or not an important issue in the host communities." (Reference 4.4-13)

The GEIS stated that "moderate and large impacts are possible at sites located in rural and remote areas, at sites located in areas that have experienced extremely slow population growth (and thus slow or not growth in housing), or where growth control measures that limit housing development are in existence or have recently been lifted." However, of the seven case studies reviewed, the GEIS concluded that "in most cases, project-related housing demand was so small or the local and regional housing markets were so large that no large impacts resulted." Of the seven projects evaluated, the two projects having a moderate impact on housing required 6.25 percent and 2.7 percent of the total number of housing units in the study area, and the project having large impacts required 18 percent of the total number of housing units in the study area. (Reference 4.4-18)

In sum, any adverse impacts on the regional housing due to Fermi 3 construction are projected to be SMALL, and no mitigative measures are needed.

4.4.2.3 **Regional Tax**

Regional taxes will be generated in several tax categories due to the construction of Fermi 3. These tax categories include: a) federal and state income taxes on worker incomes, b) state sales taxes on worker expenditures, as well as additional income and sales taxes arising through the re-spending of income in the form of direct expenditures on goods and services by construction workers, c) state sales taxes on goods and services purchased in the state or region by the Applicant, and d) local property taxes or payments in lieu of taxes based on the incremental increase in the value of Fermi 3 during construction.

As discussed in Subsection 4.4.2, it is assumed that there will be an average of approximately 1000 workers on site during the 8 year construction period. According to Table 2.5-36, Michigan residents paid $19.63 in state individual income taxes per $1000 of income in 2004 (Ohio residents paid $34.15 per $1000 of personal income). Using the Michigan number as a conservative estimate of the state individual income tax and applying this to the $533 million that will be earned

by workers residing in the region, there would be a total of approximately $10.5 million in state (Michigan and Ohio) income tax generated from the local workforce alone.

In addition to income taxes generated by the construction workforce there will also be a stream of sales tax revenues created directly by expenditures on materials and supplies during construction and indirectly via expenditures by the construction workforce. Currently no specific information is available about direct expenditures on materials and supplies expected to occur locally during the construction period, but the *DOE NP2010 Nuclear Power Plant Construction Infrastructure Assessment* estimates that the construction of a single nuclear unit would utilize the materials and approximate quantities indicated in Table 4.4-3-(A). Also listed are approximate unit costs and total costs for the quantities listed, based on current pricing information for these materials.

It is not known how many of the materials listed above will come from local suppliers, and the DOE NP2010 states "a significant portion of the large bore pipe would be brought to the site in prefabricated modules and as prefabricated large bore pipe spool pieces. A portion of the small bore pipe, cable tray, conduit, and tubing would also be brought to the site in prefabricated modules." On the other hand, a large portion of other materials such as concrete, fencing, conduit, and wire could potentially be sourced from the region.

In addition to the material mentioned above, other non-reactor work will require the use of goods and services that could be sourced from the region. The list includes but is not limited to the following:

- Road work and parking—developing new roads for the constriction area, a new access road and gate, new administration building parking lot and roads, and construction parking and lay down.
- Buildings—construction of a new administration building, new warehouse, new shops, and a new simulator wing.
- Excavation—excavating the power block and other construction sites.
- Water Systems—the development of the station water system, the circulating water system, and the circulating water blow down outfall.

The indirect sales tax generated through the employment of the construction labor force is estimated based on the Applicant's information regarding indirect sales taxes generated by the labor employed during operation and maintenance of Fermi 2. As discussed in Subsection 2.5.2.2.2 approximately $62.1 million dollars in wages created $2.2 million in indirect sales tax (or approximately 3.5 percent of wages paid). Applying this percentage to the assumed $533 million in wages paid to local construction workers over the construction period, approximately $18.7 million in indirect sales taxes would be generated.

Lastly, Fermi 3 would generate an incremental increase in property tax revenue as the construction phase progresses. Although no specific information is available at this time regarding the incremental value of the Fermi 3 plant each year during construction, it is certain that the assessed

value of the project will increase and is therefore likely to result in significant increased property taxes during this phase.

4.4.2.4 Local Public Services

There is the potential for a number of local public services in the primary impact area to be impacted by construction of Fermi 3. Key categories of impacts to be evaluated include schools, transportation, local taxes, public services, and public utilities. Given that the estimated 1131 relocating workers and families (435 Fermi 3 construction workers multiplied by 2.6 persons per household within the region) would represent an extremely small percentage of the 50-mile radius population (0.019 percent) of the 5.4 million regional 2000 population, a detailed assessment of the potential impact on the entire region is not provided. Instead, the following discussion is limited to the impacts likely to occur in the three primary impact area counties of Monroe, Wayne, and Lucas. The primary focus is on Monroe County given the small impacts expected on the larger counties of Wayne and Lucas.

Generally, an increase in the employment and population base from a large construction project will increase taxes and user fees for the funding of continued facilities and services. However, the potential for negative impacts is also present, and could occur if the relocation of workers was rapid and outpaced the area's ability to provide for the sudden increase in demand for such services. There could also be a mismatch of timing between when negative impacts are experienced and when added revenues are realized by local community governments. The potential for such impacts is evaluated below. First, however, it is useful to understand the general findings of previous studies of nuclear and large power plant construction projects.

In general, previous studies have concluded that the degree of impact on local community facilities and services is strongly linked to the geographic location of the project. When projects are located near a large city and allow for both the local hiring of a significant percentage of the project workforce and the disbursement relocating workers, negative impacts are relatively minor, though benefits are also widely distributed.

For example, the Pijawka study found that, due to the dispersed settlement patterns of in-migrants for plants located near large cities, "such locational characteristics had the effect of reducing the level of mover in-migration, thus diminishing potential adverse effects both on the provision and level of public services and on the social structure of the host community." (Reference 4.4-13) The Pijawka study further concluded:

> Of the four major public service areas examined - education, transportation, public safety, and social services - the study found that there had been little demand for project-related expansion in public safety and social services. Traffic congestion, however, was found to be a serious problem at most sites. Project-related demands on the school system occurred at some of the sites, but in all these cases successful adjustments were made to absorb the students without deleterious effects on educational quality…of total pupil enrollment at the 12 sites, an average of only 2.9 percent was attributable to the nuclear plants. It should be noted, however, that at the taxpaying sites, plant-generated revenues contributed to an average of 40 percent of total school district revenues. (Reference 4.4-13)

Summarizing another study of the impact of TVA nuclear plants and the Pilgram Nuclear Plant in Massachusetts, Pijawka states that "because nuclear plants are located near areas having large labor pools, mass in-migration to the host communities was avoided and, consequently, few adverse effects occurred to community services." (Reference 4.4-13)

The GEIS reviewed the impact of the construction of seven nuclear power plants. The summary of socioeconomic impacts stated:

> The significance of any given nuclear power plant to its host area will depend to a large degree on its location, with the effects generally being most concentrated in those communities closest to the plant. Major influences on the local communities include the plants effects on employment, taxes, housing, offsite land use, economic structure, and public services…Nuclear power plants can have a significant positive effect on their community environment. These effects are stable and long term. Because these socioeconomic effects generally enhance the economic structure of the local community, nuclear power plants are accepted by the community, and indeed, become a major positive contributor to the local environs. (Reference 4.4-18)

The EPRI study was more pessimistic about the impact on local services as the study included a number of power plants that were distant from larger communities. In such circumstances, small local communities tended to be saddled with a relatively large number of relocating construction workers, and the impacts on public schools, water and sewer facilities, streets and highways, parks and recreation, public safety, and fiscal resources were often a significant and negative factor. This was particularly an issue in the 5 of 12 plants studied that produced no associated property tax revenues due to the exempt status of the owner or prohibitive state or local laws. The EPRI study also noted that local impacts often preceded the receipt of the revenue benefits, and this mismatch tended to cause a temporary degradation in the provision of community services. (Reference 4.4-12)

With this background, the following subsections evaluate the potential for impacts of the Fermi 3 workforce on the primary impact area counties. The first area of discussion is the impact on education.

4.4.2.4.1 **Education**

Based on the methodology discussed in Subsection 4.4.2, it is estimated that 196 construction workers and families may relocate to Monroe County, 109 may relocate to Wayne County, and 65 may relocate to Lucas County. The potential impact on the educational system in these counties is largely a function of the average number of school age children per construction household, and the change in the pupil to teacher ratio that additional pupils may create. A district's physical ability to accommodate additional students without the need to construct new schools is also a key indicator of the potential for impacts.

The number of additional students expected in the primary impact area counties from relocating Fermi 3 construction workers is estimated by taking the number of relocating worker households assumed for each county times the number of students per occupied housing unit. From Table

2.5-43, there were 25,963 students in the 55 schools in Monroe County in 2005-2006. There were also 58,376 occupied housing units in 2006, resulting in 0.44 students per occupied housing unit. If 196 construction workers were to relocate in Monroe County, with 0.44 students per newly occupied unit, a total of 86 new students would be expected. Compared to 2005-2006 enrollment levels, this would result in a 0.33 percent increase. This increase is well within the long-term historical growth rate of population in the county (0.94 percent from 1990 through 2007).

As seen in Table 4.4-4 for Wayne County, the impact of the addition of 109 workers and 55 new students (based on 0.5 students per occupied housing unit for the county in 2006) would hardly be noticeable given the total enrollment of 359,643 students among 700 schools in 2005-2006. Given the decrease in population and employment plus the increase in vacant housing experienced since 2000, the largest concern for Wayne County school districts may be whether some schools will need to be closed due to declining enrollment, and the small increase in students associated with Fermi 3 construction will be a stabilizing benefit.

In Lucas County, the 87 additional workers and 35 students (based on 0.4 students per occupied housing unit for the county in 2006) would likewise present an insignificant increase in the number of students in the 140 schools that had a 2005-2006 enrollment of 73,146 students.

Regarding the capacity of existing schools to accommodate new students, contact was made with the superintendents of Monroe Public Schools and Jefferson Public Schools in Monroe County. Both indicated that their districts should be able to absorb new students joining the system. While some advance planning and coordination could be required, there were no reservations that the districts would be able to accommodate additional students. Given the large number of districts in Lucas and Wayne counties, the insignificant increase in students projected for these counties, and the length of time until the peak construction period in 2017, no districts in these counties were contacted. In summary, the construction impacts on existing schools in Monroe, Wayne, Lucas Counties is expected to be SMALL, and no mitigative measures are needed.

4.4.2.4.2 **Transportation**

Transportation to the Fermi 3 site will include workers and deliveries during the 10-year construction period. These trips will be in addition to the operation staff and deliveries at Fermi 2 that include 800 operational staff, 150 contract supplemental employees, and maintenance workers traveling to the site for scheduled and unscheduled outages. The number of maintenance workers can peak at 1200 to 1500 workers during Fermi 2 refueling, which occurs approximately every 18 months. Thus, in a worst case scenario, should refueling of Fermi 2 coincide with peak Fermi 3 construction employment level of 2900 workers, the total onsite population could reach as high as approximately 5000 personnel, not including deliveries.

With up to 5000 workers commuting to the Fermi site at the time of peak Fermi 3 construction employment, there is the potential for large traffic impacts near the plant entrance, though a number of factors will serve to reduce the number of vehicles entering the site at any one time. First, based on data presented in Table 2.5-56, it is reasonable to expect that at least 10 percent of the workers will carpool. Also, the Fermi 2 operational workforce will be distributed among 24-hour shifts, and it is very possible - as an obvious preventive measure - that shift start times between the Fermi 2 and

Fermi 3 work force will be staggered. Another major factor influencing the traffic flow near the site will be the number of Fermi 3 construction shifts. It is possible that multiple shifts will be used at Fermi 3, which would be ideal from a traffic flow standpoint.

According to MDOT's document *Traffic and Safety Note 607A*, "a traffic impact study is required for any proposed development expected to generate over one hundred (100) peak hour directional trips or at the discretion of the Region/ TSA Traffic & Safety Engineer." (Reference 4.4-19) In order to analyze the effects that the construction of Fermi 3 would have on area traffic patterns, Detroit Edison has performed a Level of Service traffic study (Reference 4.4-22). The traffic study involved collecting traffic count data during and after a Fermi 2 refueling outage in order to factor in the fluctuation of vehicles accessing the site during these times. Existing information on area traffic flows was also utilized including average daily traffic counts presented in Figure 2.5-25. Consultations with the Michigan Department of Transportation and the Monroe County Road Commision were made during the course of the analyses.

In the EPRI study of twelve power plant projects, "traffic problems and congestion were mentioned as a negative factor in all 12 case studies." (Reference 4.4-12) The Fermi study analyzes the effects that both the projected operations and construction workforces will have on traffic flows in the vicinity of the Fermi site when combined with existing Fermi 2 traffic. The greatest negative impacts are projected to occur in 2017 when the construction workforce is at its peak of 2900 workers. It has been determined that by implementing potential improvements including signal installations and signal modifications, staggering worker shifts, bussing employees from off-site, minor lane additions and/or a second entrance to the site that a great deal of the increased traffic impacts can be minimized resulting in a SMALL impact.

The transportation impact of the construction workforce will be a function of several factors such as the number of workers and the workforce commuting patterns, including average distance traveled to the Fermi 3 construction site. The average distance traveled is estimated in Table 4.4-4-(A) and utilizes information in Table 4.4-4-(B).

Subsection 4.4.2 of the assumes that 15 percent of the peak construction workforce would consist of workers who have relocated from outside the region and that the remaining 85 percent would permanently reside within the Fermi region. Subsection 4.4.2 also assumes that the 15 percent of workers who relocate during construction will reside primarily in Monroe County (45 percent), Wayne County (25 percent), and Lucas County (20 percent), with the remaining 10 percent distributed among other region counties presented in Column A.

To project the distribution of the 85 percent of employees with permanent regional residency, American Community Survey Data 2005-2007 was referenced regarding the distribution of the total regional construction workforce as shown in Column B. The Column B data, however, may not be a good indicator of the residential distribution of the Fermi 3 workforce because of: 1) geographical considerations (distance from the Fermi site of populated counties, primarily Oakland County), and 2) the location of Union Locals having Monroe jurisdiction or otherwise located nearby, as provided in Table 4.4-4-(B). As a result of these considerations, the regional distribution values in Column B were adjusted using subject matter expert judgment to arrive at the assumed Fermi 3 workforce

place of residence distribution in Column C. Comparing Columns B and C, the adjustments were to reduce the percentage of Fermi 3 construction workers assumed to reside in Oakland County (a 15 percentage point reduction) and Wayne County (a 4 percentage point reduction), and to increase the percentage assumed to reside in Lucas County (a 10 percentage point increase), Monroe County (a 5 percentage point increase), and in the "Other County" classification (a 4 percentage point increase).

Next, given the assumed distribution of relocating (Column A) and resident (Column C) Fermi 3 construction workers, the overall distribution of workers was calculated, as seen in Column D. The process used in the "operations employees" calculation was then repeated by determining the weighted distance to the Fermi site (calculated by estimating the distance from the center of each county's largest city to the Fermi site) and then multiplying the result by the fraction of workers commuting from each respective county (Column G is equal to Column D multiplied by Column F). Lastly, the weighted values in Column G were added together to arrive at the average distance of 36.6 miles.

4.4.2.4.3 **Public Safety and Social Services**

The possibility exists that construction activities could result in a slight increase in demand for safety and social services due to relocated workers to the primary impact area counties. These services could include demands for police, fire, ambulance, and hospital services. However, given the estimated small percentage of additional households in all counties arising from Fermi 3 construction, and given that these additions are well within the long-term historical growth rate of housing and the 0.94 population growth for the area, it is expected that the additional households will represent a SMALL increase in the demand for police, ambulance, or hospital services in the primary impact area.

Fermi 3 construction activities also have the potential to negatively impact local community public safety facilities and services due to services needed by the site (e.g., construction workplace injury/accidents). However, construction practices, as described below, will be designed with the specific intent to minimize or eliminate these negative impacts. Accordingly, the expected impact on the following services is SMALL, and no mitigative measures are needed.

A construction safety plan, which conforms to industry requirements and OSHA regulations, will facilitate a safe working environment for the construction workforce. The workers undergo training to familiarize themselves with the safety plan, and members of the construction workforce are required to adhere to the established standards. Examples of proven safety measures include the required use of hard hats in construction areas, the availability of first aid supplies, and required use of tie lines for those working at elevated heights.

In addition, there will be limited access to the construction area. A security guard will be posted onsite and a badge system will be used to control personnel access. The site will include security lighting and fire suppression equipment. First aid stations will be established and maintained throughout the Fermi 3 construction area. First aid training will also be provided to selected individuals in the construction workforce. Standard procedures will be adopted for spill prevention

and containment, injury response, and requests for assistance for local police, fire, and ambulance services.

Emergency, medical, fire, law enforcement, and other offsite response support to the Fermi site is performed in accordance with agreements established in the Fermi Emergency Plan contained in COLA Part 5.

4.4.2.4.4 Public Utilities

Construction of Fermi 3 will require onsite electricity, water, and wastewater services. These impacts, however, will represent no more than a SMALL increase in demand for local utility services. Relocating workers will also utilize these services but their dispersal throughout the region will minimize the impact on any single utility provider.

4.4.2.4.5 Recreation, Tourism, Aesthetics, and Land Use

One of the primary advantages of Fermi 3 is that it will be built on an existing site. As mentioned in Subsection 2.5.2.7, while there are recreation facilities near Fermi 3, the only foreseen impact on these facilities is a longer commute time if travel coincides with peak construction worker commutes. Consequently, the impacts on recreation and tourism due to construction are expected to be SMALL, and no mitigative measures are needed.

From an aesthetics perspective, the construction of Fermi 3 will occur in the heart of the Fermi site, and most of the activity will not be visible from beyond the site. The primary exceptions are the temporary increase in traffic volume that will noticeable, particularly during the peak construction months, plus the NDCT that will be approximately 600 feet tall and will become visible from beyond the site as construction proceeds; therefore, impacting the visual aesthetics of the area. Once construction is complete, the aesthetic and visual impacts associated with construction will recede, with only the NDCT impact remaining visible from offsite.

It is also very significant to note that the construction of Fermi 3 will produce economic benefits while conforming to the objectives established by the local planning authorities. Within the area there are three main agencies that influence local planning, these include: The Monroe Planning Department and Commission (Planning Commission), the Southeast Michigan Council of Government (SEMCOG), and the Frenchtown Township.

Figure 2.5-17 indicates that the Fermi site in the extreme eastern part of the township and bordering on Lake Erie is zoned for utility use, as is a corridor extending from the Fermi site to I-75 and following the highway for much of its route through the township.

Figure 2.5-18 indicates the future land use plans for Frenchtown Township as presented in the most recent (2002) Master Plan. As seen in the figure, the Fermi site is expected to remain zoned for utility use. Related to utility land use, the Master Plan states “The Future Land Use Map acknowledges the continued presence of the Enrico Fermi Energy Center by designating the entire complex as “utilities”.” Thus, the addition of Fermi 3 is consistent with current and future land use plans in Monroe County. Therefore, land use impacts will be SMALL, and no mitigative measures are needed.

4.4.2.4.6 Local Employment and Income

As discussed above, it is reasonable to assume that approximately 85 percent, or 2,465 of the peak construction workers will be from the existing workforce in the primary impact area, and this will be a significant benefit. In addition to the direct employment benefits, there will be employment and income multiplier impacts arising from the construction jobs at Fermi 3, the local expenditures made by the construction workforce and the purchase of materials, supplies, and services during construction. This section estimates the multiplier impacts in the primary impact area associated with the construction of Fermi 3.

One way to estimate the multiplier impact of a new investment in a region is through the use of a regional input-output model, which can estimate an expected industry multiplier to be applied to the direct impact estimates. Input-output models typically use an accounting matrix that shows the change in output, earnings, or employment in all industries due to a change in investment in one industry. For estimating the impact of Fermi 3, the Regional Input-Output Modeling System (RIMS II model) developed and maintained by the U.S. Bureau of Economic Analysis was used. The RIMS II model can produce multipliers for roughly 500 industry classifications and, as a static equilibrium model, can predict the total impact associated with an initial investment, though it does not predict the timing of impacts. (Reference 4.4-20)

The RIMS II model requires the user to select a geographical area of study for which multipliers will be estimated. Typically, this will consist of contiguous counties near the investment location. For the Fermi 3 analysis, the primary impact area counties of Monroe, Wayne, and Lucas were selected.

Based on the "DOE NP2010 Nuclear Power Plant Construction Infrastructure Assessment" publication that lists craft requirements at peak, a weighted average direct wage (no fringes, overheads, or indirect are included) of the Fermi 3 construction workforce was then calculated to be $31.37 per hour (Table 4.4-5). Not including overtime, this hourly wage would result in an annual salary for craft workers of approximately $65,250 (2008 dollars). For the non-craft portion of the labor force, an average of $48.00 per hour was assumed; this equates to an annual salary of $99,840 (2008 dollars). Assuming craft labor comprises two-thirds of the total labor force and the non-craft comprises one-third of the labor force the weighted average annual direct wage during construction is $76,780 (2008 dollars). Taking $76,780 (2008 dollars) multiplied by 8,173 total man-years of employment equates to a revised estimate of wages paid during Fermi 3 construction of $627.5 million (2008 dollars).

From Subsection 4.4.2, the project is expected to create 8,173 man-years of employment and $627.5 million in direct wages, though not all man-years and wages are subject to the regional multiplier. Income and employment multipliers can be applied to income and employment for those workers moving into the primary impact area from outside the region, and to those workers living in the region, who will be hired from the ranks of the unemployed.

In terms of projecting the number of construction workers who will be hired from the ranks of the unemployed, current discussions with the craft trades in the Detroit and Toledo area indicated that current unemployment rates are 25 to 40 percent for most crafts. For purposes of this analysis, it is

conservatively assumed that 25 percent of the Fermi 3 construction workforce hired from the region will be hired from the ranks of the unemployed and can be included in the multiplier impact analysis. The remaining 75 percent of the positions filled from the region are assumed to be filled by employed workers and are not subject to the multiplier impact analysis; hence, their multiplier is effectively one.

Table 4.4-6 shows the calculation process that produces the total construction employment and earnings impact estimate for the region and for the primary impact area counties of Monroe, Wayne, and Lucas. The top portion of the table indicates that of the 15 percent of the construction workforce assumed to move to the region, 90 percent (392 workers) are assumed to relocate to the primary impact area counties. In addition, of the 85 percent of the workforce assumed to be located in the region, approximately 70 percent are assumed to be located in the primary impact area. These percentage assumptions were initially made with regard to the peak workforce, but are here also applied to the overall man-years and earnings distribution.

In terms of calculating an employment multiplier impact for the primary impact area counties, a multiplier is applied to the man-years associated with workers relocating to the primary impact area (90 percent of the 15 percent relocating to the region), and to the man-years associated with the 25 percent of the regional workforce living in the primary impact area that are assumed to be unemployed. Combining these group results is an estimate of 2,334 man-years of employment, as seen in row C in the middle section of Table 4.4-6.

Applying the RIMS II direct effect employment multiplier for the primary impact area of 1.7113 times the 2,334 man-years of employment eligible for application of a multiplier yields a primary impact area employment impact of 3,994 man-years (row E). When combined with the 3,691 man-years of employment in the primary impact area not subject to the multiplier (these are those who are employed when hired for Fermi 3 construction, including the under employed), the total impact on the primary impact area is projected to be 7,685 man-years of employment (row G) in Table 1. For the Fermi 3 region as a whole (including those counties not in the primary impact area), the total man-years of employment including the multiplier impacts on the primary impact area will be 9,833 man-years as seen in row I of Table 4.4-6.

Turning to earnings (all in 2008 dollars) and following a similar methodology, Table 4.4-6 indicates that a multiplier is applied to the earnings of workers relocating to the primary impact area (90 percent of the 15 percent relocating to the region), and to the earnings of 25 percent of the regional workers living in the primary impact area assumed to be unemployed. Combining these groups in row L, it is seen that $179 million in primary impact area earnings is subject to the multiplier impact.

Applying the RIMS II direct effect earnings multiplier for the primary impact area of 1.5998 times the $179 million in earnings yields a primary impact area earnings impact of $287 million in row N of Table 4.4-6. When combined with the earnings in the primary impact area not subject to the multiplier ($283 million associated with those employed when hired for the project, including the under employed), the total impact on the primary impact area will be $570 million in earnings as indicated in row P. For the Fermi 3 region as a whole (including those counties not in the primary

impact area), the total earnings generated, including the multiplier impacts on the primary impact area, is estimated to be $735 million.

4.4.3 Environmental Justice Impacts

The purpose of the environmental justice review is to determine if low income and minority populations would bear a disproportionate amount of any detrimental environmental impacts from the construction of Fermi 3. Potential areas of impact that deserve special attention include cultural, economic, and human health impacts.

Based on the analysis presented in Subsection 2.5.4, no counties within the 50-mile region qualified as a low income. However, as shown in Figure 2.5-30, 572 Census Block Groups (CBGs) within the region were minority areas, primarily these were associated with the cities of Detroit and Toledo. Specifically, of the 488 low-income CBGs located within the Michigan portion of the 50-mile region, 428 were in Wayne County. Similarly, of the 84 low-income CBGs located within the Ohio portion of the 50-mile radius, 71 were located in Lucas County. In Monroe County, only one CBG qualified as low-income, and this was located in the city of Monroe, southwest of the Fermi site.

Of the counties within a 50-mile radius of Fermi, only Wayne County qualified as a minority, based on a 52.89 percent minority population (see Figure 2.5-28). Although Wayne County is the only minority county within the 50-mile region, there was 1438 minority CBGs within the region. Most of the minority CBGs are associated with the cities of Detroit and Toledo. For example, of the 1316 minority CBGs within the Michigan portion of the 50-mile region, 1124 were located in Wayne County. Of the 122 minority CBGs located within the Ohio portion of the 50-mile region, 113 were located in Lucas County. In Monroe County, only one CBG qualified as minority and this was located in the city of Monroe. The minority CBGs are show in Figure 2.5-29.

4.4.3.1 Impacts on Low Income Areas

For there to be a significant concern that the culture, economy, or human health of low income populations may be harmed due to the construction of Fermi 3, or receive a disproportionate share of negative impacts: 1) a low income county, or CBGs in close proximity to the site would need to be present, 2) negative cultural, economic, or health impacts on such populations would need to be expected, and 3) the low income areas would be expected to encounter a disproportionate share of negative impacts from the construction of Fermi 3.

The socioeconomic analysis found that no low-income county exists in the 50-mile radius of Fermi 3, and that there is only one nearby CBG in Monroe County that qualifies as low income. Thus, based on the definition of low income populations, the first criterion only marginally applies.

The remaining discussion addresses the second and third criteria and uses information from previous sections to support the conclusion that 1) very minimal cultural and health impacts would be expected while the economic benefits associated with Fermi 3 would be significantly positive, and 2) the low income CBG would not encounter a disproportionate share of any negative impacts.

Previous sections have indicated that the potential health impacts on local populations from construction of Fermi 3 are expected to be limited to minor noise impacts and possibly impacts

related to the increased emissions and delays associated with worker vehicles and transportation of materials and supplies to the site. These impacts will be temporary and largely limited to the Fermi site and areas near the entrance to the Fermi site. Due to the limited geographic nature of such impacts, the nearest low income CBG in Monroe County would not be disproportionately impacted.

Concerning cultural impacts, a culture can be defined as "the ideas, customs, skills, arts, etc. of a given people in a given period." Previous discussions have indicated that due to the dispersion the relocating workforce in the primary impact area it is estimated that 196 workers at the peak of construction will relocate to Monroe County. In 2000, the CBG in Monroe County that qualified as low-income had a population of 766 people; this represents approximately 0.5 percent of the 2000 Monroe County population. If a 0.5 percent of the relocating workers choose to reside in this CBG, it would mean that one worker would be added to this CBG. Therefore, there would be minimal potential for a significant change in culture that could theoretically be brought about by a change in population mix by the addition of one worker.

Related to economic impacts, the previous socioeconomic impact sections have concluded that the impacts of Fermi 3 construction are almost wholly positive and beneficial to the region. Primary benefits include employment and income benefits, and increased tax revenues. Though the most significant economic benefit will occur in Monroe County due to increased property tax revenues, all areas in the primary impact area will benefit economically from the project. Generally, low income populations can be assumed to benefit from these impacts to a comparable degree as other regional populations from these impacts. In summary, the impacts on low income populations are projected to be SMALL, and no mitigative measures are needed.

4.4.3.2 Impacts on Minority Populations

The same process followed in the previous section for low income populations can be followed to determine whether minority populations will be negatively and disproportionately impacted by the construction of Fermi 3. That is, for there to be a significant concern that the culture, economy, or human health of minority population areas may be harmed due to the construction of Fermi 3 or receive a disproportionate share of negative impacts, 1) a minority County or minority Census Block Groups in close proximity to the site would need to be present, 2) negative cultural, economic, or health impacts on such populations would need to be expected, and 3) the minority areas would be expected to encounter a disproportionate share of negative impacts from the construction of Fermi 3.

Wayne County is the only county within the 50-mile region classified as a minority area. In that Wayne County is not in the immediate vicinity of Fermi 3, while most of the impacts are limited to the plant site and the immediate surrounding area, Wayne County should not experience any negative impacts, and certainly the population would not be disproportionately impacted more than Monroe County.

In Monroe County, the only minority CBG was located in the city of Monroe and had a 2000 population of 738. This population number was approximately 0.5 percent of the 2000 Monroe County population. Given the expectation that negative impacts should be a temporary occurrence related to noise and traffic near the site, the CBG should not be directly affected by Fermi 3

construction. Further, should the 109 workers assumed to relocate to Monroe County do so in a distribution pattern similar to the current population, only one worker would establish a residence in the minority CBG. Given that this would be a minimal change in population, the impacts on health and culture should be very minor or nonexistent.

In summary, any negative impacts on minority populations are expected to be SMALL, and not disproportional to the overall population impacts. Therefore, no mitigation measures are required.

4.4.3.3 Isolated Population Impacts

The foregoing conclusions that there would be no environmental justice impacts were supported by Monroe County officials and other citizens. This is an important confirmation, because it is possible that small groups of low income or minority populations could be present and not detected at the CBG level. These potential populations could be involved in subsistence activities near or on the site and could be impacted by Fermi 3 construction.

Consultations with a local landowner, nearby clergy, and local county officials indicated that there were no known environmental justice issues or subsistence populations on or near the Fermi site that could be affected by Fermi 3 construction. Most discussions indicated that the project would be welcomed due to its economics benefits, with the only expected negative impact being increased traffic during the construction period.

In summary, no isolated populations engaged in subsistence activities are known to exist on or near the Fermi site. It is therefore concluded that disproportionate construction impacts to such populations would be SMALL, and no mitigative measures are needed.

4.4.4 Summary

The potential for negative environmental impacts during construction will largely be minimized through the application of routine construction procedures and the location of Fermi 3 at an existing and relatively remote site. Routine onsite procedures include those in the areas of site security, employment screening, fire protection, medical preparedness, spill containment measures, dust suppression, and other measures.

As discussed above, the primary concern regarding the potential for negative impacts is associated with the volume of traffic that will be accessing the site during the peak months of construction. To guard against preventable safety impacts and delays, it is appropriate to further investigate the potential for impacts through a full Level of Service analysis at the appropriate time, and to implement appropriate mitigation measures. Aside from the small negative impacts that could temporarily arise during the construction of Fermi 3, the socioeconomic benefits of the project will be significant and positive in the areas of employment, income generation, and tax benefits.

4.4.5 References

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Table 4.4-1 Estimated Construction Equipment Noise Emissions

Equipment	L_{eq} [1,2,3] @ 50 ft (dBA)	L_{eq} @ 1000 ft (dBA)
Backhoe	80	54
Grader	82	56
Dozer	83	57
Front End Loader	83	57
Compactor	80	54
Trencher	74	48
Pile Driver	89	63
Truck, Large	77	51
Concrete Vibrator	67	41
Concrete Saw	68	42
Mobile Crane	70	44
Stationary Crane	68	42
Diesel Generator	79	53
Air Compressor	76	50
Welder	68	42
Grinder	75	49
Forklift	76	50
Manlift	76	50
Overall Average[4]	N/A	<64
Maximum[5]	N/A	67

Notes:
1. Average sound pressure level at 50 feet horizontal distance from the equipment.
2. Based on information provided in Reference 4.4-7 and information available from previous similar projects.
3. Energy average sound pressure level at 50 feet horizontal distance from the equipment for work shift of 7 – 10 hours.
4. Exluding Pile Driving Noise
5. Including Pile Driving Noise

Table 4.4-2 Construction Workforce within 70-mi and 50-mi Radii of the Fermi Site

Category	70-mi Radius	50-mi Radius
Total Area Construction Workers, 2000	166,473	120,470
Projected Area Construction Workers, 2017	189,021	136,787
Fermi 3 Peak Employment Projection, 2017	2900	2900
Fermi 3 Peak Employment as a percent of 2017 Area Construction Employment	1.5	2.1
Fermi 3 Peak Employment from the Region if 85 percent are Hired Locally	2465	2465
Fermi 3 Employment from the Region as a percent of 2017 Region Construction Employment	1.2	1.8

Table 4.4-3 Regional Labor Force in 2000 for the Primary Impact Area and the Assumed Allocation of Fermi 3 Relocating Workers at Peak

Primary Impact Area County	Housing Units, 2000	Vacant Housing Units, 2000	Assumed Relocating Households	Relocating Households as Percent of Total Housing Unites	Relocating Households as Percent of Vacant Housing Units
Monroe	56,471	2699	196	0.35	7.26
Wayne	826,145	57,705	109	0.01	0.19
Lucas	196,259	13,412	87	0.04	0.65
Total	1,078,875	73,816	392	0.04	0.53

Table 4.4-3-(A) Selected Bulk Material Purchases and Approximate Costs

B&V Estimate	Quantity	Dollar/Unit Costs	Material Cost $2008
Concrete (cubic yards)	460,000	150.00	$69,000,000
Reinforced steel and embedded parts (ton)	46,000	1,120.00	51,520,000
STRUCTURAL Steel, Decking (ton)	25,000	1,350.00	33,750,000
Cable tray (feet)	220,000	22.75	5,005,000
Conduit (feet)	1,200,000	7.30	8,760,000
Power Cable (feet)	1,400,000	5.00	7,000,000
Control Wire (feet)	5,400,000	1.10	5,940,000
Large bore pipe >2.5 (feet)	260,000	96.74	25,152,400
Small bore pipe (feet)	430,000	32.00	13,760,000
Process and Instrument tubing 9 (feet)	740,000	16.00	11,840,000
	Total Selected Material cost($)		231,727,400

Table 4.4-4 Assumed Primary Impact Area Relocating Worker Households and Students

Primary Impact Area County	Assumed Relocating Households	Average Students Per Household in the Primary Impact Area	Projected Additional Students from Relocating Construction Workers
Monroe County	196	0.44	86
Wayne County	109	0.50	55
Lucas County	87	0.40	26
Total	392	0.43	167

Notes:

Average number of students per household calculated from Table 2.5-43 through Table 2.5-45.

Table 4.4-4-(A)Projected Fermi 3 Construction Workforce County of Residence and Average Commute Estimation

	15 Percent Relocating to Fermi Region Assumed	85 Percent In Fermi Region		Estimation of the Average Commuting Distance of the Fermi 3 Construction Workforce			
County	County of Residence for Relocating Construction Workers by County (A)	Regional Construction Workforce Distribution by County* (B)	Fermi 3 Adjustments based on Distance and Union Hall Locations (C)	Percent of Total Fermi 3 Construction Workforce Residing in Each County (D)[1]	Major City in County (E)	Distance to Fermi (miles) (F)	Weighted Average Distance Calculation (miles) (G)[2]
Monroe County (MI)	45.0%	6.0%	11.0%	16.1%	Monroe City	10.0	1.6
Wayne County (MI)	25.0%	42.5%	38.5%	36.4%	Detroit	35.7	13.0
Lucas County (OH)	20.0%	11.4%	21.4%	21.2%	Toledo	30.3	6.4
Washtenaw County (MI)	3.0%	6.8%	6.8%	6.2%	Ann Arbor	43.1	2.7
Oakland County (MI)	3.0%	25.9%	10.9%	9.7%	Pontiac	64.1	6.2
Wood County (OH)	2.0%	3.9%	3.9%	3.6%	Bowling Green	53.5	1.9
Lenawee County (MI)	1.0%	3.6%	3.6%	3.2%	Adrian	63.8	2.1
Other County	1.0%	N/A	4.0%	3.6%	Other	75.0	2.7
				Average Commuting Distance (Miles)			36.6

*Based on American Community Survey Data 2005-2007

Note 1: (0.15*A)+(0.85*C)=D

Note 2: D*F=G

Table 4.4-4-(B)Regional Union Construction Labor Force and Wage by Major Craft Occupation, 2009

Primary Coverage Unions	Location	Number of Journeymen	Number of Apprentice	Base Journeyman Wages ($2009)
Iron Worker #55	Toledo	661	72	28.00
Boiler Makers #85	Toledo	256	144	33.43
Electrician #8	Toledo	1,520	194	34.00
Operating Eng. #324	Michigan (State wide)	4,500	77	32.75
Brick Layer-Allied	SEM*	1,550	138	29.00
Pipefitter/Plumber #671	Monroe	335	21	32.32
Cement Mason #886	SEM*	400	24	28.00
Sheet Metal Worker #33	SEM*	400	50	29.00
Carpenters	SEM*	4,391	338	30.16
Laborers #959	SEM*	1,091	63	26.28
Insulators #45	Toledo	110	57	29.37
Other Union Hall Locations				
Iron Workers #25	Detroit	2,500	200	29.00
Boiler Makers #169	Detroit	444	146	32.89
Electrician #58	Detroit	4,024	275	35.85
Pipefitter/Plumbers #636	**Detroit**	**1,650**	**140**	**36.25**
Insulators #25	**Detroit**	**195**	**35**	**30.77**

*SEM-Southeast Michigan

Table 4.4-5 Average Wage Data for Key Craft Occupations in the Fermi Region[1]

Occupation	Weights	Average Wage (2008 dollars)
Iron Workers	19.7%	$28.50
Boiler Makers	4.1%	$33.16
Electricians	19.7%	$34.93
Operating Engineers	8.8%	$32.75
Pipefitters-Plumbers	18.4%	$34.29
Cement Mason	2.0%	$28.00
Sheet Metal Worker	3.4%	$29.00
Carpenters	10.9%	$30.16
Laborers	10.9%	$26.28
Insulators	2.0%	$30.07
Weighted Average		$31.37

[1]Information derived from ER Table 2.5-28(A)

Table 4.4-6 Fermi 3 Construction Workforce Employment and Earnings Impacts

	15% Relocating		85% Locals	
Counties in Primary Impact Area	Relocating Distribution	Workers @ Peak	Fermi 3 Adjusted	Workers @ Peak
Monroe County (MI)	45.0%	196	11.0%	272
Wayne County (MI)	25.0%	109	38.5%	948
Lucas County (OH)	20.0%	87	21.4%	527
Primary Impact Area (PIA) Subtotal	*90.0%*	*392*	*70.9%*	*1,746*
Washtenaw County (MI)	3.0%	13	6.8%	168
Oakland County (MI)	3.0%	13	10.9%	267
Wood County (OH)	2.0%	9	3.9%	95
Lenawee County (MI)	1.0%	4	3.6%	89
Other County/Misc	1.0%	4	4.0%	99
Region Total	100.0%	435	100%	2,465
Estimated Employment Benefits with Multiplier Impacts				
Total Man Years of Employment (based on 17 million hours)	8,173			
A) In-migrant const. man-years (8173*0.15*.9)	1,103			
B) Resident Unemployed Man-years (8173*0.85*0.709*0.25)	1,230			
C) Man Years Multiplier Applicable (A+B)	2,334			
D) RIMSII Employment Multiplier, Construction Sector	1.7113			
E) PIA Man Years, Multiplier Applicable (C*D)	3,994			
F) PIA Man-years not Multiplier Applicable (8173*0.85*0.709*0.75)	3,691			
G) Total Man-years of Employment in PIA (E+F)	**7,685**			
H) Regional Man-years not in PIA ((8173*0.15*0.1) + (8173*0.85*0.291))	2,148			
I) Total Regional Impact, with PIA multiplier impact (H + G)	**9,833**			
Estimated Earnings Benefits with Multiplier Impacts				
Total Earnings Estimate	$627,526,667			
J) In-migrant const. earnings ($627.5 M *0.15*0.9)	$84,716,100			
K) Resident Unemployed Earnings ($627.5 M *0.85*0.709*0.25)	$94,478,062			
L) Earnings Multiplier Applicable (J+K)	$179,194,162			
M) RIMS II Earnings Multiplier, Construction Sector	1.5998			
N) PIA Earnings, Multiplier Applicable (L*M)	$286,674,820			
O) PIA Earnings Not Multiplier Applicable ($627.5 M *0.85*0.709*0.75)	$283,434,185			
P) Total Earnings in PIA (N+O)	$570,109,005			
Q) Regional Earnings not in PIA ($627.5 M *0.15*0.1) + ($627.5 M *0.85*0.291))	$164,898,320			
R) Total Regional Impact, with PIA multiplier impact (P+Q)	**$735,007,325**			

Note: The formulas shown in parentheses may differ to the corresponding result due to rounding.

4.5 Radiation Exposure to Construction Workers

This section evaluates the potential radiological dose impacts to construction workers at Fermi 3 resulting from the operation of Fermi 2.

4.5.1 Site Layout

Fermi 3 is located to the southwest of Fermi 2. Fermi 2 is expected to be operating normally during the construction period for Fermi 3. Construction support areas such as offices, parking, warehouses, and laydown areas are also located to the south and west of the new facility location.

Figure 4.5-1 shows the construction areas relative to the Fermi 2 power block and associated facilities.

4.5.2 Radiation Sources

Construction workers at a new facility on the site could be exposed to radiation from a range of sources associated with the normal operation of Fermi 2. These include direct radiation, radiation from gaseous effluents, and radiation from liquid effluents.

Figure 4.5-1 shows the location of the primary sources of radiation from Fermi 2 relative to the construction areas, as discussed below.

4.5.2.1 Direct Radiation Sources

A large portion of the radiation dose to construction workers is expected to be due to the “skyshine” (gamma radiation that scatters in the atmosphere and is reflected back to the ground) from the nitrogen-16 (N-16) source present in the operating Fermi 2 main turbine steam cycle. Hydrogen Water Chemistry (HWC) is employed at Fermi 2 in order to control the production of corrosion products and thereby mitigate intergranular stress corrosion cracking of susceptible components. The Fermi 2 Updated Final Safety Analysis Report (UFSAR), Table 11.1-5, indicates an N-16 specific activity of 100 μCi/g in the steam for normal water chemistry, and 600 μCi/g for HWC (Reference 4.5-1). The N-16 activity present in the main steam lines, turbines, and moisture separators provides an air-scattered radiation dose contribution to locations outside Fermi 2 structures as a result of the high energy gamma rays which N-16 emits as it decays.

Other sources at the Fermi 2 with the potential for a direct radiation dose contribution to construction workers are the condensate storage tanks and the onsite low level waste storage facility. The minimal activity within the tanks and the concrete shielding used in the design of the onsite storage facility results in a negligible dose rate at the site boundary (Reference 4.5-1, Section 12.1.1.2). Therefore, these sources of direct radiation are deemed negligible in comparison with the skyshine doses when considering the dose to construction workers.

Depending on the construction schedule undertaken for Fermi 3, a potential source of direct radiation could be an independent spent fuel storage installation (ISFSI) constructed for Fermi 2. Currently, there is no ISFSI at the Fermi site, but there are plans to construct an ISFSI using a Holtec HI-STORM system. The ISFSI dose contribution to a Fermi 3 construction worker is calculated at a distance of 820 feet from the ISFSI pad for an exposure period of 2080 hours. The

distance of 820 feet is based on the closest Fermi 3 structures. The estimated dose for a 2080 hour exposure period at a distance of 820 feet from the ISFSI pad is approximately 13.8 mrem/yr.

Fermi 1 will be decommissioned before the construction of Fermi 3. In accordance with the limits established in 10 CFR 20.1402, the dose from Fermi 1 can not exceed 25 mrem/yr. It is expected that the dose from Fermi 1 will be significantly less than 25 mrem/yr.

4.5.2.2 Radiation from Gaseous Effluents

Fermi 2 is designed with the provision for releasing airborne effluents via three gaseous effluent release points to the environment. These are the radwaste building vent, the reactor building vent, and the turbine building vent (Reference 4.5-1, Section 11.3.7). The reactor building vent is the primary release point and includes exhaust from the offgas system, turbine gland seal system, and the reactor building ventilation. The turbine building vent contains low activity exhaust resulting from small leaks from the turbine, condenser and other components in the turbine building. The radwaste building vent contains low activity exhaust resulting from small leaks from laboratory fume hoods, tank vents, and contaminated cubicles. The expected radiation sources (nuclides and activities) for the primary gaseous effluents are listed in the Fermi 2 UFSAR, Table 11.3-1 (Reference 4.5-1).

4.5.2.3 Radiation from Liquid Effluents

Fermi 2 releases radioactive liquid effluents via the circulating water reservoir blowdown line. The minimum dilution flow is approximately 10,000 gpm (Reference 4.5-1, Section 11.2.8). The annual expected maximum dose to an individual resulting from Fermi 2 liquid effluents is presented in the Fermi 2 UFSAR (Reference 4.5-1, Appendix 11A). When effluents are released, they discharge directly to Lake Erie via the circulating water reservoir blowdown line. Lake Erie provides further dilution through natural mixing characteristics in the vicinity of the discharge. From Figure 4.5-1, it is clear that construction activities for a new facility would be well removed from the release point for liquid effluents.

4.5.3 Measured and Calculated Radiation Dose Rates

Measured and reported data from Fermi 2 is available for gaseous and liquid effluents, as well as direct radiation sources. This information is reported annually to the NRC as part of the Radioactive Effluent Release and Radiological Environmental Operating Report. Reports from the years 1999 through 2008 were utilized in the preparation of this section (Reference 4.5-2 through Reference 4.5-9 and Reference 4.5-11 through Reference 4.5-13).

4.5.3.1 Dose Rate from Direct Radiation Sources

Fermi 2 measures radiation doses at various locations on the site using thermoluminescent dosimeters (TLDs). As shown on Figure 4.5-2, TLDs T47, T48, T54, and T64 are the TLDs closest to the expected construction areas for the Fermi 3 site. The location of TLD 47 represents the maximum radiation exposure a construction worker is expected to encounter, TLD T48 is representative of the near edge of the Fermi 3 construction site (southwest of the Fermi 2 plant buildings), TLD T54 is representative of the far edge of the Fermi 3 construction site, and TLD T64 is representative of the location of the planned ISFSI construction site due west of Fermi 2.

Measurements from these TLDs are used to determine the expected direct radiation dose to construction workers.

Table 4.5-1 collects ten years of radiation dose rate data for the four TLDs of interest. As explained in the footnotes of the table, the dose rates from the Radioactive Effluent Release and Radiological Environmental Operating Reports are expressed in units of radiation exposure (Roentgen) and represent one year (365 days x 24 hours/day = 8760 hours) of exposure time. In order to compare the expected dose rates to the dose limits prescribed in 10 CFR 20, conversion of these dose rates into mrem/yr is necessary.

The most limiting annual dose rates at the four TLDs of interest were 410.31 milliroentgen/yr, recorded at TLD T47 in 2008 and 194.96 milliroentgen/yr, recorded at TLD T48 in 2008 (Reference 4.5-12). TLD T47 and TLD T48 are approximately 525 ft and 1000 ft from the centerline of the Fermi 2 Turbine Building, respectively (Reference 4.5-9). Conversion of these radiation exposures into a dose equivalent in tissue is accomplished by multiplying by 0.95 (Reference 4.5-10). Conversion results in an annual dose rate of 389.79 mrem/yr at T47 and 185.21 mrem/yr at T48. The annual dose measured at these TLDs was accumulated over an exposure time of 8760 hours. It is assumed that construction workers will work standard 8-hour shifts. Applying this work rate to 5 days per week, 52 weeks per year, yields 2080 hours per year. Therefore, the annual dose to a construction worker due to direct radiation at the Fermi 3 construction site is approximately 92.6 mrem/yr at TLD T47 and 44.0 mrem/yr at TLD T48. While the dose rate measured at TLD T47 is the most bounding of the four TLD locations, this location overestimates the average dose rate a construction worker would incur on the Fermi 3 construction site. From Figure 4.5-1 and Figure 4.5-2, TLD T47 is located on the Protected Area fence south of the Fermi 2 Turbine Building, well removed from the eventual location of the Fermi 3 building structures. As such, the location of TLD T48 is more representative of the areas where the bulk of the construction activities will occur. TLD T48 provides a more representative dose rate to a construction worker and is used to calculate the radiological impact to construction workers at the Fermi 3 site.

As a comparison, the most limiting annual dose at TLD T54 was 77.34 milliroentgen/yr in 2008 (Reference 4.5-12). TLD T54 is approximately 1530 ft from the centerline of the Fermi 2 Turbine Building (Reference 4.5-1). The estimated annual dose to a construction worker at TLD T54 is approximately 17.4 mrem/yr.

The most limiting annual dose at TLD T64 was 101.05 milliroentgen/yr in 2008 (Reference 4.5-12). TLD T64 is approximately 1340 ft from the centerline of the Fermi 2 Turbine Building (Reference 4.5-1). The estimated annual dose to a construction worker at TLD T64 is approximately 22.8 mrem/yr.

The dose measured by these TLDs includes background radiation. Based on remote TLDs background radiation is approximately 50 mrem per year. This corresponds to an annual radiation dose to a construction worker of approximately 12 mrem per year based on a 2080 working hours in a year. Subtracting the background radiation yields a direct dose from Fermi 2 as measured by T48 of 32.0 mrem per year.

The ISFSI dose is conservatively based on all planned casks being located at a single point on the ISFSI pad, and assumes all fuel is 15 years old and uniformly loaded. By assuming a single point, which is physically impossible, additional separation distance shielding is neglected as is the cask to cask shielding. The fuel will also be loaded using industry accepted programs placing the oldest fuel on the outside and newer fuel in the middle. This arrangement provides additional shielding of the more radioactive fuel which is also not accounted for. The ISFSI dose is calculated at a distance of 820 feet from the ISFSI pad for an exposure period of 2080 hours. The distance of 820 feet is based on the closest Fermi 3 structures. The estimated dose for a 2080 hour exposure period at a distance of 820 feet from the ISFSI pad is approximately 13.8 mrem/yr.

Fermi 1 will be decommissioned before the construction of Fermi 3. In accordance with the limits established in 10 CFR 20.1402, the dose from Fermi 1 to an individual Fermi 3 construction worker can not exceed 25 mrem/yr, regardless of the number of hours the worker spends on site. Therefore, the maximum dose due to the decommissioned Fermi 1 site is 25 mrem/yr.

4.5.3.2 Dose Rate from Gaseous Effluents

Environmental radiological monitoring data obtained from the Fermi 2 Annual Radioactive Effluent Release and Radiological Environmental Operating Report were used to assess any potential radiological impact on construction workers due to the operation of Fermi 2. The data from these reports is considered representative for the Fermi 3 site dose evaluations.

The Annual Radioactive Effluent Release and Radiological Environmental Operating Reports for 1999 through 2008 (Reference 4.5-2 through Reference 4.5-9, Reference 4.5-11, and Reference 4.5-13) give both the airborne effluent doses for the most highly exposed individual living near the plant, as well as the maximum potential dose to a visitor to Fermi 2 due to all radioactive effluents, including noble gases. The annual doses to the most highly exposed individual living near the site are negligible.

TLD T54 is positioned very close to the Fermi 2 Visitor's Center. Due to the proximity of this location to the expected Fermi 3 construction site, the dose rates due to gaseous effluents calculated at the Visitor's Center are representative of the dose rates to which the construction workers would be exposed.

The radiological data was collected for the years 1999 through 2008 and is presented in Table 4.5-2 (Reference 4.5-2 through Reference 4.5-9, Reference 4.5-11, and Reference 4.5-13). The annual doses at the Visitor's Center were calculated based on an exposure time of 4 hours/year. Dividing these annual doses by four results in an hourly dose rate which is representative of what a construction worker could expect to receive, and can then be used to extrapolate the dose rate to construction workers on an annual basis (2080 hours) due to gaseous effluent from Fermi 2. This extrapolation is shown in Table 4.5-6 and resulted in a maximally exposed organ (thyroid) dose of 10.4 mrem/yr and a maximum whole body dose of 1.6 mrem/yr for the maximum annual dose from Fermi 2 gaseous releases.

4.5.3.3 Dose Rate from Liquid Effluents

The Annual Radioactive Effluent Release and Radiological Environmental Operating Reports for 1999 through 2008 (Reference 4.5-2 through Reference 4.5-9, Reference 4.5-11, and Reference 4.5-13) explicitly state that "there were no releases of liquid radioactive effluents," and furthermore that "there has not been a liquid radioactive discharge from Fermi 2 since 1994."

As such, the dose rate from liquid effluents is not expected to be a factor in the cumulative dose to construction workers.

4.5.4 Construction Worker Dose Estimates

The overall estimate of dose to construction workers considers an occupational exposure period of 2080 hours per year, and a construction work force of approximately 2,900. All annualized dose estimates developed in this section are based on a 2080-hour year. Contributions from each type of source are developed below and a total estimated dose is provided in the conclusions.

4.5.4.1 Dose Estimate from Direct Radiation Sources

As described in Subsection 4.5.3.1, a dose rate of 32.0 mrem/yr for the Fermi 3 construction area is used to estimate the annual dose to construction workers from N-16 skyshine radiation. Fermi 2 utilizes hydrogen water chemistry, which results in elevated skyshine doses.

A dose rate of 13.8 mrem/yr for the Fermi 3 construction area is used to estimate the annual dose to construction workers from Fermi 2 ISFSI radiation. A dose rate of 25 mrem/yr for the Fermi 3 construction area is used to estimate the annual dose to construction workers from the decommissioned Fermi 1 site radiation.

As described in Subsection 4.5.2.1, the contribution to the total dose estimate for construction workers from the condensate storage tanks and the onsite storage facility are negligible.

4.5.4.2 Dose Estimate from Gaseous Effluents

Table 4.5-6 provides the estimated bounding dose of 10.4 mrem/yr to a maximally exposed organ (thyroid) and whole body dose of 1.6 mrem/yr from gaseous effluents.

4.5.4.3 Dose Estimate from Liquid Effluents

Liquid radioactive effluents from Fermi 2 can be released to Lake Erie via the circulating water reservoir blowdown line. However, there have been no liquid radioactive effluent releases from Fermi 2 since 1994. As such, the dose estimate from liquid effluents is negligible.

4.5.5 Summary and Conclusions

The annual dose to an individual construction worker from all three pathways is summarized in Table 4.5-4 and compared to the public dose criteria in 10 CFR 20.1301 and 40 CFR 190 in Table 4.5-5 and Table 4.5-6, respectively. Because the calculated doses meet the public dose criteria of 10 CFR 20.1301 and 40 CFR 190, the workers would not need to be classified as radiation workers and no shielding or other protective measures are required. Table 4.5-7 shows that the doses also meet the design objectives of 10 CFR 50, Appendix I, for gaseous and liquid effluents.

The maximum annual collective dose to the construction work force (2900 workers) is estimated to be 210 person-rem.

It is concluded that annual construction worker doses attributable to the operation of Fermi 2 for the Fermi 3 construction areas would be SMALL because it would be a fraction of 10 CFR 20 and 10 CFR 50 Appendix I limits. Thus, monitoring of individual construction workers will not be required. Construction workers will be treated as if they were members of the general public in unrestricted areas.

4.5.6 References

4.5-1 Detroit Edison, “Fermi 2 Updated Final Safety Analysis Report, UFSAR.”

4.5-2 Detroit Edison, “Fermi 2 – 1999 Annual Radioactive Effluent Release and Radiological Environmental Operating Report for the period of January 1, 1999 through December 31, 1999.”

4.5-3 Detroit Edison, "Fermi 2 – 2000 Annual Radioactive Effluent Release and Radiological Environmental Operating Report for the period of January 1, 2000 through December 31, 2000.”

4.5-4 Detroit Edison, “Fermi 2 – 2001 Annual Radioactive Effluent Release and Radiological Environmental Operating Report for the period of January 1, 2001 through December 31, 2001.”

4.5-5 Detroit Edison, “Fermi 2 – 2002 Annual Radioactive Effluent Release and Radiological Environmental Operating Report for the period of January 1, 2002 through December 31, 2002.”

4.5-6 Detroit Edison, “Fermi 2 – 2003 Annual Radioactive Effluent Release and Radiological Environmental Operating Report for the period of January 1, 2003 through December 31, 2003.”

4.5-7 Detroit Edison, “Fermi 2 – 2004 Annual Radioactive Effluent Release and Radiological Environmental Operating Report for the period of January 1, 2004 through December 31, 2004.”

4.5-8 Detroit Edison, “Fermi 2 – 2005 Annual Radioactive Effluent Release and Radiological Environmental Operating Report for the period of January 1, 2005 through December 31, 2005.”

4.5-9 Detroit Edison, “Fermi 2 – 2006 Annual Radioactive Effluent Release and Radiological Environmental Operating Report for the period of January 1, 2006 through December 31, 2006.”

4.5-10 Turner, J.E., “Atoms, Radiation, and Radiation Protection,” Pergamon Press, 1986.

4.5-11 Detroit Edison, “Fermi 2 - 2007 Annual Radioactive Effluent Release and Radiological Environmental Operating Report for the period of January 1, 2007 through December 31, 2007.”

4.5-12 Detroit Edison, “Fermi 2 - 2008 Annual Radiological Environmental Operating Report for the period of January 1, 2008 through December 31, 2008.”

4.5-13 Detroit Edison, “Fermi 2 - 2008 Annual Radioactive Effluent Release Report for the period of January 1, 2008 through December 31, 2008.”

Table 4.5-1 TLD Annual Dose(milliroentgen/yr)[1,2]

	TLD Locations[3]			
Year	TLD T47 – South of Turbine Building rollup door on PAF, 0.1 miles from Fermi 2 Reactor	TLD T48 – 30 ft. from corner of AAP on PAF, 0.2 miles from Fermi 2 Reactor	TLD T54 – Pole next to Fermi 2 Visitor's Center, 0.3 miles from Fermi 2 Reactor	TLD 64 – West of switchgear yard on PAF, 0.2 miles from Fermi 2 Reactor
1999	142.68	92.19	52.89	64.31
2000	202.53	124.8	72.30	86.85
2001	288.85	142.76	64.77	81.14
2002	292.63	153.6	63.32	83.13
2003	296.77	161.6	68.57	84.51
2004	316.53	162.28	66.10	86.48
2005	293.99	143.68	62.73	80.71
2006	293.30	161.38	68.98	82.60
2007	329.12	179.17	69.53	92.92
2008	410.31	194.96	77.34	101.05

Notes:

1. TLD annual doses are based on continuous exposure (8760 hours).
2. The TLD dose rates are given in terms of exposure (Roentgen) rather than dose equivalent (rem). Conversion of Roentgen to rem for gamma radiation in tissue is 1 Roentgen = 0.95 rem (Reference 4.5-10).
3. The locations of the TLDs are indicated in Figure 4.5-2.

Source: Reference 4.5-2 through Reference 4.5-9, Reference 4.5-11, and Reference 4.5-12

Table 4.5-2 Annual Doses to Members of the Public at the Visitor's Center from Gaseous Releases from Fermi 2[1]

Year	Maximally Exposed Organ (Thyroid) (mrem/yr)	Total Body Dose (mrem/yr)
1999	0.02	0.0003
2000	0.01	0.002
2001	0.02	0.003
2002	0.01	0.003
2003	0.003	0.0004
2004	0.004	0.002
2005	0.0023	0.0017
2006	0.0027	0.0018
2007	0.0029	0.0020
2008	0.0048	0.0021

Notes:

1. Doses are based on an exposure time of 4 hours per year.

Source: Reference 4.5-2 through Reference 4.5-9, Reference 4.5-11, and Reference 4.5-13

Table 4.5-3 Estimated Doses to Construction Workers from Gaseous Releases from Fermi 2

	Maximally Exposed Organ (Thyroid)(mrem/hr)	Total Body Dose (mrem/hr)
2001	5.0E-03	7.5E-04
For 2080 per year	10.4 mrem/yr	1.6 mrem/yr

Table 4.5-4 Annual Dose to a Construction Worker by Source (mrem)

	Fermi 2	Direct ISFSI[1]	Fermi 1	Gaseous	Liquid	Total[2]
Critical Organ	-	-	-	10.4	N/A	10.4
Whole Body	32.0	13.8	25	1.6	N/A	72.3

Notes:

1. The ISFSI and decommissioned Fermi 1 site only contribute to the direct dose.
2. The Total dose calculation for Whole Body exposure may not match the sum of the individual dose values due to rounding.

Table 4.5-5 Comparison of Construction Worker Dose to Public Dose Limits Specified in 10 CFR 20.1301

Type of Dose	Annual Dose Limits	Estimated Dose
Total effective dose equivalent per year	100 mrem	72.3 mrem
Maximum dose in any hour	2 mrem	<< 1 mrem

Table 4.5-6 Comparison of Construction Worker Dose from Gaseous Effluent Discharges to Public Dose Limits Specified in 40 CFR 190[1]

Type of Dose	Annual Dose Limits	Estimated Dose
Whole body dose	25 mrem	1.6 mrem
Thyroid doses	75 mrem	10.4 mrem
Other organ doses	25 mrem	< 1 mrem

Notes:

1. 10 CFR 20 requires that the dose to an individual from radioactive effluents also meet 40 CFR 190 limits.

Table 4.5-7 Comparison with 10 CFR 50 Appendix I Criteria for Effluent Doses

	Annual Dose (mrem)	
	Annual Limit	**Estimated Dose**
Whole body dose from liquid effluents	3	Negligible[1]
Organ dose from liquid effluents	10	Negligible[1]
Whole body dose from gaseous effluents	5	1.6
Organ dose from all effluents	15	10.4

Notes:

1. Per Reference 4.5-2 through Reference 4.5-9, there have been no liquid effluent releases at Fermi 2 since 1994.

Figure 4.5-1 Radiation Sources from Fermi 2

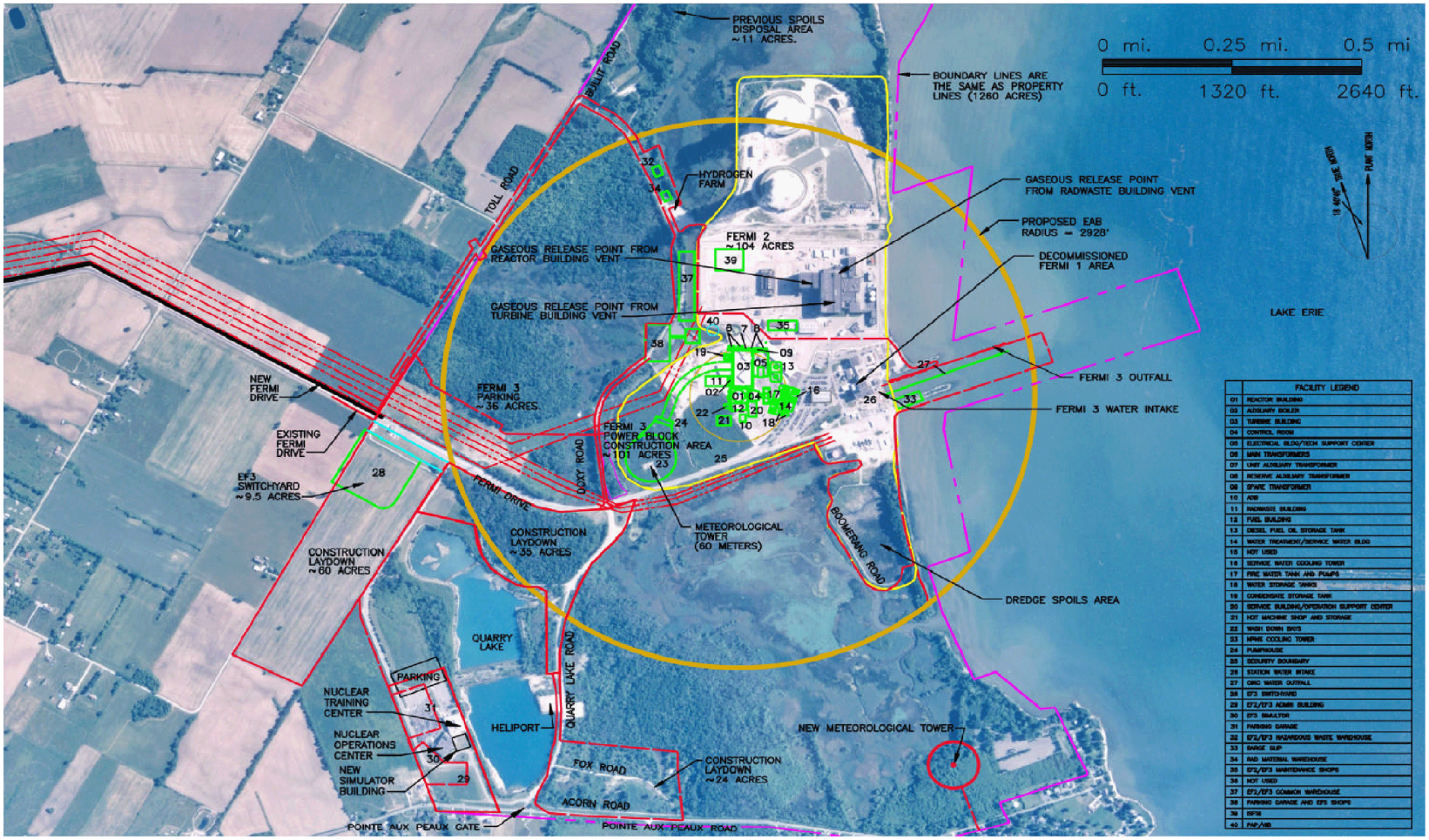
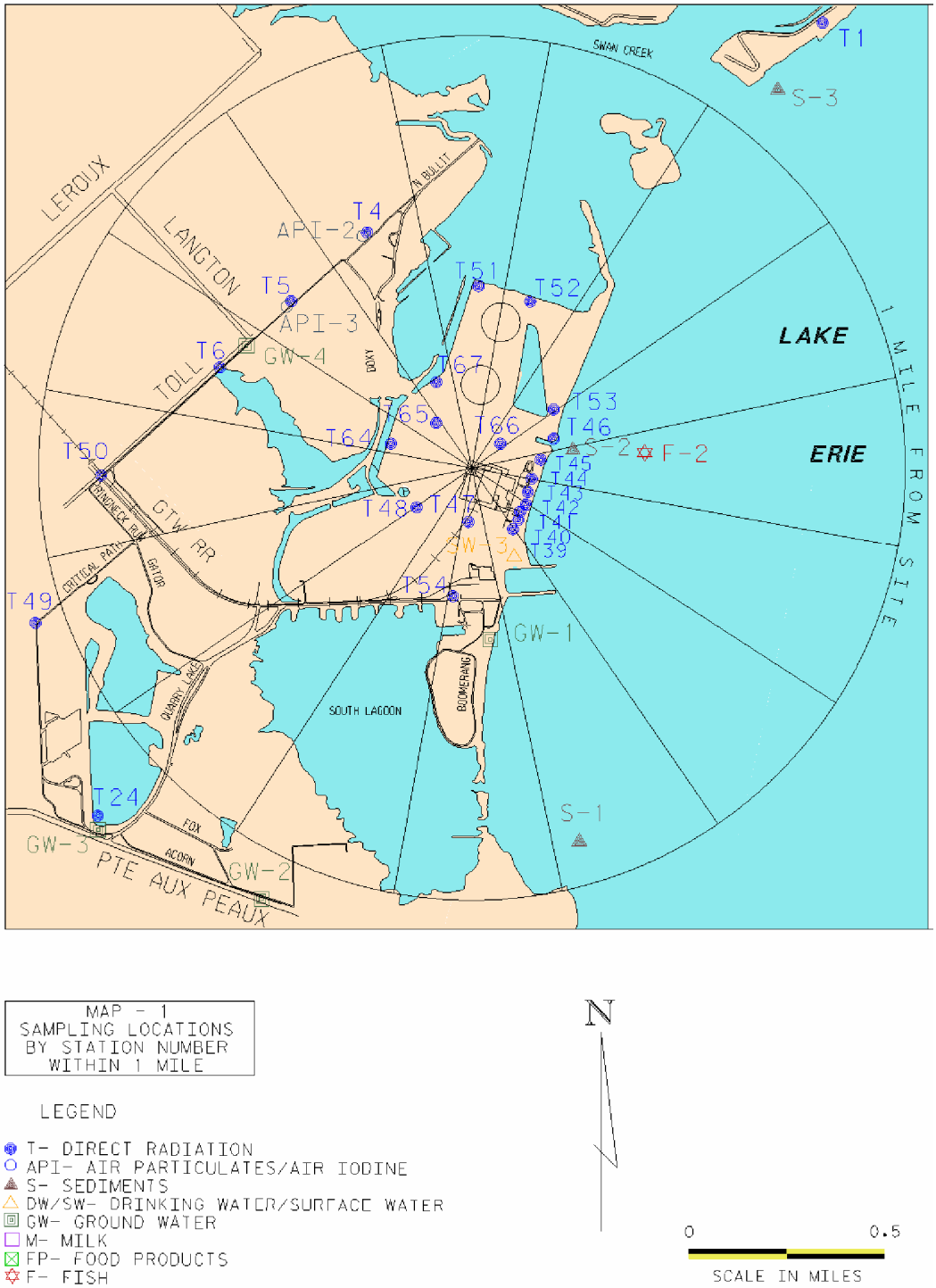


Figure 4.5-2 TLD Locations for Fermi 2



4.6 Measures and Controls to Limit Adverse Impacts During Construction

This section summarizes adverse environmental impacts of construction, as well as controls to limit these impacts. Table 4.6-1 shows the cause-and-effect relationships between construction environmental impacts and actions and affected environmental resources. Significance levels SMALL (S), MODERATE (M), and LARGE (L) are determined assuming that measures and controls are implemented for each impact. If a range of effect is expected, then two significance levels are assigned, such as M-L, meaning a MODERATE to LARGE impact. The levels of impact significance (S, M, and L) are defined below:

SMALL — Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered small.

MODERATE — Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE — Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Table 4.6-1 also summarizes specific measures and controls (both preventative and mitigative) to alleviate construction impacts. Each "Impact Description or Action" attribute is assigned a number, and each "Specific Measures and Controls" attribute is assigned a number that corresponds to the respective "Impact Description or Action." The assignment of significance levels (S, M, and L) in Table 4.6-1 is based on the assumption that the corresponding measures and controls have been taken for each impact. The measures and controls described in Table 4.6-1 are considered reasonable from practical, engineering, and economic standpoints. The measures and controls are generally accepted practices within the utility industry, and stem from guiding statutes and regulatory requirements. These measures and controls, therefore, are appropriate and not expected to create a hardship for the applicant.

4.6.1 References

None.

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 1 of 9)

Environmental Resource Categories	Impact Category and Level of Impact														Impact Description or Action	Specific Measures and Controls
	Noise	Erosion/Sediment	Air Quality/Dust	Traffic	Effluents and wastes	Surface water Impacts	Groundwater Impacts	Land Use protection/restoration	Water-use protection/restoration	Terrestrial Ecosystem Impacts	Aquatic Ecosystem Impacts	Socioeconomic Impacts	Radiation Exposure to	Other Site-Specific Impacts		
4.1 Land-Use Impacts																
4.1.1 Site and Vicinity		S			S			S						S	1) Construction of new buildings and impervious surfaces. 2) Ground-disturbing activities, including grading and re-contouring. 3) Removal of existing vegetation. 4) Potential hazardous material spills. 5) Stockpiling of soils onsite. 6) Disposition of dredge materials and use of borrow material.	1 and 2) Conduct ground-disturbing activities in accordance with permit requirements. Implement erosion control measures described in the SESC Plan. 3) Limit vegetation removal to those areas designated for construction activities. Restore temporarily disturbed areas. 4) Remove hazardous wastes/spills with rigorous compliance with applicable regulations. Plant staff will implement PIPP measures. 5) Restrict soil stockpiling and reuse to designated areas within the construction footprint on the Fermi site. 6) Use BMPs listed in the SESC plan and minimize footprint of the designated construction area. Place dredge materials in the dredge spoils area (surrounded by Boomerang Road).

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 2 of 9)

Environmental Resource Categories	Impact Category and Level of Impact														Impact Description or Action	Specific Measures and Controls
	Noise	Erosion/Sediment	Air Quality/Dust	Traffic	Effluents and wastes	Surface water Impacts	Groundwater Impacts	Land Use protection/restoration	Water-use protection/restoration	Terrestrial Ecosystem Impacts	Aquatic Ecosystem Impacts	Socioeconomic Impacts	Radiation Exposure to	Other Site-Specific Impacts		
4.1.2 Transmission Corridors and Offsite Areas.		S						S							1) Potential adverse impact due to soil compaction and erosion. 2) Potential impacts to agricultural land and vegetation. About 1069 acres of land could potentially be affected along the entire 29.4-mile route; about 393 acres along the new 10.8-mile portion of the corridor would be most affected because ROW expansion to an assumed 300-foot width and construction of transmission towers and steel poles along this portion would be required.	The 345 kV transmission system and associated corridors are exclusively owned and operated by the ITC*Transmission*. The applicant has no control over the construction or operation of the transmission system. The construction impacts are based on publicly available information and reasonable expectations on the configurations and practices that ITC*Transmission* is likely to use based on standard industry practice. Such efforts would likely include transmission design considerations and Best Management Practices that would minimize the effects on land use

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 3 of 9)

Environmental Resource Categories	Impact Category and Level of Impact														Impact Description or Action	Specific Measures and Controls
	Noise	Erosion/Sediment	Air Quality/Dust	Traffic	Effluents and wastes	Surface water Impacts	Groundwater Impacts	Land Use protection/restoration	Water-use protection/restoration	Terrestrial Ecosystem Impacts	Aquatic Ecosystem Impacts	Socioeconomic Impacts	Radiation Exposure to	Other Site-Specific Impacts		
4.1.3 Historic Properties		S										S		S	1) Damage to uninspected archaeological sites due to ground disturbing activities (transmission corridors) 2) Permanent visual impacts to site-vicinity above-ground resources from cooling tower.	1) ITC*Transmission* would be expected to conform to regulatory requirements pertaining to uninspected archaeological sites that could be impacted by transmission line development. 2) The closest above-ground historic resource is located 0.5 mile from the construction site, and all others are located 2 to 3 miles distant. Visual impacts are not substantial and no measures or controls are necessary.

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 4 of 9)

Environmental Resource Categories	Impact Category and Level of Impact														Impact Description or Action	Specific Measures and Controls
	Noise	Erosion/Sediment	Air Quality/Dust	Traffic	Effluents and wastes	Surface water Impacts	Groundwater Impacts	Land Use protection/restoration	Water-use protection/restoration	Terrestrial Ecosystem Impacts	Aquatic Ecosystem Impacts	Socioeconomic Impacts	Radiation Exposure to	Other Site-Specific Impacts		
4.2 Water Related Impacts																
4.2.1 Hydrologic Alterations		S				S	S								1) Construction activities increase runoff and silt loads to surface waters. 2) Use of the spoil fill and aggregate stockpile areas may result in increased runoff and silt to surface waters. The above impacts are temporary, lasting during the construction phase.	1and 2) Develop and implement the SESC Plan. This plan may require use of silt fences, straw bales, slope breakers, and other erosion prevention measures.
4.2.2 Water Use Impacts						S	S		S						1) Potential increased turbidity of Lake Erie. 2) Minor drawdown of nearby wells due to dewatering activity. Wetlands are not adversely impacted by dewatering.	1) Use of the construction SESC Plan will limit sedimentation of drainage to Lake Erie. 2) Dewatering plan will minimize the amount of water discharged.

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 5 of 9)

Environmental Resource Categories	Impact Category and Level of Impact														Impact Description or Action	Specific Measures and Controls
	Noise	Erosion/Sediment	Air Quality/Dust	Traffic	Effluents and wastes	Surface water Impacts	Groundwater Impacts	Land Use protection/restoration	Water-use protection/restoration	Terrestrial Ecosystem Impacts	Aquatic Ecosystem Impacts	Socioeconomic Impacts	Radiation Exposure to	Other Site-Specific Impacts		
4.3 Ecological Impacts																
4.3.1 Terrestrial Ecosystems	S		S		S			S		S					1) Noise from construction could startle wildlife. 2) Fugitive dust and equipment emissions. 3) Vegetation clearing and grading would disturb/destroy habitat and displace/kill wildlife (temporary and permanent impacts). 4) Potential for birds to collide with construction equipment (cranes, buildings). 5) Wetland impacts 6) Construction near or on Threatened and Endangered (T&E) species habitat.	1) MDNR construction limitation recommendations for bald eagle nests will be followed. 2) Fugitive dust is controlled through construction watering, and vehicle emissions by regularly scheduled maintenance. 3) Use developed and previously disturbed grounds where possible. Limit clearing to the smallest quantity of land practical to construct Fermi 3. Revegetation will follow construction. 4) Impact is considered SMALL. 5) Wetland mitigation to be developed in consultation with MDEQ and USACE 6) American lotus mitigation to be developed in consultation with MDNR.

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 6 of 9)

Environmental Resource Categories	Impact Category and Level of Impact														Impact Description or Action	Specific Measures and Controls
	Noise	Erosion/Sediment	Air Quality/Dust	Traffic	Effluents and wastes	Surface water Impacts	Groundwater Impacts	Land Use protection/restoration	Water-use protection/restoration	Terrestrial Ecosystem Impacts	Aquatic Ecosystem Impacts	Socioeconomic Impacts	Radiation Exposure to	Other Site-Specific Impacts		
4.3.2 Aquatic Ecosystems		S				S					S				1) Shoreline/bed/benthic erosion from construction/dredging (temporary impacts). 2) Possible spills from construction and/or construction equipment (temporary impacts). 3) Potential adverse impacts caused by dredging.	1) Implement measures in the SESC Permit & NPDES Permit. 2) Implement measures in the PIPP. 3) Implement measures outlined in the USACE Permit.

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 7 of 9)

Environmental Resource Categories	Impact Category and Level of Impact														Impact Description or Action	Specific Measures and Controls
	Noise	Erosion/Sediment	Air Quality/Dust	Traffic	Effluents and wastes	Surface water Impacts	Groundwater Impacts	Land Use protection/restoration	Water-use protection/restoration	Terrestrial Ecosystem Impacts	Aquatic Ecosystem Impacts	Socioeconomic Impacts	Radiation Exposure to	Other Site-Specific Impacts		
4.4 Socioeconomic Impacts																
4.4.1 Physical Impacts	S		S									S			1) Increase in noise levels at nearby receptors during construction. 2) Increased air emissions and fugitive dust. 3) Potential offsite building impacts from blasting.	1) Implement standard noise control measures for construction equipment (silencers). 1) Limit the types of construction activities during nighttime and weekend hours. 1) Notify all affected neighbors of planned activities. 1) Establish a construction noise monitoring program. 2) Fugitive dust is controlled through construction watering, vehicle emissions by regularly scheduled maintenance. 3) Distances to offsite buildings render mitigation unnecessary.

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 8 of 9)

Environmental Resource Categories	Impact Category and Level of Impact														Impact Description or Action	Specific Measures and Controls
	Noise	Erosion/Sediment	Air Quality/Dust	Traffic	Effluents and wastes	Surface water Impacts	Groundwater Impacts	Land Use protection/restoration	Water-use protection/restoration	Terrestrial Ecosystem Impacts	Aquatic Ecosystem Impacts	Socioeconomic Impacts	Radiation Exposure to	Other Site-Specific Impacts		
4.4.2 Social and Economic				M-L				S				S		S	1) The increase in project-related population creates an increased demand for short-term housing. 2) Increased construction-related populations may temporarily affect adequacy of public services, tourism/recreation, and public utilities. 3) Potential for increased traffic and accidents with increased construction traffic on North Dixie Highway near Fermi Drive. 4) Potential conflict with zoning restrictions.	1) Influx of construction personnel is within the anticipated growth rate. Anticipate that existing housing is sufficient. 1) Housing construction will comply with land use ordinances to prevent overcrowding and promote “smart growth.” 2) Impacts are within the overall growth rate for the region. User fees and taxes will fund demands. 3) The applicant will pursue level of service analysis at the appropriate time and in conjunction with the Michigan Department of Transportation (MDOT), the Monroe County Road Commission, and other appropriate agencies to determine possible mitigation measures. 4) Fermi site is zoned for Public Service. Therefore, no zoning conflicts will be introduced.

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction (Sheet 9 of 9)

Environmental Resource Categories	Impact Category and Level of Impact														Impact Description or Action	Specific Measures and Controls
	Noise	Erosion/Sediment	Air Quality/Dust	Traffic	Effluents and wastes	Surface water Impacts	Groundwater Impacts	Land Use protection/restoration	Water-use protection/restoration	Terrestrial Ecosystem Impacts	Aquatic Ecosystem Impacts	Socioeconomic Impacts	Radiation Exposure to	Other Site-Specific Impacts		
4.4.3 Environmental Justice				S				S				S			1) No disproportionately high, adverse impacts have been identified in the primary impact area.	1) No mitigation measures are deemed necessary.
4.5 Radiation Exposure to Construction Workers																
4.5.1 Worker Impacts													S		1) Construction workers could be exposed to radiation from a range of sources including direct radiation, radiation from gaseous and liquid effluents, radiation associated with onsite low level waste and spent fuel storage.	1) The annual construction worker doses attributable to the operation of Fermi 2 for the construction areas for a new facility would be within 10 CFR 20 limits for members of the public. Monitoring of individual construction workers is not required. Facility staff will be treated as members of the general public in unrestricted areas.

4.7 Cumulative Impacts of Construction

This section discusses cumulative impacts to the environment that could result from the construction of Fermi 3. A cumulative impact is defined in the Council of Environmental Quality (CEQ) regulations (40 CFR 1508.7) as an "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions."

The construction impacts of Fermi 3, as described in Chapter 4, are combined with other past, present, and reasonably foreseeable future actions that would affect the same resources in the vicinity. Cumulative impacts anticipated during construction phases are discussed in this section.

To determine whether cumulative impacts to the existing environment near the Fermi site are likely to occur, the baseline environmental information and proposed, ongoing and future development projects in the Fermi area of similar magnitude (Chapter 2) are considered herein along with the environmental impacts (Chapter 4) of constructing a new unit on the Fermi site. For purposes of this review, the geographical area considered for cumulative impacts from construction is Monroe County, and the focus includes and Fermi 3 along with other comparable projects. Apart from Fermi 3, the only known major construction project planned in Monroe County is the installation of scrubbers at the Monroe Power Plant. The respective environmental impacts from Fermi 3 and Monroe Power Plant construction are anticipated to be contained within the respective sites by various regulatory and permit requirements. Furthermore, potential cumulative impacts related to the scrubber installation (e.g., air quality effects from construction equipment, increased temporary work force size, and commuter traffic) are anticipated to decrease before Fermi 3 construction is started. Therefore, Fermi 3 is considered the primary action influencing cumulative impacts for the Fermi 3 project.

As discussed in the Chapter 4 introduction, activities involving Fermi 1 and 2 will be taking place during the Fermi 3 construction period (e.g. deconstruction of Fermi 1, relocation of Fermi 2 outbuildings, access separation between Fermi 2 and 3, etc.). Although they are separate activities from Fermi 3 construction, there is still a close interdependent environmental relationship. Accordingly, the Chapter 4 impacts previously took these activities into consideration in characterizing the Fermi 3 construction impacts, and no specific itemization is provided in this section for Fermi 1 and 2 cumulative impacts.

4.7.1 Land Use

For purposes of this analysis, the geographical area considered for cumulative impacts to land use resulting from construction is a circular area within 7.5 miles of the existing facility, centered on the proposed Fermi 3 location. Approximately 290 acres of the existing 1260-acre Fermi site will be used for construction of Fermi 3. Of the 290 acres required, approximately 108 acres already are developed and contain structures, pavement or other maintained areas; the remainder is composed of various terrestrial habitats as discussed in Subsection 4.3.1 and shown on Figure 4.3-2. The construction and operation of Fermi 2 did not stimulate substantial industrial growth in Monroe County, and impacts from construction of Fermi 3 are expected to be similar. Land use in the

undeveloped portions of the Fermi site is devoted almost exclusively to the DRIWR. Actions to reduce land use impacts would include re-vegetation using native species to improve forage and shelter quality for wildlife use. Rural and agricultural land uses are dominant near the Fermi site. These land uses will not be affected by Fermi 3 construction, except for the offsite transmission corridor, which is in existing right-of-way (ROW). No other Federal or major construction projects are known in Monroe County during the same time as Fermi 3 construction.

Cumulative impacts for land use consist of development and land conversions to accommodate Fermi 3 facilities. Analysis of land use effects at the Fermi site includes an increase in impervious surface, resulting in increased stormwater runoff. Much of the area to be disturbed by construction of Fermi 3 was previously disturbed during Fermi 1 or Fermi 2 construction, although some locations have remained undisturbed for longer periods allowing volunteer vegetation to become established (Subsection 4.1.1.2). To construct Fermi 3 some of these disturbed areas would be cleared, but portions not needed for safety or operational reasons would be revegetated using native species.

Additional transmission towers and steel poles will be constructed in an existing transmission corridor, extending approximately 29.4 miles within an assumed 300-foot wide ROW. Monroe County, which immediately surrounds the Fermi site and the offsite transmission corridor, is predominantly rural and agricultural land uses or forested. These land uses affected by construction of Fermi 3 will be temporary; and because the new transmission lines will use existing ROWs and towers to the maximum extent practicable, land use impacts are minimized.

Construction of Fermi 3 will contribute to changing land use within the Fermi site, but is not likely to encourage offsite industrial development on a scale similar to the facility, in part because of county and township zoning, which favors preservation of agricultural and rural land use. No large-scale industrial or commercial projects are planned near the Fermi site or the offsite transmission line. The Fermi site is zoned for public service/ utilities and this land use is not expected to change. Because Fermi 3 construction will comply with all applicable county or township land use and zoning regulations, the cumulative impacts are anticipated to be SMALL, and no mitigative measures are needed.

4.7.2 **Air Quality**

For purposes of this analysis, the geographical area considered for cumulative impacts to air quality resulting from construction is Monroe County, and the focus includes Fermi 3 along with other sources of similar emissions. As indicated in Subsection 4.4.1.2, Monroe County is designated by USEPA as a non-attainment area for the annual $PM_{2.5}$ standard and a maintenance area for the 8-hour ozone standard. A temporary increase in air pollution will arise during construction activities; however, the net impact on the local and regional air qualilty is expected to be minimal. Apart from Fermi 3, the only known major construction project planned in Monroe County is the installation of scrubbers at the Monroe Power Plant. The effects of Fermi 3 and Monroe Power Plant construction are anticipated to be contained within the respective sites by various regulatory and permit requirements. Additionally, the bulk of the Monroe Power Plant scrubber work is projected to be completed prior to the commencement of Fermi 3 construction. Accordingly, the temporary impact

of construction activities should not produce noticeable air quality impacts or elevate air pollutant levels. The vehicles and machinery used onsite will comply with applicable government standards during construction activities and dust control procedures will be employed. The rural nature of the construction area will help prevent a marked impact on air quality beyond the site. However, the cumulative impact on air quality in Monroe County during construction is projected to be temporary and SMALL, and no mitigative measures are needed.

4.7.3 Hydrology, Water Use, and Water Quality

No direct or indirect impact will occur to surface waters from Fermi 3 construction, with the exceptions of a small wetland area in the DRIWR, certain onsite water bodies, the vicinity of the existing station water intake, and the barge slip in Lake Erie. Thus, cumulative impacts for surface water in this analysis are limited to Fermi 2 and Fermi 3. The impact area for groundwater is Monroe County because of possible impacts to subsurface aquifers from dewatering during Fermi 3 construction.

Past and present impacts are from existing activities and no known major projects are being proposed within the timeframe of the Fermi 3 project. Future impacts are determined from knowledge of potential development in the resource areas.

The Fermi vicinity has abundant water supplies and temporary water needed for construction will not affect the availability of water for other water users, including groundwater. Groundwater will not be used for construction activities and is limited to withdrawals for dewatering. Dewatering of the construction site during excavation will be temporary, effects will be limited to the immediate area during construction and other groundwater users in Monroe County, primarily rock quarries, will not be adversely affected. It is anticipated that groundwater effluent will be discharged to a local surface water effluent location in accordance with appropriate local and environmental permit requirements. This discharge is not anticipated to require wastewater treatment plant expansion. All surface waters within or near the Fermi site will be avoided to the extent feasible. In addition, construction activities, construction materials and construction site good housekeeping rules implemented under the SESC Plan and the PIPP will minimize any impacts from construction-related runoff to surface water quality. The usability of the water by others will not be significantly impacted by Fermi 3 construction.

There will be a permanent change in water seepage patterns into groundwater from expansion of impervious area within the Fermi site. Implementation of the PIPP will control loss or potential seepage of construction-related pollutants into groundwater.

4.7.3.1 Surface Water Use

Fermi 3 will obtain its potable water from Frenchtown Township, which obtains its water from Lake Erie. The potable water use rate for Fermi 3 construction is planned at a maximum of 8,700 gallons per day (Subsection 4.2.1.8). Fermi 3 construction activities are estimated to need between 350,000 to 600,000 gallons per day from Lake Erie for concrete batch plant operation, dust suppression and sanitary needs.

The cumulative impacts of surface water use for construction at Fermi 3 combined with existing use of Lake Erie water would be SMALL, and no mitigative measures are needed.

4.7.3.2 Surface Water Quality

Three primary accountabilities will limit the effects from construction activities to surface water quality:

1. The NPDES discharge permit for Fermi 2 includes limitations for stormwater runoff discharge from the Fermi site with associated monitoring and reporting requirements. These requirements will continue to be applicable during the construction phase for Fermi 3. A permit modification to include the new construction at Fermi 3 would be required by MDEQ.
2. Construction impacts for Fermi 3 will be reduced and effectively managed through permit compliance and through implementation of the NPDES Stormwater Construction Permit. The Stormwater Construction Permit will establish plans to minimize erosion, control sediment, manage construction materials/activities and reduce the impact of any surface runoff from the construction site to the waterways in the site vicinity.
3. A Soil Erosion and Sedimentation Control (SESC) Permit from Monroe County Drain Commission. As part of the SESC Permit, a detailed SESC Plan will be developed. Details regarding the SESC Permit and Plan are discussed in Subsection 4.2.1.

The continuing NPDES permit limitations on the discharges from Fermi 2 and the continuing regulation of water quality criteria in Lake Erie by the MDEQ and EPA provide a management system with measurable standards to control cumulative impacts on surface water quality.

Construction plans and permit limitations will be designed to minimize temporary impacts to surface water quality from construction of Fermi 3. The cumulative impacts to surface water quality resulting from construction of Fermi 3 would be SMALL, and no mitigative measures are needed.

4.7.3.3 Groundwater Use

Fermi 3 construction will have no impact to local sole source aquifers (SSA). The closest SSA is located approximately 35 miles southeast of the site, across Lake Erie.

The largest regional groundwater use is by quarries, with some additional use by various local governments. There is some concern among local residents about groundwater levels in the Fermi area, believing the quarries may be contributing to drawdown of local water levels. Fermi 3 construction dewatering is not anticipated to contribute further to this local concern, as described in Section 4.2.

No major project of similar magnitude is planned for development in Monroe County during the Fermi 3 construction period. Therefore, no cumulative interaction related to Fermi 3 construction would occur. The following discussion is focused on Fermi 3 impacts to existing local uses.

As noted above in Subsection 4.7.3, dewatering effluent (groundwater within the overburden and Bass Islands aquifer) will be discharged to a local surface water effluent location during the

construction excavation phase. The construction dewatering impact is discussed in Section 4.2. Once details related to construction are determined following final project design, the drawdown impact on groundwater users in the affected area will be further investigated before dewatering is started.

Considering that no discharges to groundwater will occur and the low volume of dewatering required during excavation, with the implementation of mitigation measures discussed in Section 4.6, Fermi 3 construction impacts to groundwater are expected to be SMALL and are not anticipated to affect groundwater use away from the Fermi site.

4.7.3.4 Groundwater Quality

Because of changes in seepage patterns from temporary redirection of surface flows for construction and stormwater runoff control, groundwater recharge may be temporarily reduced during the construction phase of Fermi 3. As building construction and paving progresses, increased runoff and decreased seepage on the developed portion of the site may occur. However, there will be no groundwater discharges, so groundwater quality will not be affected by influents or seepage.

The impact of this reduction in groundwater recharge on groundwater quality is expected to be minimal because the larger area surrounding the construction site will not be affected. Execution of the SESC Plan and its housekeeping elements will limit potential groundwater contamination resulting from the potential seepage of construction materials/supplies into groundwater. Potential contamination of groundwater from Fermi 3 construction activities will be limited by such actions as preventing spills, leaks and material releases under the SESC Plan, the PIPP, appropriate use of chemical storage systems, and frequent inspections of material storage systems.

Combined with existing and proposed activities at the Fermi site and in Monroe County, the cumulative impacts to groundwater quality are expected to be SMALL, and no mitigative measures are needed.

4.7.4 Ecology

The Fermi 3 site layout and construction plan was designed to minimize site-specific and cumulative impacts to the terrestrial ecosystem to the greatest feasible extent while meeting the project purpose. Currently developed and previously disturbed land will be preferentially used wherever practicable. Approximately 2.75 acres of wetlands and 7.28 acres of open water habitats would be permanently impacted.

A 29.4-mile 345 kV transmission line corridor, with an assumed width of 300 feet, between the Fermi site and the Milan Substation is being proposed. Route selection will use already developed land to avoid impacts to terrestrial resources. The land in the transmission corridor is not owned or controlled by Detroit Edison. Accordingly, any impacts would be addressed by ITC*Transmission*. Should any such impacts be unavoidable, mitigation to alleviate the adverse effects would be expected to be provided in coordination with the appropriate land authority (e.g., MDNR) in compliance with applicable regulatory oversight.

There are no other past, present, or known planned actions in Monroe County that involve major effects on wildlife and wildlife habitat similar to those from construction of Fermi 3. Most impacts from construction would be temporary or limited in effect through site management and regulatory compliance mechanisms. American lotus in wetlands affected by construction activities will be subject to future consultation with MDNR to minimize impacts (Subsection 4.3.1.2.1). Construction activities near bald eagle nests, particularly noise, will be limited during the nesting season to reduce the effects of disturbance. Therefore, cumulative impacts to county rare species, plant communities or wildlife will be SMALL, and no mitigative measures are needed.

4.7.4.1 **Terrestrial Ecology**

The geographic area evaluated for cumulative effects to terrestrial resources (vegetation and wildlife) is the vegetation or species-specific habitat within one mile of the Fermi 3 site and along the offsite transmission corridor. Existing terrestrial resources are described in Subsection 2.4.1, and the potential impacts to these resources are discussed in Subsection 4.3.1. As noted in Subsection 4.3.1, aside from developed or temporarily impacted areas, Fermi 3 construction will impact 1692.75 acres of wetlands. In the region (50-mile radius) there are 910,711 acres of this habitat where the total wetland acreage was derived by combining open water, emergent herbaceous and woody wetland acreage (Table 2.2-7). As a percentage of the regional acreage, approximately 0.001 percent of the total disturbance will be in wetland habitats. These impacts are the minimum needed to satisfy the project need and purpose and impacts will have been reduced by avoiding adverse effects to protected species, wildlife resources, wetlands, and other resources as discussed in Subsection 4.3.1. Construction work is subject to regulatory compliance requirements, which further promotes impact avoidance. Terrestrial resource use in the region will not be dramatically shifted from agricultural to industrial or urban uses because of the addition of another nuclear unit to the Fermi site. Thus, the cumulative impacts to terrestrial resources from construction of Fermi 3 are considered SMALL, and no additional mitigative measures are needed.

Coastal Emergent Wetlands and other wetlands yet to be identified will be avoided to the extent feasible. Approximately 2.75 acres of wetland, composed of forested wetland (0.52 acres), and emergent wetland (2.23 acres), associated with DRIWR, would be permanently impacted. An additional 7.28 acres of open waters also would be permanently impacted. Wetland acreage filled for Fermi 3 construction may require separate mitigation. Cumulative impacts to wetlands are expected to be MODERATE. The type and extent of wetland mitigation will be determined during the Clean Water Act Section 404 permitting process.

The cumulative impacts from offsite transmission line construction were assessed using desktop research and ground studies. Detroit Edison does not own the offsite ROW and does not control the construction or operation activities in the offsite transmission corridor. Resource agency consultation is expected by ITC*Transmission* during the final stages of offsite transmission route development. This will allow for measures to be taken to avoid or minimize impacts. However, line routing uses already developed lands as much possible, including avoiding protected species, wetlands and other important terrestrial resources wherever feasible. Because wildlife impacts from construction, including wildlife displacement, fugitive dust and noise from construction are

localized, temporary and minimized in accordance with regulatory limitations, they are considered cumulatively SMALL, and no mitigative measures are needed.

No Federal-listed threatened, endangered, or other protected species would be affected. Two state-listed species (American lotus, and eastern fox snake) would be minimally affected by Fermi 3 construction. Potential impacts are minimized to the extent practicable by minimizing impacts to the habitat areas used by these species. Clearing of wooded areas has been planned so that wildlife corridors and roosting or nesting areas would be avoided. Temporarily disturbed sites will be replanted with native vegetation following completion of the project. In some cases (e.g., erosion control), revegetation would occur sooner in locations vulnerable to degradation unless stabilized by vegetation.

The potential impact of construction on bird collisions associated with the cooling tower or construction cranes is a poorly understood topic. However, experience suggests that any impacts are relatively small. In a recent study by Detroit Edison, 19 individual birds in 13 species were found dead below the Fermi 2 cooling towers during a 73-day period from March to June 2008. This averages to 0.26 bird per day, a collision rate unlikely to affect the population size of these birds. Based on current knowledge with the Fermi 2 towers and experience during Fermi 2 construction, it is reasonable to assume that the use of construction cranes during Fermi 3 cooling tower construction would have little cumulative effect on regional bird populations.

In sum, the anticipated cumulative impacts of onsite and offsite activities are expected to remain SMALL relative to terrestrial ecology.

4.7.4.2 Aquatic Ecology

For this analysis, the geographic region encompassing past, present and foreseeable construction actions (including Fermi 3) is the area immediately surrounding the Fermi site, including adjoining sections of Lake Erie, offsite ponds or lakes (e.g., the Quarry Lakes), and offsite transmission line rights-of-way that cross surface water resources. There are no known projects of similar scale to Fermi 3 started or planned within the construction timeframe of Fermi 3. Cumulative impacts to wetlands are described in Subsection 4.7.4.1. Direct impacts to onsite aquatic resources at the Fermi site from Fermi 3 construction activities are expected to be minimal.

Dredging of a barge slip within the existing Lake Erie intake embayment may be conducted to allow delivery of heavy construction equipment and building materials during Fermi 3 construction and for removal of construction debris. If done, this activity may result in a localized temporary loss of benthic biota. Dredging also may take place at the intake embayment to allow for the addition of a new water intake for Fermi 3. These dredging activities are expected to be similar to ongoing operations and maintenance (O&M) dredging activities used to maintain the barge slip and the intake embayment in operable condition under an existing USACE permit. Because dredging must comply with the existing permit, the added barge traffic would not substantively increase existing barge traffic in Lake Erie and no new roads or other transportation means would be required, no adverse impacts are anticipated from this activity. Dredge spoils are expected to be contained in the Spoils Disposal Pond at Outfall 013, as designated in the Fermi 2 NPDES permit.

Additional impacts to offsite aquatic resources from transmission line construction, as discussed in Subsection 4.1.2, also are expected to be minimal. Wetlands and other aquatic resources will be avoided to the extent feasible. Where impacts will occur, measures to minimize impacts are expected to be used by ITC*Transmission* to lessen the impact. Design of the new transmission lines and corridors would be expected to span aquatic ecosystems encountered as much as possible. Existing transmission towers are likely to be used as much as possible. If new transmission towers are needed, construction would be expected to be limited to terrestrial locations to the maximum extent possible. ROW clearing may occur adjacent to aquatic resources; however, indirect impacts to aquatic resources are expected to be minimized through preventative measures developed and implemented using the appropriate SESC Plan.

Indirect impacts to aquatic systems, such as increased sedimentation and local increased water flow are expected, primarily in dredged locations. These effects could cause temporary losses to benthic habitat and biota from siltation, as well as short-term declines in phytoplankton productivity and zooplankton densities in the immediate area affected by construction. However, the increased availability of nutrients should result in a temporary increase in planktonic organisms following the cessation of construction activities. While food resources for forage fish species would be temporarily reduced, these effects will be limited in duration, localized in effect and temporary, so adverse effects would cease on completion of dredging. Affected aquatic systems are expected to revert to pre-construction conditions following construction, and impacts are anticipated to be SMALL, and no mitigative measures are needed.

Other less likely but potential impacts may include interruption of fish migration and spawning and fish mortality related to accidental toxic spills. While it is not expected that migratory pathways would be physically barricaded during construction, increased turbidity can inhibit migratory cues in some fish species. Contaminants in construction effluents can also act as chemical barriers inhibiting fish migratory behavior. To reduce sediment loading and effluent runoff into water bodies, potentially affected by construction activities, the SESC Plan and the PIPP will be implemented before the start of construction.

Planktonic and benthic community composition has changed in western Lake Erie from increasing pollution in the 1970s that was reduced through the 1980s, resulting in species composition changes, mainly among invertebrate species, such as aquatic insects. However, fish communities identified in both historic and recent surveys are similar, indicating that the fish community of Lake Erie near the Fermi site has not changed appreciably because historic studies (late 1970s) were performed prior to Fermi 2 power plant operations. Construction and operation of Fermi 2 did not appreciably change Lake Erie aquatic habitats near the Fermi site, and a similar result is anticipated for Fermi 3 construction.

In summary, cumulative impacts on aquatic resources by Fermi 3 construction would be SMALL.

4.7.5 Socioeconomic, Environmental Justice, Historic and Cultural Resources

The socioeconomic impacts of power plant construction are mainly a function of construction workforce size, wages and the number of relocated workers relative to the available community facilities and services. The more workers that must re-locate to the construction site, the more

likely it is that negative impacts could accrue, unless adequate housing and services are available. While a precise count is not available, reasonable assumptions appropriate for evaluating the socioeconomic impacts on the region were made to evaluate potential impacts; these are further described in Section 4.4. Aside from Fermi 3, the only other major project identified is the installation of scrubbers at the Monroe Power Plant. However, the bulk of this effort is projected to be completed prior to the commencement of Fermi 3 construction. Accordingly, no cumulative impact is anticipated in the socioeconomics of the site vicinity.

The geographical area of the cumulative analysis varies depending on the particular impacts considered, and may depend on specific boundaries, such as tax jurisdictions, or may be distance-related, as for environmental justice. For evaluation of cumulative effects from a socioeconomic perspective, Monroe County is considered likely to have the highest concentration of adverse socioeconomic impacts (Subsection 4.4.2) because of a history of slow rural growth, with other impacts diffused through the larger metro regions of Detroit and Toledo. The area of potential effect (APE) to archaeological resources is the Fermi site. The cultural resources APE consists of the Fermi 3 project area and cultural resources located outside the site boundary.

During construction of Fermi 3, the project will generate considerable direct and indirect socioeconomic benefits (e.g., stabilized housing market, worker wages and increased tax and user fee revenues) while maintaining consistency with the county development plan. Substantial positive benefits would accrue in Monroe County, including low income and minority areas, while having a SMALL impact on area culture and human health. The potential for negative impacts will be controlled through appropriate construction and safety practices, traffic flow management and other measures as discussed in Subsection 4.1.1.3. Low income or minority groups within the region would not suffer adverse or disproportionate impacts from Fermi construction activities. Therefore, the cumulative impacts on environmental justice would be SMALL, and no mitigative measures are needed.

As discussed in Subsection 4.1.3.1, construction impacts to historic properties or cultural resources identified within the footprint of the Fermi 3 construction are considered SMALL, and no mitigative measures are needed. Approved procedures will be implemented to ensure that either known or newly discovered historic and cultural sites will not be inadvertently affected during onsite construction activities. Construction of the new facility would not affect land outside the current Fermi property boundaries. Therefore, the cumulative impacts to socioeconomic, cultural or historical and environmental justice would be SMALL, and no mitigative measures are needed.

4.7.6 Non-Radiological Health

No projects of similar scale to Fermi 3 are planned near the site. Because construction impacts are limited to the Fermi site and the offsite transmission line corridor, non-radiological health impacts will be localized such that projects outside the Fermi site need not be considered in this cumulative analysis.

The non-radiological health risk to workers is expected to be dominated by occupational injuries at rates below average U.S. industrial rates. Health impacts on the public from noise was evaluated and found to be minor (Subsection 4.4.1.1). Noise impacts to workers are controlled through

adherence to OSHA regulations. In summary, the cumulative impacts on non-radiological health would be SMALL, and no mitigative measures are needed.

4.7.7 Radiological Impacts

This impact analysis is limited to the Fermi site during construction of Fermi 3 and is based on continuing operation of Fermi 2 (including ISFSI) and decommissioned Fermi 1. No other significant radiological sources are present in the region nor are new radiation sources (other than Fermi 3) known as possibly occurring in the region. During construction of Fermi 3, construction workers onsite will be exposed to low-level radiation doses from the continued operation of Fermi 2 (including ISFSI) and decommissioned Fermi 1 (Subsection 4.5.5). Doses were calculated based on exposure to direct radiation, gaseous effluents and liquid effluents likely to occur during ordinary plant operations. The total individual dose received during the construction period from all onsite sources is summarized in Table 4.5-5 relative to public dose criteria. This data indicates that construction workers would not be classified as radiation workers.

Based on available data reviewed, dosage levels would be low, averaging 72 percent of the maximum allowable dose (Table 4.5-5). Exposure to construction workers experiencing annual doses attributable to operation of Fermi 2 would be SMALL because exposure would be within 10 CFR 20 and 10 CFR 50 Appendix I limits. Thus, monitoring of individual construction workers will not be required. Construction workers will be treated as if they were members of the public in unrestricted areas. Access to restricted areas generally will not be provided to construction workers. Radiological impacts to workers and the public will be SMALL, and no mitigative measures are needed.

4.7.8 Conclusion

This section summarizes potential cumulative impacts resulting from Fermi 3 construction at the Fermi site. This impact evaluation describes existing and known foreseeable impacts of similar magnitude in Monroe County and Fermi 3 construction plans during the construction period.

For the potential impacts addressed, cumulative impacts resulting from construction or from planned mitigations/avoidance are SMALL, and no mitigative measures are needed. Project status during construction will be monitored and procedures may be modified as necessary to maintain public and worker safety and environmental health.

4.8 Summary of Construction and Pre-Construction Activities

Table 4.8-1 summarizes the construction and pre-construction related impacts associated with the building of Fermi 3 in accordance with the Limited Work Authorization Rulemaking that became effective November 8, 2007, and associated guidance.

The table provides a reference to each section within Chapter 4 that provides potential impacts and significance determination. The potential impacts and significance determination utilized the three significance levels of SMALL (S), MODERATE (M), and LARGE (L) as defined in Footnote 3 of Table B-1 of 10 CFR 51. As indicated in the Introduction to Chapter 4, the chapter sections do not individually distinguish between pre-construction and construction impacts; therefore, the identified

potential impacts and significance determination was determined evaluating the combined impact of pre-construction and construction activities. The Estimated Impacts Percentage provides a relative estimate of impacts to the environment attributable to either pre-construction or construction activities. The Basis for Estimate provides the supporting justification for the estimated impacts percentage.

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 1 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Section 4.1 Land Use Impacts				
Subsection 4.1.1.1 The Site and Vicinity, Site and Vicinity Land Use Impacts	S – Land Use	10%	90%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., 290 acres, excluding offsite electric transmission lines)
Subsection 4.1.1.2.1 Local Monroe County and Frenchtown Township Land Use	S – Land Use	10%	90%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., 290 acres, excluding offsite electric transmission lines)
Subsection 4.1.1.2.2 Agricultural and Soil Issues	S – Land Use	10%	90%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., 290 acres, excluding offsite electric transmission lines)

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 2 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Subsection 4.1.1.2.3 Federal, Regional, and State Land Use Plans	S – Land Use	10%	90%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., 290 acres, excluding offsite electric transmission lines)
Subsection 4.1.1.3 The Site and Vicinity, Transportation and Rights-of-Way	S – Land Use	70%	30%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). Estimates also based on percent of man hours expected to be dedicated to the construction of activities within the definition of construction of SSC as this provides a measure of impacts to vicinity and transportation relative to land use.
Subsection 4.1.2 Transmission Corridors and Offsite Areas, Planning and Zoning	S – Land Use	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.
Subsection 4.1.2.1 Planning and Zoning	S – Land Use	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.
Subsection 4.1.2.2 Transmission Corridors and Offsite Areas, Transportation and Rights-of-Way	S – Land Use	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 3 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Subsection 4.1.2.4 Transmission Corridors and Offsite Areas, Corridor Restoration and Management Actions	S – Land Use	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.
Subsection 4.1.3.1.1 Archaeological Sites	S – Land Use	5%	95%	The impacts to archaeological sites, i.e., below-ground resources, will apply almost exclusively to preconstruction activities. The archaeological sites were previously identified and ground-disturbing activities such as excavation areas, access roads, and laydown areas will provide the greatest impacts.
Subsection 4.1.3.1.2 Above-Ground Resources Sites	S – Land Use	5%	95%	The impacts to above-ground resources sites, will apply almost exclusively to preconstruction activities. The construction activities associated with Fermi 3 that would impact these sites are limited to the introduction of a permanent visual element, the cooling tower, into the viewshed.
Subsection 4.1.3.2 Historic Properties, Transmission Corridors and Offsite Areas	Not Determined[b]	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's. Detroit Edison has no control or ownership over the transmission.
Section 4.2 Water-Related Impacts				
Subsection 4.2.1.3 Construction Water Sources	S – Water	50%	50%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's to the need for construction batch plant operations, dust suppression, and sanitary water needs.

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 4 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Subsection 4.2.1.4 Water Bodies Receiving Construction Effluents	S – Water	25%	75%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's to the need for dredge spoil disposal, the filling of onsite water bodies, and expected storm water flow.
Subsection 4.2.1.5 Effects of Dewatering	S – Water	95%	5%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's to the need for dewatering.
Subsection 4.2.1.6 Transmission Facilities	S – Water	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.
Subsection 4.2.1.7 Floodplains and Wetlands	S – Water	5%	95%	Estimates are based on the expected acreage of land delineated as wetlands that that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1).
Subsection 4.2.1.8 Groundwater and Surface Water Users	S – Water	50%	50%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's to the need for dewatering activities and potable water consumption
Subsection 4.2.2.2 Water-Use Impacts, Water Quality of Bodies Receiving Construction Effluents	S – Water	25%	75%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's to the need for dredging, site development, stormwater controls, and other activities as needed.
Subsection 4.2.2.3 Water-Use Impacts, Water Quality Used and Quantity Available to Other Users	S – Water	25%	75%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's to the need for concrete batch plant operations, dust suppression, and establishment of new cover vegetation.

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 5 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Subsection 4.2.2.4 Water-Use Impacts, Water Quality Changes Due to Substratum Exposure	S – Water	25%	75%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in the discharge of water from the Spoil Disposal Pond and impacts to the intake and discharge areas.
Subsection 4.2.2.5 Water-Use Impacts, Effects of Alterations on Other Water Users	S – Water	95%	5%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's to the need for dewatering.
Section 4.3 Ecological Impacts of Construction				
Subsection 4.3.1.1.1 Vegetation on the Site and in the Vicinity	S – Terrestrial Ecosystems	10%	90%	Estimates are based on the acreage that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1).It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., 290 acres, excluding offsite electric transmission lines)
Subsection 4.3.1.1.2 Wildlife on the Site and in the Vicinity	S – Terrestrial Ecosystems	10%	90%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in takes or displacement of wildlife, fugitive dust emissions, bird collisions with elevated construction equipment, pollutant spills, and noise.

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 6 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Subsection 4.3.1.2.1 Important Species	S – Terrestrial Species	10%	90%	Estimates are based on the area of land use and potential presence of important species within those areas dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., 290 acres, excluding offsite electric transmission lines)
Subsection 4.3.1.2.2 Important Habitats	M – Terrestrial Habitats	5%	95%	Estimates are based on the expected acreage of land delineated as wetlands that that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1).
Subsection 4.3.1.5 Terrestrial Ecosystems, Transmission Corridors and Other Offsite Areas	S – Terrestrial Ecosystems	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.
Subsection 4.3.2.1 Aquatic Ecosystems, Impacts to Impoundments and Streams	S – Aquatic Ecosystems	25%	75%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in increased sedimentation and turbidity, increased sediment/silt loads into onsite impoundments, surface drainages, site clearing and grading, loss of vegetated buffer zones, and site dewatering.
Subsection 4.3.2.2 Aquatic Ecosystems, Impacts to Lake Erie	S – Aquatic Ecosystems	5%	95%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in dredging activities within Lake Erie and dewatering.

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 7 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Subsection 4.3.2.3 Aquatic Ecosystems, Impacts to the Transmission Corridors and Offsite Areas	S – Aquatic Ecosystems	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.
Subsection 4.3.2.4.1 Threatened and Endangered Species	S – Aquatic Species	5%	95%	Estimates are based on the area of aquatic habitat and potential presence of threatened and endangered species within those areas dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1).
Subsection 4.3.2.4.2 Commercial and Recreational Aquatic Species	S – Aquatic Species	5%	95%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in increased turbidity presenting potential direct and indirect impacts to commercial and recreational aquatic species.
Subsection 4.3.2.4.3 Other Important Species	S – Aquatic Species	5%	95%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in increased turbidity and physical impacts to benthic habitat impacting other important species such as the mayfly.
Subsection 4.3.2.5 Summary	S – Aquatic Ecosystems and Species	5%	95%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in potential increases in erosion that could lead to deposition in aquatic water bodies.

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 8 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Section 4.4 Socioeconomic Impacts				
Subsection 4.4.1.1.4 Potential Impacts	M – Short Term S – Long Term Socioeconomic	50%	50%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in noise impacts.
Subsection 4.4.1.1.6 Buildings	S – Socioeconomic	25%	75%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in shock and vibration.
Subsection 4.4.1.2 Physical Impacts, Air Quality	S – Socioeconomic	70%	30%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in an increase in air pollution attributable to engine exhaust from worker vehicles and machinery and percent of man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.
Subsection 4.4.1.3 Physical Impacts, Dust	S – Socioeconomic	50%	50%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in the generation of dust onsite activities such as operation of the concrete batch plant, vehicle operation, site leveling and dirt work and percent of man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.
Subsection 4.4.2.2 Social and Economic Impacts, Local Housing	S – Socioeconomic	70%	30%	Estimates based on percent of man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.
Subsection 4.4.2.4.1 Education	S – Socioeconomic	70%	30%	Estimates based on percent to man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 9 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Subsection 4.4.2.4.2 Transportation	S – Socioeconomic	70%	30%	Estimates based on percent to man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.
Subsection 4.4.2.4.3 Public Safety and Social Services	S – Socioeconomic	70%	30%	Estimates based on percent to man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.
Subsection 4.4.2.4.4 Public Utilities	S – Socioeconomic	70%	30%	Estimates based on percent to man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.
Subsection 4.4.2.4.5 Recreation, Tourism, Aesthetics, and Land Use	S – Socioeconomic	70%	30%	Estimates based on percent to man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.
Subsection 4.4.3.1 Environmental Justice Impacts, Impacts on Low Income Areas	S – Socioeconomic	70%	30%	Estimates based on percent to man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.
Subsection 4.4.3.2 Environmental Justice Impacts, Impacts on Minority Populations	S – Socioeconomic	70%	30%	Estimates based on percent to man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.
Subsection 4.4.3.3 Environmental Justice Impacts, Isolated Population Impacts	S – Socioeconomic	70%	30%	Estimates based on percent to man hours expected to be dedicated to the construction of activities within the definition of construction of SSC.

Table 4.8-1 Summary of Construction and Pre-Construction Related Impacts (Sheet 10 of 10)

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Section 4.5 Radiation Exposure to Construction Workers				
Subsection 4.5.2 Radiation Sources	S – Radiation	80%	20%	Estimates based on percent to man hours on site and consideration of proximity of workers to radiation sources.
Subsection 4.5.3 Measured and Calculated Radiation Dose Rates	S – Radiation	80%	20%	Estimates based on percent to man hours on site and consideration of proximity of workers to radiation sources.
Subsection 4.5.4 Construction Worker Dose Estimates	S – Radiation	80%	20%	Estimates based on percent to man hours on site and consideration of proximity of workers to radiation sources.

Notes:

a. As discussed in the associated sections, the assigned potential impact significance levels of (S)MALL, (M)ODERATE, or (L)ARGE are based on the assumption that mitigation measures and controls would be implemented, where identified.

b. Detroit Edison has no control or ownership over the proposal transmission corridors. ITC*Transmission* follows the applicable regulatory processes and approvals in order to implement changes to the transmission system. Accordingly, Detroit Edison cannot reasonably provide the transmission system detailed impacts encountered by ITC*Transmission.* It would be expected that ITC*Transmission* would conduct the necessary cultural resource surveys consistent with State and Federal regulatory requirements.