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3.0 Site Layout and Plant Description

The proposed Enrico Fermi Unit 3 (Fermi 3) would be located in Monroe County in rural southeastern Michigan. Detroit Edison Company (Detroit Edison) applied to the U.S. Nuclear Regulatory Commission (NRC) for a combined license (COL) for Fermi 3. The proposed new unit would be situated wholly within the existing Enrico Fermi Atomic Power Plant (Fermi) site and adjacent to the existing Enrico Fermi Unit 2 (Fermi 2). Enrico Fermi Unit 1 (Fermi 1), also located on the Fermi site, is in the process of being decommissioned. The Fermi site is located on the western shore of Lake Erie approximately 30 mi southwest of Detroit, Michigan, and 7 mi from the United States–Canada international border.

In addition to the COL application, Detroit Edison must obtain a Department of Army permit from the U.S. Army Corps of Engineers (USACE) to conduct activities that affect waters of the United States, including wetlands. As a first step, Detroit Edison initiated coordination with USACE through preapplication and jurisdictional determination meetings. Then, on June 17, 2011, Detroit Edison submitted a Joint Permit Application (Detroit Edison 2011a) to the Michigan Department of Environmental Quality (MDEQ) for activities associated with the proposed Fermi 3 project. On September 9, 2011, Detroit Edison subsequently submitted a permit application to the USACE.

This chapter describes the key characteristics of the proposed plant that must be understood to assess the environmental impacts of the proposed action; the characteristics are drawn primarily from Detroit Edison's Environmental Report (ER) (Detroit Edison 2011b), its Final Safety Analysis Report (FSAR) (Detroit Edison 2012), and supplemental information provided by Detroit Edison in response to requests for additional information (Detroit Edison 2011d).

Whereas Chapter 2 of this environmental impact statement (EIS) describes the existing environment at the proposed site and its vicinity, this chapter describes the physical layout of the proposed plant. This chapter also describes the physical activities involved in building and operating the plant and associated transmission lines. The environmental impacts of constructing and operating the plant are discussed in Chapters 4 and 5, respectively. This chapter is divided into four sections: Section 3.1 describes the external appearance and layout of the proposed plant; Section 3.2 describes the major plant structures and distinguishes structures that interface with the environment from those that do not interface with the environment, or that interface with the environment temporarily; Section 3.3 describes the activities involved in building or installing each of the plant structures; and Section 3.4 describes the operational activities of the plant that interface with the environment. Full citations for references are listed in Section 3.5.

3.1 External Appearance and Plant Layout

The 1260-acre (ac) Fermi site is located on the western shore of Lake Erie at a grade of approximately 581.8 ft North American Vertical Datum of 1988 (NAVD 88). The grade at the power block area where seismic Category I structures[(a)] are located is approximately 589.3 ft NAVD 88. The site contains one operating boiling water reactor (BWR), Fermi 2, and one fast breeder reactor, Fermi 1, and their associated facilities. Fermi 1 is no longer operational, and the unit has been defueled in preparation for dismantling. Full decommissioning of Fermi 1 is expected to be complete prior to initiation of Fermi 3 construction. Fermi 2 currently is in operation and, if its license is renewed, the unit will continue to operate when Fermi 3 comes online in 2021.

Figures 3-1 and 3-2 show aerial views of the Fermi site layout, including the location of existing and proposed buildings, and the site property boundary. Fermi 1 is shown in these figures, although, as discussed above, Detroit Edison plans to remove this unit as part of a separate action prior to construction of Fermi 3. Figure 3-3 is an aerial view of the current configuration of the Fermi site; Figure 3-4 is an aerial view with the proposed site layout and Fermi 3 structures superimposed.

Fermi 2 uses two 400-ft-tall concrete natural draft cooling towers for heat dissipation (Figure 3-3). Each tower is approximately 450 ft in diameter at the base. As can be seen in Figure 3-3, the natural draft cooling towers for Fermi 2 are the dominant visible structures on the site and are visible from outside the site property boundaries.

The normal power heat sink (NPHS) for Fermi 3 would be provided by an additional concrete natural draft cooling tower. Water from Lake Erie would be used for makeup water for the Circulating Water System (CIRC), the Plant Service Water System (PSWS), and the Fire Protection System (FPS). The intake for Fermi 3 would be adjacent to the existing intake for Fermi 2, which is located between the two groins that project into Lake Erie (Figure 3-1). An offshore underwater discharge pipe would serve as the outfall from the Fermi 3 CIRC and PSWS. The proposed natural draft cooling tower for Fermi 3 would be located to the southwest of the two existing Fermi 2 cooling towers (Figure 3-4).

Fermi 3 would share some facilities with Fermi 2, including office buildings, potable water supply, and sanitary discharge structures (Detroit Edison 2011b). Paved onsite roadways would connect Fermi 3 to the remainder of the Fermi site, providing routine and nonroutine access.

(a) The seismic Category I structures in the GE-Hitachi Nuclear Energy Americas, LLC, Economic Simplified Boiling Water Reactor (GEH ESBWR) design for Fermi 3 include the Concrete Containment, Reactor Building, Control Building, Fuel Building, and Firewater Service Complex.

01 Reactor Building
02 Auxiliary Boiler
03 Turbine Building
04 Control Room
05 Electrical Bldg/Tech Support Center
06 Main Transformers
07 Unit Auxiliary Transformer
08 Reserve Auxiliary Transformer
09 Spare Transformer
10 ADB
11 Radwaste Building
12 Fuel Building
13 Diesel Fuel Oil Storage Tank
14 Water Treatment/Service Water Bldg
16 Service Water Cooling Tower
17 Fire Water Tank and Pumps
18 Water Storage Tanks
19 Condensate Storage Tank
20 Service Building/Operation Support Center
21 Hot Machine Shop and Storage
22 Wash Down Bays
23 NPHS Cooling Tower
24 Pumphouse
25 Security Boundary
26 Station Water Intake
27 CIRC Water Outfall
32 EF2/EF3 Hazardous Waste Warehouse
33 Barge Slip
34 RAD Material Warehouse
35 EF2/EF3 Maintenance Shops
37 EF2/EF3 Common Warehouse
38 Parking Garage and EF2 Shops
39 Fermi 2 ISFSI
40 PAP/VIB

miles
0 .0625 .125
0 330 660
feet

Figure 3-1. Fermi Site Layout Showing Existing and Proposed Facilities: Power Block and Adjacent Facilities (Detroit Edison 2011b)

Figure 3-2. Fermi Site Layout Showing Existing and Proposed Facilities: Ancillary Facilities (Detroit Edison 2011b)

Figure 3-3. Aerial View of the Existing Fermi Site Looking North (Detroit Edison 2011b)

Some of the existing infrastructure on the Fermi site would be modified to integrate Fermi 3 with Fermi 2. None of the Fermi 2 structures or facilities that directly support power generation at that unit would be shared. The electrical switchyard for Fermi 3 would be separate from the existing Fermi 2 switchyard, but the transmission lines from the two switchyards would share common transmission towers as the lines leave the site. The existing Fermi 2 protected area would be expanded to include Fermi 3. Existing administrative buildings, warehouses, and other minor support facilities would be used, expanded, or replaced, based on economic considerations and operational requirements.

As shown in Figures 3-1 and 3-2, Fermi 3 would be located in close proximity to Fermi 2. Major proposed plant structures would be located, for the most part, on areas that were disturbed during construction and operation of Fermi 1 and Fermi 2. In designing the site layout for Fermi 3, Detroit Edison attempted to minimize offsite visual intrusion and other impacts by locating major plant structures away from the Lake Erie shoreline, placing new structures in relatively close proximity to Fermi 2 facilities, and placing the intake structure in the existing developed section of shoreline (Detroit Edison 2011b).

Figure 3-4. Aerial View of the Fermi Site Looking North with Proposed Fermi 3 Structures Superimposed (Detroit Edison 2011b)

Land use within 5 mi of the Fermi site is primarily for agriculture, although there are several small beach communities (Estral Beach, Stony Point, Detroit Beach, and Woodland Beach) and the small Newport-Oldport residential area to the northwest. The nearest of these communities is Stony Point, located about 2 mi south of the Fermi site. Visual impacts from the site are limited to the closest residents and traffic on the Dixie Highway and other nearby roads. The site is not visible from any nearby recreational areas or other areas that have frequent visitor use.

Figure 3-5 provides a view of the Fermi site from outside the site boundary. As can be seen, the most obviously visible existing structures are the natural draft cooling towers. Although vegetation blocks public view of many of the power plant structures, the cooling towers and their plumes are prominently visible from all directions. Because Fermi 3 would be located in the same general vicinity as Fermi 2, the same vegetation would block views of some Fermi 3

Figure 3-5. View of the Fermi Site from Post Road Looking Southeast: Existing Fermi 2 Cooling Towers Are Shown on the Left; the Proposed Fermi 3 Cooling Tower Is on the Right (Detroit Edison 2011b)

facilities. However, similar to Fermi 2, the proposed natural draft cooling tower and its plume would be visible from offsite (Figure 3-5), including by recreational boaters on Lake Erie. The height of the proposed Fermi 3 natural draft cooling tower would be approximately 600 ft.

3.2 Plant Structures

This section describes each of the major plant structures and is divided into three categories: the reactor power system, structures that would have an interface with the environment during operation, and the balance of plant structures. All of these structures are relevant in the discussion of building impacts in Chapter 4. Only those structures that interface with the environment are relevant to the operational impacts discussed in Chapter 5.

3.2.1 Reactor Power Conversion System

Detroit Edison has proposed the construction and operation of an Economic Simplified Boiling Water Reactor (ESBWR) designed by GE-Hitachi Nuclear Energy Americas, LLC (GEH), at the Fermi site. GEH submitted the Standard Design Certification Application for the ESBWR to the NRC on August 24, 2005, and it was accepted for review on December 1, 2005 (Detroit Edison 2011b). The NRC staff is performing a detailed review of that certification application.

The ESBWR design is a single-cycle, natural circulation BWR with passive safety features. The reactor is rated at 4500 megawatt thermal (MW(t)), with a design gross electrical output of approximately 1605 megawatt electrical (MW(e)) and a net output of 1535 MW(e) (Detroit Edison 2011b). Figure 3-6 provides an illustration of the reactor power conversion system. Steam generated in the reactor vessel drives high-pressure and low-pressure turbines to create electricity. Steam that has passed through the low-pressure turbines is condensed and pumped back to the reactor vessel as water. The heat rejected from the plant to the environment, principally the atmosphere, is calculated to be 9.883×10^9 British thermal units per hour (Btu/hr) (Detroit Edison 2011b).

3.2.2 Structures with Major Plant-Environment Interfaces

For assessment purposes, the review team divided the plant structures into two primary groups: (1) those that interface with the environment and (2) those that are internal to the reactor and associated facilities but without environmental intakes or releases. Examples of environmental interfaces are withdrawal of water from the environment at the intake structures, release of water to the environment at the discharge structure, and release of excess heat to the atmosphere. Structures with environmental interfaces are those that the review team considers in its environmental review of the operational impacts of the facility in Chapter 5. The processes that occur within the plant itself and that do not affect the environment are not relevant to a National Environmental Policy Act (NEPA) review and are not discussed further in this EIS. However, such internal processes are considered in the ESBWR design certification documentation and in NRC plant safety reviews. This section discusses the plant structures that would interface with the environment. The remaining structures are discussed in Section 3.2.3, inasmuch as they may alter the landscape and are relevant in the review team's consideration of construction impacts, which are discussed in Chapter 4 of this EIS.

3.2.2.1 Landscape and Stormwater Drainage

Landscapes and stormwater drainage systems affect the rates and routing of rainfall-generated runoff and affect the infiltration of rainfall into the groundwater as recharge. Impervious areas eliminate recharge to aquifers beneath the site. Pervious areas managed to reduce runoff and maintained free of vegetation will experience considerably higher recharge rates than adjacent areas with local vegetation. Landscaping at the Fermi site would be managed to reduce runoff and erosion. The Fermi 3 power block area would be mostly impervious. The proposed Fermi 3 stormwater drainage patterns are discussed in the FSAR (Detroit Edison 2012), because the stormwater drainage system performs a safety-related function by preventing flooding of the safety structures. The grading of the surface topography would direct water away from the safety structures and into drop inlets, and stormwater runoff would be routed through storm drains to the North Lagoon. If the storm drains were blocked, stormwater would drain off the power block area in all directions and drain to the North Lagoon, the South Lagoon, or directly to Lake Erie (Detroit Edison 2012). The land surrounding the Fermi 3 power block

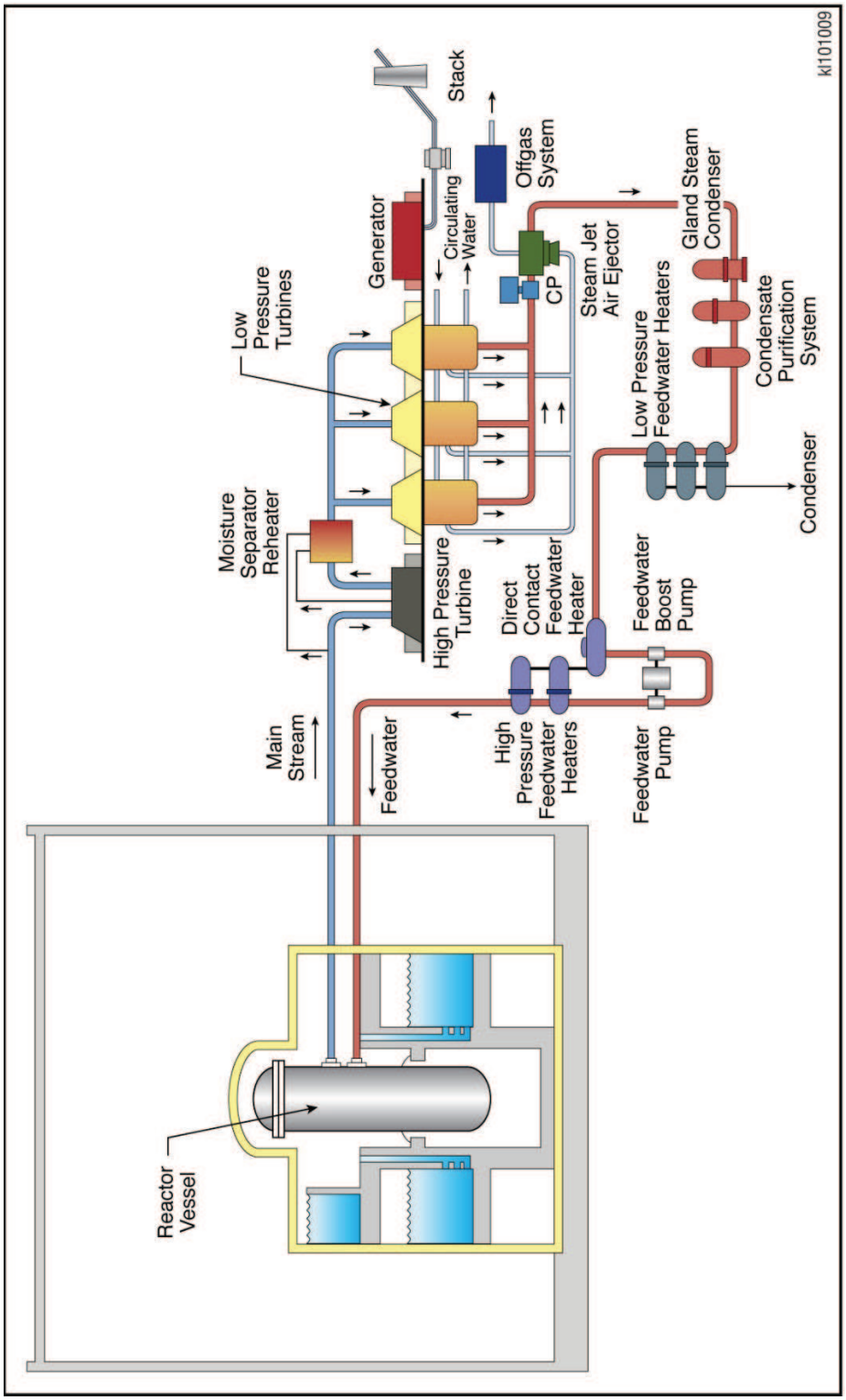

Figure 3-6. Simplified Flow Diagram of the ESBWR Power Conversion System (Detroit Edison 2011b)

would be gently sloped away to allow drainage of stormwater runoff toward the North Lagoon, the South Lagoon, or Lake Erie.

3.2.2.2 Cooling System

The following sections provide detailed descriptions of the components of the cooling water systems for the proposed Fermi 3. These descriptions were determined from the *Economic Simplified Boiling Water Reactor Design Control Document* (GEH 2010) and include site-specific characteristics as described in the Fermi 3 ER (Detroit Edison 2011b).

The cooling system would represent the largest interface between the plant and the environment. Makeup water would be provided to Fermi 3 through the intake structure on Lake Erie. A portion of this makeup water would be returned to Lake Erie as blowdown via the discharge pipe. The remaining portion of this water would be lost to the atmosphere through evaporation or drift from the natural draft cooling tower. These three components represent interfaces between the plant and the environment, and are described next.

Cooling-Water Intake Structures

Water would be withdrawn from Lake Erie for use in Fermi 3 systems through an intake bay. The intake from Lake Erie for Fermi 3 would be located near the intake for Fermi 2, between the two rock groins that extend into Lake Erie. The proposed location of the intake for Fermi 3 is shown in Figure 3-1. Section 3.4.2.1 of the ER (Detroit Edison 2011b) describes the intake system for Fermi 3 in detail.

The intake structure would provide water for the nonsafety-related cooling for the Station Water System (SWS), which would supply makeup water for both the CIRC and the PSWS. The cooling water in the CIRC provides heat dissipation from the main condensers to the normal plant heat sink (NPHS). The NPHS for Fermi 3 would be a natural draft cooling tower. The cooling water in the PSWS would provide head dissipation from the heat exchangers of both the Turbine Component Cooling Water System and the Reactor Component Cooling Water System. The heat from the PSWS would be dissipated to the NPHS and/or the Auxiliary Heat Sink (AHS). The AHS would consist of two mechanical draft cooling towers and would be housed adjacent to the Water Treatment/Service Water on the southeast side of the Fermi 3 power block. The SWS would supply makeup water to the NPHS and AHS cooling tower basins and would consist of two subsystems: the Plant Cooling Tower Makeup System (PCTMS) and the Pretreated Water Supply System (PWSS). The PCTMS would provide makeup water from Lake Erie for evaporation, drift, and blowdown losses. The PWSS would provide water for the FPS and would serve as an alternate to the PCTMS for supplying PSWS makeup water to the cooling towers. The FPS would consist of onsite storage tanks and would be available for fire protection needs for Fermi 3.

At the interface with Lake Erie, there would be a pump house equipped with trash racks to screen out large objects from the pump system and three traveling screens with a 3/8-in. mesh arranged side by side to further screen out litter from the water entering the pump house. Trash collected on the rack and screens would then be disposed of. After water entered the pump house, it would be treated using sodium hypochlorite, a biocide/algaecide, before it entered the pumps at the location of the biocide injection diffuser. There would be two groups of pumps in the intake bay: three PCTMS pumps, each equipped to pump at 50 percent capacity for makeup water to the cooling tower basins, and two PWSS pumps, each designed to pump at 100 percent capacity for makeup water to the AHS and FPS during shutdown.[(a)]

The maximum flow rate at the intake would be 34,264 gallons per minute (gpm) (Figure 3-7, Table 3-1; Detroit Edison 2011b). Detroit Edison (2011b) stated that the water velocity at the intake would be no more than 0.5 feet per second (ft/s) under all operating conditions to minimize the number of fish being impinged onto the screens.

The cooling water intake for Fermi 3 would include a trash rack, traveling screens, and a fish return system. The trash rack, equipped with a trash rake, would be positioned at the inlet to the pump house structure to capture larger debris; trash collected from the trash racks would be disposed of. Three dual-flow traveling screens (mesh size 3/8 in.) would be arranged side-by-side behind the trash rack to further prevent debris from entering the pump house and to collect aquatic organisms large enough to be caught on the screens. Aquatic organisms would first be washed from the traveling screens using a low-pressure water spray followed by a high-pressure wash to remove remaining debris. Strainers would be in place to collect the organisms washed from the screens, and a strainer backwash would then be used to direct those organisms back to Lake Erie via a fish return system in a manner compatible with the limits of the applicable NPDES permit (Detroit Edison 2011b). With such a system in operation, most impinged fish would be returned alive to Lake Erie. The point of return for the fish return system would be outside the zone of influence of the intake bay (Detroit Edison 2011b).

The elevation of the bottom of the planned intake bay is 559.0 ft NAVD 88, and the location of pump suction would be at 553.0 ft NAVD 88 inside the pump house. The record low water elevation of Lake Erie at the Fermi site (National Oceanic and Atmospheric Administration [NOAA] gage 9063090) is 563.9 ft NAVD 88. Low water levels in Lake Erie should not affect pump suction because the suction would be located at over 10 ft below the lowest recorded water level (Detroit Edison 2011b).

(a) Shutdown is defined as a decrease in the rate of fission (and heat/energy production) in a reactor (usually by the insertion of control rods into the core).

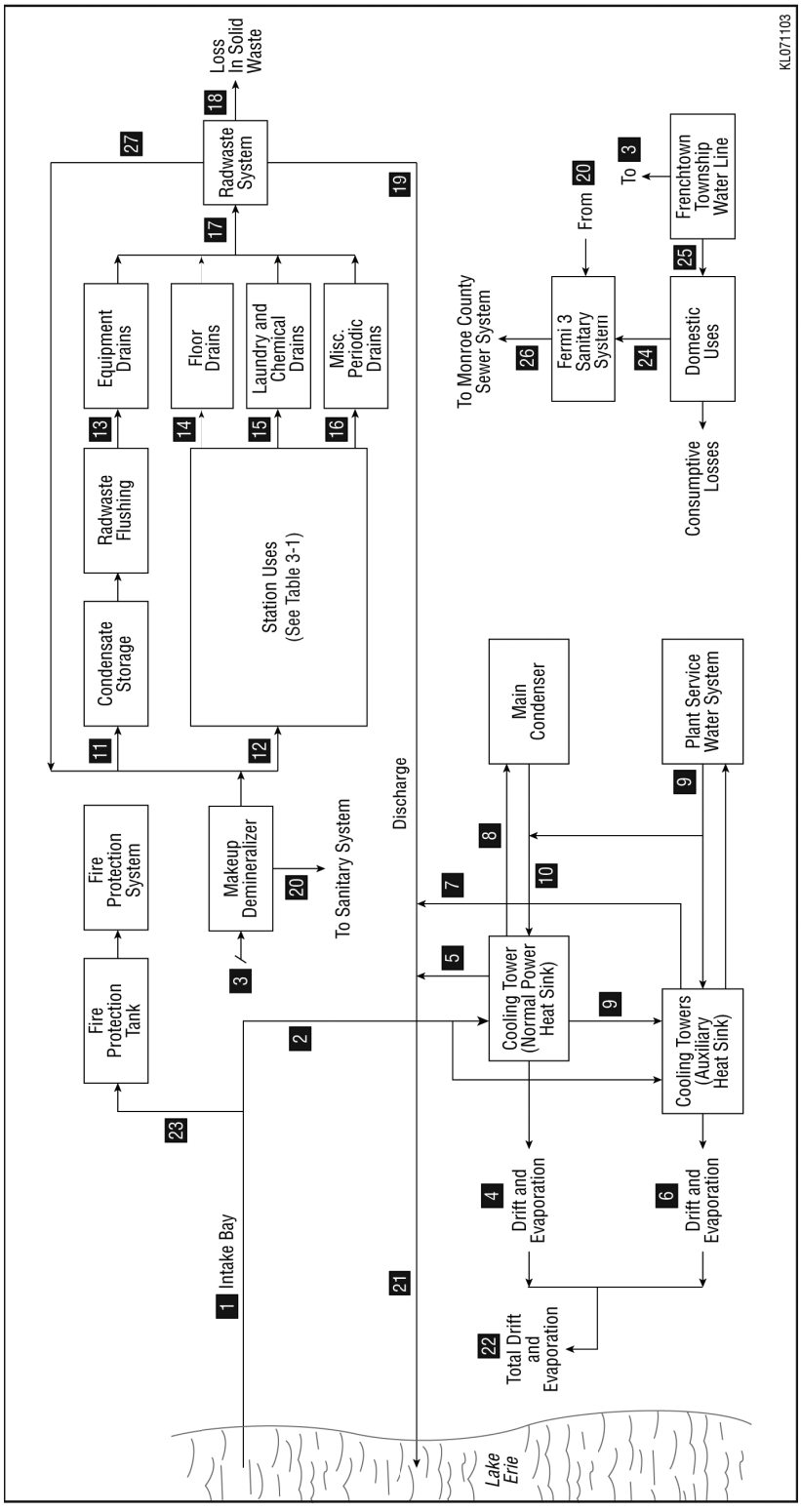

Figure 3-7. Water Use Flow Diagram for Fermi 3 Operations (flow values that correspond to the numbers shown in the figure are provided in Table 3-1) (Detroit Edison 2011b)

Table 3-1. Water Use during Fermi 3 Operations

Flow[a]	Description	Value (gpm) Maximum Normal Power Operation[b]	Value (gpm) Minimum Normal Power Operation[c]	Value (gpm) Average Normal Power Operation[d]	Value (gpm) Average Shutdown Operation
1	Total makeup water intake	34,264	23,780	28,993	1,166
2	Cooling tower makeup water	34,234	23,750	28,963	1,136
3	Demineralizer makeup water	160	160	160	639
4	Normal power heat sink drift and evaporation	17,124	11,882	14,488	0
5	Normal power heat sink discharge (blowdown)	17,110	11,868	14,474	0
6	Auxiliary heat sink drift and evaporation	0	0	0	569
7	Auxiliary heat sink discharge	0	0	0	567
8	Inflow to main condenser	684,000	684,000	684,000	0
9	Total plant service water system flow	40,000	40,000	40,000	40,000
10	Total circulating water system flow	724,000	724,000	724,000	0
11	Inflow to condensate storage	58	58	58	232
12	Inflow to station uses[e]	49	49	49	196
13	Outflow to equipment drains	58	58	58	232
14	Outflow to floor drains	8	8	8	30
15	Outflow to laundry and chemical drains	24	24	24	95
16	Outflow to miscellaneous periodic drains	18	18	18	71
17	Inflow to the radwaste system	107	107	107	428
18	Solid radwaste	2	2	2	9
19	Liquid radwaste discharge[f]	105 (0)	105 (0)	105 (0)	419 (0)
20	Makeup demineralizer blowdown	53	53	53	211
21	Total discharge	17,215	11,973	14,579	987
22	Total drift and evaporation	17,124	11,882	14,488	569
23	Fire protection uses	30	30	30	30
24	Potable water discharge to sewer	200	35	35	47
25	Domestic uses	200	35	35	47
26	Total discharge to Monroe County sewer system	253	88	88	258
27	Liquid radwaste recycled[e]	0 (105)	0 (105)	0 (105)	0 (419)

Source: Detroit Edison 2011b

(a) Numbers correspond to flow arrows shown in Figure 3-7.

(b) Summer months (design/maximum).

(c) Winter months (January/minimum).

(d) Spring and fall months (average).

(e) Station uses include: Standby Liquid Control System, Reactor Component Cooling Water System, Process Sampling System process use, HVAC System, Liquid Waste System chemical addition and line flushing, Turbine Component Cooling Water System, Auxiliary Boiler System, Isolation Condenser/Passive Containment Cooling Pool, Solid Waste System for line flushing, Chilled Water System, and Post Accident Sampling station flushing.

(f) 105 gpm of liquid radwaste is normally recycled for station uses, but system design allows for discharge to Lake Erie.

Cooling Towers

A natural draft cooling tower (NDCT) would be built for the proposed Fermi 3 as the NPHS. The location of the cooling tower is shown in Figure 3-1. The concrete cooling tower would be approximately 600 ft tall and 480 ft in diameter at the base. The cooling tower would be a part of the CIRC, and the cooling water in the CIRC would provide heat dissipation from the main condensers to the NPHS. The CIRC would have four pumps that circulate water from the intake to the condenser during startup,[(a)] shutdown, and normal operation of Fermi 3. The four CIRC pumps (each 25 percent capacity) would be able to pump a total of 744,000 gpm. The NPHS would be located 2200 ft from the intake structure on Lake Erie and 1100 ft from the main condenser. Consumptive use of water (NDCT drift and evaporation) for cooling would average 14,488 gpm and vary between 11,882 and 17,124 gpm (Figure 3-7 and Table 3-1). Blowdown water from the NDCT would be transported to the discharge pipe to be discharged to Lake Erie at an annual average rate of 14,474 gpm (range 11,868 and 17,110 gpm) (Figure 3-7 and Table 3-1). The NDCT would be designed to dissipate heat at a rate of 1.07×10^{10} Btu/hr to the atmosphere.

The heat from the PSWS would be dissipated to the NPHS and/or the AHS. Two mechanical draft cooling towers would serve as the AHS and would be located adjacent to the Water Treatment/Service Water Building (Figure 3-1). The AHS would have the capacity to dissipate heat at a rate of 2.98×10^{8} Btu/hr (Detroit Edison 2011b).

Discharge Structure

After the water is cooled in the cooling towers, some water would be discharged to Lake Erie. Additional discharges to Lake Erie could include treated liquid radwaste. The proposed location of the discharge pipe is shown on Figure 3-1 as the CIRC water outfall (shown as “27” in figure). The discharge pipe would extend approximately 1300 ft into Lake Erie and would be 4 ft in diameter. For thermal plume simulations (see Section 5.3), Detroit Edison (2011b) assumed that the discharge pipe would be buried in the Lake Erie lake bed and consist of a 3-port diffuser system. This preliminary design assumed that ports would be elevated 1.6 ft above the lake bed and be angled at 20 degrees above horizontal, pointing to the east (away from the shore).

3.2.2.3 Other Permanent Structures that Interface with the Environment

Roads, rail lines, and buildings are additional permanent plant-environment interfacing structures that would be built on the proposed site. These are discussed in this section.

(a) Startup is defined as an increase in the rate of fission (and heat production) in a reactor (usually by the removal of control rods from the core).

Roads

Enrico Fermi Drive is the main existing site access point from North Dixie Highway into the Fermi site. Fermi Drive crosses Leroux Road and Toll Road before reaching the main entrance. Pointe Aux Peaux Road parallels the southern boundary of the site. Onsite roads include Quarry Lake Road, Fox Road, Boomerang Road, Doxy Road, and Bullit Road. Construction traffic would use existing onsite roads, but a new access road (new Fermi Drive) would be constructed parallel to and just north of the existing Fermi Drive from Dixie Highway to the west Fermi property boundary, and would continue through the site to the new personnel access gate (Detroit Edison 2011b). The new Fermi Drive would provide separation between Fermi 2 operations traffic and Fermi 3 construction traffic. Construction of the new Fermi Drive would occur during the early stages of Fermi 3 construction. After construction of Fermi 3 is complete, the new Fermi Drive would be used as the main access to the site, and the existing Fermi Drive might be retained as a secondary access road or abandoned (Detroit Edison 2011b).

To reduce the potential for erosion and siltation from road use by heavy construction vehicles, existing paved roads may be widened or additional surface layers added to roads to support construction traffic (Detroit Edison 2011b). Otherwise, roads are not expected to need reconditioning to handle the loads from Fermi 3 construction.

Rail Lines

Four rail lines occur in the immediate vicinity of the Fermi site, and there are no plans to expand the current level of rail service in the area (Detroit Edison 2011b). Rail transport is available for the construction of Fermi 3 as needed, and no construction or modification of rail lines is anticipated. A single spur track off the Canadian National main rail line crosses the Fermi site parallel to the route of Fermi Drive.

Excavation Water Infiltration Barriers

During construction of Fermi 3, Detroit Edison would use barriers to minimize the flow of water entering the excavation. Water in the shallow fill layer would be excluded from the excavation by barriers such as reinforced diaphragm concrete walls, sheet piles, grout curtains, or freeze walls extending through the fill to the top of the glacial till. The approach to be used has not yet been determined by Detroit Edison. If diaphragm concrete walls, sheet piles, or grout curtains are used, they would remain in place and continue to reduce the permeability of the affected areas.

Spoils Disposal Area

Excavated material from the power block and circulating water pipe runs would be used as backfill and structural fill for the cooling tower and circulating water pipe run area

(Detroit Edison 2011b). No onsite borrow pit is anticipated to be used for Fermi 3 construction. About 500,000 cubic yards (yd^3) of excess excavated material will be disposed of in an onsite area. This onsite disposal area may be an expansion of one of the areas used for Fermi 2 spoils disposal (Figure 3-2), or a new spoils disposal area may be designated onsite. A new Fermi 3 construction material disposal site, if located in waters of the United States including wetlands, would require USACE authorization. The use of an onsite construction landfill is not anticipated.

Diesel Generators, Ancillary Diesel Generators, Auxiliary Boiler, Diesel Fire Pumps

Two 17.1-megawatt (MW) standby diesel generators, two 1.65-MW ancillary diesel generators, a 33-MW auxiliary boiler, and two 200-kilowatt (kW) diesel fire pumps will be installed on the site to provide auxiliary and backup systems. Infrequent testing and operations of these units would result in combustion emissions to the atmosphere. Standby diesel generators would operate about 4 hours per month, ancillary diesel generators are expected to operate 2 hours every three months (8 hours annually), the auxiliary boiler is expected to operate a maximum of 30 days each year, and the fire pumps would operate approximately 48 hours annually.

Barge Slip

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 (shown as “33” in Figure 3-1) (Detroit Edison 2011b). No new roads or other transportation facilities would be required to accommodate Fermi 3 barge traffic. Dredge spoils would be placed in the Spoils Disposal Pond that drains to Lake Erie through Outfall 013, as designated in the Fermi 2 National Pollutant Discharge Elimination System (NPDES) permit.

Based on an evaluation of the size and draft of the barge that would be needed to transport the reactor vessel and other heavy equipment to the site, dredging to the navigation channel in Lake Erie does not appear to be necessary (Detroit Edison 2011a). If it is later determined that dredging to the navigation channel is needed, Detroit Edison would apply for USACE and MDEQ permits, impacts would be assessed, and any necessary mitigative measures determined through the respective permit evaluation processes.

Radwaste Facility

Liquid, gaseous, and solid radioactive waste-management systems collect the radioactive materials produced as byproducts of operating the proposed Fermi 3. The radioactive waste management systems are designed to maintain releases of radioactive materials in effluents to “as low as reasonably achievable” levels in conformance with 10 Code of Federal Regulations (CFR) Parts 20 and 50, including the design objectives of 10 CFR 50, Appendix I

(Detroit Edison 2011b). These systems would process radioactive liquid, gaseous, and solid effluents to maintain releases within regulatory limits, as described in Section 3.4.3. The Radwaste Building would be located adjacent to the Turbine Building (shown as "03" in Figure 3-1). The Radwaste Building source terms are discussed in Chapter 12 of the ESBWR Design Control Document (DCD) (GEH 2010).

Sanitary Waste Treatment Plant

Sanitary waste systems needed at Fermi 3 during construction activities would consist of portable toilets supplied and serviced by an offsite vendor; there would be no sanitary waste system discharge into the effluent stream. During operations, the Fermi 3 wastewater treatment system would collect sewage and wastewater generated from portions of the plant that are outside radiological control areas. The system would use mechanical, chemical, and biological treatment processes. Sanitary effluent would be gathered and discharged to the Monroe Metropolitan Wastewater Treatment Facility and would be required to meet applicable NPDES permit requirements, health standards, regulations, and total maximum daily loads (TMDLs) set by the MDEQ and the U.S. Environmental Protection Agency (EPA) (EPA 2009).

Wastewater treatment operations for Fermi 3 would be similar to those for the existing Fermi 2 and those that are commonly used in wastewater treatment plants throughout the United States. Components of the Fermi 3 sanitary wastewater treatment system include waste basin, wet well, septic tank, settling tank, wet well pumps, sewage discharge pumps, and associated valves, piping, and controls. Chemical treatments applied to the waste would be those within the Monroe Metropolitan Wastewater Treatment Facility, in keeping with municipal sewage treatment standards.

Power Transmission System

Transmission lines and corridors are considered to interface with the environment during operation, because there are potential continuing impacts from electric fields, noise, and corridor maintenance.

A system impact study conducted for Fermi 3 identified the need for a new onsite 345-kilovolt (kV) switchyard and three new 345-kV transmission lines to connect Fermi 3 to the regional electrical grid (Detroit Edison 2011b). The new switchyard would be separate from the existing Fermi 2 switchyard and the onsite 120-kV transmission system.

A new 170-ft-wide transmission corridor (Figure 3-2) is planned on the Fermi site to service Fermi 3 (Detroit Edison 2011b). This transmission corridor would include two sets of towers that would carry both rerouted 345-kV lines that serve Fermi 2 and the new 345-kV lines that serve Fermi 3. The new transmission lines would transmit power from the Fermi 3 generator to the

Fermi 3 switchyard at the intersection of Toll Road and Fermi Drive (Figure 3-2). Onsite 120-kV support for Fermi 2 would be routed underground along the Fermi Drive corridor.

The offsite route for the new lines will traverse approximately 30 mi within a 300-ft transmission line corridor along mostly existing corridors to the Milan Substation (Figure 3-8). The first 18.6 mi of transmission lines (going west and north from Fermi) would be installed alongside the 345-kV lines that are already in place (Figure 3-8). By reconfiguring conductors, new lines in this portion of the route could use existing towers, but placement of additional transmission infrastructure may be necessary. The remaining 10.8 mi of transmission lines to the Milan Substation would be located in an undeveloped portion of the transmission line corridor that was previously authorized for transmission use (Figure 3-8). Some transmission tower footings were installed as part of the original Fermi 3 plan, but the corridor has been minimally maintained. The 350-ft-by-500-ft Milan Substation may be expanded to an area about 1000 ft by 1000 ft to accommodate the Fermi 3 expansion (Detroit Edison 2011b).

Most of the 18.6-mi portion of the route crosses agricultural land, but the undeveloped 10.8-mi portion crosses a variety of land cover types including forest, agricultural lands, rural residential areas, and a golf course.

ITC*Transmission* owns and operates the transmission system in southeastern Michigan. This system transfers power from regional power plants to local distribution systems, and carries power transfers from power plants to loads across the Eastern Interconnection (Detroit Edison 2011b). The offsite portions of the proposed Fermi 3 transmission system and associated corridors would be owned and operated by ITC*Transmission*. Detroit Edison has no control over the construction or operation of the transmission system and is not involved in the evaluation or decision making for proposed changes to or design of the transmission system. The two 345-kV transmission lines that would exit Fermi 3 would be owned by Detroit Edison up to the proposed new Fermi 3 switchyard. Detroit Edison would continue to own the onsite transmission corridor, but expects to contract with ITC*Transmission* to maintain these transmission lines and towers (Detroit Edison 2011b).

In addition to the new transmission lines and switchyard, upgrades to existing transmission lines would be needed to facilitate the new generation on the system (Detroit Edison 2011b). Transmission line and switchyard design would meet or exceed the requirements established in the National Electrical Safety Code (NESC) (IEEE 2007), which provides standards for electrical safety, electrical clearances, structural design loadings, and material strength factors. Modifications to the existing system would comply with relevant local, State, and industry standards, including NESC and various American National Standards Institute/Institute of Electrical and Electronic Engineers, Inc. (ANSI/IEEE) standards.

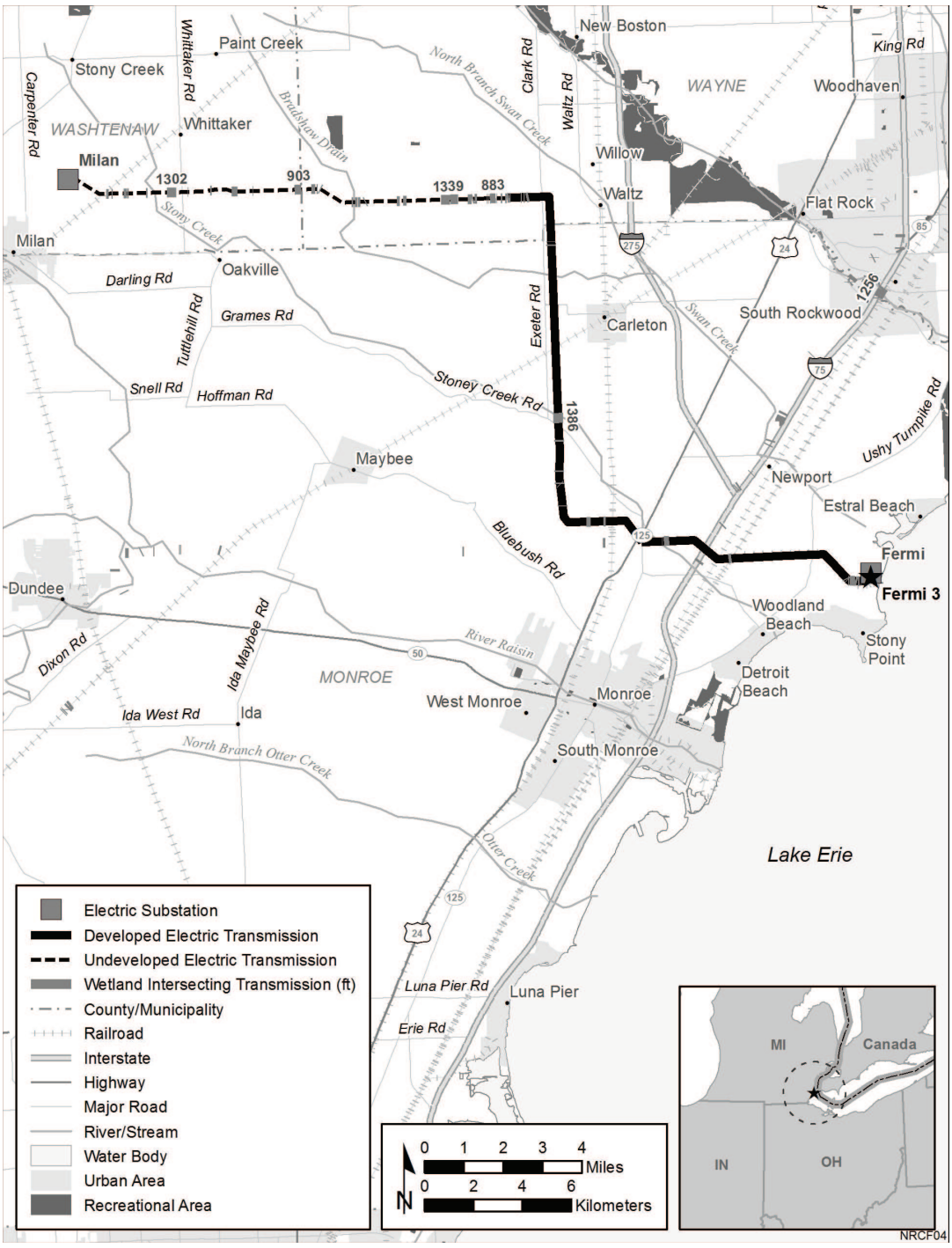

Figure 3-8. Proposed Transmission Line Corridor from Fermi 3 to Milan Substation (Detroit Edison 2011b)

3.2.2.4 Other Temporary Plant-Environment Interfacing Structures

Temporary plant–environment interfacing structures include a concrete batch plant, construction laydown, a construction parking area, and groundwater dewatering systems.

Concrete Batch Plant

An onsite concrete batch plant would be used to produce concrete during Fermi 3 construction. Lake Erie water would be used for concrete production. The plant would be equipped with a dust-control system that would be checked and maintained on a routine basis. The location of the concrete batch plant onsite is expected to result in fewer offsite dust impacts than if concrete were produced offsite and trucked to the construction area.

Construction Laydown Areas and Temporary Parking

Portions of the Fermi site would be used for temporary construction parking and construction laydown (Figure 4-1). These areas would occupy a total of 143 ac (Detroit Edison 2011b). On completion of construction, these areas would be rehabilitated by removing gravel, replacing stocked topsoil, regrading, and revegetating.

Groundwater Wells and Dewatering Systems

Groundwater is not used for Fermi 2 operations, and has not been proposed for use during construction or operation of Fermi 3. However, it is possible that groundwater may be supplied to certain outbuildings as potable water during the construction period (Detroit Edison 2011b). This water use would be expected to be minimal. Groundwater wells or sumps are planned to dewater deep excavations during construction; however, no permanent dewatering systems would be required for Fermi 3.

3.2.3 Structures with Minimal Plant-Environmental Interface

The structures described in the following sections would have minimal interface with the environment during plant operation.

3.2.3.1 Power Block

Buildings and facilities within the power block would include the Reactor Building, Fuel Building, Control Building, Turbine Building, Radwaste Building, and several service buildings (e.g., Electrical Building, Service Water Building) (Figure 3-1).

The Reactor Building (shown as “01” in Figure 3-1) would house the reactor system, reactor support and safety systems, concrete containment, safety-related power supplies and

equipment, steam tunnel, and refueling[(a)] area (GEH 2010). The Fuel Building (shown as "12" in Figure 3-1) would house the spent fuel pool, cask loading area, fuel equipment and storage areas, lower connection to the inclined fuel transfer system, and other plant systems and equipment. The Reactor and Fuel Buildings would share a common wall and a large common foundation mat. The radioactive sources in the spent fuel pool are discussed in Chapter 12 of the ESBWR Design Control Document (DCD) (GEH 2010).

The Control Building (shown as "04" in Figure 3-1) would house safety-related electrical, control, and instrumentation equipment and the control room for the Reactor and Turbine Buildings (GEH 2010). The Turbine Building (shown as "03" in Figure 3-1) would be the tallest building within the power block (171 ft tall and with a 234 ft ventilation stack) and would house the turbine generator, main condenser, condensate and feedwater systems, condensate purification system, offgas system, turbine-generator support systems, and bridge crane.

The Radwaste Building (shown as "10" in Figure 3-1) would house the equipment and floor drain tank(s), sludge phase separator(s), resin hold-up tank(s), detergent drain collection tank(s), concentrated waste tank(s), chemical drain collection tank(s), and associated pumps and systems for the radioactive liquid and solid waste treatment systems (GEH 2010). Tunnels would connect the Radwaste Building to the reactor and Fuel and Turbine Buildings. The radwaste facility is discussed in Section 3.2.2.

3.2.3.2 Cranes and Crane Footings

Mobile cranes and a stationary crane would be used to facilitate the construction of the Fermi 3 power block. The stationary crane would require that footings be fabricated and cranes be erected on the site.

3.2.3.3 Ultimate Heat Sink

The ESBWR design has no separate emergency water cooling system. The ultimate heat sink function would be provided by safety systems integral and interior to the reactor plant. These systems would ultimately use the atmosphere as the heat sink. The ultimate heat sink would not rely on cooling towers, basins, or cooling water intake/discharge structures external to the reactor plant. In the event of an accident, the ultimate heat sink would be provided by the Isolation Condenser/Passive Containment Cooling Pools, which would provide the heat transfer mechanism for the reactor and containment to the atmosphere.

(a) Refueling is a process (one mode of plant operation) of replacing older fuel that can no longer produce electricity effectively from nuclear fission reactions with new fuel.

3.2.3.4 Pipelines

New pipelines would be needed to provide makeup water from Lake Erie for the CIRC, PSWS, and FPS. Cooling tower blowdown water would be discharged via a new pipeline and discharge structure within Lake Erie. The review team assumed that pipelines would follow existing roads or roads created when building Fermi 3. Therefore, the installation of pipelines would be limited to areas already disturbed.

3.2.3.5 Permanent Parking

Two new multiple-level parking garages would be built to accommodate Fermi 2 and 3 operational workers (shown as "38" on Figure 3-1 and "31" on Figure 3-2). The two parking garages are sized to accommodate Fermi 2 and Fermi 3 operational parking.

3.2.3.6 New Meteorological Tower

A new meteorological tower would be built for the Fermi site and would be located near the southeastern boundary of the property (shown as "42" in Figure 3-2) (Detroit Edison 2011b). Relocating the existing meteorological tower would be necessary because the Fermi 3 cooling tower would interfere with the current meteorological tower location. The new meteorological tower would be a guyed open-latticed tower and would have a height of 197 ft.

3.2.3.7 Miscellaneous Buildings

Several small buildings would be built on the site to support worker, construction, and operational needs (e.g., shop buildings, construction support offices, warehouses, guard houses). Some buildings may be temporary and would be removed after the plant begins operation.

3.3 Preconstruction and Construction Activities

Although nuclear-plant construction activities are similar to those for other large industrial facilities, the NRC's authority is limited to only those construction activities that have a "reasonable nexus to radiological health and safety or common defense and security" (72 *Federal Register* [FR] 57432). This definition of "construction" includes placement of fill, mud mat, concrete, or permanent retaining walls within an excavation for safety-related structures, systems, or components (SSCs) (but not the excavation activity itself); installation of foundations; or in-place assembly, erection, fabrication, or testing of any safety-related SSC. This definition also extends to SSCs needed to mitigate accidents that are used in plant emergency operating procedures or whose failure could cause a safety-related problem. Activities fitting this definition of "construction" can only occur after the NRC issues a COL or a Limited Work Authorization.

Construction activities associated with structures that do not provide a safety function are called "preconstruction" by the NRC in 10 CFR 51.45(c). Preconstruction activities are not within the NRC's regulatory authority; they are typically regulated by other local, State, and Federal agencies. Preconstruction includes activities such as clearing and grading, excavating, and erection of buildings or facilities that do not support the reactor or associated safety structures. Examples of such facilities are parking lots, rail spurs, potable water systems, and sanitary waste treatment facilities. Activities associated with transmission line corridors are also considered preconstruction. Preconstruction activities can occur before, during, or after the construction of safety-related structures, but require the appropriate permits and authorizations from regulating agencies. Further information about the delineation of construction and preconstruction activities in this EIS is presented in Section 4.0.

In this section, those structures and activities that are associated with building a nuclear power plant are described without distinguishing whether those structures and activities are construction or preconstruction. Table 3-2 provides general definitions and examples of construction and preconstruction activities that would be performed in building the new unit. This section is not a comprehensive discussion of all activities or a detailed engineering plan for construction and preconstruction activities. Rather, this section provides an overall characterization of the major activities for the major structures to provide a framework for the activities involved in building the proposed nuclear power plants.

Land would be graded and stormwater pipes would be installed to facilitate stormwater drainage from Fermi 3. The existing site grade would be raised to 589.3 ft NAVD 88 in the vicinity of safety-related structures, approximately 7.5 ft above the current Fermi plant grade. The power block would contain drop inlets connected to a stormwater collection system that would route stormwater to the North Lagoon, which drains to Swan Creek.

3.3.1 Power Block and Cooling Tower

Building the Fermi 3 power block is anticipated to affect 87 ac, including the natural draft cooling tower, fabrication area, construction offices, and the concrete batch plant (Detroit Edison 2011b). Deep excavations would be required for certain Fermi 3 building foundations, including approximately 50 ft for the Reactor Building, 46 ft for the Radwaste Building, 43 ft for the Control Building, and 31 ft for the Turbine Building. Dewatering would be necessary during excavation and foundation-building and could be accomplished using sumps within the excavation and, if necessary, groundwater extraction wells. Portions of the subsurface could be injected with grout to reduce inflow of groundwater to the excavation areas (Detroit Edison 2011b). Grouting was done during construction of Fermi 2, resulting in a reduction in hydraulic conductivity and less inflow of water into the excavation area (Detroit Edison 2011b).

Table 3-2. Definitions and Examples of Activities Associated with Building Fermi 3

Activity	Definition	Examples
Clearing	Removing vegetation or existing structures from the land surface.	Cutting trees from an area to be used for construction laydown.
Grubbing	Removing roots and stumps by digging.	Removing stumps and roots of trees logged from the construction laydown area.
Grading	Reforming the elevation of the land surface to facilitate operation of the plant and drainage of precipitation.	Leveling the site of the reactors and cooling towers.
Hauling	Transporting material and workforce along established roadways.	Construction workers driving on new access road.
Paving	Laying impervious surfaces, such as asphalt and concrete, to provide roadways, walkways, parking areas, and site drainage.	Paving the new Fermi Drive.
Shallow excavation	Digging holes or trenches to a depth reachable with a backhoe. Shallow excavation may not require dewatering.	Pipelines; foundations for small buildings.
Deep excavation	Digging an open hole in the ground. Deep excavation requires equipment with greater vertical reach than a backhoe. Deep excavation generally requires dewatering systems to keep the hole from flooding.	Excavation of the basemat for the reactor.
Excavation dewatering	Pumping water from wells or pumping water directly to keep excavations from flooding with groundwater or surface runoff.	Pumping water from deep excavation for reactor building.
Dredging	Removing substrates and sediment in navigable waters or wetlands.	Enlargement of the barge slip.
Spoils placement	Placing construction (earthwork) or dredged material in an upland location.	Placing dredge spoils into a designated spoils disposal area.
Structure erection	Assembling structures into their final positions, including all connections between structures.	Using a crane to assemble structures.
Fabrication	Creating an engineered material from the assembly of a variety of standardized parts. Fabrication can include conforming native soils to some engineered specification (e.g., compacting soil to meet some engineered fill specification).	Preparing concrete for pouring; laying rebar for basemat.
Well drilling	Drilling and completing wells.	Drilling wells for dewatering or water supply.
Vegetation management	Thinning, planting, trimming, and clearing vegetation.	Maintaining the construction parking lots and laydown areas free of vegetation.
Filling a wetland or waterbody	Discharging dredge and/or fill material into waters of the United States, including wetlands.	Placing fill material into wetlands to bring it to grade with the adjacent land surface.

3.3.2 Intake Structure

The new intake structure would involve building a pump house near the intake structure for Fermi 2. The intake structure itself would be built on previously developed portions of the Lake Erie shore. Additional hydraulic dredging of the intake bay would be required for building of the intake structure. Material that is dredged from the intake bay would be disposed of in the Fermi Spoils Disposal Pond.

3.3.3 Discharge Structures

A portion of Lake Erie would be affected by building the Fermi 3 cooling water discharge pipe. Flow would exit to Lake Erie through three ports in a multi-port diffuser approximately 1300 ft east of the Lake Erie shoreline at the Fermi site. The ports would be at an elevation of approximately 1.6 ft above the lake bed. A 1300-ft line at least 5 ft deep and 5 ft wide at the bottom would be mechanically dredged into Lake Erie for the discharge pipe. The pipe would be installed within the bottom of Lake Erie in a bed of structural fill. Installation of the discharge structure would require USACE and MDEQ permits. Material that is dredged for the discharge pipe installation would be disposed of in the Fermi Spoils Disposal Pond (Figure 3-2).

3.3.4 Barge Slip

The barge slip that was used to offload equipment during Fermi 2 construction would be reconfigured to allow delivery of certain equipment and supplies during construction of Fermi 3. The barge slip and offloading area are cleared gravel with some trees and weedy vegetation along a sandy inlet area having no permanent structures. The facility would require substantial dredging and other preparation work before it could be used for equipment delivery, but dredging activities are expected to be similar to those associated with ongoing operations and maintenance dredging of the existing intake embayment.

3.3.5 Roads

New onsite roads would be graded and paved. Temporary access roads may need to be constructed. A road is planned to be constructed parallel to the current Fermi Drive, to accommodate construction traffic associated with Fermi 3 (Detroit Edison 2011b).

3.3.6 Pipelines

Pipelines would be installed for the CIRC, stormwater collection systems, intake structures, and discharge structures. Shallow excavation (trenching) would be necessary to install the subsurface pipelines, with the exception of the aforementioned discharge pipeline, which would require permitted dredging as mentioned in Section 3.3.1.

3.3.7 Transmission Line Corridors

Installing transmission lines would require the removal of trees and shrubs along portions of the transmission line corridor, movement of construction equipment, and shallow excavation for the foundations of the transmission line towers. It is assumed that development of the first 18.6 mi of transmission line from the Fermi 3 switchyard would require minimal land disturbance because the lines would be placed in an existing developed corridor. The 10.8 mi corridor to the Milan substation is currently undeveloped, and building this portion of the line could disturb 393 ac of mostly forested and agricultural lands. A total of 1069 ac of land would be occupied by the 29.4-mi-long transmission line corridor.

A new 170-ft-wide transmission corridor (Figure 3-2) is planned on the Fermi site to service Fermi 3 (Detroit Edison 2011b). This transmission corridor would include two sets of towers that would carry both rerouted 345-kV lines that serve Fermi 2 and the new 345-kV lines that serve Fermi 3. Clearing of vegetation and land disturbance for this transmission line would be limited to the location of transmission towers because the wetland area traversed by the line could be spanned without clearing.

3.3.8 Switchyard

Detroit Edison would build a new switchyard containing three 345-kV transmission lines to transport to power generated by Fermi 3. The Fermi 3 switchyard would be constructed on 10 ac of the prairie restoration area at the intersection of Fermi Drive and Toll Road (shown as "28" on Figure 3-2). The offsite Milan Substation may be expanded in size, and this expansion would affect an additional 19 ac.

3.3.9 Construction Support and Laydown Areas

A total of 143 ac have been identified for possible construction laydown areas (Detroit Edison 2011b): 60 ac in an agricultural field next to the proposed Fermi 3 switchyard, 20.5 ac north and west of the intersection of Fermi Drive and Doxy Road, and 61 ac located in separate parcels around the Quarry Lakes (Figure 3-2). Existing topsoil would be removed, geofabric would be laid down, and the areas would be surfaced with rock. It is anticipated that construction laydown areas would be used during construction and then restored following project completion.

3.3.10 Parking and Warehouse

A parking structure and a warehouse would be built in the area to the west and north of the Fermi 3 power block, and about 7 ac of open water (the entire central canal and parts of the north and south canals) would be filled in to facilitate building a parking structure and a warehouse on a total of 5 ac (Figure 3-1).

3.3.11 Miscellaneous Buildings

The construction of the meteorological tower and its access road is anticipated to affect approximately 6 ac in the southeast portion of the Fermi site (Figure 3-2). In the southeast corner of the site, the Fermi 3 Simulator, the EF2/EF3 Administrative Building, and the parking garage would affect approximately 7 ac in an area that was previously impacted by construction activities. Shallow excavation and land clearing would likely be required prior to building activities.

3.3.12 Cranes and Crane Footings

Mobile cranes and a stationary crane would be used during building installation. The impact of these cranes is included in the area of impact within the Fermi 3 power block.

3.3.13 Summary of Resource Commitments Resulting from the Building of Fermi 3

Table 3-3 provides a list of the resource commitments resulting from the building of Fermi 3. The values in the table combined with the affected environment described in Chapter 2 provide the basis for the construction and preconstruction impacts assessed in Chapter 4. The sources of the values are provided, and the review team has confirmed that each of the values is not unreasonable.

3.4 Operational Activities

The operational activities considered in the review team's environmental review are those associated with structures that interface with the environment, as described in Section 3.2.2. Examples of operational activities are withdrawing water for the cooling system, discharging blowdown water and sanitary effluent, and discharging waste heat to the atmosphere. Activities within the proposed ESBWR plant are discussed by Detroit Edison in the Fermi 3 FSAR (Detroit Edison 2012) and are reviewed by the NRC in its Safety Evaluation Report (final expected in May 2013). Structures that interface with the environment and related operational activities are listed in Table 3-4.

The following sections describe the operational activities, including operational modes (Section 3.4.1), plant-environment interfaces during operations (Section 3.4.2), and the radioactive and nonradioactive waste management systems (Sections 3.4.3 and 3.4.4); the values of resource parameters likely to be experienced during operations are summarized in Section 3.4.5.

Table 3-3. Summary of Parameters and Resource Commitments Associated with Building the Proposed Fermi 3

Resource	Value	Description and References
Disturbed land area footprint onsite	Approximately 301 ac total; of that approximately 154 ac would be permanently occupied; of the 301 ac, approximately 189 ac consists of currently undeveloped land	ER Section 4.1.1.1, p. 4-5 and Table 10.1-2, p. 10-8
Length of new transmission line corridors	Onsite: Less than 1 mi from Fermi 3 to switchyard	ER Section 2.2.2.2, p. 2-22
	Offsite: Approximately 29.4 mi (18.6 mi of currently developed corridor; 10.8 mi of undeveloped corridor)	ER Section 2.2.2.2, p. 2-23
Width of new transmission line corridors	Onsite: 170 ft	ER Section 2.2.2.2, p. 2-22
	Offsite: 300 ft	ER Section 2.2.2.2, p. 2-23
Disturbed land area in new onsite transmission corridor	Approximately 20 ac	Calculated from information in ER Section 2.2.2.2, p. 2-22
Disturbed land area for Milan Substation expansion	Approximately 19 ac	ER Section 2.2.2.2, p. 2-23
Land area permanently occupied by 29.4 mi offsite transmission corridor	Approximately 1069 ac; Approximately 393 ac in new corridor	ER Section 2.2.2.2, p. 2-23; Table 4.1-1, p. 4-23
Excavation depth to which dewatering would be required	40 ft to 50 ft below grade	Design Control Document, Rev. 6, Section 1.2.2.16; ER Section 4.2.1.5
Water use	350,000 to 600,000 gpd	Obtained from Lake Erie; ER Section 4.2.1.3, p. 4-26
Water discharge	200 gpm (288,000 gpd) dredge effluent discharge; no discharge of sanitary waste	Permitted discharge to Spoils Disposal Pond; ER Section 4.2.1.4, p. 4-24
Workforce	Increase from 150 workers in first 2 years to maximum 2900 workers	ER Section 4.4.2, p. 4-71
Duration of preconstruction and construction activities	9 to 12 years	ER Section 4.4.2, p. 4-71
Noise	89 dBA maximum construction noise level at 50 ft from activity; 63 dBA 1000 ft from activity	ER Section 4.4.1.1.3, Table 4.4-1, p. 4-90

Table 3-4. Operational Activities Associated with Major Structures

Structure Interfacing with Environment	Water Withdrawal from Lake Erie	Traveling Screen Operations	Cooling Tower Blowdown	Heat Dissipation to Atmosphere	Electricity Generation	Solid or Liquid Nonradioactive Waste Export	Gaseous Nonradioactive Effluent Discharge	Liquid Nonradioactive Effluent Discharge	Solid Radioactive Waste Export	Gaseous Radioactive Effluent Discharge	Liquid Radwaste Discharge	Stormwater Discharge	Personnel into and out of Site	Maintenance Dredging Spoils	Vegetation Management
Stormwater management system												x			x
Intake structure	x	x													
Discharge structure			x					x			x				
Cooling towers				x											
Diesel generators, auxiliary boiler, diesel fire pumps					x		x								
Roads						x	x						x		x
Rail lines						x	x								x
Barge slip														x	
Radwaste facility						x	x			x	x				
Sanitary waste treatment plant								x							
Power transmission system					x										x

3.4.1 Description of Operational Modes

The following sections describe the operational systems for the proposed Fermi 3 under normal operating conditions and under emergency shutdown conditions. Design basis accidents and severe accidents are not considered to be normal plant operations. Modes of operation can be divided into six categories: power operation, startup, hot shutdown,[(a)] safe

(a) Hot shutdown is a mode of operation in which the average reactor coolant temperature is greater than 420°F following a safe shutdown.

shutdown,[a] cold shutdown,[b] and refueling. Lake Erie would be the water source for all normal cooling and shutdown conditions. There is no separate emergency cooling water system. Fermi 3 would have its own supply of cooling water for safety-related cooling in the ultimate heat sink. Effluent discharges during normal plant operations at full capacity would be at their highest levels.

Therefore, impacts discussed in subsequent sections exclusively consider discharges during normal operations at full capacity.

3.4.2 Plant-Environment Interfaces during Operations

Fermi 3 operational activities as they relate to structures or systems with an interface to the environment are discussed in this section.

3.4.2.1 Station Water System – Intakes, Discharges, Cooling Towers

Lake Erie would supply the nonsafety-related cooling at Fermi 3 for the SWS, which would supply the CIRC and the PSWS. The cooling water in the CIRC provides heat dissipation from the main condensers to the NPHS. The NPHS for Fermi 3 would be a natural draft cooling tower as shown in Figures 3-1 and 3-3. The cooling water in the PSWS would provide heat dissipation from the heat exchangers of both the Turbine Component Cooling Water System and the Reactor Component Cooling Water System.

The SWS would supply makeup water to the NPHS and AHS cooling tower basins and would consist of two subsystems: the PCTMS and the PWSS. The PCTMS would provide makeup water from Lake Erie for evaporation, drift, and blowdown losses. During normal power operations, the NPHS would reject heat from the plant at a rate of 1.07×10^{10} Btu/hr (Detroit Edison 2011b). It is anticipated that Fermi 3 will be in normal mode 96 percent of the time and will shut down for refueling every 2 years for 30 days (Detroit Edison 2011b).

The heat from the PSWS would be dissipated to the NPHS and/or the AHS. The AHS would reject heat during startup, hot shutdown, stable shutdown,[c] cold shutdown, and refueling at a rate of 2.98×10^{8} Btu/hr (Detroit Edison 2011b). The AHS could also be used during normal

(a) Safe shutdown is a shutdown in which (1) the reactivity of the reactor is kept to a margin below criticality consistent with technical specifications; (2) the core decay heat is being removed at a controlled rate sufficient to prevent core or reactor coolant system thermal design limits from being exceeded; (3) components and systems necessary to maintain these conditions are operating within their design limits; and (4) components and systems necessary to keep doses within prescribed limits are operating properly.

(b) Cold shutdown is a mode of reactor operation in which the reactor coolant system is at atmospheric pressure and at a temperature below 200°F after shutdown.

(c) Stable shutdown is a mode of operation in which the average reactor coolant temperature is less than or equal to 420°F following a safe shutdown.

power operations. The AHS would consist of mechanical draft cooling towers and would be housed in the Water Treatment/Service Water Building (Figure 3-1) on the southeast side of the Fermi 3 power block. The PWSS would provide water for the FPS and serve as an alternate to the PCTMS for supplying PSWS makeup water to the cooling towers.

During normal plant operations, the only variable quantity of water use would be the amount of water that would be consumed by evaporation and drift from the cooling towers, which would vary based on the ambient temperature conditions (Detroit Edison 2011b). The monthly average anticipated water intake from Lake Erie would vary between approximately 23,750 and 33,500 gpm (Table 3-5). Monthly average consumptive use of water for cooling (drift plus evaporation) would vary between 11,882 and 16,757 gpm, and monthly discharge to Lake Erie (blowdown) would vary between 11,868 and 16,743 gpm.

Table 3-5. Monthly Fermi 3 Cooling Water Discharge Temperature and Flow Rates

Month	Discharge Temperature (°F)	Blowdown Flow Rate (gpm)	Drift Flow Rate (gpm)	Evaporation Flow Rate (gpm)	Makeup Flow Rate (gpm)
January	53.8	11,868	7.2	11,875	23,750
February	55.3	12,193	7.2	12,200	24,400
March	59.4	13,093	7.2	13,100	26,200
April	66.0	14,293	7.2	14,300	28,600
May	72.7	15,393	7.2	15,400	30,800
June	78.4	16,293	7.2	16,300	32,600
July	81.5	16,743	7.2	16,750	33,500
August	80.8	16,693	7.2	16,700	33,400
September	76.3	16,093	7.2	16,100	32,200
October	68.8	14,793	7.2	14,800	29,600
November	62.7	13,743	7.2	13,750	27,500
December	56.6	12,493	7.2	12,500	25,000

Source: Detroit Edison 2011b

- The maximum discharge to Lake Erie would be 17,110 gpm (Table 3-1).
- The maximum consumptive water use rate (evaporation and drift) would be 17,124 gpm (Table 3-1).
- The maximum makeup water flow rate would be 34,264 gpm (Table 3-1).

During shutdown conditions, less than 1166 gpm would be needed for makeup water to the plant (Table 3-1). Approximately 639 gpm of water would be consumed by evaporation and drift from cooling, and 569 gpm would be discharged back to Lake Erie. Periodic dredging of the intake canal would be required. Potential radwaste discharges from the plant are discussed in Section 3.4.2.3. Any discharges from Fermi 3 would require an NPDES permit, similar to the one already regulating Fermi 2 discharges.

The atmosphere would receive heat and water in the form of cooling tower vapor and drift.

3.4.2.2 Power Transmission System

During operation of Fermi 3, vegetation along the power transmission line system would need to be maintained by ITC*Transmission*. Vegetation removal activities would include trimming and application of herbicides periodically and on an as-needed basis along the transmission line corridor.

3.4.2.3 Radioactive Waste-Management Systems

Liquid, gaseous, and solid radioactive waste management systems would be used to collect and treat the radioactive materials produced as byproducts of operating Fermi 3. These systems would process radioactive liquid, gaseous, and solid effluents to maintain releases within regulatory limits and to levels as low as reasonably achievable before releasing them to the environment. Waste-processing systems would be designed to meet the design objectives of 10 CFR Part 50, Appendix I ("Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents"). Radioactive material in the reactor coolant would be the primary source of gaseous, liquid, and solid radioactive wastes in light-water reactors. Radioactive fission products build up within the fuel as a consequence of the fission process. These fission products would be contained in the sealed fuel rods, but small quantities would escape the fuel rods and contaminate the reactor coolant. Neutron activation of the primary coolant system would also be responsible for coolant contamination.

The Offsite Dose Calculation Manual (ODCM) for the operating Fermi 2 was revised in 2010 and is attached as Appendix C to the 2010 radioactive effluent and monitoring report for Fermi 2 (Detroit Edison 2011c). It describes the methods and parameters used for calculating offsite radiological doses from liquid and gaseous effluents. The ODCM also describes the methodology for calculation of gaseous and liquid monitoring alarm/trip set points for release of effluents from Fermi 2. Operational limits for releasing liquid and gaseous effluents are also specified in the ODCM to ensure compliance with NRC regulations. This ODCM will be revised to include operation of Fermi 3 or a similar ODCM will be developed for Fermi 3.

Summary descriptions of the liquid, gaseous, and solid radioactive waste management systems for the proposed Fermi 3 are presented in the following sections. A more detailed description of these systems can be found in Chapter 11 of the ESBWR DCD (GEH 2010).

Liquid Radioactive Waste Management System

The liquid radioactive waste management system (LWMS) would function to collect, monitor, process, store, and dispose of liquids containing radioactive material. The LWMS consists of

four subsystems: equipment drain system, floor drain system, chemical drain system, and detergent drain system. The LWMS process flow diagram is provided in Figure 11.2-1 of the DCD (GEH 2010). Processing would be managed using evaporation, centrifugal separation, demineralization, and filtration in several process trains consisting of tanks, pumps, reverse osmosis, ion-exchanger, and filters. The system is designed to handle both normal and anticipated operational occurrences. Normal operations would include processing of (1) reactor coolant system effluents, (2) floor drains and other wastes with potentially high suspended solid contents, (3) chemical wastes, and (4) detergent wastes.

All liquid effluent discharges from the tanks to the environment are monitored so that the radioactivity release levels do not exceed the levels specified in 10 CFR Part 20, Appendix B, Table 2. The total liquid radioactive source term for liquid effluents can be found in Table 12.2-19b of the DCD (GEH 2010). Calculated doses to the maximally exposed individual (MEI) and the population within 50 mi are presented in Section 5.9.2.

Gaseous Radioactive Waste Management System

The gaseous radioactive waste management system would function to collect, process, and discharge gaseous radioactive effluents. Gaseous radionuclides generated during normal operation of Fermi 3 include gaseous fission products and gaseous radionuclides formed by neutron activation of the reactor coolant and contained gases. These gases would be retained in the plant systems and removed in a controlled fashion through the gaseous waste management system. The building heating, ventilating, and air-conditioning (HVAC) systems and power cycle off-gas system (OGS) are the two main sources of the plant gaseous effluent. The gaseous waste management system, or OGS, collects waste from multiple sources and delays its release to allow short-lived radionuclides to decay. In the off-gas process, the OGS would use activated charcoal absorber beds for holdup and decay of radioactive gases containing radioactive isotopes of krypton, xenon, iodine, nitrogen, and oxygen.

All gaseous effluents from the gaseous waste processing system, the containment ventilation purge system, the main condenser exhaust, and ventilation from the Radwaste Building, the Fuel Pool Building, Reactor Building, Turbine Building, and the safeguards and access-controlled areas would be released via the plant stacks. Gaseous effluents would be monitored upon discharge so that radioactivity release levels are not exceeded. The total gaseous radioactive source term for gaseous effluents can be found in Table 12.2-16 of the DCD (GEH 2010) and FSAR Table 12.2-206 (Detroit Edison 2012). Calculated doses to the MEI are presented in Section 5.9.2.

Solid Radioactive Waste Management System

The solid radioactive waste management system (SWMS) for Fermi 3 would function to control, collect, handle, process, package, and temporarily store dry or wet solid radioactive waste

before shipment offsite. The SWMS located in the Radwaste Building is a four-part system, including the waste collection system, the waste processing system, the dry waste accumulation and conditioning system, and the container storage system. The SWMS process flow diagram is provided in Figure 11.4-1R of the Fermi 3 FSAR (Detroit Edison 2012). Solid radioactive wastes include filter backwash sludge, reverse-osmosis concentrates, bead resins generated by the LWMS, the reactor water cleanup/shutdown cooling system, the fuel and auxiliary pools' cooling systems, the high-efficiency particulate air (HEPA) and cartridge filters, and rags, plastic, paper, protective clothing, tools, and equipment. The SWMS is designed to handle both normal and anticipated operational occurrences. There are no onsite facilities for permanent disposal of solid wastes, so the packaged wastes would be temporarily stored in the Radwaste Building prior to being shipped to a licensed disposal facility. The Radwaste Building is designed to accommodate up to 10 years' worth of packaged Class B and Class C waste, and 3 months' worth of packaged Class A waste.

The estimated annual solid radwaste volumes of dry active solids, wet solids, and mixed waste generated by an ESBWR are estimated to be 363, 110.8, and 0.416 m^3/yr, respectively (FSAR Table 11.4-2R in Detroit Edison 2012). FSAR Table 11.4-2R also identifies the annual quantity of waste in Class A, B, and C that would be stored in the facility or shipped offsite.

3.4.2.4 Nonradioactive Waste Systems

The following sections provide descriptions of the nonradioactive waste systems proposed for Fermi 3, including systems for chemical or biocide, sanitary, and other effluents. This category of effluent includes nonradioactive gaseous emissions, liquids, hazardous waste, mixed wastes, and solids.

Effluents Containing Chemicals or Biocides

Water chemistry for various plant water uses would be controlled with the addition of biocides, algaecides, corrosion inhibitors, scale inhibitors, and dehalogenators. Fermi 3 would use chemicals and biocides similar to those currently used for the existing Fermi 2, including sodium hypochlorite, sodium silicate, and sodium bisulfite. Cooling water effluents from Fermi 3 would be discharged to Lake Erie and may be subject to the limitations of the Fermi site's existing NPDES permitted outfalls. Estimated concentrations of chemicals in the Fermi 3 discharge are presented in Table 3-6 (Detroit Edison 2011b).

Makeup water to the SWS would be treated with the biocide/algaecide sodium hypochlorite before it enters the pumps at the intake from Lake Erie. The SWS would supply water to the CIRC, the PSWS, and the FPS. Biocide injection is an important step to remove plant and animal life from the water, including invasive zebra mussels. If mussels do make it into the SWS, they could be controlled through either chlorination or thermal shock treatment.

Table 3-6. Estimated Concentrations of Chemicals in Fermi 3 Cooling Water Discharges[(a)]

Chemical	Maximum Concentration (ppm)	Mean Concentration (ppm)
Sodium (Na)	46.6	34.3
Calcium (Ca)	71.9	71.9
Magnesium (Mg)	17.4	17.4
Silica (SiO_2)	19.9	19.5
Chloride (Cl)	61.3	42.5
Sulfate (SO_4)	38.5	38.5
Potassium (K)	3.6	3.6
Scale inhibitor/dispersant	11.6	11.6
Bicarbonate alkalinity ($CaCO_3$)	167.8	167.7
Total dissolved solids (TDS)	428.5	397.4
Total suspended solids (TSS)	16.0	16.0

Source: Detroit Edison 2011b
(a) Based on two cycles of concentration.

Both the influent to and the effluent from the CIRC would be treated. A biocide, a corrosion inhibitor, and a scale inhibitor would be injected into the CIRC at the inlet to the condenser. Before the CIRC water is discharged to Lake Erie, the water would be treated using sodium bisulfite for dehalogenation and maintenance of oxidant water quality standards. Water entering the PSWS also would be treated with biocide, corrosion inhibitor, and scale inhibitor. When the water from Lake Erie has high turbidity, an additional chemical to reduce sediment would be injected into the PSWS.

Water discharge temperatures would vary monthly as shown in Table 3-5 (Detroit Edison 2011b). The discharge temperature at times could reach a maximum of 86°F (Detroit Edison 2011b). When the Turbine Bypass System is in operation, the temperature of the discharge could reach up to 96°F. Impacts presented in subsequent sections consider discharges during normal operations and at full capacity.

Sanitary System Effluents

Sanitary waste effluent would first be mechanically treated at Fermi 3 using an onsite treatment system consisting of a waste basin, wet well, septic tank, settling tank, wet well pumps, sewage discharge pumps, and associated piping and controls. After onsite treatment, sanitary waste water would be discharged to the Monroe Metropolitan Wastewater Treatment Facility. In addition to wastes generated by domestic uses, Detroit Edison would discharge the demineralized water effluent from the auxiliary boiler to the Sanitary Waste Discharge System. Detroit Edison projected that the maximum volume of sanitary effluent would be 253 gpm during

normal operations. During shutdown operations, Detroit Edison projected that the average volume of sanitary effluent would be 258 gpm (Figure 3.3-1 of the ER) (Detroit Edison 2011b).

Gaseous Effluents

Gaseous emissions would be produced by the combustion of diesel fuel in the diesel engines that would power the two 17.1-MW standby generators (SDG), two 1650-kW ancillary diesel generators (ADG), the two 200-kW fire pumps (FP), and one 30-MW (or 50 tons of steam per hour) auxiliary boiler. Based on four operating hours per month (or 48 hours per year) for two SDGs and two diesel-driven fire pumps, eight operating hours annually for two ADGs, and 720 hours of operation annually for an auxiliary boiler, the estimated annual emissions from these seven stationary combustion sources are 0.85 tons of particulates, 0.11 tons of sulfur oxides, 0.94 tons of volatile organic compounds (VOCs), 9.91 tons of nitrogen oxides, and 7734 tons of carbon dioxide (Detroit Edison 2011b, d). These emissions would be permitted in accordance with MDEQ and Federal regulatory requirements.

The SDGs, ADGs, and FPs would be required to comply with the requirements of the National Emission Standards for Hazardous Air Pollutants given in 40 CFR 63.6603 and 63.6604. These regulations specify emission limits and, for nonemergency diesels, performance tests, limitations on fuel sulfur content, and operating limitations. In addition, depending on when the engines are built and installed, there may be additional requirements under the Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60, Subpart IIII).

Small amounts of VOCs would also be generated from the use of common building maintenance materials such as paints, adhesives, and caulk; from mechanical maintenance materials such as oils and solvents; and periodically from activities such as asphalt resealing.

Other Effluents

Fermi 3 would have two standby diesel generators, two ancillary diesel generators, two diesel-driven fire pumps, and one package auxiliary boiler system. The gaseous and particulate emissions from the operation of the standby and ancillary diesel generators, fire pumps, and the auxiliary boiler would be in compliance with all applicable standards (Detroit Edison 2011b).

Fermi 3 would have nonradioactive liquid discharges from stormwater runoff and various plant drains. The potential release of nonradioactive liquid effluents to Lake Erie would be controlled to meet restrictions of the Fermi 3 NPDES permit and Section 401 Water Quality Certification (Detroit Edison 2011b).

The location of Fermi 3 is within the Swan Creek watershed, and water running off of the Fermi 3 developed area would drain primarily to Swan Creek before entering Lake Erie. Drop

inlets on the power block would collect the stormwater runoff resulting from storm events and route it to Swan Creek. If storm drains were blocked, runoff would drain off the elevated area in all directions and flow into the North Lagoon, the South Lagoon, or Lake Erie. Stormwater drainage patterns are shown in Figures 2.4-215 and 2.4-217 of the FSAR (Detroit Edison 2012).

Fermi 3 would produce effluents from various plant drains, including equipment drains, floor drains, laundry and chemical drains, and other miscellaneous periodic drains. Effluent from these drains would be treated, combined with the cooling water discharge, and then discharged into Lake Erie through the discharge pipe.

Table 3-7 lists the types of hazardous wastes generated by the existing Fermi 2, including laboratory solvents, paint wastes, and aerosol residues; similar wastes are expected from operation of proposed Fermi 3 (Detroit Edison 2011b). The generation, treatment, storage, and disposal of hazardous wastes are governed by Federal Resource Conservation and Recovery Act (RCRA) regulations. Detroit Edison addresses RCRA requirements for Fermi 2 and would manage hazardous wastes from Fermi 3 in the same manner.

Table 3-7. Quantities of Hazardous Wastes Generated during Fermi 2 Operations

Hazardous Waste Type	2007 (lb)	2006 (lb)	2005 (lb)
Paint – related materials	43	1782	387
Oil/solvent waste	103	20	506
Fiber wound parts – cleaner filters	7	0	309
Vehicle antifreeze – used	600	0	20
Munge-Blanchard and surfacegrinder/marble saw	180	0	210
Lead paint/contaminated mat	0	80	120
Lead contaminated rags/debris	45	0	405
Aerosol cans	692	70	1167
Leaking lead-acid batteries	0	75	0
Cutting fluids	0	80	0
Sand blast grit	0	1222	0
Parts cleaner solvent	0	32	0
Total	**1670**	**3361**	**3136**

Source: Detroit Edison 2011b

Mixed waste is a combination of hazardous waste and low-level radioactive material, special nuclear material, or byproduct materials. Mixed waste could be created during activities such as routine maintenance, refueling, and radiochemical laboratory work. NRC (10 CFR) and EPA (40 CFR) regulations govern generation, management, handling, storage, treatment, disposal, and protection requirements associated with these wastes. Management of these wastes would conform to applicable Federal and State requirements in a similar manner as that for Fermi 2. The quantities expected from Fermi 3 would be small (Detroit Edison 2011b), as they are from other nuclear power plants.

During construction of Fermi 3, solid effluents that could be disposed of in a landfill include clays, sand, gravels, silts, topsoil, tree stumps, root mats, brush and limbs, vegetation, and rocks. Such a landfill for land clearing debris does not require a permit but must comply with regulations issued by the State of Michigan for solid waste facilities.

During operation of Fermi 3, solid waste would be generated from periodic plant maintenance projects. Nonradioactive solid waste would be reused or recycled according to existing Fermi 2 plans to the extent practicable, and the rest would be disposed of at an approved and licensed offsite commercial waste disposal facility.

3.4.3 Summary of Resource Parameters during Operation

Table 3-8 summarizes the operational parameters that are relevant to assessing the environmental impacts of operating Fermi 3.

Table 3-8. Resource Parameters Associated with Operation of Proposed Fermi 3

Item	Value	Description and References
Project footprint	Permanent commitment of approximately 155 ac onsite, and 1069 ac for offsite transmission corridor	ER Table 10.1-2
Operations workforce	900 workers	ER Section 5.8.2.1, p. 5-158
Total makeup water intake	Minimum: 23,780 gpm; average: 28,993 gpm; maximum: 34,264 gpm	ER Figure 3.3-1, p. 3-22
NPHS makeup water intake	Minimum: 23,750 gpm; average: 28,963 gpm; maximum: 34,234 gpm	ER Figure 3.3-1, p. 3-22
NPHS drift and evaporation	Minimum: 11,882 gpm; average: 14,488 gpm; maximum: 17,124 gpm	ER Figure 3.3-1, p. 3-22
NPHS discharge	Minimum: 11,868 gpm; average: 14,474 gpm; maximum: 17,110 gpm	ER Figure 3.3-1, p. 3-22
Waste heat to atmosphere	1.07×10^{10} BTU/h	ER Section 3.4.1.6, p. 3-26
Blowdown temperature	Monthly discharge temperatures range from 53.8 to 81.5°F	ER Table 3.4-1, p. 3-30
Solid radwaste volume	Dry active: 363 m^3/yr; wet solid: 110.8 m^3/yr; mixed: 0.416 m^3/yr	DCD Table 11.4-2
Sanitary system discharge	Average: 88 gpm; maximum normal operations: 253 gpm; average shutdown operations: 258 gpm	ER Figure 3.3-1, p. 3-22
Power transmission system	Vegetation management on 1069 ac	ER Section 2.2.2.2, p. 2-22; Table 4.1-1, p. 4-20
NPHS sound level at 1000 ft	55 to 60 dBA at 1000 ft	ER Section 3.4.1.6, p. 3-26
AHS sound level at 1000 ft	55 to 60 dBA at 1000 ft	ER Section 3.4.1.6, p. 3-26

3.5 References

10 CFR Part 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, "Standards for Protection against Radiation."

10 CFR Part 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

40 CFR Part 60. Code of Federal Regulations, Title 40, *Protection of Environment,* Part 60, "Standards of Performance for New Stationary Sources."

40 CFR Part 63. Code of Federal Regulations, Title 40, *Protection of Environment,* Part 63, "National Emission Standards for Hazardous Air Pollutants for Source Categories."

72 FR 57432. October 9, 2007. "Limited Word Authorizations for Nuclear Power Plants, Final Rule." *Federal Register*. U.S. Nuclear Regulatory Commission.

Detroit Edison Company (Detroit Edison). 2011a. *Detroit Edison Fermi 3 Project, U.S. Army Corps of Engineers and Michigan Department of Environmental Quality, Joint Permit Application.* Revision 0, Detroit Michigan. June. Accession No. ML111940490.

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Detroit Edison Company (Detroit Edison). 2011c. *Fermi 2 – 2010 Radioactive Effluent Release and Radiological Environmental Operating Report, January 1, 2010, through December 31, 2010*. Accession No. ML111220090.

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Detroit Edison Company (Detroit Edison). 2012. *Fermi 3 Combined License Application, Part 2: Final Safety Analysis Report*. Revision 4, Detroit, Michigan. February. Accession No. ML12095A119.

GE Hitachi Nuclear Energy Americas, LLC (GEH). 2010. *ESBWR Design Control Document*. Revision 9. December. Accession No. ML103440266.

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National Environmental Policy Act, as amended (NEPA). 42 USC 4321, *et seq*.

U.S. Environmental Protection Agency (EPA). 2009. *Final Rule: Effluent Guidelines for Discharges from the Construction and Development Industry.* EPA 821-F-09-004. November.

4.0 Construction Impacts at the Proposed Site

This chapter examines the environmental issues associated with the construction of a proposed new Enrico Fermi Unit 3 (Fermi 3), at the Enrico Fermi Atomic Power Plant (Fermi) site, as described in the application for a combined license (COL) submitted by Detroit Edison Company (Detroit Edison). As part of its application, Detroit Edison submitted an Environmental Report (ER) (Detroit Edison 2011a), which discusses the environmental impacts of building, operating, and decommissioning the proposed Fermi 3, and a Final Safety Analysis Report (FSAR) (Detroit Edison 2012f), which addresses safety aspects of construction and operation.

In addition to the COL application, Detroit Edison has applied for a Department of Army permit from the U.S. Army Corps of Engineers (USACE) to conduct activities in or affecting waters of the United States, including wetlands. Also, Detroit Edison will be required to submit a number of other applications for permits and certifications related to construction to the Michigan Department of Environmental Quality (MDEQ). As of October 2012, no preconstruction activities related to development of Fermi 3 or associated facilities have occurred on the Fermi site, and none are expected in the immediate future.

As discussed in Section 3.3 of this EIS, the U.S. Nuclear Regulatory Commission's (NRC's) authority is limited to "construction activities that have a reasonable nexus to radiological health and safety and/or common defense and security" (72 *Federal Register* [FR] 57416). Many of the activities required to build a nuclear power plant do not fall within the NRC's regulatory authority and therefore are not "construction" as defined by the NRC; such activities are referred to as "preconstruction" activities in Title 10 of the Code of Federal Regulations (CFR) 51.45(c). The NRC staff evaluates the direct, indirect, and cumulative impacts of the construction activities that would be authorized with the issuance of a COL. The environmental effects of preconstruction activities (e.g., clearing and grading, excavation, and erection of support buildings) will be included in the evaluation of cumulative impacts.

As described in Section 1.1.3 of this EIS, the USACE is a cooperating agency on this EIS consistent with the updated Memorandum of Understanding (MOU) signed with the NRC (USACE and NRC 2008). The NRC and USACE established this cooperative agreement because both agencies have concluded it is the most effective and efficient use of Federal resources in the environmental review of a proposed new nuclear power plant. The goal of this cooperative agreement is the development of one EIS that provides all the environmental information and analyses needed by the NRC to make a license decision as well as the information needed by the USACE to perform analyses, draw conclusions, and make a permit decision in the USACE's regulatory permit decision document. In an effort to accomplish this goal, the environmental review described in this EIS was conducted by a joint NRC/USACE

team. The review team was composed of NRC staff and its contractors and staff from the USACE.

The USACE is responsible for ensuring that the information presented in this EIS is adequate, to the extent possible, to allow USACE to evaluate, in part, the proposed jurisdictional activities in accordance with USACE regulations; the Clean Water Act (CWA) Section 404(b)(1) "Guidelines," which contain the substantive environmental criteria used by the USACE in evaluating discharges of dredged or fill material into waters of the United States; and the USACE public interest review. The USACE will decide whether to issue a permit on the basis of an evaluation of the probable impact, including the cumulative impacts of the proposed activity on the public interest. In accordance with the Guidelines, no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have a less adverse impact on the aquatic ecosystem, provided the alternative does not have other significant adverse consequences. The USACE permit decision will reflect the national concern for both protection and utilization of important resources. The benefit that reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. Factors that may be relevant to the proposal, including its cumulative effects, will be considered; among those factors are conservation, economics, aesthetics, general environmental concerns, wetlands, historic resources, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and in general, the needs and welfare of the people (see Appendix J of this EIS for a summary of the USACE public interest review factors and Detroit Edison's proposed analysis of the impacts of alternative site layouts on waters of the United States, including wetlands).

Many of the impacts that the USACE must address in its analysis are the result of preconstruction activities. In addition, most of the activities conducted by a COL applicant that would require a permit from the USACE would be preconstruction activities.

While both the NRC and the USACE must meet the requirements of the National Environmental Policy Act of 1969, as amended (NEPA), both agencies have mission requirements that must be met in addition to the NEPA requirements. The NRC's regulatory authority is based on the Atomic Energy Act of 1954, as amended (42 USC 2011 *et seq.*). The USACE's regulatory authority that is related to the proposed action is based on Section 10 of the Rivers and Harbors Appropriation Act of 1899 (RHAA) (33 USC 403 *et seq.*), which prohibits the obstruction or alteration of navigable waters of the United States without a permit from the USACE, and Section 404 of the Clean Water Act (33 USC 1344), which prohibits the discharge of dredged or fill material into waters of the United States without a permit from the USACE. Therefore, the applicant may not commence preconstruction or construction activities in jurisdictional waters, including wetlands, without a USACE permit.

The USACE will make its evaluation after completion of its public interest review including full consideration of the recommendations of Federal, State, Tribal, and local resource agencies and members of the public, the 404(b)(1) Guidelines Evaluation, mitigation plan approval, and after it completes the following consultations and coordination efforts, if applicable: Section 106 of the National Historic Preservation Act (NHPA), including, as appropriate, development and implementation of any Memorandum of Agreement (MOA); Section 7 of the Endangered Species Act (16 USC 1531–1544); State forest conservation plans; State water quality certifications; and State coastal zone consistency determinations. Because the USACE is a cooperating agency under the MOU for this EIS, the USACE's decision whether to issue a permit will not be made until after the final EIS is issued and its evaluation is completed.

The collaborative effort between the NRC and the USACE in presenting their discussion of the environmental effects of building the proposed project, in this chapter and elsewhere, must serve the needs of both agencies to the extent possible. Consistent with the MOU, the staffs of the NRC and the USACE collaborated (1) in the review of the COL application and information provided in response to requests for additional information (developed by the NRC and the USACE) and (2) in the development of the EIS. 10 CFR 51.45(c) requires that the impacts of preconstruction activities be addressed by the applicant as cumulative impacts in its ER. Similarly, the NRC's analysis of the environmental effects of preconstruction activities on each resource area would be addressed as cumulative impacts normally presented in Chapter 7. However, because of the collaborative effort between the NRC and the USACE in the environmental review, the combined impacts of the preconstruction and construction activities that would be authorized by the NRC with its issuance of a COL are presented in this chapter. For each resource area, the NRC also provides an impact analysis solely for construction activities that meet the NRC's definition of construction in 10 CFR 50.10(a). Thereafter, both the assessment of the impacts of 10 CFR 50.10(a) construction activities and the assessment of the combined impacts of preconstruction and construction are used in the description and assessment of cumulative impacts in Chapter 7 of this EIS.

In addition to guidance provided in NUREG-1555, staff used guidance provided in the NRC Staff Memorandum *Addressing Construction and Preconstruction Activities, Greenhouse Gas Issues, General Conformity Determinations, Environmental Justice, Need for Power, Cumulative Impact Analysis, and Cultural/Historical Resources Analysis Issues in Environmental Impact Statements* (NRC 2011). For most environmental resource areas (e.g., aquatic ecology), the environmental impacts are not the result of either only the preconstruction activities or only the construction activities. Rather, the impacts are attributable to a combination of preconstruction and construction activities. For most resource areas, the majority of the impacts would occur as a result of preconstruction activities.

This chapter is divided into 13 sections. In Sections 4.1 through 4.10, the review team evaluates the potential impacts on land use, water use and quality, terrestrial and aquatic

ecosystems, socioeconomics, environmental justice, historic and cultural resources, meteorology and air quality, nonradiological and radiological health effects, and nonradioactive waste impacts of building Fermi 3.

In accordance with 10 CFR Part 51, impacts were analyzed and an impact category level (SMALL, MODERATE, or LARGE) of potential adverse impacts was assigned for each resource area by the review team on the basis of the definitions for these terms established in Chapter 1 of this EIS. The impacts on some resource areas (e.g., the impacts on taxes under the socioeconomic resource area) may be considered beneficial and are stated as such. The review team's determination of an impact category level was based on the assumption that the mitigation measures identified in the ER or the activities planned by various State and county governments, such as infrastructure upgrades (discussed throughout this chapter), would be implemented. Failure to implement these upgrades might result in a change in the impact category level. Possible mitigation of adverse impacts, where appropriate, is discussed in Section 4.11. A summary of the construction impacts is presented in Section 4.12. Citations for the references cited in this chapter are listed in Section 4.13. Cumulative impacts of construction and operation are discussed in Chapter 7. The technical analyses provided in this chapter support the results, conclusions, and recommendations presented in Chapters 7, 9, and 10 of this EIS.

The review team's assessment of the impacts from the construction of proposed Fermi 3 draws on information presented in Detroit Edison's ER Revision 2 (Detroit Edison 2011a) and supplemental documents, as well as other government and independent sources.

4.1 Land Use Impacts

This section provides information on land use impacts associated with site-preparation activities and the building of Fermi 3 at the Fermi site. Topics discussed include land use impacts at the Fermi site and in the vicinity of the site, and land use impacts in the transmission line corridor and offsite areas. For the purposes of the analysis, the site vicinity is defined as the area encompassed by a 7.5-mi radius around the site.

4.1.1 The Site and Vicinity

Approximately 301 acres (ac) of land on the Fermi site would be used to build Fermi 3 and associated facilities (Detroit Edison 2011a). Land would be used for an equipment and materials laydown and access area (143 ac); a new power block, including nuclear containment structure, turbine building, cooling towers and batch plant (87 ac); parking, warehouse, and access roads (22 ac); and a switchyard and onsite transmission line corridor (18 ac). An administrative building and meteorological tower would occupy 13 ac (Detroit Edison 2011a). An additional 18 ac would be used, but Detroit Edison has not indicated the specific use of this

land. Approximately 189 ac of the land required for Fermi 3 would be land previously undisturbed by urban development, and 112 ac would be land that had been previously disturbed when building Fermi 1 or 2 (Detroit Edison 2011a). The footprint of Fermi 3 and an exclusion area extending 2927 ft out from the center of the reactor building would overlap part of the exclusion area of Fermi 2, which is defined as an area extending 2001 ft from the center of the Fermi 2 containment structure (Detroit Edison 2011a). This overlap would not constitute a land use conflict.

Land preparation and building activities for Fermi 3 would involve clearing, grading, excavation, and draining land, resulting in the alteration of existing vegetation, topography, and drainage patterns. Mitigation measures implemented to reduce preconstruction and construction activity impacts would include erosion control, controlled access roads, and restricted building zones. Surface features and soils would be stabilized and restored after completion of building activities, and permanently disturbed locations would be stabilized and contoured to blend with the surrounding area. Vegetation 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 (BMPs).

Excavated material from the power block and cooling system would be used as backfill for building the cooling tower and cooling water system. Detroit Edison expects to use the remaining excavated material (265,000 cubic yards [yd^3]) as fill for onsite road improvements and in building the parking and laydown areas (Detroit Edison 2011a). No onsite borrow pits or landfills are anticipated. Material dredged while building the water-intake structure, barge slip, and associated facilities would be disposed of in the existing onsite spoils disposal pond, (Detroit Edison 2011a).

Approximately 34.5 ac of wetlands and 5.2 ac of open water on the Fermi site would be disturbed. Approximately 23.7 ac of the disturbed wetlands would be only temporarily disturbed and would be rehabilitated (Detroit Edison 2012). Approximately 8.3 ac of the disturbed wetlands and the 5.2 ac of disturbed open water would be permanently lost. Approximately 2.5 ac of the disturbed wetlands are forested wetlands that would be converted to emergent wetlands. Most wetland impacts on or close to the Fermi site would require permits from the USACE and the MDEQ. Wetland impacts and associated mitigation are discussed further in Sections 4.3.1.3 and 4.3.1.5.

All of the roughly 64-ac agricultural field in the west-southwest part of the Fermi site, including the prime farmland contained within, would be temporarily disturbed to establish an equipment and material laydown area (Detroit Edison 2011a). Although the temporarily disturbed farmland would ultimately become available for possible future agricultural use after the building period, compaction or removal of topsoil during the use of the land for laydown could permanently alter the soil properties responsible for designation of portions of the field as prime farmland. Although approximately 21 ac of forested land would be cleared to accommodate new facilities

(Detroit Edison 2011a), Detroit Edison does not manage any land on the Fermi site for timber production and has no plans to do so in the future (Detroit Edison 2009a).

Approximately 45 ac of land managed as part of the Detroit River International Wildlife Refuge (DRIWR) would be disturbed during development of Fermi 3, of which approximately 26 ac would be only temporarily used, while approximately 19 ac would be permanently occupied (Detroit Edison 2011a). Detroit Edison currently has a Cooperative Agreement with the U.S. Fish and Wildlife Service (FWS) for management of the onsite portion of the DRIWR, and a reduction of this size is consistent with the 2003 Cooperative Agreement and the FWS Comprehensive Conservation Plan for the Refuge (see Section 2.1.1).

The Fermi site and some adjoining areas lie within the Coastal Zone defined by the State of Michigan under the Coastal Zone Management Act, which is designed to ensure the reasonable use of coastal areas (see Section 3.1). Before ground disturbance, Detroit Edison must obtain a coastal zone consistency determination from the MDEQ (Detroit Edison 2011a) (see Section 2.1.1). On January 24, 2012, the MDEQ issued Permit No. 10-58-0011-P to Detroit Edison (MDEQ 2012). Issuance of this permit constitutes a coastal zone consistency determination from the MDEQ.

Temporarily disturbed areas would be restored to their existing topographic and hydrological conditions and be planted with natural vegetation once no longer needed, to assist in protecting coastal lands from erosion and pollution (Detroit Edison 2011a). Because the public is already excluded from lands where Fermi 3 would be built and from areas of Lake Erie within the offshore portions of the security zone, Fermi 3 is not expected to interfere with public recreation in or enjoyment of the Coastal Zone. The project would be situated in an area already zoned as Industrial and dedicated to energy production; it would therefore not alter general land use patterns already established in the Coastal Zone. The aesthetics of the surrounding landscape and adjoining waters of Lake Erie have already been influenced by existing Fermi facilities, and the addition of Fermi 3 would not alter the general aesthetic character.

As stated in Section 2.2.1, Detroit Edison owns the mineral rights to the entire Fermi site, except for approximately 0.88 ac in southeastern part of the site (Detroit Edison 2011a). Development of Fermi 3 would not involve that 0.88 ac.

The majority of the proposed Fermi 3 buildings and structures would be situated outside the 100-year and 500-year floodplains (Detroit Edison 2011a). Detroit Edison designed the proposed layout to minimize floodplain encroachment. The majority of the floodplain impacts would be temporary, and the small number of permanent impacts would not noticeably reduce floodplain capacity. Additional description of floodplain impacts is provided in Section 4.2. Development in floodplain areas requires review and approval by Frenchtown Charter Township. A barge slip, water intake, and cooling tower outfall would be built on the Lake Erie shoreline, in an area subject to coastal flooding.

Some dredging in Lake Erie could be needed for a passage from the main channel of the lake to the barge slip, to accommodate movement of heavy equipment and components to the site by barge. Dredged material would be removed and transported to an existing onsite spoils disposal pond area for treatment prior to disposal (Detroit Edison 2011a). All dredging would be performed in compliance with permits from the USACE and MDEQ.

Fermi 3 construction traffic would use existing onsite roads, as well as a new access road designated as New Fermi Drive, which would extend from Dixie Highway to Fermi 3 (Detroit Edison 2011a). Installation of the new road is not expected to interfere with existing land use on the Fermi site. In addition to the new road, existing roadways onsite might be widened or additional surface layers added to roads used by heavy construction equipment, in order to reduce the potential for erosion and siltation. Traffic increases would be localized and occur mainly during shift changes. Rail access to the Fermi site currently exists, and would be available for Fermi 3 if necessary (see Section 3.1), with no new or modified rail lines required (Detroit Edison 2011a).

Fermi 3 and associated facilities (other than offsite transmission lines) would be situated entirely within the existing Fermi site. Land on the entire site is zoned as “Public Service” by Frenchtown Township and designated as “Industrial” by Monroe County (James D. Anulewicz Associates, Inc., and McKenna Associates, Inc. 2003; Monroe County Planning Department and Commission 2010). The new facilities would be consistent with these zoning designations. No impacts on land use planning in Monroe County or Frenchtown Township would be expected as a result of Fermi 3, as the facility would comply with all applicable land use and zoning regulations of Monroe County and Frenchtown Township. Regional and State land use plans do not contain designations that apply specifically to the Fermi site, and these plans would therefore not be affected by Fermi 3. Development of Fermi 3 would, therefore, be in compliance with all local, regional, and State land use plans.

The existing onsite 120-kilovolt (kV) and 345-kV transmission lines serving Fermi 2 would be rerouted to cross mostly emergent wetland and uplands in the DRIWR (Detroit Edison 2011a). New 345 kV transmission lines serving Fermi 3 would be built within the relocated corridor alongside the rerouted Fermi 2 lines. As stated previously, a proposed new switchyard for Fermi 3 would occupy about 10 ac of land that has previously been restored to prairie vegetation (Detroit Edison 2011a).

Some offsite land use changes could indirectly result from the development of Fermi 3. Possible impacts include the conversion of some land in surrounding areas to housing developments (e.g., recreational vehicle parks, apartment buildings, single-family condominiums and homes, and manufactured home parks) and retail development to accommodate workers. Property tax revenue from the addition of Fermi 3 could induce additional growth in Monroe County as a result of infrastructure improvements (e.g., new roads and utility services). Additional information on roads, housing, and construction-related infrastructure impacts is

discussed in Section 4.4, with operations-related infrastructure impacts presented in Section 5.4.

Based on information provided by Detroit Edison, and the review team's independent evaluation, the review team concluded that the land use impacts of preconstruction and construction activities on the Fermi site would be SMALL and that mitigation measures beyond those required by Federal and State agencies would not be warranted. This conclusion recognizes that the impacts on the DRIWR are consistent with Detroit Edison's Cooperative Agreement with the FWS for management of the DRIWR, that Detroit Edison would ensure that the Fermi 3 project is consistent with Michigan's objectives for managing its coastal zone, and that Detroit Edison would perform compensatory mitigation required by the USACE and MDEQ for unavoidable losses of wetlands. It also recognizes that ITC*Transmission* would obtain a coastal zone consistency determination for that part of the proposed transmission line to be built on the Fermi site. Because NRC-authorized construction activities represent only a portion of the analyzed activities, the NRC staff concluded that the land use impacts of NRC-authorized construction activities would also be SMALL. As previously noted, the project would require certification from the State of Michigan that it would be consistent with Michigan's coastal zone management program.

4.1.2 Transmission Line Corridors and Other Offsite Facilities

Three new 345-kV transmission lines have been proposed to serve Fermi 3, and would extend offsite along a 29.4-mi route in Monroe, southwest Wayne County, and southeast Washtenaw County. Within the required corridor, approximately 18.6 mi of lines would be sited within established transmission line rights-of-way, and approximately 10.8 mi of the corridor would be sited along new undeveloped right-of-way (Detroit Edison 2011a). The lines would be connected to the ITC*Transmission* Milan Substation for distribution to the grid. New towers would require foundation excavations, and the new lines would be constructed, owned, and operated by ITC*Transmission*. The Milan Substation currently occupies 4 ac; it is likely that the substation footprint would be expanded to an area of approximately 23 ac, encompassing approximately 19 ac of additional land, to accommodate the three new transmission lines from Fermi 3 (Detroit Edison 2011a).

Approximately 1069 ac would be used for the proposed lines, assuming that a 300-ft-wide right-of-way (ROW) would be required for a distance of 29.4 mi (Detroit Edison 2011a). Additional acreage for laydown and other activities, located outside the corridors, might also be required. No new roadway access would be anticipated, with existing roads used for access and construction traffic. While the new lines are being built, the corridor areas might be fenced to prevent impacts on other land uses. Once the lines are installed, a small amount of land around the transmission tower bases would be lost from productive use in agricultural areas, while in forested areas, the corridor would remain cleared. Clearance of new corridor would result in vegetation removal and brush piles, disturbance of soils and soil erosion, and damage to

culverts and roadways. Within the 300-ft corridor, there would be impacts on forest, agricultural lands, wetlands and streams, residences, undeveloped land, and recreational uses.

Practices used for extending the new transmission lines to the Milan Substation would be expected to comply with the requirements of local, State, and Federal environmental regulations. ITC*Transmission* has stated that industry standards for best environmental practices would be observed, including (1) continual and responsible management of wastes and chemicals to prevent and avoid pollution, (2) use of environmentally preferable materials, (3) reduction or elimination of wastes at the source, (4) appropriate storage and handling of wastes, (5) recycling and reuse of waste materials, and (6) sediment and erosion control (ITC 2010). Detroit Edison has stated that it expects ITC*Transmission* to largely restore existing land uses, other than forest, in the transmission line corridor once the transmission line is built (Detroit Edison 2011a).

Land use in each section of the corridor for the proposed new transmission lines is shown in local Township and County future use plans as being utility use, while land for the new corridor is shown as agricultural (Monroe County Planning Department and Commission 2010; James D. Anulewicz Associates, Inc., and McKenna Associates, Inc. 2003). Sections 460.551–460.575 of the Michigan Compiled Laws (MCL) authorize the Public Service Commission to regulate electric transmission lines. In siting the new transmission line, Detroit Edison would contact the State Historic Preservation Office (SHPO), FWS, MDEQ, and USACE.

Based on information provided by Detroit Edison, ITC*Transmission*, and the review team's own independent review, the review team concluded that the land use impacts of building the new transmission line would be SMALL, and no additional mitigation beyond that required by other environmental permits would be warranted. None of the impacts related to transmission lines would result from NRC-authorized activities.

4.2 Water-Related Impacts

Water-related impacts associated with building a nuclear power plant are similar to impacts associated with building any large industrial facility development project and to the impacts that occurred during the construction of Fermi 2. Prior to initiating onsite activities, including any site preparation work, Detroit Edison is required to obtain the appropriate authorizations that regulate alterations to the hydrological environment. These authorizations would likely include:

- Clean Water Act Section 404 Permit. This permit is required for the discharge of dredged and/or fill material into waters of the U.S.
- Clean Water Act Section 401 Water Quality Certification. This certification would be issued by the MDEQ to ensure that the project does not conflict with State and Federal water-quality management programs. Permit No. 10-58-0011-P was issued to Detroit Edison on

January 24, 2012 (MDEQ 2012). Issuance of this permit constitutes the required State of Michigan 401 Water Quality Certification.

- Clean Water Act Section 402(p) National Pollutant Discharge Elimination System (NPDES). The MDEQ administers the NPDES program for the U.S. Environmental Protection Agency (EPA) Construction General Permit and industrial discharge permits. These permits regulate point source stormwater and wastewater discharges. Discharge of excavation dewatering water would require an additional permit under Section 402(p). Discharges from hydrostatic pressure testing of new and existing piping, tanks, and other equipment would be regulated under an NPDES General Hydrostatic Pressure Test Water permit.
- Section 10 of the Rivers and Harbors Appropriations Act of 1899 Permit. This permit would be issued by the USACE to regulate any structure or work in, over, under, or affecting waters of the United States, such as Lake Erie. Maintenance dredging activities under Section 10 are currently authorized by USACE Permit No. LRE-1988-10408.
- Federal Coastal Zone Management Act of 1972. This concurrence of consistency with the policies of the State coastal program would be issued by the MDEQ. It applies to any activity that is in land, water, or any natural resource in the coastal zone or any activity that affects land use, water use, or any natural resource in the coastal zone, if the activity requires a Federal license or permit. Permit No. 10-58-0011-P was issued to Detroit Edison on January 24, 2012 (MDEQ 2012). Issuance of this permit constitutes the required coastal zone consistency determination from the MDEQ.
- MDEQ Soil Erosion and Sedimentation Control (SESC) Permit. This permit regulates controls on soil and sediment at construction sites. The authority for this permit is assigned to the Monroe County Drain Commissioner.
- MDEQ Permit Under Act 451, Natural Resources and Environmental Protection Act, Part 325, "Great Lakes Submerged Lands." This Michigan law regulates dredging activities in the Great Lakes. Permit No. 10-58-0011-P was issued to Detroit Edison on January 24, 2012 (MDEQ 2012) and authorizes construction-related activities under Part 325. Maintenance dredging activities under Part 325 are currently authorized by MDEQ Permit No. 11-58-0055-P.
- MDEQ Permit under Act 451, Natural Resources and Environmental Protection Act, Part 303, "Wetlands Protection." This Michigan law regulates dredge and fill activities in jurisdictional wetlands. Permit No. 10-58-0011-P was issued to Detroit Edison on January 24, 2012 (MDEQ 2012) and authorizes construction-related activities under Part 303.
- Monroe County Environmental Health/Sanitary Code Well Permit. Well permit is required for construction of wells, including dewatering and monitoring wells.

Hydrological alterations are discussed in Section 4.2.1; water use impacts are discussed in Section 4.2.2; water-quality impacts are discussed in Section 4.2.3; and water monitoring is discussed in Section 4.2.4.

4.2.1 Hydrological Alterations

Building the proposed Fermi 3 facility would affect several surface water bodies, site drainage patterns, and groundwater underlying the site.

4.2.1.1 Surface Water Bodies

Surface water bodies that would be altered by site preparation and building activities include Lake Erie, Swan Creek, and several onsite water bodies.

As part of building Fermi 3, Detroit Edison plans to construct a water intake structure and a water discharge pipe in Lake Erie. The intake structure would be located between two rock groins that extend 600 ft from the facilities' shoreline into the lake. The discharge pipe will extend 1300 ft from the shoreline in the plant vicinity and into Lake Erie. Dredging, bedding placement, and cover material would be required between the intake rock groins and along the discharge pipe pathway and outfall structures. The MDEQ has issued Permit No. 10-58-0011-P to Detroit Edison authorizing dredging activities related to the construction of the intake structure and the discharge pipe (MDEQ 2012). The permit describes State of Michigan conditions, mitigation, and monitoring that must be adhered to for permit compliance. Detroit Edison applied for a USACE permit for activities associated with the proposed Fermi 3 project, including activities related to constructing the intake structure and discharge pipe, to USACE on September 9, 2011 (Detroit Edison 2011e). The USACE and MDEQ permitting processes would ensure that construction and preconstruction impacts are avoided as practicable, then reduced as practicable by implementation of BMPs or other appropriate measures, and then mitigated by compensation and/or other appropriate means.

Maintenance dredging for the intake canal would also be required for ongoing Fermi 2 operations during building activities for Fermi 3. Maintenance dredging activities for Fermi 2 are currently authorized by (1) USACE Permit No. LRE-1988-10408 and (2) MDEQ Permit No. 11-58-0055-P.

Swan Creek could receive increased stormwater runoff from construction areas. In addition, the water removed from the subsurface during construction dewatering would likely be discharged into stormwater outfalls that flow to the mouth of Swan Creek.

During the building of Fermi 3, the north canal (overflow canal) and the small pond (the central canal) would be dewatered and backfilled, and the south canal (discharge canal) would be partially dewatered and backfilled (Detroit Edison 2011a; Figure 4-1). It is estimated that a total

Figure 4-1. Areas Affected by Building Activities for Fermi 3 (Detroit Edison 2011a)

of 5.2 ac of open water would be permanently impacted (Doub 2011). In addition, some onsite wetlands would be temporarily or permanently affected by building activities. Approximately 8.3 ac of wetlands would be permanently affected (Doub 2011). Impacts on waters of the United States and jurisdictional wetlands are regulated by the USACE and the MDEQ. The jurisdictional determinations are discussed in Section 2.7.1. As described above, the MDEQ has issued Permit No. 10-58-0011-P to Detroit Edison authorizing activities related to construction and dredging in regulated wetlands, at the shoreline, and in Lake Erie, below the State of Michigan ordinary high water mark (MDEQ 2012). The permit describes State of Michigan conditions, mitigation, and monitoring that must be adhered to for permit compliance. The USACE and MDEQ permitting processes would ensure that construction and preconstruction impacts are avoided as practicable, then reduced as practicable by implementation of BMPs or other appropriate measures, and then mitigated by compensation and/or other appropriate means.

Building activities would decrease the available area of floodplain at the site, due to the emplacement of fill and building of new facilities that will occupy land which is currently available to accommodate flood waters. However, the majority of impacts on areas within the floodplain will be temporary, and the small amount of permanently affected area is not anticipated to cause noticeable impacts on the floodplain capacity at the Fermi site. In addition, Detroit Edison's proposed compensatory mitigation of anticipated aquatic resource losses would restore and provide additional capacity to accommodate flood waters in coastal areas of Monroe County (Detroit Edison 2011e).

4.2.1.2 Landscape and Drainage Patterns

It is anticipated that a total of 189 ac of previously undeveloped land at the Fermi site would be affected by building activities related to the Fermi 3 power block, new parking structures, a warehouse, construction and preconstruction parking, construction and preconstruction laydown, a new switchyard, a new meteorological tower, and administrative buildings (Figure 3-2). Stormwater runoff from all building and site preparation activities would be regulated by an NPDES Construction General Permit under Section 402(p) of the Clean Water Act (EPA 2009). Before commencing any building activities, Detroit Edison would be required to develop an SESC plan to obtain an SESC permit. The SESC plan would include descriptions of the BMPs used during preconstruction and construction activities to prevent and manage erosion and offsite sedimentation. The SESC permit is needed to obtain the NPDES Construction General Permit.

During preconstruction and construction activities, the site stormwater drainage patterns and runoff quantities would be affected. Construction of the power block area would require excavation and alteration of the land surface in the vicinity of Fermi 3 in order to build an elevated area for the safety structures and to install a stormwater drainage system for the site. The existing site grade would be raised to 589.3 ft North American Vertical Datum of 1988

(NAVD 88) in the vicinity of the safety-related structures. Stormwater drainage patterns would be altered during clearing and grading activities for the new buildings, transmission lines, a substation, laydown areas, and the meteorological tower. The site clearing and building activities for the proposed Fermi 3 would also convert some land that is currently available for drainage to an impervious surface, so the quantity of stormwater runoff would increase compared to current conditions.

Offsite areas would be affected by the installation of the new 345-kV transmission lines along a 29.4-mi route to the Milan Substation, 10.8 mi of which is currently not developed. It is estimated that the undeveloped portion of the transmission line corridor would be approximately 393 ac, assuming the width along the 10.8-mi transmission line corridor would be 300 ft (Detroit Edison 2011a). Development of the new transmission lines would also take place along an existing 18.6 mi of ROW currently used for transmission structures and lines (Detroit Edison 2011a). The 10.8-mi undeveloped portion of the transmission line corridor would cross nine drains or streams, and these water bodies could be affected by building the line. The previously developed transmission line ROW crosses 12 drains or streams and eight wetland areas that could be affected by activities associated with upgrading the transmission lines (Detroit Edison 2011a).

4.2.1.3 Groundwater

Groundwater would not be used during the building of Fermi 3, but it would be affected during building activities. Building activities and conditions that could affect groundwater levels and alter groundwater flow around Fermi 3 include the following: excavation of portions of site aquifers (overburden and Bass Islands Group) and emplacement of the high-conductivity structural fill, filling in of the onsite water bodies, changes in recharge due to impervious surfaces and stormwater routing, and dewatering during excavation. Excavation dewatering would lower the water levels locally, in the overburden and in the Bass Islands Group bedrock aquifer. The impacts of excavation dewatering are discussed more fully in Section 4.2.2.2. Water produced during excavation dewatering would likely be discharged to Swan Creek via the North Lagoon by using the NPDES stormwater outfalls.

A drop in the groundwater elevation as a result of dewatering would not affect water levels in the onsite wetlands because the wetlands are hydraulically connected to Lake Erie. This means that any loss of wetland inflow due to dewatering would be quickly replaced by inflow from the lake. Detroit Edison (2011a) estimates that the water levels in the Quarry Lakes would drop between 1 and 2 feet as a result of dewatering operations for preconstruction and construction activities. Impacts on groundwater systems during dewatering would be reduced by installing flow barriers at the edges of the excavation area (Detroit Edison 2011a). Methods such as the (1) emplacement of a concrete wall extending from the surface to below the base of the excavation around the perimeter of the deep excavation area or (2) installation of a grout curtain at the perimeter of excavation would be used. Detroit Edison (2011a) also states that grouting

in the bottom of the excavation could also be used to reduce groundwater inflows into the excavation area. These steps would limit the impacts of dewatering on offsite groundwater systems and groundwater users.

4.2.1.4 Summary of Hydrological Alterations

In summary, the hydrological alterations associated with building on and near the Fermi site would be limited to dredging for the intake and discharge structures and barge slip, altering the surface topography and hydrology (e.g., site grading, laydown areas, filling of onsite water bodies), and dewatering the excavation for construction of the nuclear facilities. Offsite hydrological alterations are associated with the proposed new or expanded transmission line corridors where the lines cross wetlands and drainages. The impacts of hydrological alterations resulting from both onsite and offsite construction activities would be localized and reduced with the implementation of BMPs and mitigation measures required by the necessary permits and certifications. Any impacts on USACE jurisdictional water resources associated with the compensatory mitigation construction activities proposed by Detroit Edison would be evaluated by the USACE during its permit evaluation process.

4.2.2 Water Use Impacts

This section describes, analyzes, and assesses the impacts of proposed project preconstruction and construction activities on the use of both groundwater and surface water resources. It identifies the proposed preconstruction and construction activities that could have impacts on water use and analyzes and evaluates proposed practices designed to minimize adverse impacts on water use. The impacts of building a nuclear power plant on water use are similar to impacts associated with building any large industrial construction project.

4.2.2.1 Surface Water Use Impacts

Surface water obtained directly from Lake Erie would be used to support building activities at the site. Potable water to support preconstruction and construction would be obtained from Frenchtown Township, which also uses water from Lake Erie. Fermi 3 building activities are anticipated to require between 350,000 and 600,000 gallons per day (gpd) for concrete batch plant operation, temporary fire protection, dust control, and sanitary needs (Detroit Edison 2011a). Since this water withdrawn from Lake Erie would be for consumptive use (apart from the sanitary water returned to the system) no runoff is anticipated to be generated from these building activities. The usage rate of water for preconstruction and construction activities would be approximately 2 percent of the usage rate of water consumed for operation of Fermi 3, which is 0.1 percent of average consumptive use rate in Lake Erie basin between 2000 and 2006 and 0.001 percent of the average rate of Lake Erie water withdrawn between 2000 and 2006. In addition, annual water use during preconstruction and construction activities would be minute compared to the total volume of Lake Erie (approximately 0.00017 percent). The Great

Lakes Compact of 2008 requires any new water use of more than 5 million gallons per day (MGD) to be subjected to a regional review. Water use during the building of Fermi 3 would be less than 5 MGD, so water use for building activities would not be subject to regional review.

Detroit Edison (2011a) states that the only user of surface water near Fermi 3 preconstruction and construction activities would be the Fermi 2 power plant. Figure 4-1 shows the area of Lake Erie that would be affected by withdrawals of water from Lake Erie for use as construction water. Though the intake area for Fermi 3 and Fermi 2 would be shared, Detroit Edison (2011a) states that water withdrawals for operations at Fermi 2 would not be affected by Fermi 3 building activities.

On the basis of information provided by Detroit Edison (2011a) and the review team's independent evaluation, the review team concludes that surface water use impacts of preconstruction and construction activities would be SMALL and that no mitigation would be warranted. On the basis of the above analysis, the NRC staff concludes that the impacts of NRC-authorized construction activities would be SMALL. The NRC staff also concludes that no further mitigation measures would be warranted.

4.2.2.2 Groundwater Use Impacts

Excavation dewatering is the only anticipated use of groundwater during building and site-clearing activities for Fermi 3. Excavation will occur in the power block area and a barrier would be installed around the edge of the excavation area to limit flow into the excavation. This barrier would extend from the ground surface to below the maximum depth of excavation, into the Bass Islands Group bedrock aquifer (Detroit Edison 2011a). The barrier would be a concrete wall or a grout curtain extending from the ground surface to below the excavation at the perimeter of excavation. Grouting could also be done in the bottom of the excavation. Installing a barrier would reduce the groundwater flow into the excavation area, especially from the water in the overburden (Detroit Edison 2011a). Dewatering would occur from the bedrock aquifer, but groundwater in the site overburden drains down into the bedrock aquifer. Because the units are hydraulically connected, groundwater would also be drained from the overburden. Detroit Edison (2011a) anticipates that the proposed barriers around the excavation areas would minimize groundwater inflow, such that using sumps at the bottom of the excavation would be sufficient for dewatering the area of interest.

Detroit Edison (2011a) modeled the effects of excavation dewatering at the Fermi site by using a modified version of a published U.S. Geological Survey (USGS) MODFLOW model of Monroe County (Reeves et al. 2004). The review team performed an independent evaluation of the model and found the methods, parameters, and conclusions to be satisfactory. Detroit Edison (2011a) determined that construction and preconstruction dewatering activities could affect the groundwater table of the bedrock aquifer in the vicinity of the site and also that users in the vicinity could be affected by the lower water levels. Two alternative scenarios estimating

drawdown caused by construction and preconstruction dewatering activities are presented in the ER:

- In Scenario 1, Detroit Edison assumed there would be a reinforced diaphragm concrete wall in the subsurface to reduce the water drainage from the aquifer for dewatering.
- In Scenario 2, Detroit Edison assumed that there would be a grout curtain or freeze wall to reduce the water drainage from the aquifer during dewatering.

Both scenarios assumed that the bottom of the excavation would be grouted to reduce groundwater inflows. Based on the results of the model scenarios, the reinforced diaphragm concrete wall would be a better flow barrier and result in smaller drawdown in the groundwater system in the area of the site, although the differences offsite were not significant (Detroit Edison 2011a).

Groundwater wells that could be affected by drawdown from dewatering during the building of Fermi 3 are nearby household wells, irrigation wells, and other wells (Detroit Edison 2011a). The model results indicate that the reinforced diaphragm concrete (Scenario 1) wall could limit offsite impacts due to dewatering somewhat better than the grout curtain or freeze wall (Scenario 2). The nearest well to the site is a domestic water supply well located approximately 3800 ft from the center of the power block area, where both modeling scenarios predict that drawdown would be highest. In Scenario 1, a drawdown of 1 ft or greater is confined within the site boundary and is estimated to be less than 1 ft at the nearest offsite well (Figure 4-2). In Scenario 2, a drawdown of 2 ft or greater is confined within the site boundary and is estimated to be slightly less than 2 ft at the nearest offsite well (Figure 4-3). These drawdowns are the modeled maximum amounts associated with long-term dewatering to arrive at steady-state conditions.

The predicted impact of excavation dewatering is less than the observed seasonal fluctuation in local bedrock wells. Water levels in Fermi site wells screened in the Bass Islands Group aquifer have been observed to fluctuate an average of 4 ft within a year (Detroit Edison 2011a). Groundwater elevations in the vicinity of the Fermi site have declined between approximately 10 and 15 ft since the early 1990s as a result of dewatering for offsite quarry operations elsewhere in Monroe County (Reeves et al. 2004). Onsite dewatering during construction is temporary and may result in an additional decrease of 2 ft or less to nearby users; therefore, their water source is not expected to be affected. As a result, dewatering would not create significant, long-term impacts on nearby water users. Detroit Edison has committed to supply water to meet all users' needs, if necessary (Detroit Edison 2011a).

The groundwater flow beneath the site has been reversed from toward Lake Erie (historically) to toward quarry operations to the north and southwest of the Fermi site. While dewatering at the site may affect groundwater flow directions in the area, these effects will be minor and temporary due to limited scope and timeframe of dewatering activities.

Figure 4-2. Modeled Drawdown of Groundwater in the Bass Islands Group as a Result of Dewatering for Fermi 3 Construction – Scenario 1 (Detroit Edison 2011a)

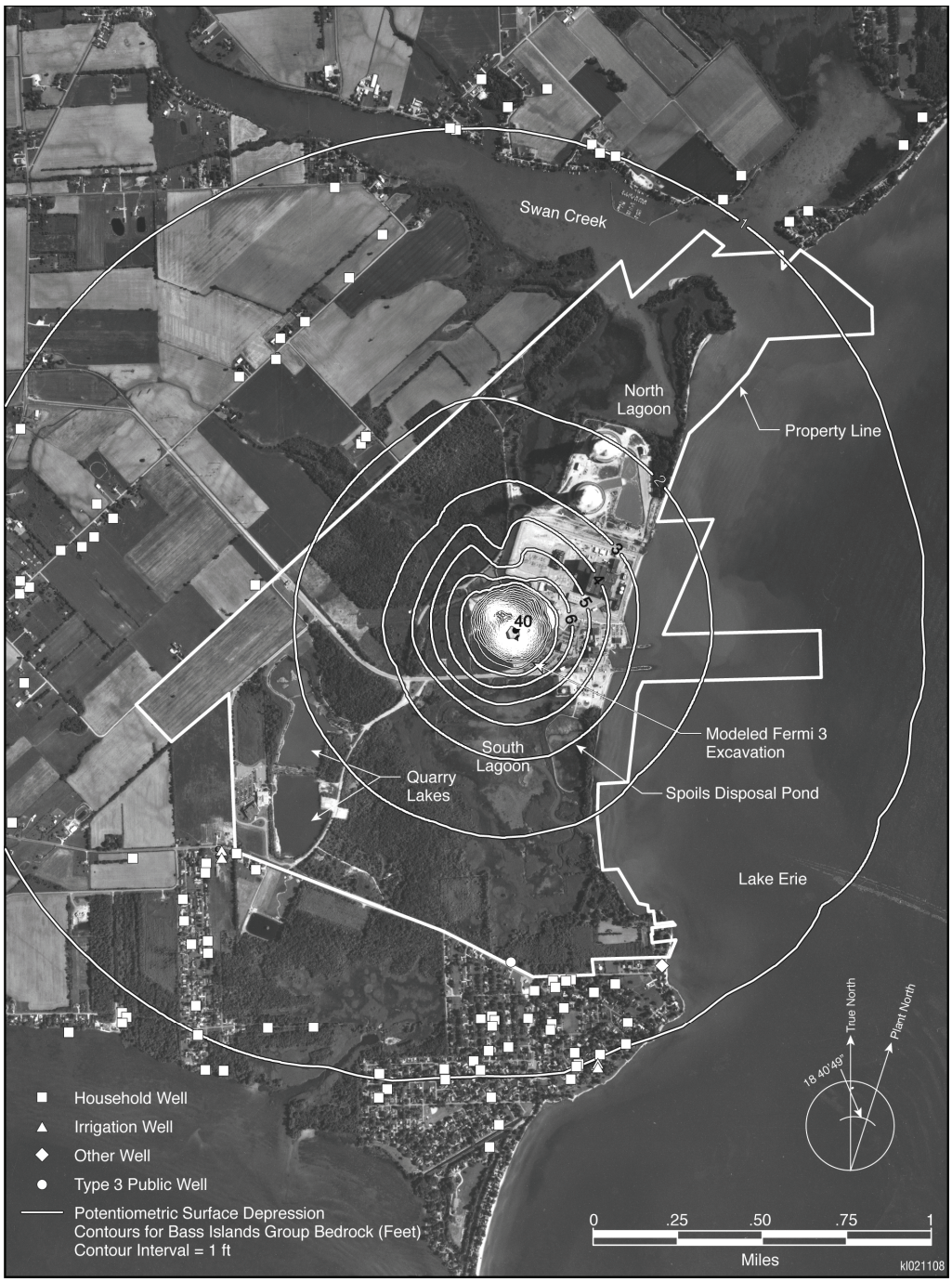

Figure 4-3. Modeled Drawdown of Groundwater in the Bass Islands Group as a Result of Dewatering for Fermi 3 Construction – Scenario 2 (Detroit Edison 2011a)

Groundwater dewatering activities are not expected to affect onsite wetlands, because these wetlands are hydraulically connected to Lake Erie and inflow from the lake would rapidly supply the wetland with water if dewatering caused drawdown of the groundwater table in wetland areas.

On the basis of information provided by Detroit Edison (2011a) and the review team's independent evaluation, the review team concludes that groundwater use impacts of construction and preconstruction activities for Fermi 3 would be SMALL and no further mitigation would be warranted. On the basis of the above analysis, and because NRC-authorized construction activities represent only a portion of the analyzed activities, the NRC staff concludes that the impacts of NRC-authorized construction activities would be SMALL. The NRC staff also concludes that no further mitigation measures would be warranted.

4.2.3 Water Quality Impacts

Water quality impacts from construction activities are similar to those from other large industrial construction projects. Impacts on the quality of the water resources of the site are expressed for surface water (Swan Creek and Lake Erie) features and groundwater (i.e., the water table in the overburden and Bass Islands Group aquifer) features that are most directly affected by construction and preconstruction activities.

4.2.3.1 Surface Water Quality Impacts

The water quality of surface water bodies on or near the Fermi site could be affected by building and site clearing activities and impacts from these activities on the quality of surface water need to be considered. These impacts are discussed in the applicant's ER (Detroit Edison 2011a).

Installation of fish return and intake and discharge structures in and along the shoreline of Lake Erie and installation of culverts in the overflow and south canals would disturb sediments during building and dredging activities, potentially increasing turbidity near the intake and discharge structures and the overflow and south canal at the Fermi site. Dredged sediments would be disposed of in the Spoils Disposal Pond (Figure 4-1), and the water draining from dredged sediments would drain through an NPDES outfall. The outfall from the Spoils Disposal Pond is regulated by the Fermi 2 NPDES permit. Discharge from the Spoils Disposal Pond associated with Fermi 3 dredging activities would be regulated under the existing Fermi 2 NPDES permit, which allows 450 million gallons per year to be discharged from the pond (Detroit Edison 2011a). The applicant anticipates that the Spoils Disposal Pond has adequate capacity for the Fermi 3 dredged material (Detroit Edison 2011a).

Construction-related activities may potentially affect water quality near the site. Pollutants (e.g., oil and grease, copper, zinc, and other pollutants from vehicles) resulting from increased traffic related to building activities could be entrained into stormwater runoff during rainfall

events. Construction activities such as the discharge of water from dewatering, filling of the onsite canals, disposal of dredge spoils, and land clearing and grading could increase erosion and/or carry sediment in stormwater runoff from the site into the North Lagoon (to Swan Creek), South Lagoon, the Quarry Lakes, or Lake Erie. Areas of concern for potentially increasing sediment in runoff include the power block area, new buildings, transmission lines, a substation, laydown areas, and the meteorological tower. The impacts of these activities on surface water quality would be reduced by NPDES permitting, implementation of the approved SESC plan that includes soil erosion controls (such as silt fences and straw bales), and adherence to a Pollution Incident Prevention Plan (PIPP) to prevent contamination.

The NPDES construction permit requires monitoring of the discharges for turbidity during all construction and preconstruction activities (EPA 2009). Starting in August 2011, EPA-defined construction projects disturbing an area larger than 20 ac will be required to monitor construction-related discharges for turbidity (EPA 2009). After that date, the turbidity of EPA-defined construction[(a)] stormwater discharges from projects larger than 20 ac will be required to be below an average of 280 nephelometric turbidity units (NTUs).

As mentioned, to build and operate the proposed Fermi 3, Detroit Edison must obtain authorizations from Federal and State regulatory agencies. This would limit the impacts of regulated activities.

In summary, hydrological alterations resulting from site preparation and building activities, including discharge of water from dewatering, clearing, grading, filling and dredging for the intake and discharge, would be localized and temporary. In addition, State and Federal permits and certifications would require the disturbed land to be stabilized to prevent erosion through implementation of BMPs to minimize impacts, and potential impacts to be monitored. As a result, the review team concludes that the surface water quality impacts of construction and preconstruction activities for Fermi 3 would be SMALL, and no mitigation beyond the BMPs would be warranted. On the basis of the above analysis, and because NRC-authorized construction activities represent only a portion of the analyzed activities, the NRC staff concludes that the surface water quality impacts of NRC-authorized construction activities would be SMALL. The NRC staff also concludes that no further mitigation measures beyond the BMPs would be warranted.

4.2.3.2 Groundwater Quality Impacts

During site preparation and building activities for the proposed Fermi 3, the potential would exist for spills to transport pollutants (e.g., gasoline) to groundwater in the overburden. As noted, Detroit Edison would develop a PIPP and the subsequent NPDES construction stormwater

(a) EPA-defined construction would include all building activities occurring at the site, including both NRC-defined preconstruction activities and construction activities.

permit that would require the implementation of BMPs that would prevent or promptly mitigate any spills.

Because of the planned use of good housekeeping rules and BMPs, including maintaining an inventory of potential sources, performing preventive maintenance and inspections, providing signs and labels, and providing secondary containment, the review team concludes that the groundwater quality impacts of preconstruction and construction activities for proposed Fermi 3 would be SMALL, and no further mitigation beyond the BMPs would be warranted. On the basis of the above analysis, and because NRC-authorized construction activities represent only a portion of the analyzed activities, the NRC staff concludes that the groundwater quality impacts of NRC-authorized construction activities would be SMALL. The NRC staff also concludes that no further mitigation measures beyond the BMPs would be warranted.

4.2.4 Water Monitoring

Detroit Edison (2011a) presented construction monitoring programs in Sections 2.3.4.1 and 6.3 of the ER. A discussion of previous monitoring efforts at the Fermi site is presented in Section 2.3.4.

Measurements at the NOAA gaging station (ID 9063090) on Lake Erie in the vicinity of the Fermi 2 intake structure are expected to continue to provide hourly Lake Erie water level measurements at the site. The NPDES permit for Fermi 2 requires monitoring of five outfalls, including the outfall associated with the Dredge Spoils Pond (Figure 4-1). In addition, Fermi 2 is required to analyze the intake water for total mercury on a monthly basis. Fermi 2 NPDES monitoring is anticipated to be ongoing during construction and preconstruction activities. The NPDES stormwater construction permit would require monitoring of any discharge from the building areas for turbidity. Monitoring frequency and location would be decided during the permitting process.

Currently, groundwater monitoring well networks exist on the Fermi site to monitor potential impacts on groundwater levels and quality. Some of these wells would be affected by land clearing and building activities for Fermi 3 and would be taken out of service prior to the start of work (Detroit Edison 2011a). Detroit Edison (2011a) has committed to follow NRC (2007) guidance in NUREG/CR-6948 for groundwater monitoring at the site during both the building and operation phases.

At the start of dewatering activities, Detroit Edison (2011a) would monitor groundwater levels both in the overburden and the Bass Islands Group aquifer at frequent intervals. When groundwater levels would reach equilibrium during the dewatering activities, Detroit Edison would reduce the monitoring frequency (Detroit Edison 2011a).

4.3 Ecological Impacts

This section describes potential impacts on ecological resources (terrestrial, wetlands, and aquatic resources) from the construction of Fermi 3.

4.3.1 Terrestrial and Wetland Impacts

This section addresses potential terrestrial and wetland impacts from building Fermi 3 and associated facilities at the Fermi site.

4.3.1.1 Terrestrial Resources – Fermi Site and Vicinity

Impacts on Habitats

All ground-disturbing activities related to building Fermi 3, other than transmission lines, would occur within the existing Fermi site boundary. Although all impacts on terrestrial ecosystems cannot be avoided, the footprint of Fermi 3 was established to minimize impacts on high-quality terrestrial habitats, including wetlands. The proposed location of the power block and cooling tower are in an area bounded by Fermi Drive, Doxy Road, Fermi 2, and Lake Erie, thereby minimizing impacts on the South Lagoon wetlands. The proposed facilities, as well as the needed temporary parking and laydown areas, have been sited to minimize impacts on undisturbed habitats, including wetlands (see Figure 4-1).

Approximately 197 ac of terrestrial wildlife habitat on the Fermi site would be disturbed while building the proposed Fermi 3 facilities (Detroit Edison 2011a). Approximately 51 ac of that habitat would be permanently lost because it would be cleared, grubbed, and graded to develop permanent facilities. Temporary disturbance of the remaining 146 ac of terrestrial habitat would be necessary to accommodate temporary laydown and parking areas (see Table 4-1). Although the project would reportedly disturb only 189 ac of previously undeveloped land, of which approximately 42 acres would be permanently occupied (Detroit Edison 2011a), some of the terrestrial habitat impacts would take place in areas of previous development. Detroit Edison has stated its intention to restore temporarily disturbed areas with regionally indigenous species (Detroit Edison 2011a).

Detroit Edison has determined the placement of proposed facilities in an effort to minimize impacts on wetlands and forest cover. Approximately 130 ac of the permanent and temporary impacts would involve grassland habitats (Table 4-1). Approximately 63 ac of the affected grassland habitat consists of agricultural land presently used for row crops, which would be made available again for use as upland cropland after Fermi 3 is built (Detroit Edison 2011a). The remainder of the affected grassland habitat consists of existing ROW land, idle and old field land, and a portion of a restored tallgrass prairie project established by Detroit Edison. Impacts on the restored tallgrass prairie are discussed below under Important Habitat – Fermi Site.

Table 4-1. Area of Terrestrial Habitat Types on Fermi Site to Be Disturbed by Building Fermi 3

Cover Type (Habitat)	Acres Permanently Lost	Acres Temporarily Disturbed	Total Acres of Habitat Type on Site
Terrestrial Habitats			
Coastal emergent wetland open water	0	0	35
Coastal emergent wetland vegetated	1.7	2.2	238
Grassland: right-of-way	9.6	13.5	29
Grassland: idle/old field/planted	25.7	17.6	75
Grassland: row crop	1.0	63.0	64
Shrubland	2.0	38.5	113
Thicket	1.7	0	23
Forest: coastal shoreline	1.0	0	47
Forest: lowland hardwood	0	4.8	92
Forest: woodlot	8.6	6.3	117
Total Terrestrial Habitats Lost	**51.3**	**145.9**	**833**
Developed Areas	**0**	**0**	**212**
Open Water			
Lakes, ponds, rivers	0	0	44
Lake Erie	0	0	171

Source: Detroit Edison 2011a

Approximately 42 ac of the impacts would involve shrubland or thicket habitats (Table 4-1). Only about 21 ac of impact would involve forest habitats. Less than 4 ac of coastal emergent wetland would be affected (this figure represents coastal emergent wetland as a generalized habitat type only; impacts on wetlands as defined by the USACE/MDEQ are discussed in Section 4.3.1.3.). Clearing and disposal of woody vegetation would have to be performed consistent with the provisions of the Michigan Department of Agriculture (MDA) Emerald Ash Borer Interior Quarantine on firewood and other ash tree products in effect at the time of site preparation activities to avoid spreading the emerald ash borer (*Agrilus planipennis*) (MDA 2009).

Even temporary clearing of forest, shrubland, and thicket areas would reduce shelter and forage habitat until woody vegetation can re-establish those habitat elements. Clearing forest habitat would have longer-term impacts, but revegetation would gradually restore the lost habitat.

Although forested areas would be cleared for the project, most of the forested areas to be cleared would be on the edges of forest cover patches. No large forested blocks would be fragmented by project activities. The impacts on species sensitive to forest fragmentation

would, therefore, be minimal. As shown in Table 4-1, temporary forest clearings would occur on only about 11 ac of the Fermi site.

Once no longer needed, temporarily disturbed vegetated areas would be revegetated with plants native to the project vicinity (Detroit Edison 2011a). EPA (2012) recommended that Detroit Edison take the following actions when revegetating temporarily disturbed habitats:

- Use native species appropriate to the sites to be revegetated;
- Prior to clearing and revegetating temporarily disturbed habitats, develop measures of success for the revegetation based on the percentages of the numbers and/or area covered by the planted native species and any non-native invasive species; and
- Where forested land needs to be cleared for overhead transmission lines, consider establishing low-growing native plants conducive to periodic mowing.

Because many of the areas that would be disturbed contain substantial amounts of nonnative invasive plant species, a restored vegetation community of predominantly native species eventually could provide higher-quality forage and shelter habitat than the existing vegetation community in those areas. However, especially for forested areas, several years would be needed for new vegetation to grow enough to replicate the ecological functions of the original vegetation.

As indicated in Section 4.3.1.3, approximately 34.5 ac of wetlands would be disturbed, including approximately 23.7 ac of temporary impacts, approximately 8.3 ac of permanent fill (conversion to non-wetland), and approximately 2.5 ac of forested wetland permanently cleared of trees (converted to emergent or scrub-shrub wetlands). This includes not only coastal emergent wetlands, as indicated in Table 4-1, but also some other areas within forest and other habitats that were delineated as wetlands. Both the USACE and MDEQ require compensatory mitigation for the unavoidable loss of wetlands that are regulated by these agencies. Approximately 1.9 ac is not regulated by either agency, and Detroit Edison has not proposed compensatory mitigation for this acreage. Wetland losses and mitigation are discussed in more detail in Section 4.3.1.3.

The potential for short-term impacts on undisturbed wetlands and terrestrial habitats would be minimized by using BMPs to reduce stormwater runoff and the risk of pollution from soil erosion and sediment and pollutant spills (Detroit Edison 2011a). Detailed measures for BMPs would be included in the SESC plan and PIPP for the project (see Section 4.2).

The U.S. Department of the Interior (DOI) (2012) recommended that Detroit Edison develop a wildlife management plan to compensate for the loss of wildlife habitat, including development of quality grassland habitat to offset the loss of the prairie restoration area and to provide

nesting habitat for grassland avian species (e.g., bobolink [*Dolichonyx oryzivorus*], eastern meadowlark [*Sturnella magna*], and savannah sparrow [*Passerculus sandwichensis*]).

Impacts on Wildlife

Wildlife inhabiting work areas could be inadvertently killed or forced to move into adjacent habitats. Larger and more mobile species would likely flee during land-clearing activities, such as tree felling, grubbing, and grading. Mortality is expected to be limited to the least-mobile wildlife, mainly small, slow-moving, burrowing, or cavity-dwelling species, such as certain small mammals and reptiles as well as nesting forest, shrub, and grassland birds. Increased wildlife mortality in the form of road kill may result from increased traffic volume on nearby roadways. Impacts on waterfowl, shorebirds, and other wetland birds are likely to be minimal considering the limited impacts on wetland habitats.

One of the small, slow-moving species that may be affected by land-clearing and building activities is the eastern fox snake (*Pantherophis gloydi*). As discussed in Section 2.4.1, the eastern fox snake is the only State-listed terrestrial animal species on the Fermi site that could be affected in this manner. In addition to possible direct mortality, some of the snake's habitat on the Fermi site would likely be affected, some temporarily and some permanently.

Detroit Edison has prepared a Habitat and Species Conservation Plan (Detroit Edison 2012a) addressing protection of the eastern fox snake when building Fermi 3 facilities on the Fermi site, with the intention of minimizing impacts on individual specimens. The plan calls for measures including, but not limited to, training construction workers about the snake's rarity, protection status, and appearance, and instructing workers to inform inspectors with stop-work authority to allow time to catch and relocate the snakes. The Fermi 3 layout has been configured to minimize impacts on wetlands and other potential eastern fox snake habitat. The potential impacts on the eastern fox snake are discussed in more detail in Section 4.3.1.3.

As stated previously, larger or more mobile mammals and birds, including most raptors, game birds, and forest, shrub, and wetland birds, would leave the area when site disturbance activities begin. Such wildlife is expected to consist mostly of common species that adapt readily to changing environments, such as opossum (*Didelphis virginiana*), white-tailed deer (*Odocoileus virginianus*), eastern cottontail rabbit (*Sylvilagus floridanus*), eastern gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamius striatus*), raccoon (*Procyon lotor*), woodchuck (*Marmota monax*), and skunk (*Mephitis mephitis*). Populations of these species on the Fermi site may experience increased mortality due to road kill or from hunting if displaced from the Fermi site, where no hunting is allowed, to private land where hunting is allowed. The carrying capacity of nearby habitats receiving displaced individuals may be exceeded, resulting in increased competition and mortality due to limited resources. However, all of these species are abundant in the region and highly adaptable. These animals are expected to move away from the impact area to neighboring habitats both onsite and offsite. Although approximately 51 ac of

wildlife habitat would be permanently lost (with the exception of some wetlands types that would be mitigated), the types of habitat affected are common in the area. The resulting impacts on most wildlife would be minimal, with no mitigation measures needed. None of these species is of conservation concern in the State of Michigan or at the Federal level, and all are common in suitable habitats throughout the region. Impacts on important species are discussed in more detail below. Impacts on wildlife dependent on wetland habitat would be mitigated as a result of implementing the wetland mitigation discussed below.

Animals that move away from work areas may experience higher mortality rates due to road kill and increased competition with resident individuals in receiving habitats. Mammals that may suffer increased road kill include the white-tailed deer, eastern cottontail rabbit, eastern gray squirrel, eastern chipmunk, opossum, raccoon, and woodchuck. Most turtle, snake, and amphibian species, including the eastern fox snake, are also at risk for road kill. However, in a review of roads and their ecological impacts, Forman and Alexander (1998) concluded that except for local spots, road kill rates rarely limit population size.

The proposed new roads have been routed in a manner that minimizes forest fragmentation to the extent practicable. Fragmenting forest habitat can also be detrimental to many species of wildlife that favor forest-interior settings, including many migratory forest birds. The review team concluded that these impacts on common species would not be detectable beyond the local vicinity and would not destabilize regional populations. Impacts on the eastern fox snake and other rarer species are discussed further in Section 4.3.1.3.

Human activity, machinery operations, lighting, traffic, noise, and fugitive dust would likely displace wildlife in habitats surrounding work areas. The impact of fugitive dust is expected to be negligible because unpaved access roads and other exposed soils would be watered as necessary. Emissions from heavy equipment are expected to be minimal because of regularly scheduled maintenance procedures. The impact on terrestrial wildlife from these impact sources would be minimal, and no additional mitigation measures are needed.

There is limited published literature regarding bird collisions with elevated construction equipment, such as cranes. Erickson et al. (2005) reviewed the literature on anthropogenic bird mortality and concluded that collisions with communications towers, while potentially significant on a case-by-case basis, are far less important on a nationwide basis than is mortality from buildings, power lines, automobiles, domestic cats, and pesticides. Assuming elevated construction equipment such as cranes create a similar hazard as communication towers, it may reasonably be concluded that a small number of cranes for a limited duration (as planned for building Fermi 3) would have minimal impact on birds.

Noise generated by site activities, 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. Noise may displace wildlife, which may increase resource

demand in adjacent habitats, exceeding carrying capacity and ultimately resulting in higher mortality rates. Because most of the noise would be close to the existing Fermi structures, much of the wildlife in the area may have already adapted to industrial noise levels. It is therefore expected that the overall impact of construction noise on wildlife would be minimal.

Noise from site-preparation and site-development activities can affect wildlife by inducing physiological changes, nest or habitat abandonment, or behavioral modifications, or it may disrupt communications required for breeding or defense (Larkin 1996). However, it is not unusual for wildlife to adapt to such noise (Larkin 1996). Development activities that would generate noise include operation of equipment such as jackhammers, pile drivers, and heavy construction vehicles. Short-term noise levels from development activities onsite could be as high as 90 decibel(s) (acoustic) (dBA) at a distance of 50 ft from construction activity (Detroit Edison 2011a). That level would not extend far beyond the boundaries of the construction footprint. The threshold at which birds and small mammals are startled or frightened is 80 to 85 dBA (Golden et al. 1980). The review team expects that noise levels associated with creation of the transmission line corridor would be similar to noise levels associated with onsite development activities, but would be incurred for a more limited duration at any given location. Thus, impacts on wildlife from noise are expected to be negligible.

Accidental spills associated with construction activities could affect terrestrial wildlife but are of a greater concern to aquatic organisms (see Section 4.3.2). Refueling stations, fuel storage, oil storage, and storage of other fluids also pose a risk to surface waters that some wildlife species rely upon. However, activities and spill countermeasures, including the use of BMPs, would be implemented in a way that minimizes the potential for spills and limits the spread of spilled materials, thereby limiting mortality and morbidity of wildlife (Detroit Edison 2011a). As discussed in Section 4.2, a PIPP that addresses actions to be taken in the event of such spills would be implemented. Accordingly, impacts from a spill occurrence are expected to be minor, and no additional mitigation measures would be needed. BMPs related to the management of effluent and stormwater runoff as required by the Storm Water Management Plan and NPDES permit would also limit these impacts.

The DOI (2012) recommends that Detroit Edison implement several measures to reduce impacts on wildlife, especially migratory birds. First, DOI recommends restricting the timing of activities that disturb habitat for migratory birds to periods when migratory bird species known to use those habitats have migrated out of the area. Second, the DOI recommends that Detroit Edison complete removal of potential nesting habitat before spring nesting begins, or initiate removal after the breeding season has ended, to avoid take of migratory birds, eggs, young, and/or active nests. The DOI would prefer that no habitat disturbance, destruction, or removal occur between April 15 and August 15, to minimize potential impacts on migratory birds during their nesting season. The review team notes, however, that some species may initiate nesting before April 15.

4.3.1.2 Terrestrial Resources – Transmission Lines

Building Fermi 3 would require installation of three new transmission lines in an assumed 300-ft-wide corridor from the Fermi site to the Milan Substation, a distance of approximately 29.4 mi. The proposed transmission line route is described and illustrated in Section 2.4.1.2 and Figure 2-5. The 345-kV transmission system and associated corridors are exclusively owned and operated by ITC*Transmission*. Detroit Edison would not control the development or operation of the transmission system. Accordingly, the impacts discussed for the proposed new transmission lines 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. In general, the impacts on terrestrial resources from building new transmission lines for Fermi 3 would be similar to those for building onsite facilities, as described in Section 4.3.1.1.

Impacts on Habitats

Vegetation communities occurring along the transmission line route are similar to those away from the Lake Erie shoreline on the Fermi site, as described in Section 2.4.1.1. Impacts on vegetation in the initial 18.6 mi of the corridor are expected to be minimal because of the expected use of existing corridor and because access for installing new infrastructure is good. Potential impacts from building the transmission lines would, therefore, be limited primarily to the western 10.8 mi of the route. The level of vegetation maintenance to date within this undeveloped segment of the route has been minimal except to remove tall woody vegetation. Initial development of this segment would likely result in clearing of trees and other woody vegetation, followed by more intensive maintenance during operation of the transmission lines. Clearing and disposal of woody vegetation would have to be performed in a manner consistent with the provisions of the MDA Emerald Ash Borer Interior Quarantine on firewood and other ash tree products in effect at the time of site preparation activities to avoid spreading the emerald ash borer (MDA 2009). Access from existing roads is sufficient such that few, if any, new access roads would need to be built. Clearing would likely be necessary in areas of deciduous forest and forested wetlands.

Table 2-7 presents the vegetative cover types that occur within the 29.4-mi Fermi 3 transmission line corridor. Table 4-2 presents similar information for just the 10.8-mi segment of the transmission line corridor that is currently undeveloped. Most terrestrial ecology impacts would occur in this 10.8-mi segment. Based on the vegetation cover data in Table 4-2, the review team estimates that approximately 244 ac of forest cover would be permanently cleared to build the transmission line, including approximately 170 ac of deciduous forest and 74 ac of woody wetlands. The deciduous forest would be permanently converted to grassland or old field habitat, and the woody wetlands would be permanently converted to emergent wetlands. Because wetlands in the landscape traversed by the proposed transmission line corridor tend to occur in scattered locations close to streams and drainages, the review team expects that

Table 4-2. Vegetative Cover Types Occurring in the Undeveloped 10.8-mi Segment of the Transmission Line Corridor

Plant Community	Acres in Corridor[a]	Percent of Vegetative Community in Region[b]	Acres in Region[b]
Open water	0	0	725,910
Developed	11	0.001	1,089,795
Barren land	0	0	10,346
Deciduous forest	170	0.06	282,046
Evergreen forest	0	0	6717
Mixed forest	0	0	5765
Shrub/scrub	6	00.19	3179
Grassland/herbaceous	10	0.02	41,308
Pasture/hay	45	0.02	219,241
Cultivated crop	90	0.007	1,217,689
Woody wetlands	74	0.06	128,090
Emergent herbaceous wetland	9	0.02	56,711
Total	**415**	**0.01[c]**	**3,786,797**

Source: Adapted from Detroit Edison 2011a

(a) The number of acres in the corridor for each plant community was estimated by Detroit Edison using geographical information system (GIS) measurements of land cover data. The total area of these communities in the corridor sums to 415 ac, which is greater than the area within a 10.8 mi-long, 300 ft-wide corridor (393 ac). It is assumed that this difference results from slight inaccuracies in GIS measurements. This difference does not affect the analysis of impacts presented here.

(b) Region is defined as the area within a 50-mi radius of the Fermi site (see Section 2.2).

(c) Calculated using 415 as a percentage of 3,786,797.

ITC*Transmission* would be able to place the new towers in a way that would require permanent loss due to filling of no more than 0.5 ac of wetlands. Table 4-2 also indicates that even if all of the affected habitats in the 10.8-mi segment were permanently lost, the losses would be minimal when compared to the amount of the same cover types in the region.

As described in Section 4.3.1.1 for the site, most large or more mobile wildlife species present are expected to be sufficiently mobile and would temporarily move out of the way to avoid activity, but smaller ground- and cavity-dwelling animals, as well as nesting birds, would be more vulnerable to mortality from land clearing. Wildlife species that favor disturbed vegetation communities would be expected to benefit and use the newly cleared corridor following erection of the transmission lines. The impact on terrestrial wildlife resources would therefore be relatively minor, and no additional mitigation would be warranted beyond that typically used by ITC*Transmission*. Impacts on important species that may inhabit the transmission line corridor are discussed in Section 4.3.1.3.

4.3.1.3 Important Terrestrial Species and Habitats

Important Species – Fermi Site

This section describes the potential impacts on important species, including Federally proposed, threatened, or endangered terrestrial species; State-listed species; and other ecologically important species, resulting from construction of Fermi 3 and the onsite 345-kV transmission lines. The species and the potential impacts of construction activities on these species are described in the following sections. As part of the NRC's responsibilities under Section 7 of the Endangered Species Act of 1973 (ESA), the NRC staff prepared a Biological Assessment (BA) prior to issuance of the final EIS that evaluated potential impacts of preconstruction and construction activities on Federally listed (or proposed) threatened or endangered aquatic and terrestrial species (Appendix F).

Section 2.4.1 describes the important terrestrial species and habitats located within the Fermi site and vicinity and the transmission line corridors. When contacted by Detroit Edison in October 2007, the FWS stated that the proposed Fermi 3 occurs within the potential range of several plant and animal species listed under the ESA (Detroit Edison 2010a). At that time, the FWS also indicated that it had had no records of occurrence of any ESA-listed species in the project area, and that no designated critical habitat for ESA-listed species occurred on or in the vicinity of the Fermi site (Detroit Edison 2010a). In a letter to the NRC in January 2009 (FWS 2009a), however, the FWS identified several terrestrial species that were ESA-listed or candidates for listing that could occur in the area of the Fermi 3 project and the transmission line corridor.

The Michigan Department of Natural Resources (MDNR) (Detroit Edison 2009d) identified eight terrestrial State-listed threatened and endangered animal and plant species that are known to occur or that could occur on or in the vicinity of the Fermi site. Since that time, two species, the bald eagle (*Haliaeetus leucocephalus*) and Frank's sedge (*Carex frankii*), have been removed from the State list of threatened and endangered species. Field studies in 2007, 2008, and 2009 identified one State-listed animal (eastern fox snake) and one State-listed plant species (American lotus [*Nelumbo lutea*]) on the Fermi site (Detroit Edison 2009b).

Table 4-3 summarizes the potential impacts from the proposed work on the Fermi site to each Federally or State protected species known to occur or potentially occur on the Fermi site. The impacts are discussed in greater detail as necessary below.

Bald Eagle

The bald eagle is a State-listed species of special concern and is no longer Federally listed as threatened (MNFI 2010). MDNR guidelines for bald eagle management follow those provided by the FWS *National Bald Eagle Management Guidelines* (FWS 2007). These guidelines

Table 4-3. Important Terrestrial Species Known or with Potential to Occur on the Fermi 3 Site

Common Name	Scientific Name	Federal Status[a]	State Status[b]	Potential Impacts
Plants				
American lotus	*Nelumbo lutea*	NL	T	Detroit Edison has stated that it plans to transplant American lotus disturbed by filling the south canal
Arrowhead	*Sagittaria montevidensis*	NL	T	No impacts anticipated
Eastern prairie fringed orchid	*Platanthera leucophaea*	T	T	No impacts anticipated
Red mulberry	*Morus rubra*	NL	T	No impacts anticipated
Reptiles				
Eastern fox snake	*Pantherophis gloydi*	NL	T	Building of permanent and temporary facilities would disturb habitat; snakes would be relocated to extent possible; temporary facilities would be removed and habitat restored
Birds				
Barn owl	*Tyto alba*	NL	E	No impacts anticipated
Bald eagle	*Haliaeetus leucocephalus*	NL (also BGEPA)	SC	No impacts anticipated
Common tern	*Sterna hirundo*	NL	T	No impacts anticipated
Mammals				
Indiana bat	*Myotis sodalis*	E	E	Summer roost areas may be present in wooded areas; limiting tree-clearing operations to seasons when bats would not be present on the site will minimize impacts
Insects				
Karner blue butterfly	*Lycaeides melissa samuelis*	E	T	No impacts anticipated

Sources: Detroit Edison 2009d, FWS 2009a

(a) ESA-E = listed under the ESA as endangered, ESA-NL = not listed under the ESA, ESA-T = listed under the ESA as threatened, BGEPA = protected under the Bald and Golden Eagle Protection Act, MBTA = protected under the Migratory Bird Treaty Act.

(b) E = endangered, SC = species of special concern, T = threatened.

suggest avoiding any activities within a 660-ft radius around a nest during the breeding season. The restricted area is imposed because bald eagles are extremely sensitive to human activity during the first 12 weeks of the breeding season. Detroit Edison (2011a) has indicated that it would adhere to these guideline limitations when building Fermi 3.

The bald eagle is unlikely to be adversely affected, given the distances between project activities and existing eagle nests, and as demonstrated by the continued nesting behavior near the Fermi 2 cooling towers. There is also evidence of the rebuilding of a nest in the coastal forest south of Fermi 2 (Detroit Edison 2011a).

Three eagle nests have been reported on the Fermi site, at least one of which was active in 2008 and 2009 (Detroit Edison 2009b). Two nests were located east of the Fermi 2 cooling towers near Lake Erie and are more than 700 ft away from any areas that would be disturbed by activities related to Fermi 3. The third was located in trees along the Lake Erie shoreline south of Fermi 2. However, the latter nest was apparently destroyed by winter storms in late 2007 or early 2008. What appeared to be a new eagle nest was observed in the coastal forest to the southeast of the Fermi 2 facilities in an eastern cottonwood (*Populus deltoides*) during the April 2009 survey session. This unconfirmed eagle nest was within 660 ft of an area that would be disturbed temporarily during construction and preconstruction of Fermi 3 (Detroit Edison 2009e). As of January 2011, none of the previously observed bald eagle nests could be seen on the Fermi site; they have presumably deteriorated because of nonuse and weather (Detroit Edison 2011b).

Bald eagles of various ages have been observed during all surveys conducted on the Fermi site. Three fledglings were observed on the Fermi site during the October 2008 survey. More fledglings or subadults (juveniles) were observed during the January 2009 survey and one subadult was observed during the April 2009 survey. The eagles using the Fermi site do not appear to be distressed by proximity to existing human activities, as demonstrated by successful fledging of young, even though the nests are adjacent to the existing Fermi 2 cooling towers, where mechanical noises and other human activities are common (Detroit Edison 2011a). Since the existing eagle nests to the northeast of the Fermi 2 cooling towers have been active and successful for several years and because no structural changes are being proposed in that area (i.e., no vegetation clearing or similar construction activities), it is not likely that bald eagles would be permanently displaced from that part of the Fermi site or otherwise disturbed in a substantial way during the building of Fermi 3.

Detroit Edison's ER states that scheduling of work would be carefully planned to avoid activities near active nesting areas during the breeding season, such as in the area near the potential new eagle nest, in accordance with the *Bald and Golden Eagle Protection Act* (BGEPA) and the Migratory Bird Treaty Act (MBTA) (Detroit Edison 2011a). The breeding season at the Fermi site starts as early as mid-January and extends through June (Hoving 2010). Detroit Edison would coordinate with the FWS on construction locations and schedules (Detroit Edison 2011a).

Therefore, the review team anticipates that impacts on the bald eagle from the building of Fermi 3 would be minimal, and no additional mitigation measures, beyond those proposed by Detroit Edison in the ER, are needed.

Eastern Prairie Fringed Orchid

The eastern prairie fringed orchid (*Platanthera leucophaea*) is listed by the Federal and State governments as threatened. The FWS identified the eastern prairie fringed orchid as occurring in Monroe County. MDNR, however, did not include this orchid as known to occur on the Fermi site in its November 28, 2007, letter to Detroit Edison's consultant (Detroit Edison 2009d). Detroit Edison surveyed the vegetation of areas of the Fermi site most likely to be affected by construction of Fermi 3. In addition to reconnaissance surveys in 2007, more detailed surveys were conducted in 2008 and 2009, including during the plant's flowering period in early summer 2009. The surveys did not identify the eastern prairie fringed orchid on the Fermi site (Detroit Edison 2009b). From MDNR's review and Detroit Edison's more detailed surveys, the review team has concluded that the eastern prairie fringed orchid is unlikely to occur on the Fermi site, and the effects on this species would be negligible.

Indiana Bat

The Indiana bat (*Myotis sodalis*) is listed as endangered by the Federal and Michigan State governments. The NRC and Detroit Edison conferred with the FWS about this species in May 2009. There are no records of the Indiana bat being observed in Monroe County, but the habitat of the project site and transmission line corridor is suitable for roosting and is in the range of the species (FWS 2009a, b). Although there are no confirmed observations of the Indiana bat in Monroe County, the bat has been observed in nearby Washtenaw County as recently as 2005 (MNFI 2007a) and there are two known Indiana bat colonies in neighboring Lenawee County (Kurta 2010). Large trees with exfoliating bark are the preferred roosting habitat for the Indiana bat (NatureServe 2009), but trees as small as 5 in. in diameter at breast height (dbh) should be considered as potential roosting habitat (FWS 2009b). The death of many green ash (*Fraxinus pennsylvanica*) trees on the site and the wider region has resulted in many standing dead trees of 5 in. dbh or larger with peeling bark. These dead trees could temporarily serve as potential roosting habitat for Indiana bats until the dead bark sloughs off or the dead trees fall over. FWS inspected several such trees within the proposed Fermi 3 footprint in August 2011 and determined that none would continue to function as potential maternity roosts for more than a few years (Doub 2011).

The *Range-wide Indiana Bat Protection and Enhancement Plan Guidelines* (FWS 2009b) developed by the FWS for surface mining activities provides guidelines for avoidance, minimization, and mitigation measures to minimize effects on the Indiana bat. Among the measures identified are restrictions on timing of tree clearing to ensure no bats are present during clearing. The review team concludes that the impact of building Fermi 3 on the Indiana

bat would be minimal as long as Detroit Edison follows the protection measures in the *Range-wide Indiana Bat Protection and Enhancement Plan Guidelines* (FWS 2009b), including limiting the clearing of potential roosting trees to the months when the bats would not be expected on the site, and no additional mitigation measures are needed. More information on how Detroit Edison plans to address the presence of the Indiana bat is provided in the Biological Assessment (Appendix F).

Karner Blue Butterfly

The Karner blue butterfly (*Lycaeides melissa samuelis*) is listed by the Federal and State governments as endangered and threatened, respectively. The NRC and Detroit Edison conferred with the FWS about this species in May 2009. The most recent documented record of the Karner blue butterfly in Monroe County was in 1986 (MNFI 2007b). The preferred habitat for this insect is dry, sandy soils where wild lupine (*Lupinus perennis*), its sole food source, grows. The soils of the Fermi site are more fine-grained than the preferred habitat and are not well drained (Bowman 1981). Although lupines were established in the prairie creation area in the existing onsite transmission corridor and were observed in 2000 and 2002, no lupines were observed in subsequent vegetation surveys conducted between 2006 and 2009 (Detroit Edison 2009b). The MDNR Endangered Species Coordinator stated that Karner blue butterflies are not likely to occur on the Fermi site because none were found when the entire area was carefully surveyed in recent years prior to introduction of Karner blue butterflies in the Petersburg Wildlife Management Area near Petersburg, Michigan (Hoving 2010). The maximum movement of the butterflies from their point of introduction is about 1 km, eliminating the possibility that introduced butterflies would now occur on the Fermi site (Hoving 2010).

Based on this information, the likelihood of the Karner blue butterfly occurring on the Fermi site is considered very low and the effects on this species of building Fermi 3 would be negligible.

American Lotus

The American lotus is a Michigan State-listed threatened species. It is a wetland plant common in moderately shallow areas of the South and North Lagoons and the south canal on the Fermi site. The species reaches a northern limit of its distribution in southern Michigan, but several healthy populations exist in southeastern Michigan (Sargent 2010). American lotus grows from thick and creeping underground tubers that make it impractical to determine how many plants are actually present in a given area (Sargent 2010). American lotus occurring in the south canal may be affected by building Fermi 3. According to the ER (Detroit Edison 2011a), MDNR endangered species specialists have recommended that plants in areas to be disturbed be transplanted to other areas of suitable habitat on or off of the Fermi site to minimize adverse impacts. The plants are hardy and have been successfully transplanted in the Southeastern Michigan area (Hoving 2010). Project activities are not expected to disturb the South or North Lagoons, and therefore, no American lotus in these areas would likely be affected. Detroit

Edison intends to engage in further consultation with the MDNR in developing an appropriate mitigation strategy for this species (Detroit Edison 2011a). Impacts from building Fermi 3 would be minimal and no mitigation measures are needed beyond those already identified by Detroit Edison in the ER.

Arrowhead

The arrowhead (*Sagittaria montevidensis*), a State-listed threatened species, has not been conclusively identified on the Fermi property. A specimen of the *Sagittaria* genus was observed during the 2008–2009 vegetation surveys (Detroit Edison 2009b), but mature specimens with flowers were not available to conclusively identify the species. The judgment by Detroit Edison's contractor was that the plant's observable characteristics did not support identification as *S. montevidensis*. The area in which the plant was observed would not be directly affected by building Fermi 3, in any case. Most of the habitat that might have been suitable for the species has been invaded by common reed (*Phragmites australis*). Therefore, impacts from building Fermi 3 would likely be negligible.

Eastern Fox Snake

The eastern fox snake (a Michigan State-listed threatened species) has been observed several times since 1990 on the Fermi property. According to Detroit Edison, more than 15 documented sightings of the eastern fox snake have been made on the Fermi site since 1990, including two sightings in 2008 during the wetlands delineation survey (Detroit Edison 2010b). Between one and six snakes have been observed on each occasion. Eastern fox snakes have been observed in a variety of habitats, even near Fermi 2 buildings. The snake's most likely preferred habitat occurs along the cattail marshes or wetland shorelines around woody debris, but many of the habitats present on the Fermi site are usable as habitat by the snake (MNFI 2007c). Of the 1260 ac of the Fermi site, there are approximately 833 ac of terrestrial habitat; much of it is potentially suitable habitat for the eastern fox snake. Fermi 3 building activities would affect approximately 197 ac of potential fox snake habitat (see Section 4.3.1.1). Of the potential fox snake habitat that would be disturbed, however, only approximately 21 ac would be emergent wetland, the snake's preferred habitat.

Approximately 51 ac of potential fox snake habitat would be converted permanently to developed uses. The remaining 146 ac of disturbed habitat would be restored to the pre-project vegetative cover type. The three largest areas to be disturbed (i.e., parking areas, construction laydown, and Fermi Road construction) are expected to be rehabilitated to a condition of equivalent or better general ecological value following completion of the project, although forest and other habitat with woody vegetation would take years to re-establish many pre-project ecological functions.

Traffic into the site and vicinity would increase greatly during construction. Currently, approximately 800 employees and 150 contract supplemental employees operate Fermi 2. Increased traffic associated with operation of Fermi 3 has the potential to increase wildlife mortality, including mortality of eastern fox snakes, resulting from vehicle-wildlife interactions. Approximately 2900 construction workers would be employed at the peak of construction. Traffic into the Fermi site would increase correspondingly, and additional traffic would be generated by deliveries (Detroit Edison 2011a).

Detroit Edison's Habitat and Species Conservation Plan (Detroit Edison 2012a) identifies several specific minimization and mitigation actions to reduce net impacts on the snake. Specific measures to minimize impacts called for in the plan include educating construction workers through use of a site-specific eastern fox snake manual, briefing workers on the possible presence of the snake, relocating snakes from work areas to other suitable habitat, and inspecting undeveloped areas for snakes prior to initiating work. Specific measures to mitigate impacts called for in the plan include walking down work areas to inspect for the eastern fox snake, developing procedures for capturing and relocating eastern fox snakes, instructing workers to halt work in the presence of an eastern fox snake until it can be relocated, and maintaining a log of monitoring efforts and actions taken. Additionally, the plan calls for a 15-mile-per-hour speed limit on roads crossing potential eastern fox snake habitat on the Fermi site and a requirement for drivers on such roadways to stop and wait for any eastern fox snakes to move out of the way (Detroit Edison 2012a). The Endangered Species Coordinator for MDNR has reviewed Detroit Edison's proposed Habitat and Species Conservation Plan for the eastern fox snake and has found it to be acceptable (Sargent 2012).

Given the extent of potential eastern fox snake habitat that would be disturbed, although much of it temporarily, and the increased traffic on roads crossing habitat on the Fermi site during construction and preconstruction, the review team recognizes that the Fermi 3 project could result in mortality of some eastern fox snake individuals and reduce the local population unless appropriate avoidance and mitigation measures are taken. The majority of the suitable eastern fox snake habitat on the Fermi site would not be disturbed directly, however. In addition to the eastern fox snake mitigation measures described in the paragraph above, the review team believes that monitoring of the snake would be necessary after building Fermi 3. The Habitat and Species Conservation Plan (Detroit Edison 2012a) calls for a minimum of 5 years' monitoring of eastern fox snakes once the proposed Fermi 3 facilities are built.

Summary of Impacts on Important Species on the Fermi Site

The construction and preconstruction impacts on important species on the Fermi site are projected to be minimal for most species with no additional mitigation. However, impacts on eastern fox snake population levels could be noticeable unless adequate mitigation measures are developed and implemented. The Fermi 3 facility layout minimizes impacts on wetlands and forest cover. With the exception of habitat for the eastern fox snake, specific habitats preferred

by the important species of the region are mostly absent from the area to be affected by building the project. The staff expects that impacts on the eastern fox snake and its habitat would be mitigated according to provisions of Detroit Edison's Habitat and Species Conservation Plan for that species (Detroit Edison 2012a), and that those provisions will be incorporated into a State endangered species permit to be issued prior to any building activity at the site.

Important Habitat – Fermi Site

Wetlands

Detroit Edison conducted a wetlands investigation (Detroit Edison 2010a) to delineate wetland boundaries and assess functions and values of the wetlands present on the Fermi property. The results of the wetland investigation and the subsequent USACE jurisdictional determination and MDEQ Wetland Identification Program verification are summarized in Section 2.4.1.2. Detroit Edison revised its initial project plan to minimize impacts on wetlands, but requirements for placement of the proposed Fermi 3 and supporting facilities would result in unavoidable impacts on approximately 34.5 ac of wetland habitat on the Fermi site (see Figure 4-4). This area includes approximately 21.2 ac of emergent marsh, 8.0 ac of forested wetland, and 5.3 ac of scrub-shrub wetland. Of this area, approximately 23.7 ac would experience only temporary impacts; Detroit Edison would restore the contours, hydrology, and vegetation of temporarily impacted wetlands following construction (Detroit Edison 2011d).

Approximately 6.1 ac of emergent marsh and 2.2 ac of forested wetland (approximately 8.3 ac of total wetlands) would be filled and converted permanently to non-wetland (Detroit Edison 2011c). The activities resulting in the majority of wetland impacts noted above are regulated by USACE and/or MDEQ and require separate authorizations (permits) from each agency, as previously discussed. However, activities affecting approximately 1.9 ac of emergent wetlands (called "Wetland A" during the wetland delineation) would not require authorization from either agency.

The CWA Section 404(b)(1) Guidelines (40 CFR Part 230) (Guidelines) are the substantive criteria USACE uses to determine the environmental impact of regulated activities on aquatic resources (including wetlands) that would result from the discharge of dredged or fill material. Among other things, an applicant for a USACE Section 404 permit must demonstrate to the USACE that a proposed aquatic resource discharge plan constitutes the least environmentally damaging practicable alternative (LEDPA) and any impacts to special aquatic sites are unavoidable. The USACE requires compensatory mitigation for such unavoidable impacts to ensure that proposed activities are in compliance with the Guidelines and are not contrary to the public interest.

Detroit Edison conducted an analysis that evaluated alternatives to avoid and minimize impacts on special aquatic sites (Appendix J). This analysis involved four iterations to its proposed Fermi 3 site layout that have each reduced wetland impacts. During its analysis, Detroit Edison

Figure 4-4. Wetlands Affected by Building of Fermi 3 (Detroit Edison 2011a)

relocated facilities out of special aquatic sites to upland areas and reduced the footprint of facilities in special aquatic sites. Most notably, Detroit Edison moved the proposed cooling tower from wetlands in the South Lagoon to an upland area closer to the proposed location for the Fermi 3 powerblock. Detroit Edison also clustered several support facilities, originally sited in wetlands, to the edge of the existing Fermi 2 developed area. Detroit Edison's analysis of aquatic resource impacts from possible onsite layout alternatives is contained in Appendix J, and the proposed site plan presented in this document is Detroit Edison's proposed LEDPA.

To offset the Detroit Edison-identified unavoidable impacts to aquatic resources as a result of its proposed LEDPA, Detroit Edison initially proposed a conceptual mitigation strategy that was included in Appendix K of the Draft EIS. The USACE LRE-2008-00443-1-S11 public notice (USACE 2011) provided additional opportunity for public comment on Detroit Edison's proposed LEDPA and concept mitigation strategy. Detroit Edison subsequently refined its mitigation strategy based on coordination with the USACE and produced the draft mitigation plan that is now contained in Appendix K of this document (Detroit Edison 2012c). The draft mitigation plan proposes to compensate for the unavoidable loss of aquatic function on the Fermi site by reestablishing comparable aquatic functions at an offsite location at a ratio of 3:1. The USACE is currently reviewing Detroit Edison's onsite alternatives analysis to determine if the proposed impacts could be further decreased through additional practicable avoidance and/or minimization measures. The USACE is also currently reviewing Detroit Edison's draft mitigation plan relative to the USACE public interest review and compliance with the Guidelines. See Appendices J and K for more details.

The MDEQ also regulates dredge and fill activities in jurisdictional wetlands and dredging activities under Act 451, Natural Resources and Environmental Protection Act, Part 303 "Wetlands Protection" and Part 325 "Great Lakes Submerged Land Act," respectively. These authorizations are separate and different from the USACE Section 10/404 authorization. The MDEQ issued Permit No. 10-58-0011-P to Detroit Edison on January 24, 2012 (MDEQ 2012) and authorizes activities under Parts 303 and 325. The permit, by condition, also requires a mitigation plan that adequately offsets State-regulated wetland impacts (Detroit Edison 2012d).

According to Detroit Edison (2011a), work within wetlands would be carried out using BMPs to minimize impacts on wetlands near and downgradient of the disturbance zone. Temporary impacts on the soil and runoff would result from vegetation clearing and grading. Silt fences and other necessary erosion control features, as specified in a SESC plan to be approved by the MDEQ prior to site disturbance, would be erected prior to soil disturbance. The SESC would have to be developed consistent with Michigan's Soil Erosion and Sediment Control Program, which includes requirements for design and the timing of implementation of BMPs. Exposed soil would be covered, bermed, or protected with a temporary seeding until backfilled and graded. Construction effluent and stormwater runoff would be monitored as required by the NPDES stormwater construction permit and other applicable construction permits (Detroit Edison 2011a).

According to Detroit Edison, silt fencing or other barriers to protect wetlands from sedimentation would be placed between areas of proposed ground disturbance and adjoining wetlands. Entry into the wetlands by equipment or workers would be prohibited unless necessary. Other BMPs would be applied as appropriate (Detroit Edison 2011a). Wherever possible, disturbed areas would be revegetated as soon as possible following disturbance to minimize the potential for soil erosion and stormwater runoff. Plantings would be of native species.

EPA (2012) recommends, in addition to the requirements of Michigan's Soil Erosion and Sediment Control Program, the following measures to further minimize impacts on wetlands:

- Perform work in wetlands during frozen ground conditions, if feasible;
- Minimize width of temporary access roads;
- Use easily removed materials for temporary access roads and staging areas (e.g., swamp/timber mats) in lieu of materials that sink (e.g., stone, rip-rap, wood chips);
- Use swamp/timber mats or other alternative matting to distribute the weight of the construction equipment to minimize soil rutting and compaction;
- Use vehicles and construction equipment with wider tires or rubberized tracks, or use low ground pressure equipment to further minimize impacts when developing access routes and staging areas;
- Use long-reach excavators, where appropriate, to avoid driving or staging in wetlands; and
- Place mats under construction equipment to contain any spills.

Without mitigation, the impacts on wetlands associated with the development of the Fermi site would be noticeable due to the areal extent of permanent and temporary impacts and the temporal loss of wetland functions attributable to construction and post-construction rehabilitation of temporarily disturbed wetlands. Detroit Edison's onsite analysis (see Appendix J) resulted in a site layout that would both avoid and minimize activities in wetlands. Detroit Edison's proposed BMPs would further minimize impacts.

Detroit River International Wildlife Refuge

The proposed Fermi 3 footprint would encroach into a portion of the Fermi site that is managed as part of the DRIWR. Additional discussion can be found in Section 4.1. The DRIWR Lagoona Beach Unit (a total of 656 ac) is located entirely within the Fermi site. Development of Fermi 3 would encroach into approximately 45 ac, or about 7 percent of the Lagoona Beach Unit (see Figure 4-5); approximately 19 ac would be permanently lost and approximately 26 ac would be temporarily lost for the duration of the construction period (Table 4-4) (Detroit Edison 2011a).

Figure 4-5. Permanent and Temporary Impacts on DRIWR, Lagoona Beach Unit from Fermi 3 Building Activities, Overlaid on Existing Terrestrial Communities (Detroit Edison 2011a)

Table 4-4. Area of DRIWR, Lagoona Beach Unit Affected by Fermi 3 Building Activities

Refuge Area	Area Size (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)
NE	161.7	0	0
NW	161.1	16.1	22.7
SE	311.2	2.6	3.5
SW	22.4	0	0
Total	**656.4**	**18.7**	**26.2**

Source: Detroit Edison 2011a

The agreement between Detroit Edison and the FWS that established the wildlife refuge allows for modifications to the agreement (such as the proposed building of Fermi 3) by either party at any time (Detroit Edison 2003). The impacts of reducing the effective area of the DRIWR are principally land use impacts, which are discussed in Section 4.1.1. However, DRIWR is important as an ecological habitat because of its coastal wetlands. Accordingly, the impacts on the DRIWR are defined primarily by the overall wetlands impacts, as discussed above.

Transmission Line Corridor Prairie Planting

Approximately 10 ac of the existing tallgrass prairie restoration area would be permanently lost in order to build the onsite Fermi 3 switchyard (Detroit Edison 2011a). Detroit Edison revised the site layout three times to reduce wetlands impacts that would result from building Fermi 3 (Doub 2011). Ultimately, use of the prairie restoration site was necessary to avoid unnecessary filling of wetlands, including forested wetlands. The EPA (2012) recommends that Detroit Edison consider restoring tallgrass prairie on a portion of the agricultural land that is proposed for use as a temporary laydown area after project completion, as replacement for the tallgrass prairie habitat lost to build the Fermi 3 switchyard.

Important Terrestrial Species – Transmission Lines

Important species potentially occurring in or along the transmission line corridor are described in Section 2.4.1.3 and Section 2.4.1.4. The FWS (2009a) identified several terrestrial species that are Federally listed under the ESA or that are candidates for such listing that could occur in the area of the transmission line route. Federally listed species identified as potentially present in Monroe County are the Indiana bat, Karner blue butterfly, and eastern prairie fringed orchid. For Wayne County, the Federally listed species identified are the Indiana bat and eastern prairie fringed orchid. For Washtenaw County, the Federally listed species identified are the Indiana bat, Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*), and eastern prairie fringed orchid. The FWS also noted that the eastern massasauga (*Sistrurus catenatus catenatus*), a candidate species, may be present in Washtenaw and Wayne Counties. No Federally designated critical habitat occurs in the vicinity of the transmission line corridor.

The State of Michigan has identified numerous State-listed species in Monroe and Wayne Counties, but the MDNR has not commented on which species may be present in the proposed transmission line corridors. A list of Federally and State-listed species that occur in Monroe, Washtenaw, and Wayne Counties and that may occur within the transmission line corridor is provided in Table 2-8. The Indiana bat, eastern prairie fringed orchid, Karner blue butterfly, and Mitchell's satyr butterfly are also State-listed as threatened or endangered. The eastern massasauga is State-listed as a species of special concern. Among other State-listed threatened or endangered species that may be present within the transmission line corridor are the eastern fox snake and barn owl (*Tyto alba*).

ITC*Transmission* would need to confer with the MDNR to determine which State-listed species could be affected by development of the transmission line. Once the exact corridor boundary has been defined, field surveys may be required prior to ground disturbance. Because ITC*Transmission* has some leeway in the locations of transmission line towers and because transmission line development does not require the level of disturbance that Fermi 3 would require, the impacts on terrestrial species from transmission line development are expected to be minimal, assuming that measures to avoid, minimize, and mitigate impacts on habitats and wildlife equivalent to those implemented on the Fermi site are implemented.

The impacts on important species from development of the proposed transmission lines are projected to be minimal, as long as ITC*Transmission* coordinates with the FWS, MDEQ, and MDNR and implements any avoidance, minimization, or mitigation measures those agencies require to minimize impacts on Federal and State-listed species.

Important Terrestrial and Wetland Habitats – Transmission Lines

Important habitats are defined in Section 2.4.1.2 and discussed for the proposed transmission line corridor in Section 2.4.1.4. Wetlands are the only important habitat crossed by the anticipated transmission line route. Approximately 93.4 ac of forested wetland occur within the expected transmission line corridor; most, if not all, would be permanently cleared of trees (Detroit Edison 2011a). These wetlands would be converted to scrub-shrub or emergent wetlands to maintain clearance for the conductors. No wetlands would be affected in the initial 18.6 mi of the route because adequate cleared corridor to accommodate the new transmission lines is already present. No wetlands are present in the area where the Milan Substation site would be expanded (Detroit Edison 2011a). The undeveloped western 10.8-mi section could require placing towers in wetlands that cannot be spanned (span distances usually cannot exceed 900 ft). The total potential permanent impact on wetlands from installation of all the towers is expected to be approximately 0.5 ac, based on the projected surface area needed to build tower foundations (Detroit Edison 2011a). Clearing trees from forested wetlands would be necessary to construct the transmission lines. After the transmission lines are in place, woody vegetation would be managed to maintain necessary clearance around the conductors; these impacts are discussed in Section 5.3.1.2. A conceptual transmission line corridor has been

identified, but wetland delineation surveys have not yet been conducted to determine the precise locations and extent of wetlands. Permanent impacts on wetland areas would be mitigated according to a wetland mitigation plan ITC*Transmission* would develop in coordination with the MDEQ and/or USACE, as necessary. Any mitigation measures required for the impacts are expected to be determined by ITC*Transmission* in coordination with applicable regulatory agencies, which may include the MDEQ and/or USACE, at the time permit applications are submitted.

The impacts on wetlands from building the transmission system could be noticeable, due to the areal extent of the temporary impacts and the long-term conversion of forested wetlands to scrub-shrub or emergent wetlands. With the expected wetland mitigation, however, the review team expects these impacts to be minimal.

4.3.1.4 Terrestrial Monitoring

Detroit Edison has not proposed terrestrial monitoring during construction or preconstruction of Fermi 3. However, the MDEQ requires performance monitoring of the required wetland mitigation associated with Permit No. 10-58-0011-P issued to Detroit Edison on January 24, 2012 (MDEQ 2012). The USACE could require monitoring for compliance with USACE-issued permits. The USACE is expected to require short- and long-term monitoring of Detroit Edison's wetland mitigation activities if the USACE issues a permit for regulated activities associated with the Fermi 3 project. The State and other Federal agencies may also require monitoring for compliance with permits issued, including, but not limited to, regular inspection of silt fences and seeded areas and other erosion control activities. Detroit Edison plans to monitor all areas restored, enhanced, or created as part of building Fermi 3 facilities. Sampling would be conducted once site preparation work is complete and for a minimum of 5 years after completion of the site preparation and construction work (Detroit Edison 2012a).

4.3.1.5 Potential Mitigation Measures for Terrestrial Impacts

In determining the site layout for Fermi 3, Detroit Edison has made efforts to avoid or minimize impacts on wildlife habitat, wetlands, and local wildlife and habitat. Nonetheless, some impacts on these resources are unavoidable. Accordingly, Detroit Edison has identified a number of measures that would serve to mitigate impacts on terrestrial habitats and species. Each is described in the paragraphs below.

Detroit Edison (2011a) has stated its intention to avoid adverse impacts on the bald eagle by not performing most work within 660 ft of bald eagle nest sites during the nesting season (approximately mid-January through June in southeastern Michigan). If plan changes would result in the need for work within that distance, the work would be timed to take place outside of the nesting season.

Construction Impacts at the Proposed Site

As indicated in the BA contained in Appendix F, development of Fermi 3 may affect, but is not likely to adversely affect, the Indiana bat, as long as Detroit Edison follows the protection measures in the *Range-wide Indiana Bat Protection and Enhancement Plan Guidelines* (FWS 2009b), including limiting the clearing of potential maternity roost trees to seasons when the bats would not be present in the region. Implementing these measures is expected to ensure, at most, minimal impacts on the Indiana bat.

A small area of American lotus plants in the south canal could be affected by the project. Detroit Edison has indicated that it plans to relocate any affected American lotus plants to other suitable habitat (Detroit Edison 2011a).

Fermi 3 building activities would affect approximately 197 ac of terrestrial habitat (see Section 4.3.1.1), much of it potentially suitable habitat for the eastern fox snake. Detroit Edison's proposed Habitat and Species Conservation Plan for the eastern fox snake (Detroit Edison 2012a) calls for mitigating impacts on the snake by training Fermi 3 construction workers to identify the snake and notify construction inspectors when one is sighted. Trained inspectors would have stop-work authority in order to protect individual snakes and snake habitat. Increased traffic from construction equipment and construction workers' vehicles could increase mortality of the eastern fox snake. Monitoring of the eastern fox snake population during and after building of Fermi 3 could help determine whether the impacts from building activities and impacts from increased traffic during and after construction warranted additional mitigation measures. An example of mitigation for traffic mortality impacts, if needed, might be to install fences impermeable to snakes that would serve as barriers to the snake along roads and reduce the likelihood of snakes being hit by vehicles. The proposed Habitat and Species Conservation Plan is discussed in more detail above in Section 4.3.1.3.

Detroit Edison has proposed to compensate for the unavoidable loss of aquatic function on the Fermi site by reestablishing comparable aquatic functions at an offsite location at a ratio of 3:1 (Appendix K). Clearing, grubbing, and other site preparation work could contribute to wildlife mortality and habitat loss. Habitat loss would be mitigated by restoring appropriate natural vegetation through planting of native species appropriate to each cleared area. Any impacts on terrestrial or wetland ecological resources associated with construction of the compensatory mitigation proposed by Detroit Edison would be evaluated by the USACE as part of its permit evaluation.

Mortality for most species is not anticipated to have noticeable effects on local populations. The staff expects that the risk of possible mortality of eastern fox snakes would be mitigated according to Detroit Edison's *Habitat and Species Conservation Plan* for that species (Detroit Edison 2012a), as incorporated into a State endangered species permit issued by the MDNR.

4.3.1.6 Summary of Construction Impacts on Terrestrial and Wetland Resources

Based on threatened and endangered species surveys, known threatened and endangered species locations, historical records, life history information, and information provided by Detroit Edison in its ER and Request for Additional Information (RAI) responses, and based on the review team's independent evaluation, the review team concludes that the impacts from construction and preconstruction activities for Fermi 3 on terrestrial resources on the Fermi site and transmission line corridor would be SMALL to MODERATE . This conclusion is based in part on the staff's independent review of mitigation measures proposed by Detroit Edison, especially the compensatory wetland mitigation required by the USACE and MDEQ, mitigation for American lotus impacts that would be required by the MDNR, Detroit Edison's stated intention of relocating affected American lotus, and Detroit Edison's proposed mitigation measures for the eastern fox snake (Detroit Edison 2012a). This conclusion is also based on conclusion of consultation with the FWS under the ESA. The potential for MODERATE impacts is limited to possible adverse effects on the eastern fox snake. The staff's evaluation of the potential impacts on the eastern fox snake recognizes the potential for mitigation measures proposed by Detroit Edison (Detroit Edison 2012a) and approved by the MDNR to significantly reduce impacts on that species, thereby leading to SMALL impacts, but acknowledges the possibility of MODERATE impacts if proposed mitigation is not implemented as described in their plan. The NRC staff concludes that the impacts of NRC-authorized activities on terrestrial resources would likewise be SMALL to MODERATE, with the potential for MODERATE impacts limited to possible adverse effects of construction equipment on the eastern fox snake.

4.3.2 Aquatic Impacts

Impacts on aquatic resources from building Fermi 3 would potentially affect Lake Erie and the north, central, and south canals; quarry lakes; Swan Creek; Stony Creek; and wetlands at the Fermi site. Activities that could affect these aquatic habitats include (1) building of a new intake structure, (2) building of a cooling water discharge structure, (3) construction of the barge slip, (4) building of a parking structure and a warehouse, (5) dewatering of the Fermi 3 excavation area, (6) culverting of the south canal; (7) filling of the north and central canal (Sections 3.2 and 3.3); and (8) building a fish return structure. Ground-disturbing activities that lead to soil erosion during site preparation and building of Fermi 3 could result in adverse effects on water quality in water bodies on or adjacent to the Fermi site including Lake Erie, the North and South Lagoons, Swan Creek, and wetlands. In addition, during building of new transmission lines, there is potential to affect stream habitats in Monroe, Washtenaw, and Wayne Counties. This subsection evaluates impacts that could occur on aquatic resources on or in the vicinity of the Fermi site during preconstruction and construction of Fermi 3 or during building of associated transmission lines. Preconstruction- and construction-related impacts on wetlands are described in detail in Section 4.3.1.3 of this EIS. As discussed in Section 2.4.2.1, drainage ditches and the circulating water reservoir on the Fermi site do not provide suitable aquatic habitat to support significant populations of aquatic organisms. Consequently, there would be

no preconstruction- or construction-related impacts on aquatic resources within these surface water features.

4.3.2.1 Aquatic Resources – Site and Vicinity

This subsection evaluates impacts that could occur on aquatic resources on or in the vicinity of the Fermi site during preconstruction and construction of Fermi 3, including those in Lake Erie, the overflow canals, North and South Lagoons, quarry lakes, Swan Creek, and Stony Creek.

Lake Erie

Temporary or permanent loss of some aquatic habitat in Lake Erie could result from the building of the intake and discharge structures and development of the barge slip for Fermi 3. In addition, other preconstruction and construction activities on the Fermi site that result in ground-clearing, alteration of runoff patterns, or altered water quality in onsite surface waters have the potential to affect water quality and aquatic resources in adjacent areas of Lake Erie. These impacts are discussed in the following paragraphs.

Preconstruction activities associated with installation of the intake structure for Fermi 3 would include building a pump house on the Lake Erie shoreline near the intake facility, hydraulic dredging of the existing intake bay to accommodate the new intake structure, and construction of bulkheads within the intake bay. Ground-clearing and preconstruction activities on the shoreline for the pump house could result in increases in runoff to and sedimentation in adjacent nearshore areas of Lake Erie and could cause temporary effects on benthic habitat and biota due to siltation, as well as possible short-term localized declines in phytoplankton productivity and zooplankton densities in the areas within and adjacent to the existing intake bay due to an increase in suspended sediments.

Dredging for construction of the intake structure would be authorized by permits from the USACE and MDEQ and would require implementation of mitigation measures and BMPs stipulated in those permits (Section 4.2) to limit impacts on water quality and aquatic biota. The area between the groins of the intake bay is currently maintained under existing USACE and MDEQ permits (Section 4.2), and no additional dredging is proposed to accommodate development of the barge slip. No more than 3.7 ac of previously disturbed benthic habitat located between the groins of the intake bay would be affected by building these structures.

As described in Section 3.3.1.4, the proposed cooling water discharge pipeline would extend approximately 1300 ft into Lake Erie from the shore. In order to bury the pipeline, mechanical trenching of an area approximately 5 ft wide and 1300 ft long would be required, and would affect approximately 0.15 ac of benthic habitat, of which approximately 0.02 ac has not been disturbed previously by maintenance dredging activities. Installation of the discharge structure would require USACE and MDEQ permits (Section 4.2). It is anticipated that those permits

would require implementation of mitigation measures to limit impacts on water quality and aquatic biota.

Dredging for these structures (considered preconstruction activities) would result in the temporary loss of benthic organisms because of the disturbance of substrate and physical impacts on individuals, as well as short-term localized declines in phytoplankton productivity and zooplankton density due to increased turbidity. The anticipated increases in turbidity would also temporarily degrade the quality of fish habitat in the affected area. Although backfilling of the discharge pipeline trench would restore the substrate and contours of the pipeline alignment, there would be permanent loss of a small amount of aquatic habitat (less than 1 ac) within the footprints of the intake structure and the barge slip, and at the end of the discharge pipeline where the diffusers would be located. There are no known sensitive or important aquatic habitats within the areas that would be affected by these activities (e.g., aquatic vegetation or other structured habitat), and species diversity within the area is generally low (Detroit Edison 2011a; AECOM 2009). As a consequence, impacts on aquatic biota and habitats from development of the barge slip, intake structure, and discharge structure would be temporary, easily mitigated, and minor.

As described in Section 4.2.3.1, stormwater runoff from preconstruction and construction areas and discharge of water from excavation dewatering into any onsite surface waters would eventually enter Lake Erie, where aquatic resources could be affected by sediment or contaminants. As described in Section 4.2.3.1, Detroit Edison would obtain an NPDES stormwater construction permit that would require monitoring of preconstruction and construction-related discharges and would require soil erosion controls and other BMPs to comply with regulations designed to prevent degradation of water quality.

The review team considered whether preconstruction and construction activities would affect the potential for harmful algal blooms in Lake Erie in the vicinity of the Fermi site. Because the NPDES stormwater construction permit, the stormwater management plan for the Fermi site, and the employment of BMPs would have sufficient controls to protect water quality in Lake Erie, the review team concluded that chemical and physical discharges from building activities would not affect the density and distribution of aquatic nuisance species, including lyngbya (*Lyngbya wollei*), in Lake Erie.

Based on the analysis of information regarding building the intake structure, barge slip, and discharge structure in Lake Erie, the potential for water quality impacts from building activities at other areas of the Fermi site, and the implementation of mitigation measures and BMPs that would be stipulated in required permits, the review team concludes that the preconstruction- and construction-related impacts on aquatic resources in Lake Erie would be temporary, easily mitigated, and minor, and no further mitigation measures beyond those identified in the appropriate permits would be warranted.

Overflow Canals (North, Central, and South Canals)

Building of the parking structure and a warehouse would result in the complete filling of the central and the north canals and portions of the south canal. Impacts from filling these areas would result in the loss of approximately 7 ac of aquatic habitat and would affect the communities and aquatic organisms that currently reside in them. Surveys of aquatic organisms within the north, central, and south canals in 2008 and 2009 indicated that the fish and macroinvertebrate species present are common in surrounding aquatic habitats within the region; no sensitive or unique species or habitats were observed (AECOM 2009). The isolated central canal has no direct hydrological connection with the other onsite water bodies (Section 2.3.1.1), and aquatic organisms within the central canal would be killed when it is filled. Filling of the north and partial filling of the south canal systems would mostly result in habitat loss along the canal banks. Although most benthic organisms within the filled areas of the north and south canals would be killed, some of the fish and other more mobile animals within the affected areas may be able to escape harm by leaving the affected areas and moving to other portions of the canals, Swan Creek, and the South Lagoon. Some impacts in the south canal would be temporary; a culvert would be installed in the south canal and the existing bottom might be maintained or restored after installation. Dewatering of excavation areas would not affect water levels in the north or south canals or the associated wetland areas because they are hydraulically connected to Lake Erie (see Section 4.2.1).

Backfilling these onsite water bodies may affect stormwater runoff flowing to the North and South Lagoons, potentially causing a small increase of sediment loading into the North and South Lagoons, Swan Creek, and Lake Erie. An NPDES stormwater construction permit issued by the MDEQ would be needed for preconstruction and construction and, as part of the NPDES stormwater construction permit, a SESC Plan would be implemented. The SESC Plan would identify BMPs to be implemented to alleviate the potential for increased sediment loading to other surface water areas (Detroit Edison 2011a). Based on the amount of aquatic habitat that would be affected, the nature of the aquatic habitat and organisms that occupy the overflow canals and the hydrologically connected surface water habitats, and the planned implementation of BMPs to address concerns related to stormwater runoff, the review team concludes that the impacts associated with filling these areas for building the parking structure and warehouse (both considered preconstruction activities) would be minor and no additional mitigation would be warranted. No NRC-authorized construction activities would affect these water bodies.

Quarry Lakes

There would be no direct effects of NRC-authorized construction activities on the Quarry Lakes, and runoff from preconstruction and construction areas would not enter the lakes because of the topography of the Fermi site. Dewatering associated with the construction of Fermi 3 includes dewatering the excavation site for the reactor. Groundwater modeling conducted by Detroit

Edison (2011a) indicated that water levels in the Quarry Lakes could drop between 1 and 2 ft as a result of dewatering operations for preconstruction and construction activities (see Section 4.2.2.2). Methods being considered by Detroit Edison for reducing the amount of groundwater that would be extracted during dewatering operations are described in Section 4.2.1.3. As identified in Section 2.4.2.1, the Quarry Lakes were created when water filled abandoned rock quarries used for site development and construction of Fermi 2. These small lakes are steep-sided, approximately 50 ft deep, and support aquatic species common to Lake Erie coastal marsh habitats. Because of the steep sides, a decrease in water depth of up to 2 ft would result in only small temporary changes in surface area and would expose only small areas of benthic habitat. Assuming a decrease in water depth of 2 ft, the overall change in water volume would be less than 5 percent. Based on the amount of aquatic habitat that would be affected and the nature of the aquatic organisms that occupy these lakes, the impacts associated with the estimated depth changes would be temporary and minor and no mitigation would be required.

Swan Creek

The entire Fermi site is located in the Swan Creek watershed. Although no preconstruction or construction activities would occur in Swan Creek, stormwater runoff into the creek from preconstruction and construction areas could occur, and water removed from the subsurface during excavation dewatering would be discharged into stormwater outfalls that flow to Swan Creek via the North Lagoon (see Section 4.2.1.3). As described in Section 4.2.3.1, Detroit Edison would obtain an NPDES stormwater construction permit that would require monitoring of construction-related discharges and soil erosion controls and other BMPs to comply with regulations designed to prevent the water quality in Swan Creek from being affected by runoff from construction areas. As a consequence, construction-related impacts on aquatic resources within Swan Creek and adjacent areas of Lake Erie would be temporary, easily mitigated, and minor, and no further mitigation measures beyond the identified BMPs would be warranted.

Stony Creek

The entire Fermi site is located in the Swan Creek watershed, and no preconstruction or construction activities for Fermi 3 are planned in the vicinity of Stony Creek or within the Stony Creek watershed. Consequently, there would be no construction-related impacts on aquatic resources within Stony Creek.

4.3.2.2 Aquatic Resources – Transmission Lines

A short length (less than 1 mi) of new transmission line corridor would be developed on the Fermi site to transmit power from the Fermi 3 generator to a new Fermi 3 switchyard. This new onsite transmission line corridor would be approximately 170 ft wide and include two sets of towers that would carry both rerouted Fermi 2 transmission lines and new Fermi 3 transmission

lines (Detroit Edison 2011a). Surface water and wetland features located along the proposed onsite corridor include the south canal (see Section 2.4.2), a drainage area that is composed of a mosaic of emergent wetland, and some forested wetlands (Detroit Edison 2011a). There are no surface water features within the footprint for the new switchyard (Detroit Edison 2011a). Clearing of the onsite transmission line ROW, erecting the transmission towers, and stringing of the transmission lines would all be accomplished using methods that minimize impacts on wetlands and forest vegetation (Detroit Edison 2011a). The south canal and the drainage area within this portion of the Fermi site would be spanned by the transmission lines; impacts on the drainage area are expected to be minor because no activities associated with the transmission structure installation are expected to occur within the drainage channel (Detroit Edison 2011a).

Three new 345-kV transmission lines for Fermi 3 would be located within an assumed 300-ft-wide corridor from the Fermi site to the Milan Substation, a distance of approximately 29.4 mi. While the onsite Fermi 3 transmission lines would be owned by Detroit Edison up to the point of their interconnection with the new Fermi 3 switchyard, ITC*Transmission* would exclusively own and operate the offsite lines and other transmission system equipment between the Fermi 3 switchyard and the Milan Substation, and Detroit Edison would not control the building or operation of the transmission system. Detroit Edison expects to contract with ITC*Transmission* to maintain the transmission towers and lines located on Detroit Edison property (Detroit Edison 2011a).

The transmission line corridor route is described in Section 2.4.1.2 of this EIS and is illustrated in Figure 2-5. The three 345-kV lines for Fermi 3 would be built in an east-west common corridor that currently contains transmission lines for Fermi 2 for approximately 5 mi to a point just west of I-75. From this point, the three Fermi-Milan lines would be in a corridor shared with non-Fermi lines that travel to the west and north for approximately 13 mi. The last 10.8 mi of the proposed corridor that would proceed west to the Milan Substation are currently undeveloped, and no transmission infrastructure exists. This portion of the corridor has been under ITC*Transmission*'s control for future transmission development, but vegetation maintenance has been minimal except to remove tall, woody vegetation. According to FWS National Wetland Inventory mapping, the identified transmission route crosses about 30 wetlands or other waters that may be regulated by the USACE and/or MDEQ (FWS 2010). The 18.6-mi existing eastern section of the transmission route crosses 12 narrow agricultural drains and small streams; the undeveloped western 10.8-mi section of the route crosses nine drains and small streams. Reconfiguration of existing conductors would, for the most part, allow for the use of existing infrastructure to create the new lines, and access for installing additional lines is good because the vegetation has been managed to exclude tall woody vegetation. Therefore, preconstruction impacts on aquatic resources along the eastern 18.6 mi of the transmission line corridor are expected to be minor. Existing aquatic habitats in this portion of the corridor would be spanned, and BMPs would be used to protect aquatic habitats crossed by the new lines. Such BMPs include, but are not limited to, the use of silt fencing, hay bales, and

similar practices to ensure the protection of aquatic habitats in close proximity to construction activity. Similarly, agricultural drains and small streams occurring in the undeveloped western corridor are narrow, and Detroit Edison anticipates using tower spans of 700–900 ft to avoid placing structures within stream channels (Detroit Edison 2011a). 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. There are no aquatic habitats within the area that would be affected by the anticipated expansion of the Milan Substation. The review team concludes that impacts on aquatic habitats within the proposed transmission line corridor would be temporary, easily mitigated, and minor, and no additional mitigation would be required.

4.3.2.3 Important Aquatic Species and Habitats

This section describes the potential impacts of building Fermi 3 facilities and associated 345-kV transmission lines on important aquatic species including species that have been listed under the ESA, species that are listed by the State, and commercially and recreationally important species. The magnitude of impacts resulting from preconstruction and construction activities would depend on the sensitivity of a species to localized disturbance and water quality changes, species-specific habitat requirements, critical time periods in a species' life cycle, and the intensity and duration of the disturbance. The general biology, status, and habitat requirements of important aquatic species are presented in Sections 2.4.2.

Commercially and Recreationally Important Species

Commercially and recreationally important species that could occur in the vicinity of the Fermi site are identified in Section 2.4.2.3, along with information about their habitat requirements and life histories. Building the parking structure and a warehouse (both considered preconstruction activities) would result in filling the isolated central canal and portions of the north and south canals on the Fermi site, resulting in mortality to all aquatic organisms in the central canal and mortality to some aquatic organisms in the north and south canals. Commercially and recreationally important species that inhabit the canals include channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), gizzard shad (*Dorosoma cepedianum*), goldfish (*Carassius auratus*), and largemouth bass (*Micropterus salmoides*), among others (AECOM 2009), although no fishing activities are allowed within the onsite canals. As described in Section 2.4.2, surveys conducted in the vicinity of the Fermi site indicated that the species in the habitats that would be affected by filling were also found to be relatively abundant in other aquatic habitats in the vicinity of the Fermi site.

Approximately 4 ac of aquatic habitat in Lake Erie would be affected during modification and dredging of the intake bay (i.e., the area between the rock groins), building the new intake structure and the barge slip within the intake bay, and placement of the discharge structure for the facility. Although some commercially and recreationally important fish species are known to occur within the intake bay and in the area that would be affected during development of the

discharge structure (AECOM 2009), most individuals are expected to temporarily move away from the immediate area during in-lake activities. This short-term displacement of individuals is not expected to have noticeable population-level impacts on commercial and recreational fish species. Migratory pathways for commercially or recreationally important species would not be physically blocked during in-lake activities.

As described in Section 4.2.3.1, the water quality of surface waters on or near the Fermi site could be affected by site-clearing and building activities. Stormwater runoff from the site into the North Lagoon (which drains to Swan Creek), South Lagoon, or Lake Erie could contain increased amounts of sediment or other pollutants, and installation of intake and discharge structures in and along the shoreline of Lake Erie would disturb sediments during building and dredging activities, potentially increasing turbidity near the Fermi site. Increased turbidity and noise could adversely affect migratory behavior, spawning behavior, and spawning success for some fish species.

To build and operate Fermi 3, Detroit Edison must obtain approvals from Federal and State regulatory agencies, including Section 10 and 404 permits from the USACE, Part 325 and 303 permit from the MDEQ, an NPDES construction stormwater permit from the MDEQ, and a Section 401 Water Quality Certification from the MDEQ. (MDEQ granted Section 401 Water Quality Certification on January 24, 2012; see Appendix H.) The MDEQ would also require Detroit Edison to develop both an SESC and a PIPP prior to obtaining the NPDES permit. With the implementation of preconstruction and construction-runoff and spill-control measures to be detailed in the PIPP and compliance with regulatory permits, it is unlikely that turbidity or contaminants from construction activities would be present at levels that would substantially affect fish migration or spawning.

As described in Section 2.4.2.2, there are no important commercial or recreational fisheries present within the assumed transmission line route due to the small sizes of the drainages crossed by the transmission line corridor. However, some of the streams to be crossed by the proposed transmission lines support some commercially or recreationally important species. Building of transmission lines could affect individuals in the vicinity of stream crossings because of soil erosion, sedimentation, accidental spills of fuel or lubricants from construction equipment, and temporary disturbance and/or displacement of aquatic biota. Along the eastern 18.6 mi of the proposed transmission line corridor, reconfiguration of existing conductors would allow for the use of existing infrastructure to create the new lines. Aquatic habitats in this portion of the corridor would be spanned and BMPs, such as placement of silt fencing, hay bales, and similar practices, would be implemented to protect aquatic habitats in close proximity to construction activity. Similarly, streams occurring in the western portion of the proposed corridor are narrow, and Detroit Edison anticipates using line spans of 700-900 ft to avoid erecting towers within the active channel and blockage of waterways. Existing 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. The MDEQ and/or USACE would perform additional regulatory review of proposed plans for building of the needed transmission lines, which would be built, owned, and maintained by ITC*Transmission*. Potential impacts on water quality are expected to be addressed through mitigation measures and BMPs required under issued permits.

On the basis of an evaluation of information presented in Detroit Edison's ER and other existing information, the review team concludes that construction and preconstruction impacts on commercially and recreationally important species in the vicinity of the Fermi site and along associated transmission line corridors would be mostly temporary and minor, and no additional mitigation would be expected. Preconstruction and construction activities are expected to affect relatively little habitat and few individuals of commercially and recreationally important species in areas affected by building activities. Implementation of BMPs and other mitigation measures stipulated in required permits would further reduce impacts.

Federally and State-Listed Aquatic Species

This section evaluates the potential for Federally and State-listed aquatic species to be adversely affected by preconstruction and construction activities for Fermi 3. Section 2.4.2.3 identifies and describes Federally and State-listed species that could occur in Monroe, Wayne, and Washtenaw Counties within which building activities related to development of Fermi 3 would be conducted.

Based on habitat requirements, current distributions, and survey data, aquatic species with a potential to occur in the vicinity of the Fermi site or the proposed transmission line route were identified in Section 2.4.2.3 (see Table 2-15). Three Federally listed aquatic species (northern riffleshell [*Epioblasma torulosa rangiana*]; rayed bean [*Villosa fabalis*]; and snuffbox mussel [*E. triquetra*]), all of which are freshwater mussels, were identified as having the potential to occur in Monroe, Washtenaw, or Wayne Counties in Michigan (Table 2-15). None of these species has ever been documented either on the Fermi site or along the proposed transmission line route, and, based on current population status, records of occurrence, and habitat preferences, only the rayed bean and the snuffbox mussel are believed to have the potential to occur on or in the immediate vicinity of the Fermi site.

The northern riffleshell is considered unlikely to occur on or adjacent to the Fermi site due to the lack of suitable stream habitat; it is unknown whether there could be suitable habitat for the northern riffleshell in portions of streams that would be crossed by the proposed transmission line route within Monroe or Wayne Counties, although the species has not been reported from the streams that would be crossed.

Including the species identified above, which also are all listed as endangered by the State of Michigan, the State-listed species that have been observed or that have a reasonable potential to occur on or adjacent to the Fermi site include three mussel species (rayed bean, salamander

mussel [*Simpsonaias ambigua*], and snuffbox mussel) and three fish species (pugnose minnow [*Opsopoedus emiliae*], sauger [*Sander canadensis*], and silver chub [*Macrhybopsis storeriana*]) (Section 2.4.2.3; Table 2-15). Of these species, only the silver chub is known to occur at the Fermi site (Table 2-15).

The only known extant population of the white catspaw (*Epioblasma obliquata perobliqua*), which is Federally and State-listed as endangered, occurs in one stream drainage in Ohio. This species is presumed to be extirpated from Michigan; as a consequence, it is believed that this species would not be present near the Fermi site or in streams that would be crossed by the proposed transmission line corridor. Therefore, the review team concluded that the white catspaw would not be affected by preconstruction or construction activities for Fermi 3 and additional evaluation was not included in the final EIS or the BA.

There are other State-listed mussel and fish species, as shown in Table 2-15, that are considered unlikely to occur at the Fermi site but have the potential to occur in streams that would be crossed by the proposed transmission line corridor in Monroe, Wayne, or Washtenaw Counties. There is currently insufficient information to determine whether any of those species are present in the streams that would be crossed.

Building of offsite transmission lines could affect Federally and State-listed organisms in the vicinity of stream crossings in the same ways as described in the previous section for commercially and recreationally important species. Additional regulatory review of proposed plans for construction of the needed transmission lines, which would be built, owned, and maintained by ITC*Transmission*, may be conducted by the MDEQ and/or USACE, and potential impacts on Federally and State-listed aquatic species are expected to be addressed through mitigation measures and BMPs required under issued permits.

Potential impacts on Federally and State-listed species that were deemed to have a potential to occur in the waters on or in the immediate vicinity of the Fermi site or in streams that would be crossed by the proposed transmission line corridor, on the basis of previous records in the area or the expected overall range of the species, are evaluated in more detail in the following subsections.

Northern Riffleshell (*Epioblasma torulosa rangiana*)

The northern riffleshell is Federally listed as endangered and is also listed as endangered by the State of Michigan. Because there is no suitable habitat for the northern riffleshell on the Fermi site or in adjacent waters of Lake Erie (Section 2.4.2.3), construction activities at the Fermi site would have no impact on this species. Although suitable habitat for the northern riffleshell could be present in some of the streams that would be crossed by the proposed transmission line corridor, extant populations of this species in Michigan are only known to be present in the Black River in Sanilac County and the Detroit River in Wayne County (Carman and

Goforth 2000). Even if present in streams crossed by the transmission line corridors, the building of transmission lines for Fermi 3 is not expected to affect the northern riffleshell because aquatic habitats that are crossed by the corridor would be spanned without placement of structures within stream channels and because BMPs would be implemented to protect water quality in aquatic habitats located near construction activity. Additional regulatory review of proposed plans for construction of the transmission lines, which would be built, owned, and maintained by ITC*Transmission*, may be conducted by the MDEQ and/or USACE, and potential impacts on water quality are expected to be addressed through mitigation measures and BMPs required under issued permits. On the basis of this information, the review team concludes that preconstruction- and construction-related activities would have no effect on the northern riffleshell.

Pugnose Minnow (*Opsopoeodus emiliae*)

The pugnose minnow is listed as endangered by the State of Michigan and has the potential to occur in streams in Monroe and Wayne Counties. Although there is a potential for suitable habitat for the pugnose minnow to be present in the vicinity of the Fermi site, especially in weedy aquatic habitats such as those present in the North Lagoon or Swan Creek, no individuals were collected during recent surveys on the Fermi site and none were reported in past biological surveys of Stony Creek or the Swan Creek estuary near the Fermi site (AECOM 2009; MDEQ 1996, 1998; Francis and Boase 2007). If occasional individuals are present in the North Lagoon or near the mouth of Swan Creek, there is a potential for adverse effects due to water quality changes and increased turbidity related to stormwater runoff from preconstruction and construction areas (e.g., during building of the parking structure and warehouse) or due to discharge of water removed from the subsurface during excavation into stormwater outfalls that flow to Swan Creek via the North Lagoon (Section 4.2.1.3). As described in Section 4.2.3.1, Detroit Edison would obtain and implement an NPDES stormwater construction permit that would require monitoring of construction-related discharges and implement soil erosion controls and other BMPs to limit adverse effects on water quality due to runoff from construction areas. On the basis of this information, the review team concludes that preconstruction- and construction-related impacts on the pugnose minnow, if present, would be minor and that no additional mitigation would be required.

Rayed Bean (*Villosa fabalis*)

The rayed bean is Federally listed as endangered and is also listed as endangered by the State of Michigan. There are no streams on the Fermi site with conditions suitable for the rayed bean, and no extant populations are known to occur in the stream drainages that would be crossed by the proposed transmission line route. Although there are records of rayed bean specimens from shallow, wave-washed areas of western Lake Erie, information supplied by Detroit Edison suggests that it is unlikely that the species occurs in the vicinity of the Fermi site for a number of reasons: (1) approximately 30 years of information on mussels in the western basin of Lake

Erie (including in the vicinity of the Fermi site) have been collected and evaluated by the USGS, and no rayed bean specimens have been identified; (2) the USACE conducted mussel surveys in Lake Erie approximately 2 mi south of the Fermi site and found no live specimens or shells of the rayed bean; (3) the rayed bean was not observed in surveys conducted by the Michigan Natural Features Inventory just north of the Fermi site near the mouth of Swan Creek; and (4) observations made by divers during sediment sampling and buoy maintenance activities within the exclusion zone for the Fermi site indicate that the sediment is predominantly clay hardpan, which is not suitable for the rayed bean (Detroit Edison 2010c). In addition, most of the area that would be affected by development of the intake structure, the barge slip, and the discharge structure for Fermi 3 has been previously disturbed by periodic maintenance dredging.

The building of transmission lines for Fermi 3 is not expected to affect the rayed bean because (a) the species has not been reported from the streams that would be crossed by the proposed transmission line corridor, (b) aquatic habitats that are crossed by the corridor would be spanned without placement of structures within stream channels, and (c) BMPs would be implemented to protect water quality in aquatic habitats located near construction activity. On the basis of this information, the review team concludes that preconstruction- and construction-related activities for Fermi 3 would not affect the rayed bean.

Salamander Mussel (*Simpsonaias ambigua*)

The salamander mussel is listed as endangered by the State of Michigan and has the potential to occur in Monroe and Wayne Counties. There are no suitable stream habitats for the species on the Fermi site. There is the potential for suitable habitat and the appropriate host (mudpuppy; *Necturus maculosus*) for the salamander mussel to be present in Lake Erie near the Fermi site (see Section 2.4.2.3). Because the areas in Lake Erie that would be disturbed by modification and dredging of the intake bay, construction of the new intake structure, development of a barge slip within the intake bay, and placement of the discharge structure for the facility have either been previously disturbed by periodic maintenance dredging or have been identified as containing a clay hardpan substrate (Detroit Edison 2010c) and not the silt and sand substrate preferred by this species, it is considered unlikely that this species would be present.

Because no suitable habitat for this species (i.e., medium to large rivers or lakes) would be crossed by the proposed transmission line corridor, construction of the proposed transmission lines would not affect this species. On the basis of this information and the recommended mitigation described, the review team concludes that preconstruction- and construction-related impacts on the salamander mussel would be minor.

Sauger (Sander *canadensis*)

The sauger is considered a species of special concern by the State of Michigan and has the potential to occur in Lake Erie. However, the last reported occurrence of sauger in Monroe County was in 1996, and no individuals were collected during recent surveys on the Fermi site, Stony Creek, or the Swan Creek estuary (AECOM 2009; MDEQ 1996, 1998; Francis and Boase 2007). If present in nearshore areas of Lake Erie that could be affected by construction activities, sauger would likely move away during dredging and building activities because of increased noise and turbidity levels, resulting in temporary displacement but negligible levels of mortality. Detroit Edison would obtain and implement an NPDES stormwater construction permit that would require monitoring of construction-related discharges and would implement soil erosion controls and other BMPs to comply with regulations designed to prevent degradation of water quality in Swan Creek and other areas near the Fermi site. The small streams that would be crossed by the proposed transmission line corridor do not provide suitable habitat for the sauger. On the basis of this information, the review team concludes that preconstruction- and construction-related impacts on the sauger would be temporary and minor, and no additional mitigation would be warranted.

Silver Chub (*Macrhybopsis storeriana*)

The silver chub is considered a species of special concern by the State of Michigan. A single silver chub specimen was collected in July 2009 during monthly fish surveys conducted near the mouth of Swan Creek from 2008 to 2009. Although no construction activities for Fermi 3 would occur in the area where the individual was captured, increased stormwater runoff into the creek from preconstruction areas (e.g., from the parking structure and warehouse areas) could occur and groundwater removed during excavation dewatering would be discharged into stormwater outfalls that flow to Swan Creek via the North Lagoon (Section 4.2.1.3). Little is known about the life history of the silver chub, especially its tolerance of siltation and turbidity (Derosier 2004). While some researchers have suggested that silver chub are intolerant of turbidity and silt, others note that silver chub are found in silty rivers (Derosier 2004). As described in Section 4.2.3.1, Detroit Edison would obtain and implement an NPDES stormwater construction permit that would require monitoring of construction-related discharges and implement soil erosion controls and other BMPs designed to prevent water quality in Swan Creek from being affected by runoff from construction areas. As a consequence, preconstruction- and construction-related impacts on silver chub would be temporary and minor, and no additional mitigation would be warranted.

Snuffbox mussel (*Epioblasma triquetra*)

The snuffbox mussel is Federally listed as endangered and is also listed as endangered by the State of Michigan. It has the potential to occur in Monroe, Wayne, and Washtenaw Counties. Although there are no suitable stream habitats on the Fermi site, there is the potential for

suitable habitats in Lake Erie, and the host required by this species (logperch, *Percina caprodes*) has been collected near the Fermi site in Swan Creek and in Lake Erie near the South Lagoon (see Section 2.4.2.3). The areas in Lake Erie that would be disturbed during the building of Fermi 3 facilities have either been previously disturbed by periodic maintenance dredging or have a clay hardpan substrate (Detroit Edison 2010c) rather than the sand, gravel, or cobble substrate preferred by this species. Therefore, it is considered unlikely that this species would be present in the project area.

It is not known whether suitable stream habitat or populations of the snuffbox mussel occur along the proposed offsite transmission line corridor. It is anticipated that the small streams that would be crossed by the proposed transmission line corridor could be easily spanned without placing structures in stream channels and that BMPs would be implemented to protect water quality in streams during building activities. Additional regulatory review of proposed plans for construction of the offsite transmission lines, which would be built, owned, and maintained by ITC*Transmission*, may be conducted by the MDEQ and/or USACE, and potential impacts on water quality are expected to be addressed through mitigation measures and BMPs required under issued permits. On the basis of this information, the review team concludes that preconstruction- and construction-related activities for Fermi 3 would not affect the snuffbox mussel.

Summary of Impacts on Federally and State-Listed Aquatic Species

Based on information provided by Detroit Edison and the review team's independent evaluation, the review team concludes that impacts of construction and preconstruction activities on threatened and endangered aquatic species would be minor. For the northern riffleshell, the review team concluded that there would be no effect from preconstruction and construction activities because any streams containing suitable habitat could be easily spanned by the proposed transmission lines. Preconstruction activities also include building and upgrading transmission lines for Fermi 3. NRC-authorized construction activities, which exclude the preconstruction activities described above, would have no direct effects on any listed species. In addition, the implementation of BMPs that would be identified in the required NPDES stormwater construction permits would further reduce the potential for impacts from preconstruction and construction activities. The NRC staff concludes that the impacts of NRC-authorized construction activities on aquatic threatened and endangered species would be minor, and no additional mitigation measures would be warranted.

In compliance with Section 7 of the ESA, the NRC began informal consultation by letter to the FWS dated December 23, 2008 (NRC 2008). The review team completed a BA assessing the impact on three Federally protected freshwater mussel species of building and operating Fermi 3. The conclusions in the BA on potential impacts are provided above. A copy of the BA is included in Appendix F of this final EIS. The BA was forwarded to the FWS on March 30, 2012 (NRC 2012). In a letter dated June 8, 2012 (FWS 2012), the FWS concurred with the

review team's determination that building Fermi 3 would have no effect on the three freshwater mussel species that are Federally protected as endangered species.

Critical Habitats

There are no areas designated as critical habitat for aquatic species in the vicinity of the Fermi site or along the route of the proposed transmission line.

4.3.2.4 Aquatic Monitoring

No monitoring of aquatic resources is planned for the site preparation and development activities onsite or in the transmission line corridor. Fermi 2 NPDES monitoring, which requires monitoring of five outfalls, is anticipated to be ongoing during construction and preconstruction activities. However, the current NPDES permit for the Fermi site does not require monitoring of aquatic ecological resources, and there are no requirements in the license for Fermi 2 to conduct monitoring of aquatic resources, including specific aquatic ecological monitoring of the algal community, benthic invertebrates, or fish. The NPDES stormwater construction permit for Fermi 3 would require monitoring for turbidity of any discharge from the building areas; monitoring frequency and location would be identified during the permitting process (Section 4.2.4). Ecological monitoring of aquatic resources during preconstruction and construction activities could be required as a condition of permits issued by various regulatory agencies. For example, the MDEQ could request monitoring of specific ecological attributes as part of stormwater construction permits.

4.3.2.5 Potential Mitigation Measures for Aquatic Impacts

No additional mitigation measures, beyond those that may be identified in the required NPDES stormwater construction permit and in any current or future permits issued by the USACE and MDEQ would be needed to reduce potential impacts on water quality and aquatic resources.

4.3.2.6 Summary of Impacts on Aquatic Resources

Based on information provided by Detroit Edison and the review team's independent evaluation, the review team concludes that the impacts of preconstruction and construction activities on aquatic biota and habitats, including impacts on aquatic threatened and endangered species and other important species, would be SMALL, and no mitigation measures beyond those identified in the required NPDES stormwater construction permit, and in permits issued by the USACE and MDEQ, are proposed at this time. Based on the above analysis, and because NRC-authorized construction activities represent only a portion of the analyzed activities, the NRC staff concludes that the impacts of NRC-authorized construction activities would be SMALL. Any impacts on aquatic resources associated with the compensatory mitigation

proposed by Detroit Edison would be evaluated by the USACE as part of the permitting process for that activity.

4.4 Socioeconomic Impacts

This section describes the socioeconomic impacts that might occur as a result of building activities for Fermi 3. Detroit Edison employed an initial workforce at the Fermi plant site in 2011 that primarily focused on activities related to Fermi 1 and Fermi 2. This first phase would occur over 2 years, and would contribute to readying the site for subsequent building of Fermi 3. Detroit Edison plans to begin the preconstruction work specific to Fermi 3 in 2013 and to complete all building activities in 2021. The size of the construction workforce over the first phase of activities would average 100 workers. During the second and main phase of building activity, the construction workforce would range from a minimum of 200 workers to a peak of approximately 2900 workers. The average size of the onsite workforce during the 10-year building period would be approximately 1000 workers (Detroit Edison 2011a).

The review team expects most of the socioeconomic impacts related to demographics, economy and taxes, as well as infrastructure and community services, to occur in the general vicinity of Fermi 3 and in the communities where the majority of the new construction workers recruited for the project (i.e., in-migrating workers) reside. The review team expects the characteristics of the workers recruited from outside the region to be similar to the current workforce with respect to choices and preferences (e.g., commute distance, available amenities), and that they will reside primarily in Monroe and Wayne Counties in Michigan and Lucas County in Ohio during the building period. More than 87 percent of the current Fermi 2 workforce resides in these three counties. Therefore, the review team expects that most of the construction workforce relocating into the area during the building of Fermi 3 would also reside in these three counties.

As discussed in Section 2.5, no more than 3.2 percent of the current Fermi 2 workforce resides in any one county outside Monroe, Wayne, and Lucas Counties. In addition, the current and projected populations of the regional area are so large that the current workforce at the Fermi site represents less than 1 percent of the total population in any of the counties or locations where these employees reside. Therefore, the review team expects that impacts beyond the three counties will be minor. The following discussion focuses on the three-county economic impact area.

Section 4.4.1 presents a summary of the physical impacts of the project. Section 4.4.2 provides a description of the demographic impacts. Section 4.4.3 describes the economic impacts, including impacts on the economy and tax revenue. Section 4.4.4 describes the impacts on the infrastructure and community services. Section 4.4.5 summarizes the socioeconomic impacts.

4.4.1 Physical Impacts

Building activities will cause temporary and localized physical impacts, such as noise, odors, vehicle/equipment exhaust, and dust. Vibration and shock impacts are not expected because of the strict control of blasting and other shock-producing activities. The review team believes these impacts would be mitigated by compliance with all applicable Federal, State, and local environmental regulations and site-specific permit conditions. This section addresses potential physical impacts that may affect people, buildings, and roads.

4.4.1.1 Workers and the Local Public

The Fermi site is located along the relatively straight Lake Erie coastline that extends from the site approximately 20 mi southwest toward the Michigan/Ohio border and approximately 10 mi northeast toward the mouth of the Detroit River. East of this coastline are the open waters of Lake Erie. West of the site, the land is predominantly used for agriculture. Development within a 10-mi radius of the Fermi site is concentrated in the City of Monroe, which is about 8 mi southwest of the site, and along the Lake Erie shoreline in several beachfront communities. The community nearest to the Fermi site, Stony Point, is 2 mi south of it. Residential areas are also located in portions of Berlin Township and Frenchtown Charter Township. Relatively recent housing developments are present just south of Pointe Aux Peaux Road (the Fermi site's southern boundary).

The nearest designated recreational areas are the beaches at Stony Point (2 mi south of the site) and Estral Beach (2 mi northeast of the site). Nearby State recreational areas include Point Mouillee State Game Area (3.1 mi to the northeast) and Sterling State Park (4.8 mi to the south-southwest). Scattered industrial facilities are located west and southwest of the Fermi site along the I-75 corridor and near the City of Monroe. Commercial development is present along major road corridors, including Dixie Highway, Telegraph Road, and I-75, and within the City of Monroe.

All building activities would occur within the Fermi site boundary and would be performed in compliance with Occupational Safety and Health Administration (OSHA) standards, BMPs, and other applicable regulatory and permit requirements. Approximately 89,198 people live within 10 mi of the site, but physical impacts attenuate rapidly with distance. Therefore, the people who would be the most exposed to noise, fugitive dust, and vehicle or equipment emissions resulting from building activities would be construction workers and, to a lesser extent, other personnel working onsite at Fermi 2. People working or living immediately adjacent to the Fermi site and transient populations, such as people using recreational facilities or temporary employees of other businesses in the area, would not be noticeably affected because of their lack of access to and distance from the site; these factors would limit the impacts on them from building activities.

Construction workers would receive safety training and would be required to use personal protective equipment to minimize health and safety risks. Emergency first-aid care would be available at the site, and regular health and safety monitoring would be conducted. People working onsite or living near the Fermi site would not experience any physical impacts greater than those that would be considered an annoyance or nuisance.

4.4.1.2 Noise

Noise is an environmental concern because it can cause adverse health effects, annoyance, and disruption of social interactions. Noise would result from clearing, earthmoving, preparing foundations, pile-driving, concrete mixing and pouring, erecting steel structures, and various stages of facility equipment fabrication, assembly, and installation. Blasting would be employed in a manner designed to prevent damage to existing structures, equipment, and freshly poured concrete (Detroit Edison 2011a).

People who would be the most exposed to noise would be construction workers and, to a lesser extent, other personnel working onsite at Fermi 2. Detroit Edison will comply with OSHA standards for the protection of worker safety (29 CFR Part 1910) and EPA standards governing the noise levels of compressors (40 CFR Part 204).

Although some building activities would occur near the main gate of the Fermi site, approximately1900 ft (0.36 mi) from the nearest residence, most building activity would occur at the locations of the reactor building and cooling tower, which are located more than 3200 ft (0.6 mi) from the nearest residence. At this distance, noise levels would be less than 54 dBA without pile-driving and 57 dBA with pile-driving. Projected noise impacts from building activities are discussed in further detail in Section 4.8.2.

Detroit Edison will comply with NRC and EPA guidance for implementing the Noise Control Act of 1972, as amended, and the Quiet Communities Act of 1978 (Detroit Edison 2011a). In addition, Detroit Edison will need to apply for a building permit from Frenchtown Charter Township, which would require that any building activities comply with Township Ordinances, including the Noise Ordinance and the Blasting and Vibration Regulation Ordinance. The Noise Ordinance prohibits noise disturbance of residences between the hours of 7:00 p.m. and 7:00 a.m.

Detroit Edison will employ standard noise control measures for construction equipment, such as the use of silencers on diesel-powered equipment exhausts, to limit engine noise during building. In addition, Detroit Edison will limit the types of building activities during nighttime and weekend hours, notify all potentially affected neighbors about planned activities, and establish a construction-noise monitoring program (Detroit Edison 2011a). Detroit Edison (2011a) stated that the noisiest activities would be limited to daytime hours. The review team expects that noise impacts on recreation and the general public would be minimal due to the distance

between the site and recreational areas, because noise attenuates with distance, and because of intervening topography and foliage.

4.4.1.3 Air Quality

Air quality at the Fermi site is heavily influenced by the Detroit and Toledo metropolitan areas and surrounding emission sources. Monroe County is designated in nonattainment for the 1997 and 2006 National Ambient Air Quality Standard (NAAQS) for particulate matter smaller than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) and is in a maintenance area for the 8-hr ozone standard (EPA 2010a). In July 2011, the MDEQ submitted a request asking the EPA to redesignate Southeast Michigan as being in attainment with the $PM_{2.5}$ NAAQS (MDEQ 2011a). In July 2012, the EPA issued a proposed rule designating southeastern Michigan as having attained both the 1997 annual $PM_{2.5}$ NAAQS and the 2006 24-hour $PM_{2.5}$ NAAQS, based on 2009–2011 ambient air monitoring data (77 FR 39659, dated July 5, 2012), but the final determination has yet to be made.

Temporary and minor effects on local ambient air quality would occur as a result of building activities. Dust particle emissions would be generated during land-clearing, grading, and excavation activities. Air quality would also be affected by engine exhaust emissions from heavy construction equipment and machinery, concrete batch plant operations, and emissions from vehicles used to transport workers and materials to and from the site. Estimated emissions from building activities and the effect on local air quality are discussed in further detail in Section 4.7.

Detroit Edison will need to obtain a permit from the MDEQ, and will need to develop a dust-control program that will employ mitigation measures to control fugitive dust during building activities in accordance with MDEQ Rule 336.1372 (Detroit Edison 2011a). These mitigation measures may include but are not limited to the following:

- Spraying all work areas with water or other dust-suppressant compound;
- Covering debris, excavated earth, or other airborne materials with tarpaulins or any other approved material;
- Restricting the speed of vehicles that transport materials;
- Mechanically cleaning paved surfaces;
- Periodically maintaining off-road surfaces with gravel where trucks have frequent access; and
- Re-seeding work areas when no longer needed.

In addition, Detroit Edison will equip the onsite concrete batch plant with a dust control system that will be checked and maintained on a routine basis (Detroit Edison 2011a).

4.4.1.4 Buildings

Building activities would not affect any offsite buildings because they are distant from the site. In addition, vibration and shock impacts are not expected offsite because of the strict control of blasting and other shock-producing activities. Information about historic properties and the impacts of building on these properties is provided in Sections 2.7 and 4.6.

Building activities would not affect any onsite buildings. Controlled blasting would be employed to prevent damage to existing structures, equipment, and freshly poured concrete (Detroit Edison 2011a). In accordance with 10 CFR Part 50, Appendix A, Fermi 2 has been built to safely withstand any possible impact from natural phenomena, such as earthquakes, and could therefore withstand shock and vibration from activities associated with the development of Fermi 3, such as controlled blasting. Other onsite structures were constructed according to building codes and standards that address shock and vibration issues similar to those that would occur as a result of building activities associated with Fermi 3 (Detroit Edison 2011a).

4.4.1.5 Roads

This EIS assesses the impact of transporting workers and materials to and from the Fermi site from four perspectives: physical impacts related to deterioration in the quality of the roads, socioeconomic impacts resulting from congestion and reductions in level of service (LOS), air quality impacts resulting from the emissions from vehicles used to transport workers and materials to and from the site, and potential health impacts caused by additional traffic-related accidents. Only the physical impacts on roads are addressed in this section; the socioeconomic impacts resulting from congestion and reductions in LOS are discussed in Section 4.4.4.1.[(a)] The air quality impacts are addressed in Section 4.7, and human health impacts are addressed in Sections 4.8 and 4.9. Use of area roadways by construction vehicles could contribute to physical deterioration of roadway surfaces. Detroit Edison stated that additional layers may be added to roadway surfaces to support the construction vehicles (Detroit Edison 2011a). Given that any necessary road improvements will be a condition of the site plan review process by the Monroe County Road Commission (MCRC) and Michigan Department of Transportation (MDOT), physical impacts on roadways are expected to be minor. Detroit Edison would be required to provide improvements to local roadways as needed.

4.4.1.6 Aesthetics

Fermi 3 would be located within the developed area of the Fermi site, along its eastern boundary by Lake Erie. Surrounding the developed area are 656 ac of wetlands, open water, and forested land that buffer the view of the developed area from public roadways.

(a) LOS is a designation of operational conditions on a roadway or intersection, ranging from A (best) to F (worst). LOS categories as defined in the *Highway Capacity Manual* are listed in Table 2-40.

The review team expects visual impacts from grade-level building activities to be limited. Surrounding land use is predominantly agricultural, with a few residential areas that are within the viewshed of the plant site. The area around the Fermi site is a security zone, as defined under 33 CFR Part 165. In this security zone, boat traffic or other public use of the waters within a 1-mi circumference of the plant is prohibited. Therefore, views of the plant construction from the water would also be limited.

Two 400-ft-tall cooling towers are currently the predominant visible structures on the Fermi site and are visible from outside the site property boundaries in all directions. Several small beach communities are located along the Lake Erie shoreline within 5 mi of the Fermi site, including Estral Beach, Stony Point, Detroit Beach, and Woodland Beach. Activities associated with the building of the cooling tower for Fermi 3 would also cause aesthetic degradation from dust and night lighting that would be visible from locations within these communities and along the beaches and other recreational facilities (marinas, docks) along Lake Erie. Although taller than the existing cooling towers, building activities for the new 600-ft cooling tower would be consistent with the existing views of the Fermi site, and the review team expects no discernible adverse impact on visual aesthetics from the building of Fermi 3.

4.4.1.7 Summary of Physical Impacts

All building activities would occur within the site boundary. The review team has evaluated information provided by Detroit Edison, visited the site and its environs, and independently reviewed the potential physical impacts of building activities in the region and the local area around Fermi 3. The review team concluded that the expected physical impacts of building activities would be SMALL for all categories (workers and the local public, noise, air quality, buildings, roads, and aesthetics), and that no mitigation beyond that described by Detroit Edison in its ER would be warranted.

4.4.2 Demography

Detroit Edison employed an initial workforce at the Fermi plant site in 2011 that focused primarily on activities related to Fermi 1 and Fermi 2. This first phase would occur over 2 years, and would contribute to readying the site for subsequent building of Fermi 3. According to a response to comments provided by Detroit Edison in June, 2012 (ML12178A449), Detroit Edison would begin preconstruction work specific to Fermi 3 in 2013 and complete all construction activities in 2021.[(a)] In the ER, Detroit Edison also stated that the size of the

(a) The actual start date for preconstruction and construction activities is not known, but for analytical purposes the review team used the dates presented in the ER. The duration of activities and the relative schedule of workers are not expected to change from those presented in the ER, and it is unlikely that the change in schedule would affect the analysis presented in this EIS.

workforce over the first phase of activities (2011 to 2012) would range between 35 and 150 workers, with an average onsite workforce of 100 workers.

During the second and main phase of building activity, the building workforce would range from a minimum of 200 workers to a peak workforce of approximately 2900 workers in 2017. Beginning in 2017, Detroit Edison plans to begin staffing for operation and maintenance of the plant. The size of the operations and maintenance workforce would increase from approximately 50 workers in 2017 to full staffing in 2021 of 900 workers, while the size of the construction workforce would decrease from approximately 2900 workers in 2017 to 150 workers when building is completed in 2021. Between 2017 and 2021, Detroit Edison would have an average onsite workforce (combined building and operations and maintenance) of 1000 workers. Figure 4-6 shows the variation in the total onsite workforce over the building period. The review team will evaluate construction impacts by evaluating the average onsite workforce of 1000 workers and/or the peak workforce of 2900 workers, as appropriate.

Given the number of construction workers in the region, which includes portions of the Detroit Metropolitan Statistical Area (MSA) and the Toledo MSA, compared with the estimated size of the construction workforce for Fermi 3, the review team expects that a large number of the workforce would be drawn from within a 50-mi radius of the Fermi site. For purposes of analysis, the review team assumed approximately 85 percent of the building workforce

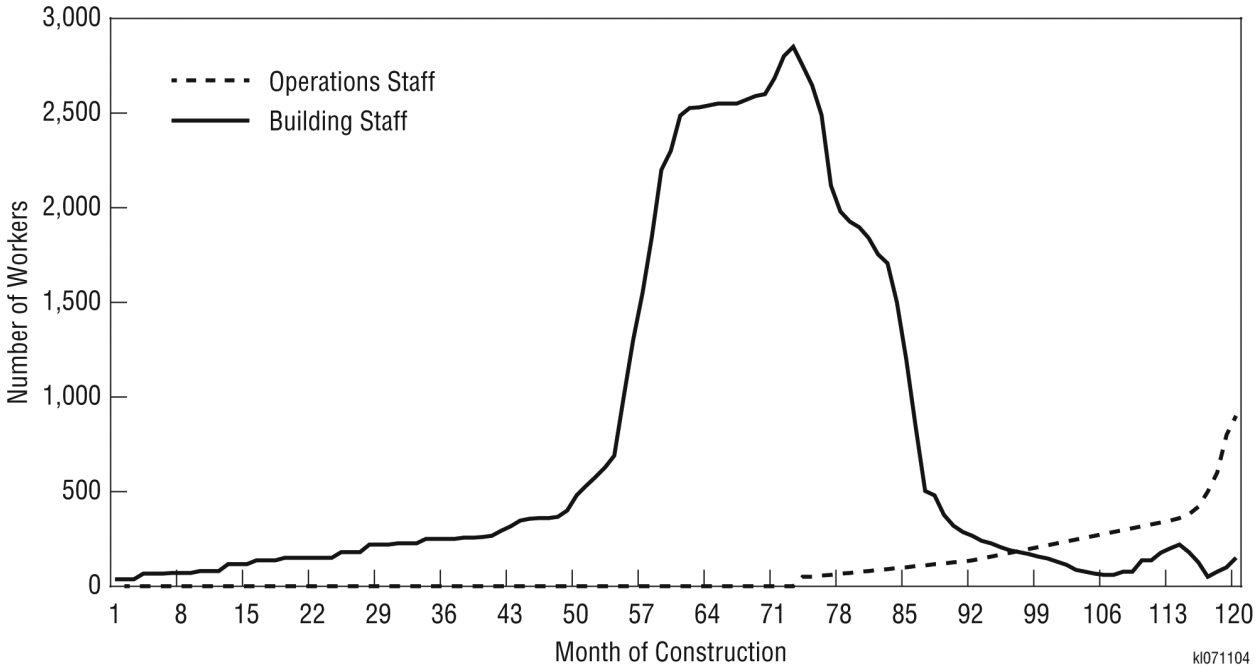

Figure 4-6. Total Number of Onsite Workers during the 10-year (120 Months) Building Period (Source: Detroit Edison 2011d)

(2465 workers during peak building employment and 850 workers on an average annual basis) would be drawn from within a 50-mi radius of the Fermi site. The residential distribution of the building workforce would likely differ from the residential distribution of the existing Fermi 2 workforce because a greater number of construction workers are located in Wayne and Lucas Counties, whereas Monroe County has the largest percentage of the operational workforce of Fermi 2. Within the economic impact area of Monroe and Wayne Counties, Michigan, and Lucas County, Ohio, Lucas County has more than twice the number of construction workers as Monroe County, and Wayne County has more than seven times the number of construction workers as Monroe County (see Tables 2-27 and 2-28). Therefore, building of Fermi 3 would likely draw more heavily from the construction workers in Wayne and Lucas Counties than those in Monroe County. Because these workers currently reside in the local area, they are already housed and serviced by the community, and the review team does not anticipate additional benefits or stresses associated with building of Fermi 3 by the existing workforce.

Despite the size of the construction workforce in the region, the review team expects that approximately 15 percent of the construction workforce (approximately 435 workers during peak building employment and 150 workers on an average annual basis) would be drawn from outside a 50-mi radius of the Fermi site. This estimate is based on the need for specialized skills and training that may not be available in the regional workforce and the expectation that a portion of the construction management, inspection, and owner's engineering staff would also likely relocate to the region during building.

The review team expects the characteristics of the workers recruited from outside the region with respect to choices and preferences (e.g., commute distance, available amenities) will be similar to those of the current workforce. Consequently, the review team could also assume the in-migrating workforce would move into the 50-mi region in the same proportions as the current operations workforce: with 87 percent residing in the three-county economic impact area and the remaining 13 percent outside of Monroe, Wayne, and Lucas Counties but within a 50-mi radius of Fermi 3. The settlement distribution of the in-migrating workers needed to support building of Fermi 3 is shown in Table 4-5.

The greatest potential impact on demographics in the region and the three-county economic impact area of Monroe, Wayne, and Lucas Counties would occur as a result of the relocation of workers during the peak building employment period. The following analysis focuses on demographic impacts associated with the peak building employment workforce, estimated to occur in 2017.

To estimate the maximum projected population increase associated with the in-migrating workers, the review team assumed all workers drawn from outside the region bring their families, and that each worker would have a household size of 2.6 persons, based on the national average household size in the U.S. Census Bureau's 2010 population data

Table 4-5. Counties Where In-migrating Construction Workforce Would Reside

County	Peak In-Migrating Construction Workforce in 2017	Percent of In-Migrating Workforce		Average Annual In-Migrating Construction Workforce
		By County[(a)]	Cumulative	
Monroe	250	57.5	57.5	86
Wayne	83	19.0	76.5	29
Lucas	47	10.7	87.2	16
All others within 50-mi region	55	12.8	100.0	19
Total	**435**			**150**

(a) The distribution of the in-migrating workforce by county is based on the residential distribution of the current Fermi 2 workforce (Detroit Edison 2008).

(USCB 2010a). On the basis of this assumption and the proportional settlement pattern shown in Table 4-5, the review team estimates that 650 persons would potentially relocate to Monroe County, 216 persons would relocate to Wayne County, and 122 persons would relocate to Lucas County. Approximately 143 persons would relocate elsewhere in the region. Projected population increases are shown in Table 4-6.

Based on the review team's analysis, the in-migrating workers and their families would increase the populations in Monroe, Wayne and Lucas Counties by less than 1 percent. As discussed in Section 2.5, Wayne and Lucas Counties are projected to experience population losses through 2020. Therefore, the projected increase in population associated with workers relocating to build Fermi 3 would have a beneficial impact on the two counties, because the population loss currently being experienced in Wayne and Lucas Counties, primarily due to the economy, would be partially offset by the in-migrating workers. While Monroe County is projected to have a modest population increase through 2020, the additional increase associated with the in-migrating construction workforce would be minimal. Therefore, the review team determined the three-county economic impact area would experience a SMALL beneficial demographic impact from building Fermi 3.

In addition, a small number of workers would in-migrate to counties outside of Monroe, Wayne, and Lucas Counties. Therefore, their impact on any one jurisdiction would not be noticeable. The current and projected populations of the regional area are so large that the in-migrating construction workforce for Fermi 3 would represent less than 1 percent of the total population in any of the counties or locations where these employees would reside. Therefore, the review

Table 4-6. Potential Increase in Population during the Peak Building Employment Period in 2017

County	Peak In-Migrating Workforce in 2017	Percent of In-Migrating Workforce	Estimated Increase in Population (number of workers × 2.6 persons per household)[(a)]	Projected 2020 Population[(b)]	Estimated Increase as Percent of Projected 2020 Population
Monroe	250	57.4	650	159,461	0.4
Wayne	83	19.1	216	1,812,593	0.01
Lucas	47	10.8	122	434,650	0.03
All others within region	55	12.6	143	–	–
Total	**435**		**1131**		

(a) National average household size in 2010 from population estimate by U.S. Census Bureau (USCB 2010a).
(b) Monroe and Wayne Counties 2020 and 2030 projections are from the Southeast Michigan Council of Governments (SEMCOG 2008). Lucas County projections are from the Office of Policy Research and Strategic Planning (Ohio Department of Development 2003). Projected populations are not provided for other counties within the 50-mi region. Given the small number of workers in-migrating to counties outside of Monroe, Wayne, and Lucas Counties, the impact on projected populations for any one jurisdiction would be minimal.

team concludes that the demographic impacts of building Fermi 3 on the remainder of the region would also be SMALL and beneficial.

The projected increase in population in Monroe, Wayne, and Lucas Counties associated with in-migrating workers and their families is less than 1 percent of the projected 2020 population for any of these counties.

Given the size of the regional population projected for 2020 of 6,130,056 persons within a 50-mi radius of the Fermi site (see Table 2-25), the projected increase associated with the in-migrating construction workforce would be minimal within the regional or local area.

4.4.3 Economic Impacts on the Community

This section evaluates the economic impacts on the 50-mi region from building Fermi 3, focusing primarily on Monroe, Wayne, and Lucas Counties. In 2010, more than 43,000 workers were employed in the construction industry in Monroe, Wayne, and Lucas Counties (USCB 2010b) (see Tables 2-28 and 2-29). Therefore, the review team expects most of the workers needed to support the building activities of Fermi 3 to be available in the local area.

4.4.3.1 Economy

Building activities for Fermi 3 would have a beneficial impact on the local economy through direct purchase of materials and supplies within the local area and through direct employment of the construction workforce. Studies of new power plant construction indicate that the estimated construction costs of a nuclear power plant average approximately $4000 per kilowatt (kW) of electrical generating capacity (MIT 2009). With a planned capacity of 1605 megawatts (MW), the cost to construct Fermi 3 would be approximately $6.4 billion.

Given the highly specialized nature of nuclear plant components, a large portion of the capital goods would be imported from outside the region. However, new units require substantial amounts of bulk materials and supplies (including concrete, steel, piping, wiring, and electrical components), some of which would likely be procured locally. Detroit Edison has estimated that approximately $232 million would be expended in the purchase of materials and supplies over the 10-year building period, including bulk quantities of concrete, reinforcing steel and embedded parts, structural steel, cables, wires, coils, and pipes. Based on materials and supplies purchased for Fermi 2 in 2008 and 2009, Detroit Edison estimates that approximately 23 percent of the materials and supplies (or approximately $53 million of materials and supplies) for Fermi 3 would be purchased from vendors or suppliers in the local area, depending on availability (Detroit Edison 2011a). Local purchases of supplies and materials would provide a short-term (but multi-year) beneficial stimulus to the regional economy.

In addition to the purchase of materials and supplies, direct employment for the building activities at Fermi 3 would benefit the local economy. The size of the construction workforce needed for Fermi 3 would range over an estimated 10-year building period from a minimum of 35 workers to a peak building employment workforce of 2900 workers. Detroit Edison estimates that the average size of the onsite workforce during the 10-year building period would be approximately 1000 workers (Detroit Edison 2011a).

The types of construction workers that would be used on the project and the number of construction workers in the economic impact area who would potentially be available to support building are shown in Table 2-30. As shown in Table 4-7, the average annual salary, based on 2008 U.S. Bureau of Labor Statistics (USBLS) data for workers in the construction industry within the economic impact area, is approximately $50,500 (USBLS 2008a). In 2008, workers in the construction industry also received an annual average nonwage compensation of $19,550, which included supplementary pay (i.e., premium pay for overtime and work on holidays and weekends), retirement benefits, insurance, and legally required benefits (worker's compensation, Social Security, etc.) (USBLS 2008b).

Although the size of the building workforce and associated payroll spending would vary depending on the building schedule and mobilization in each particular year, on the basis of an

Table 4-7. Wage Estimates for Construction Industry Occupations in the Economic Impact Area[a] in 2008

Occupation	Mean Annual Wages ($)[b]		
	Monroe, Michigan MSA	Detroit-Livonia-Dearborn, Michigan Metropolitan Division	Toledo, Ohio MSA
Construction and extraction occupations[c]	48,190	53,750	49,570
First-line supervisors/managers of construction Traces and extraction workers	56,200	69,470	67,740
Boilermakers	–[d]	66,420	54,090
Brick masons and block masons	–	53,290	52,260
Carpenters	42,910	52,100	45,380
Cement masons and concrete finishers	42,870	–	50,110
Stonemasons	–	–	–
Construction laborers	34,260	39,600	40,190
Paving, surfacing, and tamping equipment operators	–	43,880	47,050
Operating engineers and other construction equipment operators	53,990	51,470	54,000
Electricians	62,970	61,460	52,570
Insulation workers: floor, ceiling, and wall	–	–	26,130
Insulation workers: mechanical	–	–	–
Painters, construction, and maintenance	–	52,890	4410
Reinforcing iron and rebar workers	–	–	–
Plumbers, pipefitters, and steamfitters	60,100	66,740	60,120
Sheet metal workers	–	62,060	55,500
Structural iron and steel workers	50,240	60,190	45,970
Millwrights[e]	70,390	67,030	–

Source: USBLS 2008a

(a) Data are presented by the USBLS for metropolitan areas, which include the counties identified as the economic impact area.

(b) Annual wages have been calculated by multiplying the hourly mean wage by a "year-round, full-time" figure of 2080 hours. Wages include base rate pay, cost-of-living allowances, guaranteed pay, hazardous-duty pay, incentive pays such as commissions and production bonuses, tips, and on-call pay. Wages do not include back pay, jury duty pay, overtime pay, severance pay, shift differentials, non-production bonuses, employer costs for supplementary benefits, and tuition reimbursements.

(c) These estimates were calculated with data collected by the USBLS from employers in all sectors within the industry. Estimates do not include self-employed workers.

(d) – indicates this occupation is not reported in this metropolitan area.

(e) Millwrights are classified by the USBLS under the installation, maintenance, and repair occupations.

average annual workforce of 1000 workers and average annual salary of $50,500, the review team estimates that $50.5 million would be expended in payroll annually during the building activities for Fermi 3. Non-wage compensation has not been included in the average wage estimate for this analysis.

The review team assumes that a portion of the workers drawn from the regional area would be unemployed. As discussed in Section 2.5, the overall rate of unemployment in Monroe, Wayne, and Lucas Counties in 2010 ranged between 11.3 (Lucas County) and 14.8 (Wayne County) percent. Nationally, the rate of unemployment in the construction industry is slightly more than double the overall rate of unemployment. In 2010, the national rate of unemployment in the construction industry was 20.6 percent, compared to the overall unemployment rate in the country of 9.6 percent (USBLS 2012; data are not provided by industry at the State, county, or metropolitan level). Given the unemployment rate in the local area, specifically in the construction industry, the review team estimates that 25 percent of the 850 workers or approximately 212 workers would be drawn from the ranks of the unemployed on an annual basis over the 10-year building period. The review team expects 15 percent of the annual workforce, about 150 workers, will relocate from outside the region.

New workers (i.e., in-migrating workers and those previously unemployed) would have an additional indirect effect on the local economy because these new workers would stimulate the regional economy by their spending on goods and services in other industries.[(a)] A model developed by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA), called the Regional Input-Output Modeling System (RIMS II), quantifies this “ripple” effect through the use of regional industrial multipliers specific to a local economy. Each new direct job in the construction industry stimulates employment and results in additional indirect job creation in other industry sectors, such as services. This stimulus reflects additional economic activity from interdependent suppliers and vendors. The ratio of total jobs (direct plus indirect) to the number of new direct jobs is called the “employment multiplier.” Construction workers who already live and work in the local area are a part of the baseline and are therefore not included in the calculation of new indirect effects.

In the three-county economic impact area, BEA estimates that for every new worker, an additional 0.7 jobs would be created (Detroit Edison 2011a). On the basis of the employment

(a) The assessment of direct and indirect employment impacts in this analysis serves as a lower boundary estimate by only including in-migrating and formerly unemployed workers. For example, the nature of construction work is transitory; workers typically move from job to job such that vacated positions are not necessarily available for new workers. However, the review team recognizes that direct construction employment does not necessarily “crowd out” private employment. In these cases, if already-employed construction workers quit their jobs to work at Fermi 3, their old jobs would then become available for other workers to fill.

multiplier, the 362 new workers (i.e., in-migrating workers and those previously unemployed) would create an additional 253 new indirect jobs (Table 4-8).

Table 4-8. Average Annual Direct and Indirect Employment for Fermi 3 during Construction

	Category	Calculation	Number of Workers
A	Direct employment		1000
B	Reside in region	A × 85%	850
C	(Otherwise employed at time of hire for Fermi 3)	B × 75%	(638)
D	(Unemployed at time of hire for Fermi 3)	B × 25%	(212)
E	Relocate from outside region	A × 15%	150
F	Indirect employment	(D + E) × 0.7	253
G	Total annual employment	F + A	1253
	Total annual new employment	D + E + F	615

As stated above, an estimated $50.5 million (2008 dollars) would be expended in wages annually over the 10-year building period, on the basis of an average annual salary of $50,500 for 1000 workers. New workers would constitute about $18 million of that total. A regional earnings multiplier was applied to the wages of new workers to determine the effect of the direct earnings on the local economy. For every dollar of wages earned by new workers on Fermi 3, BEA estimates that an additional $0.60 in income would be created in the local economy (Detroit Edison 2011a). The new workers' $18 million in new direct wages would create an estimated $11 million in indirect wages.

The employment of a large workforce over a 10-year building period would have short-term positive economic impacts on the local area by providing additional income to the regional economy, reducing unemployment, and creating business opportunities for housing and service-related industries for the duration of the building period. The review team concluded, on the basis of its own independent review of the likely economic effects of the proposed action, that on average, beneficial economic impacts – including 1253 direct and indirect jobs, $61.5 million in direct and indirect wages, and $53 million spending on purchases of materials and supplies from local vendors and suppliers – would be experienced throughout the 50-mi region during the 10-year building period. The beneficial impacts on the economy would end when the construction ends.

Given the size of the regional economy, which includes a combined 2008 labor force in Monroe and Wayne Counties, Michigan, and Lucas County, Ohio, of approximately 1.2 million workers, the review team estimates the impact of the building of Fermi 3 on the regional economy would be positive, but minor.

4.4.3.2 Taxes

The tax structure of the region is discussed in Section 2.5 of this EIS. Building Fermi 3 would primarily affect four main tax revenue sources. These include (a) State and local taxes on worker incomes, (b) State sales taxes on worker expenditures, (c) State sales taxes on the purchase of materials and supplies, and (d) local property taxes or payments in lieu of taxes based on the assessed value of Fermi 3 during building.

State and Local Income Taxes

The States of Michigan and Ohio would receive additional income tax revenue from the income tax on wages of new workers. Table 4-9 summarizes the estimated new income tax revenue that would be received by the State annually during the 10-year building period. However, the exact amount of income tax revenue is determined on the basis of a number of factors, such as income tax rates, residency status, deductions taken, and other factors.

Table 4-9. Estimated New State Income and Sales Tax Revenue Associated with the Construction Workforce

New Workers and Revenue (in millions of $US)	Michigan	Ohio
New Construction Workers		
Workers relocated from outside region	129	21
Workers previously unemployed	182	30
Total new construction workers	311	51
Tax Revenue		
Estimated annual income (at $50,500 per year)	$15.7	$2.6
Estimated annual State income tax revenue	$0.6[a]	$0.08[b]
Estimated annual spending on goods and services[c]	$4.4	$0.7
Estimated annual sales tax revenue[d]	$0.3	$0.04
Total estimated annual new State revenue	$0.9	$0.12

(a) As discussed in Section 2.5, the income tax rate in Michigan will be set at 3.9 percent in 2015.
(b) Ohio's tax rate for an income between $40,000 and $80,000 is $1056.40 plus 4.109 percent of excess over $40,000.
(c) Based on 28 percent of income before taxes (USBLS 2010c).
(d) The Michigan sales tax rate is 6 percent, and the Ohio sales tax rate is 5.5 percent.

As discussed in Section 4.4.2, approximately 85 percent of the annual workforce, or an average of 850 workers, are expected to be drawn from the region. Construction workers who already live and work in the region are already contributing to State income tax and sales tax revenue and are not included in this analysis. However, approximately 25 percent of the 850 workers, or approximately 212 workers, live in the area but are not currently working. Those workers would contribute to new State tax revenue during the building of Fermi 3.

The review team expects approximately 15 percent of the annual workforce (150 workers) to relocate from outside the region. If all in-migrating workers move to the region from outside the States of Michigan or Ohio, they would also provide new tax revenue. To estimate the income tax revenue for the State of Michigan and State of Ohio, the review team assumed a similar residential distribution to the current Fermi 2 workforce. On the basis of the current residential distribution of the Fermi 2 workforce, approximately 86 percent of the total workforce resides in Michigan, and 14 percent resides in Ohio (both within and outside of the economic impact area). (Fewer than 1 percent resides in Canada, and they are not included in this analysis.) Assuming the in-migrating workers and previously unemployed workers are divided between Michigan and Ohio in the same proportion as the current Fermi 2 workforce, approximately 86 percent of the new workers would pay taxes in the State of Michigan and 14 percent would pay taxes in the State of Ohio. Therefore, the estimated new State income tax revenue would be approximately $0.6 million annually for the State of Michigan (2008 dollars), based on an average annual salary for the new workers of $50,500 and a 40-hr work week, and it would be approximately $0.08 million annually for the State of Ohio. This analysis serves as an upper bound to potential impacts because, to the extent that in-migrating workers relocate to build Fermi 3 from other parts of the same State, Michigan and Ohio would not benefit from new income tax revenues.

As discussed in Section 2.5, several municipalities in Wayne County and in Lucas County impose taxes on income. Depending on the residential location of in-migrating workers, municipalities in Wayne County and Lucas County may also benefit from increased income associated with building Fermi 3.

State Sales Taxes on Worker Expenditures

The States of Michigan and Ohio and some of the local jurisdictions in Ohio would also receive sales tax revenue on expenditures made by the new workers. An estimated $0.3 million in new sales tax revenue would be received by the State of Michigan, and $0.04 million would be received by the State of Ohio, on the basis of the national averages for consumer spending on goods and services.

The review team determined the impact of additional sales tax revenue at the State and local level would be positive but minimal – less than 1 percent of each State's total income tax revenues.

State Sales Taxes on Commercial (Non-Safety Related) Construction Materials and Supplies

Detroit Edison estimated approximately $232 million would be spent on materials and supplies over the 10-year building period, including bulk quantities of concrete, reinforced steel and embedded parts, structural steel, cables, wires, coils, and pipes. Based on materials and supplies purchased for Fermi 2 in 2008 and 2009, Detroit Edison estimates that approximately

23 percent of the non-safety related materials and supplies (or approximately $53 million) for Fermi 3 would be purchased from the local area. A detailed analysis of the sources for these materials and supplies has not been conducted. For purposes of analysis, the review team assumed that 60 percent of the locally purchased materials and supplies would be purchased from within the State of Michigan and 40 percent would be purchased from within the State of Ohio. Based on a State sales tax rate in Michigan of 6 percent, as estimated $1.9 million would be received by the State of Michigan over the 10-year building period; and based on a State sales tax rate in Ohio of 5.5 percent, an estimated $1.2 million would be received by the State of Ohio over the 10-year building period.

The review team determined that the impact of additional sales tax revenue from the purchase of construction materials and supplies at the State level would be positive but minimal – less than 1 percent of each State's total sales tax revenues over a 10-year period.

Local Property Taxes

During building of Fermi 3, the assessed property value of the Fermi plant site would increase each year. For purposes of analysis, the review team has estimated that Monroe County would assess the property as a Construction in Progress, which allows for plants under construction to be assessed at 50 percent of the total cost of construction each year.

Detroit Edison estimated $232 million would be expended in the purchase of materials and supplies over the 10-year construction period, for an average of $23.2 million each year. In addition, Detroit Edison would spend an average of $50.5 million on labor costs. Therefore, the Fermi 3 plant would be assessed, on average, an additional $36.9 million each year, for a total of $2.03 billion in assessed value over the 10 years of construction. The estimated annual property tax revenue over the 10 years of construction, based on current millage rates, is shown in Table 4-10.

Monroe County, Frenchtown Charter Township, and other local jurisdictions would benefit from increased property taxes associated with Fermi 3. The tax revenue from the Construction in Progress assessment of Fermi 3 would result in a significant increase in property tax revenue for Monroe County, based on 2009 property tax revenue receipts.

4.4.3.3 Summary of Economic Impacts on the Community

On the basis of information provided by Detroit Edison and the review team's evaluation, the review team concluded that the employment impact of building activities on the economy would be LARGE and beneficial in Monroe County and in local jurisdictions within Monroe County and SMALL and beneficial elsewhere. An annual average of 150 new workers would relocate into the area (including 58 percent in Monroe County), and 212 workers who are currently unemployed would be employed for building the project over the 10-year building period. A

Table 4-10. Estimated Total Construction in Progress Property Tax Revenue from Fermi 3 Construction Based on 2009 Millage Rates

Jurisdiction	Millage (2009)	Total Estimated Annual Property Tax Revenue for Construction in Progress (in millions of $US)
Monroe County – operation	4.8	$9.7
Monroe County – senior citizens	0.5	$1.0
Monroe County Community College	2.18	$.4.4
Monroe County Library	1.0	$2.0
Monroe Intermediate School District	4.75	$9.6
Frenchtown Charter Township	6.8	$13.8
Jefferson schools	18.5	$37.5
State education tax	6.0	$12.2
Resort Authority	2.8	$5.7
Total Millage	**47.33**	**$96.1**

portion of the estimated $6.4 billion construction cost of Fermi 3 would be spent on materials and supplies in the local area. Tax revenue to local jurisdictions would accrue through personal income, sales, and property taxes and would have a LARGE beneficial impact on Monroe County and on local jurisdictions within Monroe County and a SMALL beneficial impact elsewhere in the 50-mi region.

4.4.4 Infrastructure and Community Service Impacts

This section describes the estimated impacts on infrastructure and community services, including transportation, recreation, housing, public services, and education. These impacts are associated primarily with the construction workforce.

4.4.4.1 Traffic

Existing transportation routes would be affected by transportation of equipment, materials, and supplies to the Fermi site and the construction workforce commuting to and from the site.

The Fermi site can be accessed by road, rail, and water, and all three modes of transportation would likely be used during the building of Fermi 3 (Detroit Edison 2011a). A large portion of the major equipment, materials, and supplies required for building would be shipped via barge or rail (Mannik and Smith Group, Inc. 2009), and Detroit Edison may expand the existing barge slip to accommodate the construction equipment, materials, and supplies (see Chapter 3). Facilities to support both barge and rail transport to the Fermi site are available onsite, and these modes of transportation would not affect other users of port or rail facilities in the area. Personal vehicles on roadways would be the primary transportation mode for the construction

workforce and could affect the LOS on local roadways, particularly during the peak building employment period.

The interstate highways and local roadways described in Section 2.5.2.3 would be used by construction workers to commute to and from work and to transport a portion of the equipment, materials, and supplies to the Fermi site. The size of the workforce would vary over an estimated 10-year building period from a minimum of 35 workers to a peak building employment workforce of 2900 workers. As a result, traffic would increase on area roadways during the peak building employment period and would be highest during the morning commute to the site from 5:30 to 7:30 a.m. (0.49 vehicles per employee) and the afternoon commute from the site between 2:30 and 5:30 p.m. (0.44 vehicles per employee) (Mannik and Smith Group, Inc. 2009). Building-related traffic would be most concentrated on local roadways near the site, lessening as workers disperse in various directions on regional interconnecting roadways and highways. Peak traffic volumes would occur during the morning commute to the site from 5:30 a.m. to 7:30 a.m. (0.49 vehicles per employee) and the afternoon commute from the site from 2:30 p.m. to 5:30 p.m. (0.44 vehicles per employee) (Mannik and Smith Group, Inc. 2009). Traffic volumes associated with the Fermi site are shown in Table 4-11.

Table 4-11. Actual (2009) and Projected (2017) Traffic Volumes – Fermi Site

Workforce	Number of Vehicles (a.m.)	Number of Vehicles (p.m.)
Current Fermi 2 workforce (2009)	466	418
Workforce during peak building employment period (2017)	1421	1276
Total during peak building employment period	1887	1694
Outage workforce for Fermi 2	758	615
Total during peak building employment period and outage	2645	2309

Source: Mannik and Smith Group, Inc. 2009

Detroit Edison conducted a traffic study to evaluate the effect of the building workforce on the LOS of local roadways, focusing on the peak building employment period. The analysis focused on seven local roadway intersections and three interstate (I-75) interchanges, listed below:

- N. Dixie Highway and Stony Creek Road;
- N. Dixie Highway and Pointe Aux Peaux Road;
- N. Dixie Highway and Leroux Road;
- N. Dixie Highway and Enrico Fermi Drive;
- N. Dixie Highway and Post Road;
- Leroux Road and Toll Road;

- Enrico Fermi Road and Leroux Road;
- I-75 and N. Dixie Highway;
- I-75 and Nadeau Road; and
- I-75 and Swan Creek Road.

The LOS analysis was conducted in accordance with the Transportation Research Board's *Highway Capacity Manual* to evaluate the operational efficiency at each intersection and its approaching roadways. The traffic analysis indicates that unsatisfactory traffic conditions (LOS of E or F) would occur at several intersections during both the morning and afternoon commutes during the peak building employment period (see Tables 4-12 and 4-13). The review team reviewed the traffic analysis prepared by The Mannik and Smith Group, Inc. (2009) for Detroit Edison and concurred with the findings.

Deficient roadway conditions (i.e., LOS E or F) could be mitigated by roadway or traffic-flow improvements, including signal timing/phasing optimization, left-turn signal phase addition, temporary or permanent signalization, roadway widening (turn-lane additions), modification of existing roads, or addition of new roads. MCRC and MDOT will be responsible for reviewing and approving site plans as the plans affect area roadways during the site plan review and approval process for a building permit within Frenchtown Charter Township (Assenmacher 2011; Ramirez 2011). If further information is needed, MCRC and MDOT may require that a traffic impact study be conducted in accordance with Traffic and Safety Note 607C, "Traffic Impact Studies" (MDOT 2009). Detroit Edison would be required to provide improvements to local roadways as needed.

Other measures to alleviate unsatisfactory traffic conditions include staggering the Fermi 2 workforce and Fermi 3 building workforce start times, establishing multiple shifts for the building workforce, and busing the workforce from a remote site to reduce trips to and from the site (Mannik and Smith Group, Inc. 2009). In addition, a new road would be constructed parallel to and north of the existing Enrico Fermi Drive to separate the Fermi 2 operations workforce and Fermi 3 building workforce, so delays in accessing the site should be alleviated.

During Fermi 2 scheduled refueling outages, contract labor personnel are hired by Detroit Edison to carry out fuel reloading activities, equipment maintenance, and other projects associated with the outage. Detroit Edison employs approximately 1200–1500 workers for 30 days during each refueling outage, which occurs every 18 months for Fermi 2. During scheduled outages, traffic generated by the Fermi site is expected to increase by 758 vehicles during the peak morning commute and by 615 vehicles during the peak afternoon commute (Mannik and Smith Group, Inc. 2009). If the peak building employment period were to occur during a scheduled Fermi 2 outage, traffic conditions would be further exacerbated, especially during the morning and afternoon commute periods. However, these conditions would be short