Appendix A
NRC3-09-0017

List of RAI Responses in this Letter

RAI Question	Subject	Attachment Number
GE1.1-1	General[1]	1
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AQ6.4-1	Air Quality and Meteorology	6
HY2.3.1-1	Hydrology	7
HY2.3.1-2	Hydrology	8
HY2.3.1-3	Hydrology	9
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HY2.3.1-12	Hydrology[1]	11
HY2.3.1-7	Hydrology	12
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HY4.2.1-2	Hydrology	15
HY4.2.1-4	Hydrology	16
HY4.2.1-5	Hydrology	17
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1. Supplemental Response

Appendix B
NRC3-09-0017

List of Future Supplemental RAI Response Dates

Response Date	RAI Question	Subject
2/15/2010	AC7.1-1[1]	Accidents
	AC7.2-1[1]	Accidents
	AC7.2-2[1]	Accidents
	AC7.3-1[1]	Accidents
	HH5.4.3-1	Human Health
	HY5.4.4-1	Hydrology
	TL4.1.2-1	Transmission Lines
	TL4.1.2-2	Transmission Lines

1. Update due to DCD Rev. 6

Appendix C
NRC3-09-0017

List of Electronic Files on Enclosed Disks

Directory of Packer/Slug Test Input/Output Files Disk

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12/16/2009 03:49 PM	<DIR>	MW393
12/16/2009 03:38 PM	<DIR>	MW395
12/16/2009 03:38 PM	<DIR>	P385
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12/08/2009 02:01 PM	70,144	MW383T67A.xls
12/08/2009 02:01 PM	73,728	MW383T91A.xls
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Directory of D:\Packer Test Files\MW384

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12/08/2009	02:01 PM	36,352	MW384T64A.xls
12/08/2009	02:01 PM	46,592	MW384T775A.xls
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12/08/2009	02:01 PM	58,880	MW386T48A.xls
12/08/2009	02:01 PM	91,648	MW386T56A.xls
12/08/2009	02:01 PM	78,848	MW386T70A.xls
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12/08/2009	02:01 PM	62,464	MW387T72A.xls
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12/08/2009	02:01 PM	66,048	MW391T86A.xls
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12/08/2009	02:01 PM	72,192	MW393T56A.xls
12/08/2009	02:01 PM	70,144	MW393T73A.xls
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12/08/2009 02:01 PM	64,000	MW395T86A.xls
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12/08/2009 02:02 PM	26,624	P399T73B.xls
12/08/2009 02:02 PM	53,760	P399T73C.xls
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02/22/2008 12:00 PM	7,886	MW-383S_Slug_Rising_Horslev.aqt
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01/29/2008 10:27 AM	15,656	MW-384S_Slug_Falling_Horslev.aqt
01/28/2008 01:54 PM	16,640	MW-384S_Slug_Rising_Bouwer-Rice.aqt

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01/29/2008	10:34 AM	16,965	P-382S_Slug_Rising_Bouwer-Rice.aqt
01/28/2008	02:10 PM	16,965	P-382S_Slug_Rising_Horslev.aqt
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01/29/2008	10:49 AM	15,685	P-397S_Slug_Falling_Bouwer-Rice.aqt
01/29/2008	10:47 AM	15,685	P-397S_Slug_Falling_Horslev.aqt
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04/29/2008	02:37 PM	17,375	MW390S_undamped_Butler.aqt
06/04/2009	01:37 PM	17,375	MW390S_undamped_SpringerGelhar.aqt
05/01/2008	03:19 PM	27,934	MW391S_undamped_Butler.aqt
06/04/2009	01:41 PM	27,921	MW391S_undamped_SpringerGelhar.aqt
04/30/2008	08:30 AM	20,426	P385S_undamped_Butler.aqt
06/04/2009	01:30 PM	20,426	P385S_undamped_SpringerGelhar.aqt
12/18/2009	12:01 PM	26,876	P392S_undamped_Butler.aqt
12/18/2009	12:01 PM	26,876	P392S_undamped_SpringerGelhar.aqt
12/18/2009	11:55 PM	28,119	P396S_undamped_Butler.aqt
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04/14/2008 12:23 PM	10,117	T15.drn
04/14/2008 10:36 AM	3,624,500	T15.drw
04/14/2008 12:23 PM	1,772,502	T15.ghb
04/14/2008 10:35 AM	14,963	T15.glo
04/14/2008 10:36 AM	3,624,500	T15.hed
04/14/2008 12:23 PM	13,717,960	T15.lpf
04/14/2008 12:22 PM	551	T15.mfn
04/14/2008 12:22 PM	62	T15.mfr
04/14/2008 12:22 PM	904	T15.mfs
04/14/2008 12:22 PM	230	T15.oc
04/14/2008 10:36 AM	28,684,802	T15.out
04/14/2008 12:23 PM	33	T15.pcg
04/14/2008 12:23 PM	820,748	T15.rch
04/14/2008 12:23 PM	157,107	T15.riv
04/14/2008 12:23 PM	507	T15.wel
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04/18/2008	04:18 PM	33	T16.pcg
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20 File(s) 84,539,674 bytes

Total Files Listed:
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Attachment 1
NRC3-09-0017

Supplemental Response to RAI letter related to Fermi 3 ER

RAI Question GE1.1-1

NRC RAI GE1.1-1

Provide a revised and more detailed (though still concise) Purpose and Need statement, clearly specifying the project purpose and identifying and justifying the need for the project.

Supporting Information

The Purpose and Need statement should establish and justify a clear need for a specified quantity of electricity (in Megawatts, baseload or otherwise) with a specified service area and timeframe. This type of discussion would establish a clear need for additional electricity from the outset and a project purpose to fully or partially fulfill that need, and would form the strong basis needed for the identification and analysis of alternatives to meet the purpose and need.

Section 1.1 of the Environmental Report (ER) provides the following statement of purpose for the proposed action: "The purpose of the proposed new nuclear power plant is to generate electricity for sale." Chapter 8 of the ER provides a discussion of the need for power. However, although the statement in Section 1.1 specifies a "purpose," it neither adequately nor fully expresses the purpose nor does it establish the "need" in ER Chapter 1 (in addition to addressing the need later in ER under Need for Power).

10 CFR 51 Subpart A, Appendix A (4) states: "The [purpose and need] statement will briefly describe and specify the need for the proposed action."

Guidance in Reg. Guide 4.2, Chapter 1 (first paragraph) states, "In Chapter 1 of its environmental report, the applicant should demonstrate the purpose of, and thus the benefits of, the proposed facility with respect to the power requirements to be satisfied, the system reliability to be achieved, or any other primary objectives of the facility and how these objectives would be affected by variations in the scheduled operation of the proposed station."

The CEQ regulations state, in 40 CFR 1502.13 Purpose and need, "The statement shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action."

Furthermore, since the U.S. Army Corps of Engineers (the "Corps") is a cooperating agency for the Fermi 3 Environmental Impact Statement (EIS), a Purpose and Need Statement is required to also meet the Corps' requirements under the Clean Water Act, Section 404(b)(1), and the associated Corps Guidelines. This is needed to support the alternatives analysis to be evaluated as part of the Corps' Section 404 review process. The Corps requires that the applicant provide the Purpose and Need Statement for its project.

Purpose and need should be viewed as two parts of a whole:

1. *There is a problem that needs to be addressed (project purpose); and*
2. *Need is the evidence that the problem actually exists.*

Thus, the project need must be a part of purpose and need statements. For the NRC, this would mean that the need for power analysis would be briefly summarized and included as part of the purpose and need statement in ER Chapter 1. Also, the purpose and need statement should be written so as not to focus on a particular alternative, but instead to allow for the identification of more than one possible alternative to potentially meet the "need."

Supplemental Response

The original response to RAI GE1.1-1 was submitted in Detroit Edison letter NRC3-09-0012 (ML092290662), dated July 31, 2009. In telephone discussions on September 11, 2009, the NRC requested additional information be provided in the "Purpose" part of the Purpose and Need statement. Specifically, the NRC requested the following information to be included in the purpose statement: a specified quantity of baseload electricity in Megawatts; a specified service area; and, a timeframe when the new baseload electricity would be needed for the service area. Accordingly, Detroit Edison has provided the requested supplemental information below, which has been incorporated into the original Purpose and Need statement.

Purpose

The purpose of the project is fourfold:

1. Generate at least 1535 $\pm$ 50 megawatts (MW) of electricity for sale that will reliably aid in satisfying the forecasted energy and capacity needs of Detroit Edison customers located in the Detroit Edison Service Territory;
2. Provide new baseload electric generation capacity as early as 2021 to compensate for the expected retirement of existing, aging baseload generating units and diminishing availability of the Midwest Independent Service Operator regions baseload generation capacity;
3. Provide price stability by minimizing reliance on imported power into the Detroit Edison service territory; and
4. Utilize an electric generation technology that is less subject to price fluctuations resulting from either fuel or regulatory drivers, provides fuel diversity, and reduces reliance on fossil fuel and their attendant environmental impacts.

The above purpose is in-line with Detroit Edison's mission to provide reliable and affordable electrical power.

Need

Construction of a new electric generating facility is needed to provide reliable, affordable power to address Michigan's expected future peak electric demand.

Chapter 8 of the Environmental Report provides detailed discussion outlining the need for power and the related benefits to be generated by the proposed facility. The need for power was assessed by balancing the current and forecasted demand against the current and forecasted supply, while demonstrating that an adequate reserve margin is maintained. Reference Chapters 8 and 9 for a complete description of:

- Section 8.1 – Description of the power system, an overview of the pertinent service area, and a discussion of regional relationships;
- Section 8.2 – Description of the analysis performed to determine current and forecasted energy needs in the State of Michigan;
- Section 8.3 – Description of the analysis performed to determine energy supply resources;
- Section 8.4 – Description of the assessment of the need for power; and
- Section 9.1 – Description of the no-action alternative.

The need for power assessment is derived from the Michigan 21st Century Electric Energy Plan (Plan). The Plan was prepared and issued by the Michigan Public Service Commission pursuant to Executive Directive No. 2006-02. The Plan reached several significant conclusions including:

- Michigan's peak electric demand is forecasted to grow at approximately 1.2 percent per year for the next 20 years;
- There is a need for additional electric generating resources in order to preserve electric reliability and provide affordable energy over the next 20 years. This modeling outcome is confirmed even in the presence of increased use of energy efficiency and renewable resources;
- The projected electric demand will not be satisfied through the expansion of transmission nor access to external markets; and
- There is need for regulated baseload capacity to prevent natural gas prices from driving up wholesale costs and market prices for an increasing number of hours each year.

The above conclusions were based upon key factors such as the current age of baseload units and newer electric generating units' reliance on natural gas. As indicated above, the Plan concluded that the State of Michigan has a current need for new baseload capacity and the need is projected to increase. Michigan's current baseload generating units are an average of more than 48 years old. The average age of Detroit Edison's coal-fired generation units is 44 years old. The last new baseload plant in the State of Michigan began commercial operation more than 18 years ago. The assessment assumes that older, less efficient units, totaling 3755 MW of capacity, will be retired by 2025.

Further, new baseload electric production is needed due to the fact that recently constructed electric generation units in Michigan have been limited to natural gas-fired facilities. Natural gas-fired units currently represent approximately 29 percent of Michigan's generating capacity. Dependence upon natural gas-fired units has exposed Michigan to volatile electricity prices driven by fluctuating fuel market prices.

Proposed COLA Revision

Inclusion of purpose and need statement in Chapter 1

Markup of Detroit Edison COLA
(following 5 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

Chapter 1 Introduction

Environmental Reports (ERs) are documents submitted to the Nuclear Regulatory Commission (NRC) by a license applicant to aid the NRC in complying with Section 102(2) of the National Environmental Policy Act (NEPA). This ER is submitted as Part 3 of the Application for a Combined License (COLA) for a new nuclear power plant at the Detroit Edison Enrico Fermi Atomic Power Plant (Fermi) site in Monroe County, Michigan in compliance with the requirements contained within 10 CFR 52, Subpart C, for Combined Licenses.

This report was prepared in accordance with the guidance provided in NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" and Regulatory Guide 4.2, Revision 2, "Preparation of Environmental Reports for Nuclear Power Stations." The organization and format of this report follows the general format guidelines specified by NUREG-1555, as follows:

- Chapter 1: Introduction
- Chapter 2: Environmental Description
- Chapter 3: Plant Description
- Chapter 4: Environmental Impacts of Construction
- Chapter 5: Environmental Impacts of Station Operations
- Chapter 6: Environmental Measurement and Monitoring Programs
- Chapter 7: Environmental Impacts of Postulated Accidents Involving Radioactive Materials
- Chapter 8: Need for Power
- Chapter 9: Alternatives to the Proposed Action
- Chapter 10: Environmental Consequences of the Proposed Action

Chapter 1 provides a brief introductory description of the proposed project and the site location and identification of the applicant (Section 1.1). This Chapter also identifies and assesses environmentally related authorizations required by Federal, State, regional, local, and affected Native American tribal agencies as a prerequisite to plant licensing and construction (Section 1.2).

1.1 The Proposed Project

Detroit Edison (the Applicant) proposes to construct and operate a new nuclear power plant at the Fermi site. The proposed unit is to be designated as Fermi 3. Federal action resulting in the issuance of a Combined License (COL) by the Nuclear Regulatory Commission under 10 CFR 52, Subpart C, "Combined Licenses for Nuclear Power Plants" is anticipated. ~~The purpose of the proposed new nuclear power plant is to generate electricity for sale~~.

Add Insert "1" Here

Insert 1

Purpose

The purpose of the project is fourfold:

1. Generate at least 1535 $\pm$ 50 megawatts (MW) of electricity for sale that will reliably aid in satisfying the forecasted energy and capacity needs of Detroit Edison customers located in the Detroit Edison Service Territory;
2. Provide new baseload electric generation capacity as early as 2021 to compensate for the expected retirement of existing, aging baseload generating units and diminishing availability of the Midwest Independent Service Operator regions baseload generation capacity;
3. Provide price stability by minimizing reliance on imported power into the Detroit Edison service territory; and
4. Utilize an electric generation technology that is less subject to price fluctuations resulting from either fuel or regulatory drivers, provides fuel diversity, and reduces reliance on fossil fuel and their attendant environmental impacts.

The above purpose is in-line with Detroit Edison's mission to provide reliable and affordable electrical power.

Need

Construction of a new electric generating facility is needed to provide reliable, affordable power to address Michigan's expected future peak electric demand.

Chapter 8 of the Environmental Report provides detailed discussion outlining the need for power and the related benefits to be generated by the proposed facility. The need for power was assessed by balancing the current and forecasted demand against the current and forecasted supply, while demonstrating that an adequate reserve margin is maintained. Reference Chapters 8 and 9 for a complete description of:

- Section 8.1 – Description of the power system, an overview of the pertinent service area, and a discussion of regional relationships;
- Section 8.2 – Description of the analysis performed to determine current and forecasted energy needs in the State of Michigan;
- Section 8.3 – Description of the analysis performed to determine energy supply resources;
- Section 8.4 – Description of the assessment of the need for power; and
- Section 9.1 – Description of the no-action alternative.

The need for power assessment is derived from the Michigan 21st Century Electric Energy Plan (Plan). The Plan was prepared and issued by the Michigan Public Service Commission pursuant to Executive Directive No. 2006-02. The Plan reached several significant conclusions including:

- Michigan's peak electric demand is forecasted to grow at approximately 1.2 percent per year for the next 20 years;
- There is a need for additional electric generating resources in order to preserve electric reliability and provide affordable energy over the next 20 years. This modeling outcome is confirmed even in the presence of increased use of energy efficiency and renewable resources;
- The projected electric demand will not be satisfied through the expansion of transmission nor access to external markets; and
- There is need for regulated baseload capacity to prevent natural gas prices from driving up wholesale costs and market prices for an increasing number of hours each year.

The above conclusions were based upon key factors such as the current age of baseload units and newer electric generating units' reliance on natural gas. As indicated above, the Plan concluded that the State of Michigan has a current need for new baseload capacity and the need is projected to increase. Michigan's current baseload generating units are an average of more than 48 years old. The average age of Detroit Edison's coal-fired generation units is 44 years old. The last new baseload plant in the State of Michigan began commercial operation more than 18 years ago. The assessment assumes that older, less efficient units, totaling 3755 MW of capacity, will be retired by 2025.

Further, new baseload electric production is needed due to the fact that recently constructed electric generation units in Michigan have been limited to natural gas-fired facilities. Natural gas-fired units currently represent approximately 29 percent of Michigan's generating capacity. Dependence upon natural gas-fired units has exposed Michigan to volatile electricity prices driven by fluctuating fuel market prices.

1.1.1 Ownership and Applicant

The Applicant applying for a COL for the proposed nuclear power plant at the Fermi site is the Detroit Edison Company, a wholly owned subsidiary of DTE Energy, and is the owner of the proposed project. Detroit Edison is the licensed operator of the existing Fermi 2 nuclear power plant and will be responsible for construction and operation of the proposed project. Detroit Edison is the proposed licensee.

1.1.2 Site Location

The proposed location of the new nuclear power plant is the existing Fermi site. The Fermi site, the area within the Fermi property boundary, consists of approximately 1260 acres in eastern Monroe County, Michigan. The Fermi site is situated along the western shoreline of Lake Erie. It is approximately 24 miles northeast of Toledo, Ohio, 30 miles southwest of Detroit, Michigan, and 7 miles from the United States/Canada international border. Figure 2.1-3 and Figure 2.1-4 provide illustrations of the Fermi site. Figure 2.1-3 illustrates the property boundary that encompasses the approximately 1260 acres comprising the Fermi site. Figure 2.1-4 illustrates the Fermi 3 site plan.

1.1.3 Reactor Information

The Applicant proposes to construct and operate an ESBWR designed by GE-Hitachi Nuclear Energy Americas, LLC (GEH) at the Fermi site in Monroe County, Michigan. According to the ESBWR Design Control Document (DCD), the reactor has a rated core thermal power of 4500 megawatts thermal (MWt) and a gross electrical output of approximately 1605 ± 50 megawatts electric (MWe). The reactor's standard net estimated electrical power output is approximately 1535 MWe (Reference 1.1-1). The NRC accepted the ESBWR Design Certification Application for review in a letter dated December 1, 2005 and expects review of the Application to continue through 2010 (Reference 1.1-2).

1.1.4 Cooling System Information

As discussed in Chapter 3, the GEH ESBWR reactor design proposes to dissipate waste heat from the Main Condenser and transfers this heat to the Normal Power Heat Sink (NPHS). The Fermi 3 NPHS consists of a hyperbolic natural draft cooling tower. The Auxiliary Heat Sink consists of mechanical draft cooling towers.

The Fermi Station Water System (SWS) provides the necessary makeup water for the cooling systems utilized by Fermi 3 from Lake Erie. The SWS withdraws water via an intake bay formed by two rock groins extending into Lake Erie.

Cooling tower blowdown water is discharged to Lake Erie through a new wastewater discharge outfall located in Lake Erie.

1.1.5 Transmission System Information

The International Transmission Company (ITC*Transmission*) proposes to service the Fermi 3 station through the installation of three new 345 kV transmission lines from the Fermi site to the Milan Substation. The new lines for Fermi 3 will run in a common corridor with transmission lines for Fermi 2, to a point just east of I-75. From the intersection of this Fermi site corridor and I-75, the three Fermi-Milan lines will run west and north for approximately 12 miles in a corridor shared with other non-Fermi lines. From this point, all non-Fermi lines turn north and continue on to their respective destinations and the three Fermi-Milan lines will continue west through an estimated 300-foot corridor for approximately 10 miles to the Milan substation. The ITC*Transmission* system transfers power from power plants to local distribution systems. The ITC*Transmission* system also carries power resulting from transfers from power plants to loads across the Eastern Interconnection. The 345 kV transmission system and associated corridors including the proposed route for Fermi 3 are exclusively owned and operated by ITC*Transmission*. The Applicant has no control over the construction or operation of the transmission system. The interconnection point is between Fermi 3 and the switchyard. It is assumed that the Milan Substation may also be expanded from its current size of 350 by 500 feet to an area approximately 1,000 by 1,000 feet to accommodate the three new transmission lines from Fermi 3. (Reference 1.1-3)

1.1.6 **Proposed Action and Constraints**

The action proposed by the applicant is the construction and operation of a new nuclear power unit on the Fermi site. The 10 CFR 52 licensing process is being followed to obtain a combined license. The combined licensing process includes Design Certification for the ESBWR by the NRC. The Applicant has not identified any constraints to the review process at the time of submittal of this application. Prior to commencement of construction, numerous other permits and approvals are required from Federal, State and local agencies. The permits and approvals required for the construction and operation of a new unit are discussed in Section 1.2. During the permitting processes, opportunities are provided for public participation.

Detroit Edison undertook statistical analysis at the county and Census Block Group level and concluded that the areas near the Fermi site do not qualify as low income or minority areas according to the standard definitions adopted for environmental justice evaluations. Detroit Edison has also had discussions with Monroe County officials and citizens confirming these conclusions and indicating their belief that there are no environmental justice or subsistence living concerns. Given the lack of populations qualifying as low income or minority near the Fermi site and the input from citizens and county officials, no discussions have been held beyond those summarized here. Additional information on low income and minority populations is provided in Subsection 2.5.4, Subsection 4.4.3, and Subsection 5.8.3.

1.1.7 **Major Activity Start and Completion Dates**

The Applicant seeks a COL permitting the construction and operation of a new facility at any time during the lifetime of the license. Subject to required regulatory approvals and a decision to build, the following are estimated dates related to construction and operation of Fermi 3:

First Structural Concrete:	December 2013
Pre-Operational Testing:	December 2018
Fuel Load:	June 2019
Commercial Operation:	June 2020

Attachment 2
NRC3-09-0017

Response to RAI letter related to Fermi 3 ER

RAI Question GE3.1-1

NRC RAI GE3.1-1

Provide updated site layout information and a complete evaluation and assessment of short-term and long-term direct, indirect, and cumulative impacts on all resources based on site layout changes.

Supporting Information

At the site audit, Detroit Edison indicated that a modified site layout was being developed to reduce impacts to critical environmental resources. This information would represent a significant change to the ER and would be important for all aspects of the EIS.

Response

As discussed in the RAI above, Detroit Edison has modified the proposed Fermi 3 site layout. The primary purpose for modifying the site layout is to minimize the environmental impacts from the construction and operation of the new unit.

The previous site layout is shown on Figure 2.1-4 of Revision 0 to the Fermi 3 Environmental Report (ER). The new site layout is shown on the replacement for Figure 2.1-4 included with the attached mark-ups for the ER. To summarize, the site plan for Fermi 3 is being modified to reflect the following significant changes:

- The CIRC System Natural Draft Cooling Tower (NDCT) will be located closer to the power block structure to minimize wetland impacts. The original location for the NDCT was in a wetland area. The new location for the NDCT is not in a wetland area.
- Multiple-level parking garages will be used in lieu of paved parking lots to minimize the areas impacted. The original parking lot concept utilized large areas of land. Using a multiple-level parking garage concept significantly reduces the number of acres of land required and minimizes the associated ecological impacts.
- The Fermi 3 switchyard will be moved to the far west side of the property. Previously the Fermi 3 switchyard was to be located adjacent to the Fermi 2 switchyard.
- The locations of ancillary structures, such as warehouses, were moved to areas with no wetland impacts.
- The location of a new meteorological tower is shown. Relocating the meteorological tower is necessary because the Fermi 3 cooling tower will interfere with the current meteorological tower location.

A review was conducted to update the ER to reflect the revised site layout. Updates to selected sections are summarized in Table 1 below. Attached are mark-ups for the affected sections of the ER.

It is noted that responses to several other RAIs (HH4.5-4, HH5.4.3-3, LU4.1.1-1, NO5.8.1-1, TE4.3.1-1, and TE4.3.1-3) have previously addressed the potential for impacts due to the updated site layout. Some of these previous responses to other RAIs (LU4.1.1-1 and NO5.8.1-1) included mark-ups to the ER based on the site layout changes. These previously provided mark-ups are not included with this response.

Table 1
Updates to Specific Fermi 3 Environmental Report Sections Due to Revised Site Layout

Environmental Report Section	Description of Change
Figures 2.1-3 and 2.1-4	Figures are updated to reflect the updated site layout.
Section 2.2	Updated text based on location of the new meteorological tower and switchyard.
Section 2.5.3	Updated text based on additional archeological surveys performed for the location of the new meteorological tower.
Section 3.1	Figure 3.1-1 is updated to reflect the revised site layout. Figures 3.1-2, 3.1-4, and 3.1-6 are updated to reflect the new location for the Fermi 3 NDCT. Figures 3.1-3, 3.1-5, and 3.1-7 do not require updating as the new location of the NDCT is adequately depicted based on the viewpoint. Section 3.1.2 (page 3-3) is changed to indicate that, based on the new location for the Fermi 3 switchyard, the transmission towers are shared as the lines leave the site. Currently, the statement is that the lines are shared as they leave the facility. With the switchyard moving to the western side of the property, substituting "site" for "facility" is appropriate.
Section 3.4	Updated Section 3.4.2.3 based on new location for the NDCT.
Section 3.7	Updated Section 3.7.3 based on new location for the Fermi 3 switchyard.
Section 4.1.1	Updated land use values based on updated site layout. With the updated site layout, the overall impact is to significantly reduce the number of previously undisturbed acres that would be permanently impacted by the construction and operation of Fermi 3.
Section 4.1.2	Updated text based on new location for the Fermi 3 switchyard.
Section 4.1.3	Updated text based on findings from the archeological survey for the new meteorological tower location.
Section 4.2, Figure 4.2-1	Updated section and figure to reflect updated site layout plan, including construction-affected areas.
Section 4.3.1	Updated terrestrial impacted areas based on updated site layout.

Environmental Report Section	Description of Change
Figures 4.3-1, 4.3-2, 4.3-3, 4.3-5	Based on the updated site layout the overall impact is to significantly reduce the number of previously undisturbed acres that would be permanently impacted by the construction and operation of Fermi 3. This includes significant reductions to the temporary and permanent impacts to the wetlands on site.
Section 4.3.2 Figure 4.3-4	Updated aquatic impacted areas based on updated site layout. Based on the updated site layout the overall impact is to significantly reduce the number of previously undisturbed acres that would be permanently impacted by the construction and operation of Fermi 3.
Figure 4.5-1	Updated figure for determination of construction worker dose to reflect updated site layout.
Section 4.7	Updated text to reflect acreage impacts based on updated site layout.
Section 4.8	Updated text to reflect acreage impacts based on updated site layout. Relative percentages for pre-construction vs. construction did not change.
Section 5.3	Updated section to address revised cooling tower plume analyses. The new location of the NDCT affected the plume analysis.
Section 5.11	Updated text to reflect acreage impacts based on updated site layout.
Section 6.4	Updated section to address location of the new meteorological tower.
Section 6.5	Based on the updated site plan, there is a permanent impact to on-site canals. Thus, there may be an effect to aquatic species. Therefore, this sentence is deleted.
Section 9.2	Updated land areas impacted based on updated site layout.
Chapter 10	Updated land areas impacted based on updated site layout.

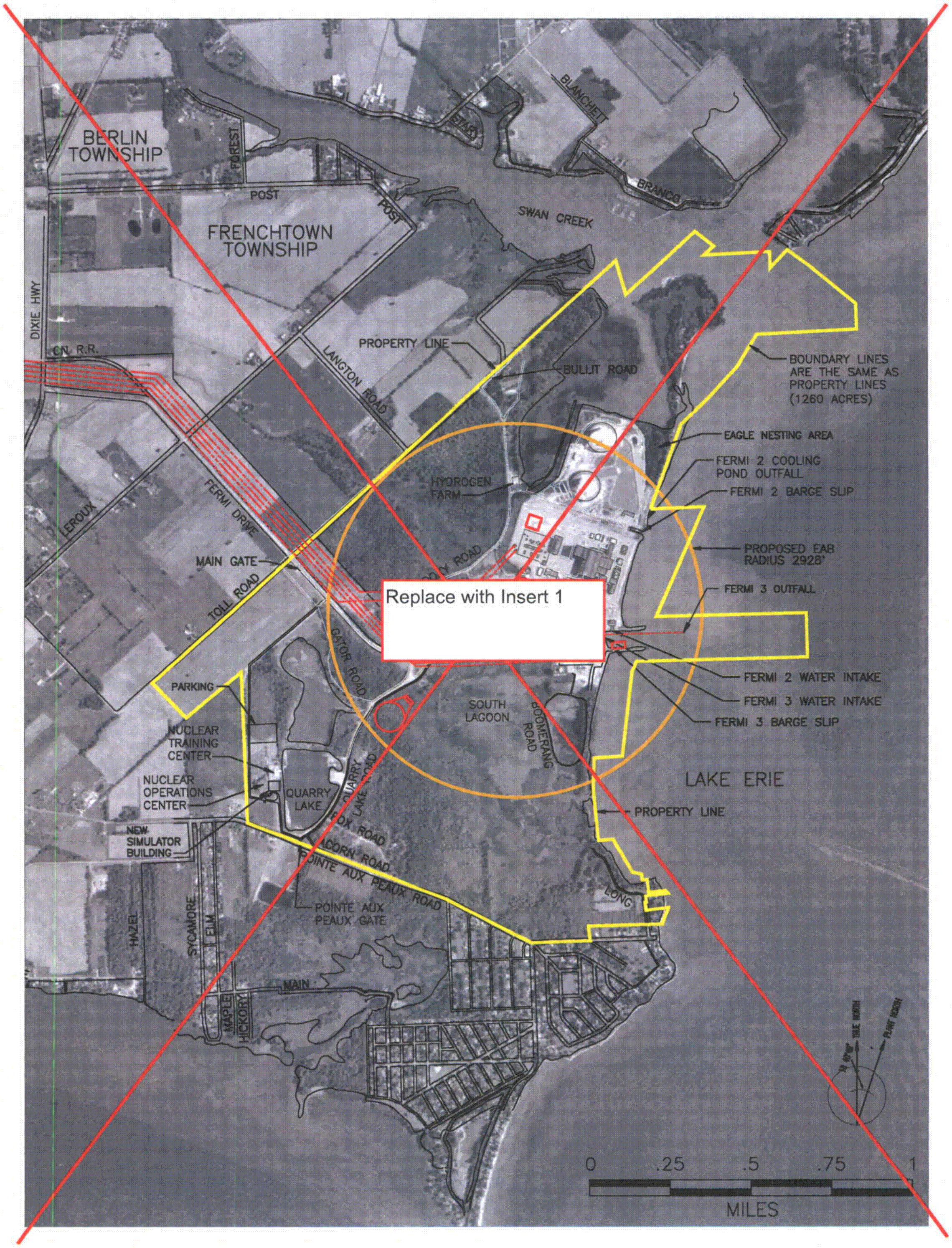
Proposed COLA Revision

Revisions to the ER are attached and provided at the end of this response.

Markup of Detroit Edison COLA
(following 182 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

Figure 2.1-3 Fermi Property Boundary



Insert 1

Figure 2.1-3 Fermi Property Boundary

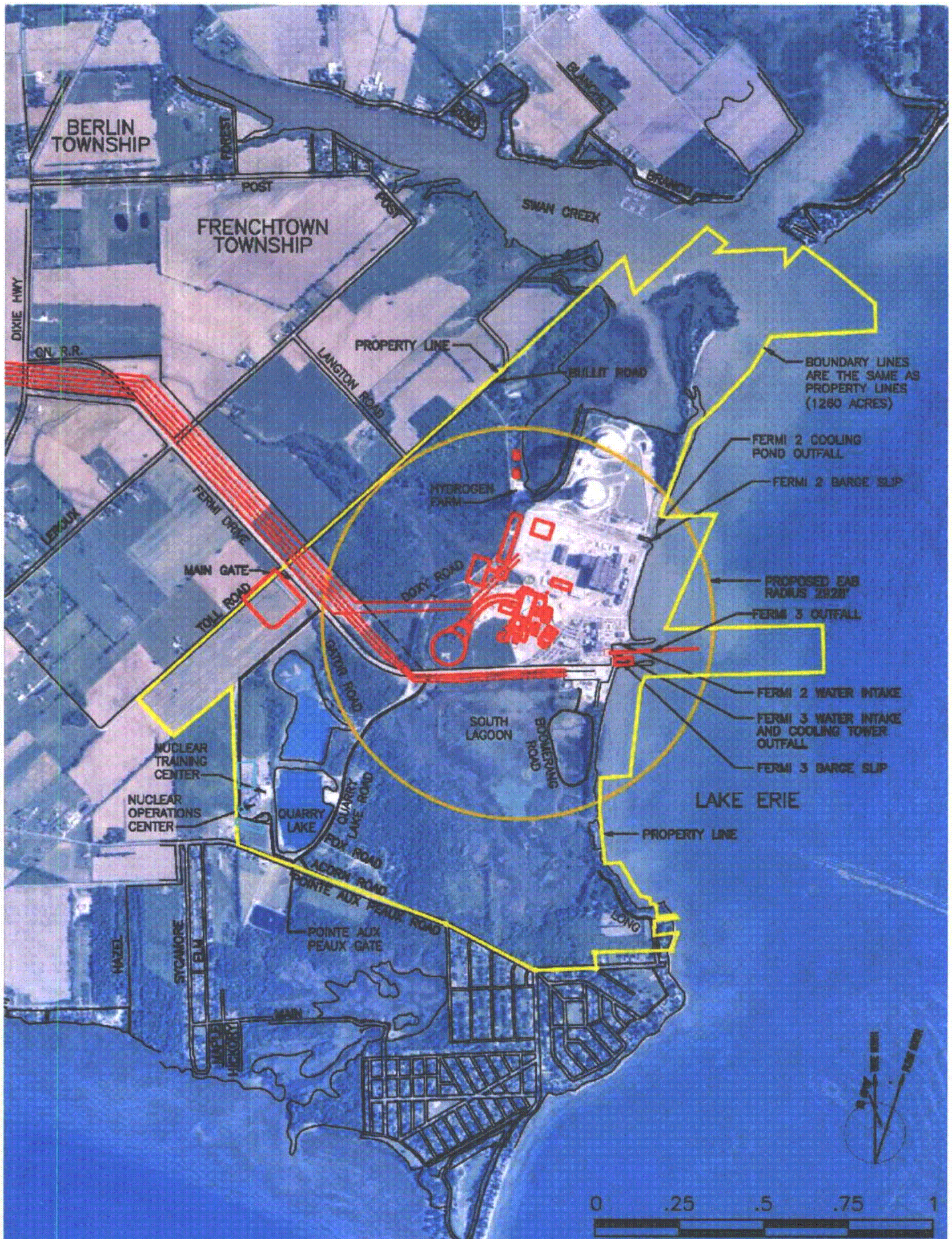
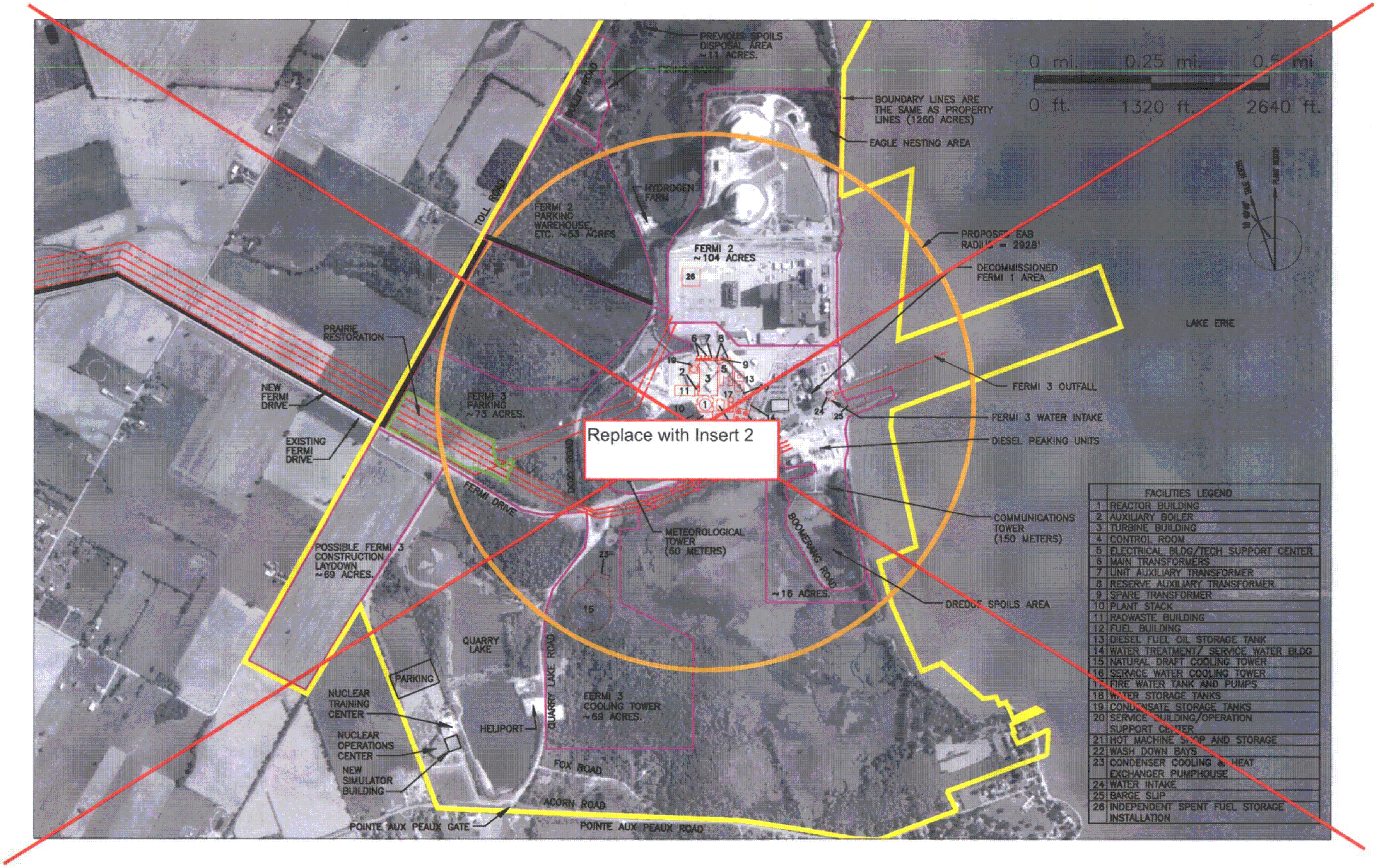


Figure 2.1-4 Fermi 3 Site Plan



Insert 2

Figure 2.1-4 Fermi 3 Site Plan

western edge of the site (Reference 2.2-2). Topography on the Fermi site is relatively level in the undeveloped areas, with an elevation range of approximately 10 feet over the site according to U.S. Geological Service (USGS) topographic maps.

The property boundary shown on Figure 2.1-3 encompasses the 1260 acres that make up the Fermi site. There are no significant erosion issues on the Lake Erie shore at the Fermi site that would affect the site acreage. A shore barrier was installed in conjunction with Fermi 2 construction to stabilize the shore along the eastern side of the site.

Detroit Edison is the licensed owner and operator of the Fermi site and currently controls the site for the purpose of generating electricity. However, some of the area within the site boundary is also used for other purposes, such as occasional ecological study by the USFWS and habitat restoration activities by state agencies or nonprofit groups. The DRIWR encompasses 656 acres of the existing 1260 acre site; the approximate boundaries of the refuge are shown on Figure 2.4-6.

Acreages of general land use categories onsite are shown in Table 2.2-1. The area previously developed for Fermi 2 plus that still occupied by deactivated Fermi 1 totals 172 acres.

There is one active railroad spur and one navigable waterway that traverse portions of the site. No public roads run through the Fermi site. Other than the decommissioned Fermi 1 structures and the existing Fermi 2 structures, there are no other industrial, commercial, or institutional structures on the site. The northwestern portion of the site also contains the security firing range. Several residences along Pointe Aux Peaux Road are present just outside the southeast property line near the village of Stony Point (Figure 2.1-3).

Detroit Edison does not allow access to Fermi property for recreational purposes. The site is posted with notifications around the perimeter to ensure awareness of access restrictions by the public.

the majority of

near the location of the new meteorological tower

Detroit Edison has acquired and will maintain surface ownership of all the land within the Fermi site property boundary. Detroit Edison owns and controls 99.93 percent of the mineral rights within the Fermi property. One third party, the Michigan Department of Natural Resources (MDNR), owns 0.88 acre of mineral rights in the far southeast portion of the Fermi site. This very small mineral rights holding by the MDNR is in an area removed from the portions of the site that will be affected by Fermi 3 site preparation, preconstruction, construction, or operation; therefore, Detroit Edison owns and effectively controls the mineral rights in the Fermi 3 power block and associated exclusion area. There is no activity at the Fermi site or in adjacent areas involving exploration for, drilling for, or otherwise extracting minerals. The geological character of the subsurface structure and the land use in the vicinity of the Fermi site indicate that commercial mineral production appears unlikely in the foreseeable future. There are no mineral resources adjacent to or within the site boundary presently being exploited or of known commercial value, nor are such resources expected to be developed in the future.

Under Michigan law, minerals can be owned by the surface property owner or by a different party (Reference 2.2-3). In Michigan, a 1998 law allows landowners to petition the state to purchase the state-owned minerals beneath their land as long as the land has no pending lease or development.

The state must sell the minerals to the surface landowner at fair market value at the landowner's request unless the state wants to reserve minerals to prevent damage in environmentally sensitive areas or for some other legitimate reason. A deed restriction is then added to the property that prohibits the mineral rights from being severed from the surface rights in the future (Reference 2.2-4). Since Detroit Edison owns the entire Fermi site and the associated exclusion areas for Fermi 2 and Fermi 3, Detroit Edison effectively controls mineral rights to the site with respect to this law.

Near the northeast corner of the Fermi site in the area of the Fermi 2 cooling towers, there is a former barge slip that was used to offload equipment during Fermi 2 construction (Figure 2.1-3). The Fermi 2 water intake is east of the Fermi 3 location and is situated between the two groins protruding into Lake Erie. Fermi 2 discharges about 20,000 to 30,000 gallons per minute into Lake Erie from the existing circulating water basin depending on the season.

The environment of the former Fermi 2 barge slip and offloading area is cleared gravel with some trees and weedy vegetation along a sandy inlet area with no permanent structures. The barge slip area used for Fermi 2 deliveries would require substantial dredging and other preparation work before it could be used for equipment delivery. Fermi 2 components were delivered and offloaded at the barge slip.

The Fermi site, including onsite waterways, roads, and railroads, is closed to public use. No additional waterways, highways, roads, or railroads would be closed to public use as a result of Fermi 3 preparation, construction, or operation activities. There are no current plans for site modifications such as a visitor's center, parks, or similar designations on the Fermi site.

In the eastern portion of the Fermi site near Boomerang Road and Lake Erie, there is a 492-foot communication tower on land leased by Detroit Edison to the tower operator for communication use.

Natural Resources Conservation Service (NRCS) maps show areas of prime farmland around the southwestern edge of the Fermi site in the agricultural field designated for ~~possible~~ the Fermi 3 switchyard and construction laydown on Figure 2.1-4. This part of the Fermi site is owned by Detroit Edison and is used as cropland. Since a large portion of the Fermi site is committed to industrial development and has been previously disturbed by site-related activities, the majority of the site would likely be exempted from the definition of prime farmland (Reference 2.2-5). The NRCS classifies most of the undeveloped areas of the Fermi site as "prime farmland if drained" (Reference 2.2-6). Parts of the approximately 69 acre parcel of agricultural land are designated prime farmland and the parcel is currently used as farmland, so this parcel would most likely still be considered prime farmland even though it is part of the Fermi site. The prime farmland designation continues on a small portion of the Fermi site undeveloped area west of the Nuclear Operations Center and Nuclear Training Center; however, this small area is not farmed. Potential construction impacts to prime farmland on the Fermi site are addressed in Section 4.1.

The Fermi site falls under the jurisdiction of the Coastal Zone Management Act of 1972, which has the goal of attaining and maintaining a healthy coast through a balance of conservation and (science), and the Detroit Institute of Arts and Museum of Contemporary Art Detroit (art) (Reference 2.5-63).

Detroit is the largest city in the state of Michigan and the Wayne County seat. It is also a major port city on the Detroit River and Lake Erie. At its peak, Detroit was the 4th largest city in the United States, but has been declining in rank since the 1960's. Detroit, sometimes nicknamed the Motor City, is known as the world's automotive center and houses the "Big Three" automobile companies[7] (General Motors, Ford, and Chrysler). The city also became well known in the 1960s as a source of popular music, largely through the rise of Motown Records; hence, the city is also nicknamed Motown.

Detroit has four border crossings into Canada. The Ambassador Bridge and the Detroit-Windsor Tunnel provide motor vehicle thoroughfares, the Michigan Central Railway Tunnel provides railroad access and Detroit-Windsor Truck Ferry, located near the Windsor Salt Mine and Zug Island, provides water transport of heavy vehicles.

Toledo was once a part of Monroe County but following the very brief 1835 Toledo War was allocated to Ohio as part of the brokered settlement that awarded the Upper Peninsula to Michigan. Today, Toledo is known as the Glass City because of its long history of innovation in all aspects of the glass industry: windows, bottles, windshields, construction materials, and glass art, of which the Toledo Museum of Art has a large collection. Also, the first all glass building was constructed in Toledo in 1936, this was the building for the Owens-Illinois Glass Company. Toledo has also been known as the "Auto Parts Capital of the World." The Jeep vehicle has been manufactured in Toledo since 1941, and the Big Three all have factories in metropolitan Toledo.

The general decline in the nation's manufacturing sector, especially in the auto industry, has significantly impacted the employment base of Detroit and, to a lesser degree, Toledo. Both metropolitan areas have fought to revitalize their cities and to bring in new industry that would create employment opportunities. Perhaps the most visible example of this effort was the development of the Renaissance Center, located in downtown Detroit, which has helped the city become a major tourist attraction and convention city. The city hosted Super Bowl XL in 2006.

The region also benefits from a number of large and respected institutes of higher education. These include the University of Michigan and Wayne State University in Michigan, and the University of Toledo and Bowling Green State University in Ohio.

2.5.3 Historic Properties

In support of the Fermi 3 project, surveys of cultural resources (above-ground and archaeological) were conducted to identify historic resources in and near the Fermi 3 project area and to assess possible Fermi 3 impacts to these resources. Additionally, preliminary investigations were conducted along the transmission line route from the Fermi 3 project area to the Milan substation in

7. The automotive industry accounts directly or indirectly for 1 out of every 10 jobs in the United States. http://www.autoalliance.org/index.cfm?objectid=2EB2CCD2-1D09-317F-BB2409EF2031755
9

Washtenaw County to identify previously recorded historic resources. The cultural resources investigations for the Fermi 3 project have been carried out pursuant to Section 106 of the National Historic Preservation Act (NHPA), as amended (P.L. 89-665, October 15, 1966; 16 U.S.C. 470) and its implementing regulations (36 CFR 800), which require federal agencies to take into account their activities on historic resources that may be impacted as a result of project activities. The work reported herein conforms to the requirements of the NHPA, as well as the guidance contained in NUREG-1555, and the requirements of the Michigan State Historic Preservation Office (SHPO). The members of the archaeological and above-ground resources teams meet or exceed the qualifications set out in the Secretary of the Interior's Qualification Standards. The work conducted for the project and the work products conform to the Secretary of the Interior's Standards and Guidelines and the standards established by the Michigan SHPO.

2.5.3.1 **Prior Cultural Resources Surveys**

<u>Site and Vicinity</u>

Prior to the field survey, no formal cultural resources investigations had been conducted in the Fermi 3 area or in the vicinity. A search of records maintained at the Office of the State Archaeologist (OSA), the State of Michigan Archives, and the Monroe County Museum revealed only one report on the archaeological resources in the Fermi 3 area, i.e., a letter from the director of the University of Michigan Museum of Anthropology, documenting his visit to the site shortly after construction of Fermi 2. No excavations were undertaken during this visit and no archaeological finds were noted. The archaeological site files maintained at the OSA record four sites within a 2-mile radius of the Fermi site. These sites are summarized in Table 2.5-62. One site is located within the Fermi 3 project area, a "Native American" site of unknown age and function and described in the site files as a "lithic scatter on beach." None of the sites within the Fermi 3 area has been field verified, nor has any been assessed for National Register of Historic Places (NRHP) eligibility.

The National Archeological Data Base (NADB), maintained by the National Park Service Archeology Program, lists 72 titles of reports of archaeological resources in Monroe County; only one of which contains information about the resources within the Fermi 3 project area (NADB record 5538). This is the report of an unverified prehistoric site recorded in the Holmquist Atlas maintained at Wayne State University. The National Register Information System (NRIS) online data base contains two National Register-listed archaeological sites in Monroe County, the North Maumee Bay Archeological District and the River Raisin Battlefield Site, neither of which is within 2 miles of the Fermi 3 project area.

The files maintained at the Michigan SHPO record 22 above-ground resources within a 10 mile radius of Fermi 3 that are listed on the National Register of Historic Places ~~(NRHP)~~ or have been determined eligible for listing ~~on~~ in the NRHP. These sites are summarized in Table 2.5-63.

Only one systematic survey has been conducted for above-ground resources within a 10 mile radius of the Fermi 3 vicinity, the 1973 Monroe County Building Survey, which exists as a collection of photographs and data cards maintained at the Monroe County Historical Museum. No accompanying report was located, and the goal of the survey is unknown, although it appears, from review of the photographs and data cards, that the primary focus of the survey was to document resources within the City of Monroe. For resources located within 10 miles of Fermi 3, the records in the 1973 survey report duplicate the information on file at the Michigan SHPO office (Reference 2.5-120).

A search of the information housed at the Monroe County Historical Museum and the Monroe County Library System's Ellis Reference and Information Center did not reveal any other previously recorded NRHP-listed or NRHP-eligible above-ground resources within a 10-mile radius of Fermi 3.

Transmission Corridors

The portion of the transmission line route from the Fermi 3 project area north to the Sumpter-Post Road junction (near Haggerty and Arkona Roads) will utilize an existing transmission line route. Therefore, the preliminary survey of historic resources was limited to the new transmission line route from the Sumpter-Post Road junction in Wayne County to the Milan substation in Washtenaw County. A search of the files at the OSA revealed 77 previously recorded archaeological sites within 1.5 miles of the proposed transmission lines from the Fermi 3 project area to the Milan substation. A summary of these sites is contained in Table 2.5-64. Fifteen reports on file at the OSA contain information regarding investigations conducted in the area of the proposed transmission line route. Of these 15 reports, six are reports of amateur surveys or collections. The remaining nine reports detail contract surveys conducted for municipal projects (e.g., wetland mitigation, proposed landfill and wastewater treatment facilities). The most recent of these surveys was conducted in 2002 on a 65-acre parcel in Wayne County. The other surveys were conducted primarily during the early 1980s and the early 1990s. All surveys conducted in the proposed transmission line route or in the near vicinity identified either prehistoric or historic archaeological sites.

Six archaeological sites are crossed by the new transmission route from the Sumpter-Post Road junction to the Milan substation. All six occur in Wayne County. Five of the sites are prehistoric and one is historic. All have been determined not eligible for listing in the NRHP.

The files maintained at the Michigan SHPO record no NRHP-listed or NRHP-eligible above-ground resources within 1.5 miles of the new transmission route from the Sumpter-Post Road junction to the Milan substation.

The only systematic survey of above-ground resources known for the transmission line area is the 1973 Monroe County Building Survey referenced above. This survey shows no resources in the vicinity of the transmission line route (Reference 2.5-120).

2.5.3.2 **Current Cultural Resources Survey**

Site and Vicinity

Geographically, the project area is comprised of portions of Berlin Township in the northern section of the area and Frenchtown Township in the southern section. A broad expanse of agricultural fields defines large portions of the area, particularly in those areas at some distance from the Lake Erie shore. In recent years, a number of the once open fields have become the site of newly erected houses and subdivisions. Remnants of historic communities like Oldport and Brest are evident, although the dominating presence in the area remains the beachfront resort communities. These communities have their roots in the late nineteenth century, but were greatly expanded during the first decades of the twentieth century. A description of the ecology of the site area is provided in Subsection 2.4.1 and Subsection 2.4.2.

Transmission Corridor

The transmission line route travels through Monroe, Wayne, and Washtenaw counties (Figure 2.2-3). The portion of the new transmission route from the Sumpter-Post Road junction to the Milan substation, which is the subject of the preliminary survey, is sited east-west through Wayne and Washtenaw counties. Land use along the corridor is characterized primarily by low-density residential development and heavily wooded undeveloped property. Agricultural property is prominent in the study area. Few obviously commercial properties were identified in the study area, and industrial properties were not encountered. An extensive landfill is situated at the far east end of the study area. A description of the ecology of the transmission corridor is provided in Subsection 2.4.1.9 and Subsection 2.4.2.9.

2.5.3.2.1 **Area of Potential Effect Delineation**

The area of potential effect (APE) is defined as "...the geographic area within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist" (36 CFR 800.16(d)). In consultation with the SHPO, two APEs were delineated, one for archaeological resources and one for above-ground resources. Overall, the APE for archaeological resources is limited to construction-impacted ground within the Fermi site. To reduce the likelihood of additional archeological surveys as more detailed construction plans are developed, the APE covers a broader expanse of the Fermi site than the current construction impact areas described in Chapter 4 for non-cultural resource impacts. At the outset of the archaeological fieldwork, the archaeological APE included a series of interconnected roadway grades (60 acres), a stone quarry (48 acres), two spoil disposal zones (11 acres and 12 acres), and two previously affected Fermi site locations comprised of a 37-acre tract and a 172-acre tract. Additions ~~A single addition~~ to the Fermi site redesign consisted of a 53-acre "EF2 Parking Warehouse, etc" tract on the northwest margin of the site~~.~~, a 24-acre construction laydown area and a 4.5-acre meteorological (MET) tower, both located at the southern margin of the site. In addition, the APE includes a tentative access road corridor from the MET tower site to Pointe Aux Peaux Road. Acreage values include areas that are based on an initial proposed site layout. The projected impact areas shown in Figure 2.5-27 encompass the current postulated APE. The current archaeological APE encompasses approximately ~~520~~ 549 acres (Figure 2.5-27).

At the determination of the Michigan SHPO, the APE for above-ground resources was reduced from the 10-mile radius set out in NUREG-1555 to an area encompassing the Fermi site and the communities of Estral Beach, Stony Point, and Woodland Beach, with boundaries as follows:

> Beginning at the approximate intersection of Masserant Road with the Lake Erie shoreline, due southwest to the approximate intersection of Sandy Creek Road with the Lake Erie shoreline; north to North Dixie Highway; due northeast along North Dixie Highway to Port Sunlight Road; south on Port Sunlight Road to Masserant Road; east on Masserant Road to the point of beginning (Figure 2.5-28).

For the new transmission lines, the preliminary survey of APE for both archaeological resources and above-ground resources measured 1.5 miles on either side of an assumed 300 feet wide corridor centerline. The transmission line route from the Fermi 3 project area north to the Sumpter-Post Road junction will utilize an existing transmission line route. Therefore, the APE for both archaeological and above-ground resources included only the undeveloped portion of the new transmission line route from the Sumpter-Post Road junction in Wayne County to the existing Milan substation in Washtenaw County.

Survey of the Construction laydown area and MET tower site and tentative access road was conducted on October 20, 2009.

2.5.3.2.2 Prefield Research and Field Methods

Prior to the cultural resources survey, documents housed at the SHPO, OSA, Monroe County Historical Museum, and Monroe County Library System Ellis Reference and Information Center were consulted to obtain information pertaining to historic land use and the existence of known historic sites in the Fermi 3 area and along the new transmission line route to the Milan substation.

The initial Phase I archaeological survey began ~~in November 2007~~ and was completed in April 2008. The methods employed in ~~this study~~ these studies entailed a combination of pedestrian surface inspections and shovel testing. Walk-over surface examinations were limited to areas exhibiting surface visibility of greater than 50 percent. Both surface inspection and shovel testing were carried out along 50-foot transects, with shovel tests spaced as 50-foot intervals. This approach was modified where access was hampered by saturated soils or flooding. Wet and flooded areas were commonly encountered throughout the undeveloped portions of the property; therefore, opportunistic shovel testing at drier elevations was routinely carried out. Similarly, the extensive made lands and spoil deposits comprising much of the property were avoided when they could be recognized and confirmed through field verification. Shovel test soils were screened through ¼-inch metal hardware cloth and trowel sorted. Each unit was backfilled upon the completion of field examination. Shovel test excavations were restricted to a maximum depth of 1 foot below the existing ground surface.

The above-ground resources survey began in December 2007 and was completed in April 2008. Architectural historians photographed and mapped resources within the APE that were at least 50 years old and "...possess a degree of integrity above the norm for the area..." Resources were photographed showing the façade and one other elevation in the same image. Where this was not possible, resources were photographed to obtain the view that would best allow for assessment of age and integrity. For complexes containing more than one building, such as farmsteads, streetscape views of the overall property were obtained to illustrate the buildings' relationship to each other. The location of each resource was plotted on a USGS quadrangle map, and photographic details (e.g., photograph number, date, and direction of view) were recorded on standard photography logs.

The field view for the transmission route preliminary survey took place on June 18 2008. During the field view, the transmission line route was evaluated for the existence of potentially significant above-ground resources. At that time, the transmission line study area was also visually inspected from existing roadways for evidence of obvious disturbance and the existence of landforms that are known to contain archaeological sites (e.g., sandy hummocks).

2.5.3.3 Consultation

In preliminary SHPO consultation, the OSA noted that the project area, especially the Lake Erie shoreline, is sensitive for archaeological resources, and the area had not been systematically examined. Based on the archaeological sensitivity of the Fermi site and the lack of prior systematic surveys in the area, the OSA required an archaeological survey of the project area. The SHPO further identified a preliminary APE for above-ground resources. Subsequent consultation resulted in a modified APE and scope of work as detailed in the preceding subsection. A report has been provided to the SHPO regarding the above ground resources of the site and vicinity.

Inquiries were made with Native American tribal agencies having historical ties to the Fermi site geographic area. These consultations did not result in any concerns regarding the further development of the Fermi site.

2.5.3.4 Archaeological Site Results

The archaeological survey resulted in the identification of ~~six~~ seven archaeological sites (4 prehistoric, ~~1~~ 2 historic, 1 multi-component [prehistoric/historic]) within the Fermi site and vicinity. All are located within the archaeological APE. However, only ~~one site is~~ two sites are located within the Fermi 3 site~~, the~~. The five other sites are located outside of Detroit Edison-owned property. None of these sites is recommended eligible for listing ~~on~~ in the NRHP.

Preliminary investigations of the transmission line route from the Sumpter-Post Road junction to the Milan substation, owned by ITC*Transmission*, indicate a moderate to high potential for encountering archaeological resources. It is unclear, however, whether any sites would be eligible for listing ~~on~~ in the NRHP.

2.5.3.4.1 Prehistoric Sites

Four sites represent isolated findspots consisting of chert debitage found on the surface. The context in which the artifacts were found had been compromised by continued plowing. These artifacts are indicative of the presence of prehistoric peoples in the area at some time in prehistory; however, little other data can be gathered from these sites. None of these prehistoric sites is recommended eligible for listing on the NRHP.

2.5.3.4.2 Historic Sites

Two historic sites located within the Fermi property represent likely farmstead sites dating to the early to mid-twentieth century.

~~One~~ site is a historic farmstead site dating to the ca. 1930s-1960s. The site was identified by the presence of four poured concrete and concrete block foundations and one brick (house) foundation. Bottle glass and historic ceramic sherds were scattered throughout the site. A farmstead at the approximate location of the site is shown on aerial photographs of the site dating to 1949 and 1957. A 1961 aerial photograph shows the site; however, it cannot be determined from this aerial if the site contains structures or merely foundations. This late-dating farmstead is unlikely to provide information about the historic settlement and use of the area; therefore, this site is not recommended eligible for listing ~~on~~ in the NRHP. Add Insert "1" Here. **[START COM 2.5-002]** The Michigan State Historic Preservation Office has expressed interest in Detroit Edison investigating the archeological resources that could be affected by construction of the Fermi 3 discharge pipe in Lake Erie, to

Insert 1

The second site is a scatter of temporally non-diagnostic historic debris and three marked pet burials near the location of the new meteorological tower. Aerials dating to 1949, 1957 and 1961 show farmsteads along Point Aux Peaux Road in the vicinity of the site. It is likely that the site is associated with one of there farmsteads; however, this site is unlikely to provide significant information about the historic settlement of the area and it is not recommended eligible for listing in the NRHP.

which Detroit Edison has agreed. A revision to the Environmental Report will be provided to the NRC within a year after docketing of the COL Application reflecting the results of this effort. **[END COM 2.5-002]**

2.5.3.4.3 **Multi-Component Sites**

One multi-component site was found during the archaeological survey. It was identified through the discovery of a single piece of chert debitage located on the surface and a scatter of historic bottle glass and ceramic sherds. Neither the prehistoric nor the historic component is likely to provide significant information about this site or the people who occupied it; therefore, this site is not recommended eligible for listing on the NRHP.

2.5.3.5 **Above-ground Resources Results**

Eighty-three above-ground sites within the above-ground APE were recorded. One four-building district and 19 individual sites are recommended as eligible for listing on the NRHP. One previously determined NRHP-eligible above-ground resource, a residence, is situated within the Fermi 3 APE, but it is not located in the Fermi 3 project area. The house was determined eligible for listing on the NRHP by the Michigan SHPO in 1995. The above-ground resources APE contains no other above-ground resources listed on or determined eligible for listing on the NRHP.

The current above-ground resources survey resulted in the identification of one four-building district and 19 individual properties that are recommended eligible for listing on the NRHP. A detailed description of these buildings has been provided to the SHPO. Although these resources are located within above-ground resources APE, none is located within the Fermi 3 site. The only resource of possible note within the Fermi site is the Enrico Fermi Atomic Power Plant, Unit 1 (Fermi 1). Fermi 1 was not evaluated as part of this cultural resources survey. An assessment is in progress to determine Fermi 1 NRHP eligibility.

in

2.5.3.6 **Site National Register Eligibility**

The archaeological APE contains no archaeological resources listed ~~on~~ in or determined to be eligible for listing ~~on~~ the NRHP. One prehistoric archaeological site is located within the archaeological APE. This site was identified on the basis of archival material and has not been field verified, nor has it been assessed by the SHPO for ~~National Register of Historic Places~~ NRHP eligibility. No NRHP-eligible archaeological sites have been identified as a result of the archaeological survey.

The Fermi 3 site contains no above-ground resources that are listed ~~on~~ in the NRHP or that have been determined eligible for listing ~~on~~ in the NRHP. A determination of Fermi 1 NRHP eligibility is pending SHPO review. **[START COM 2.5-001]** Detroit Edison will provide to the NRC an update to the Fermi 3 Environmental Report reflecting the results of Fermi 1 NRHP eligibility within one year after docketing of the COL Application. **[END COM 2.5-001]**

2.5.4 **Environmental Justice**

The Environmental Justice analysis presented in this subsection has its impetus in Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," which was issued on February 11, 1994. The order was designed to focus the

Figure 2.5-27 Fermi 3 Project Archaeological Area of Potential Effect

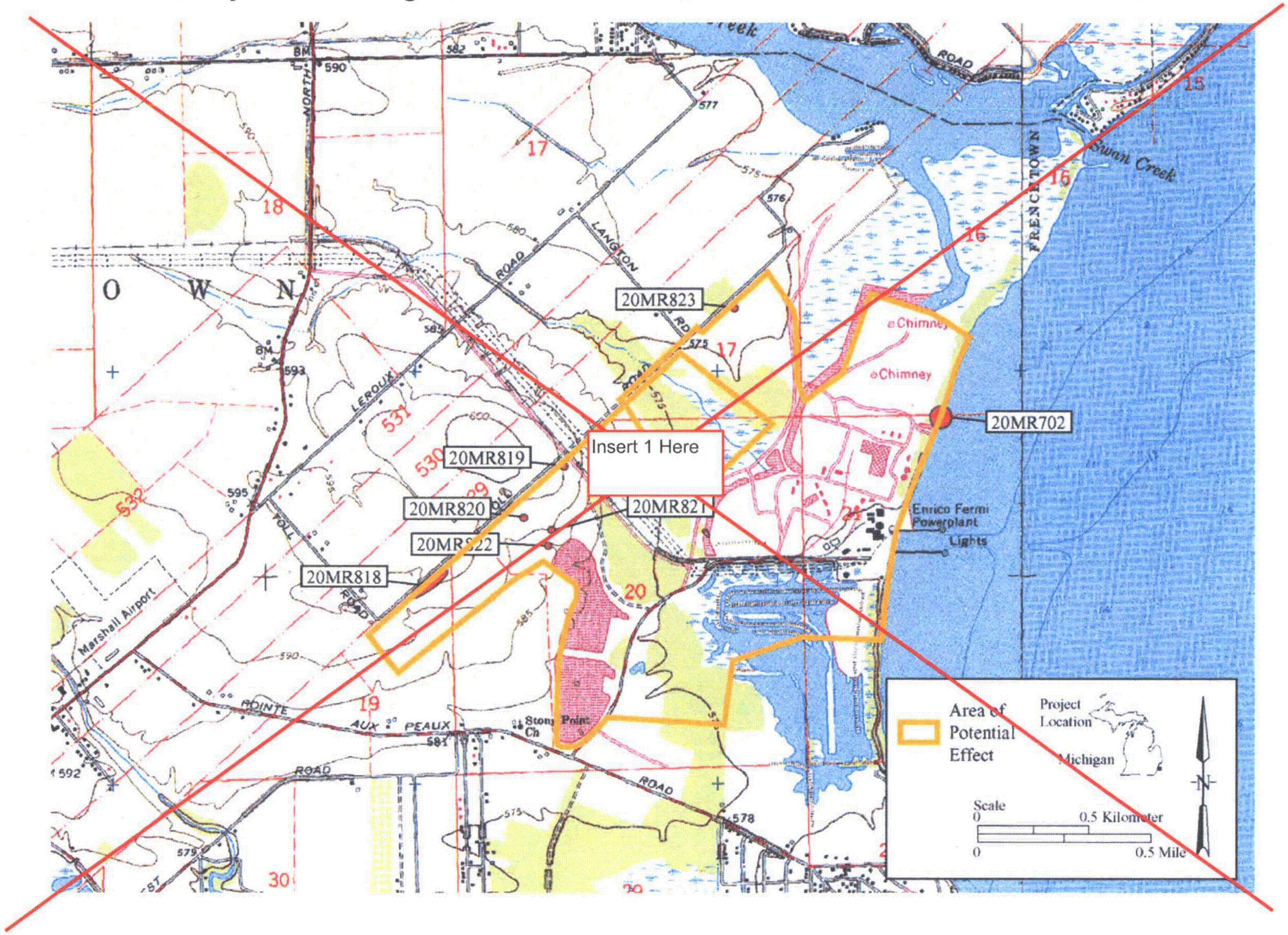


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Figure 2.5-27 Fermi 3 Project Archeological Area of Potential Effect

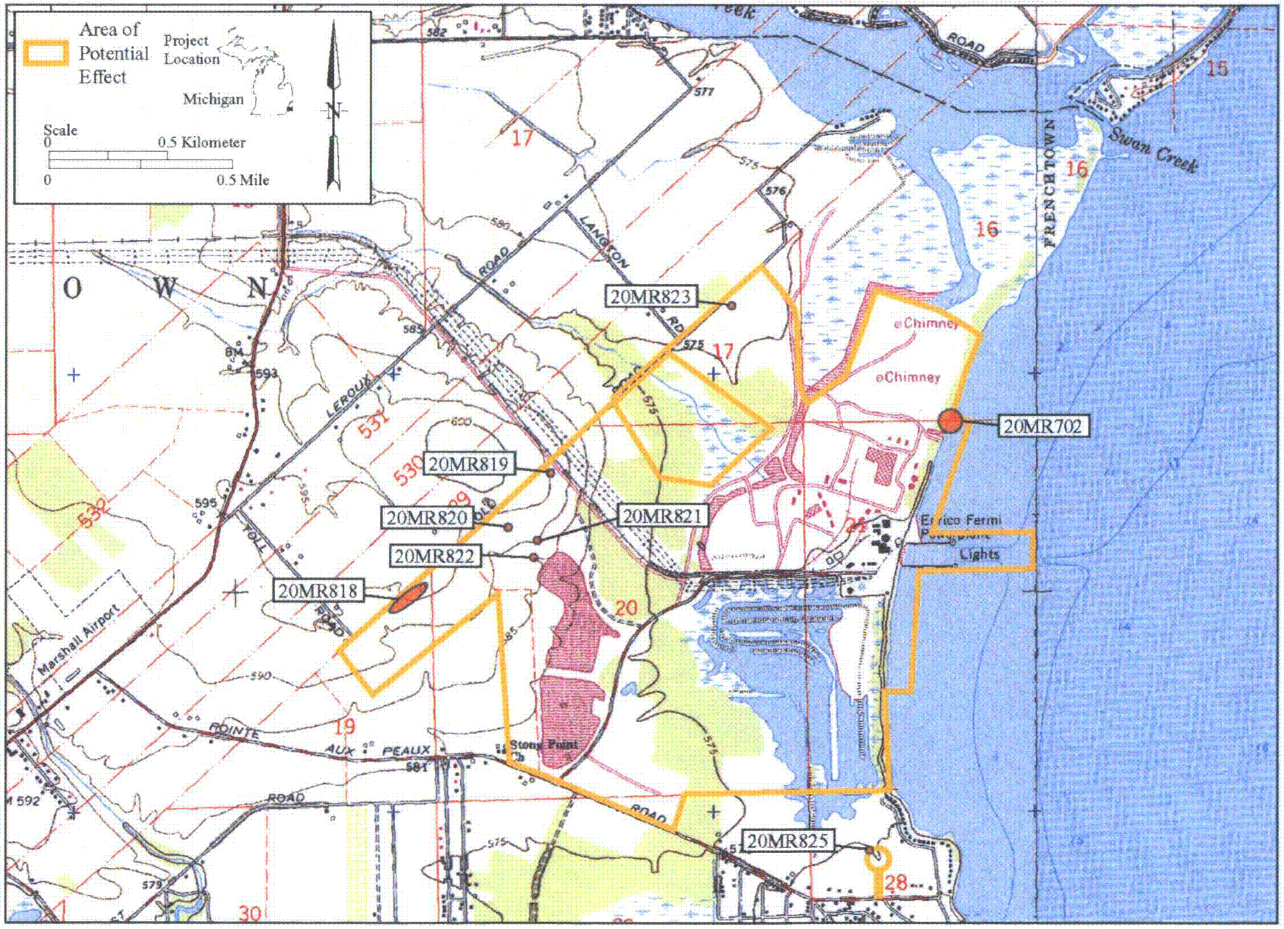

Figure 2.5-28 Fermi 3 Project Above-Ground Cultural Resources Area of Potential Effect

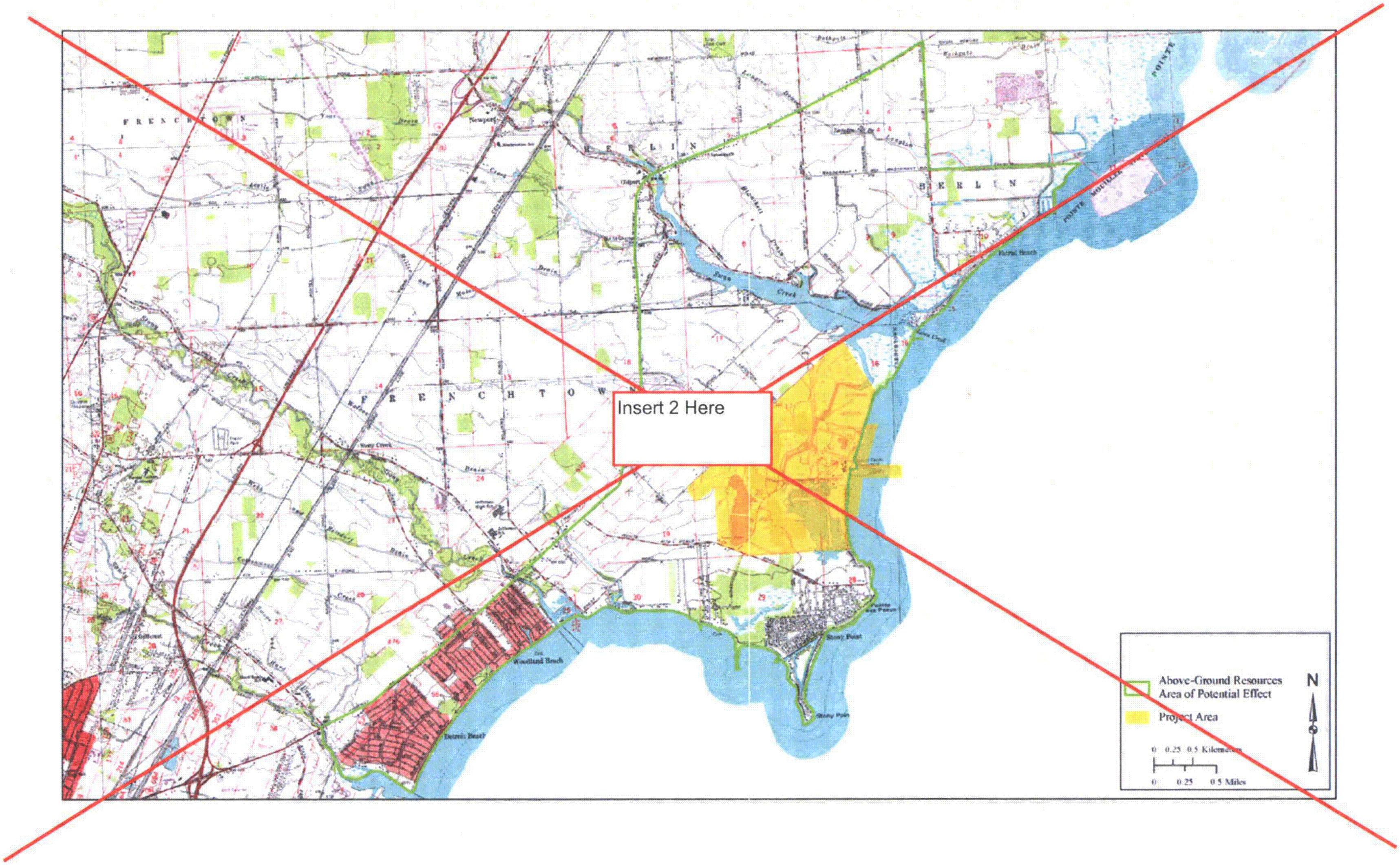

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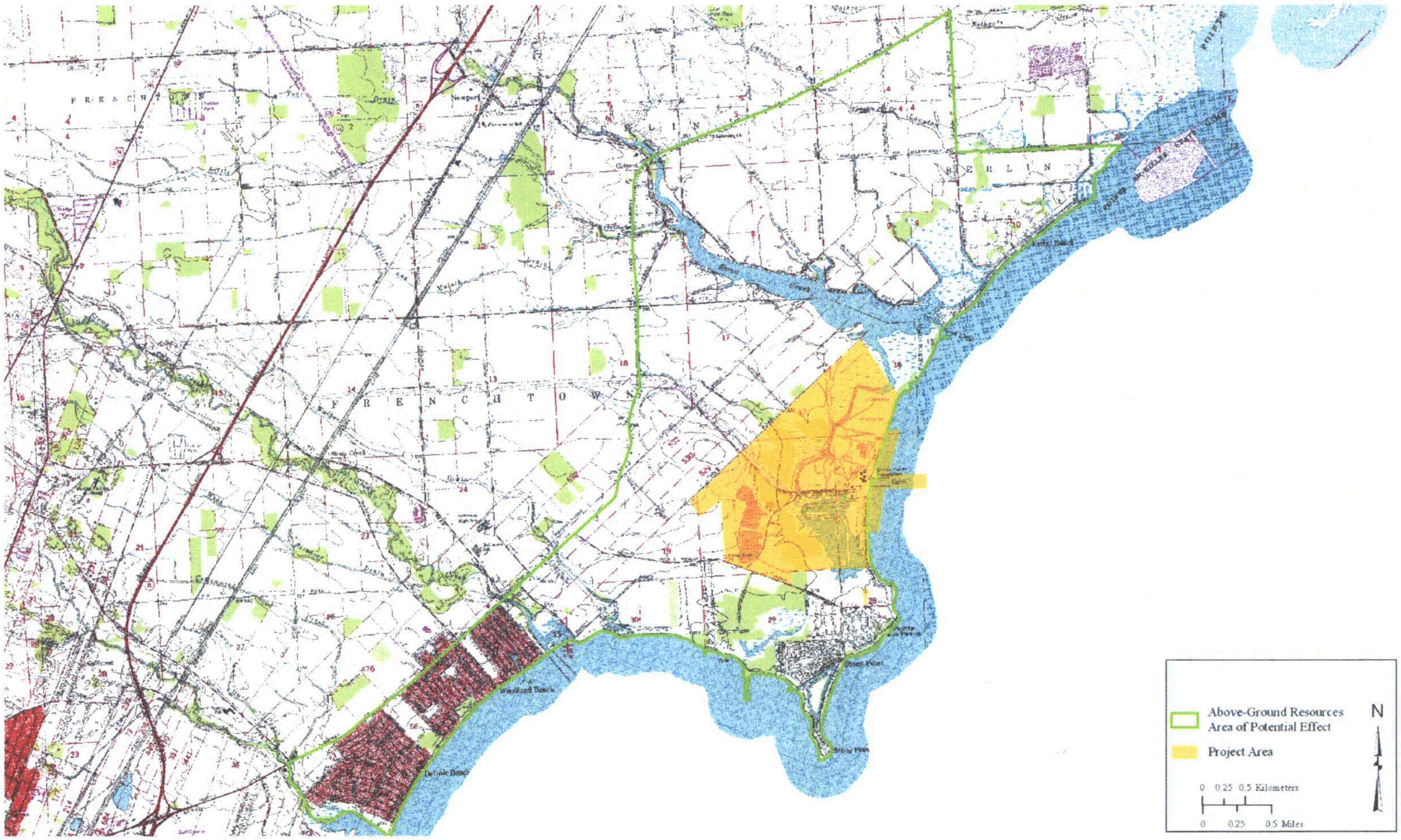
Figure 2.5-28 Fermi 3 Project Above-Ground Cultural Resources Area of Potential Effect



Chapter 3 Plant Description

This chapter discusses the construction and operation of Fermi 3. Chapter 3 is written for single unit operation. The parameters associated with Fermi 3 appearance, water use, transmission facilities, and its relationship to the surrounding area are described in the following sections:

- External Appearance and Plant Layout (Section 3.1)
- Reactor Power Conversion System (Section 3.2)
- Plant Water Use (Section 3.3)
- Cooling System (Section 3.4)
- Radioactive Waste Management System (Section 3.5)
- Nonradioactive Waste Systems (Section 3.6)
- Power Transmission System (Section 3.7)
- Transportation of Radioactive Materials (Section 3.8)

For purposes of this section, the site, vicinity, and region are defined in Chapter 2.

3.1 External Appearance and Plant Layout

This subsection describes the planning, layout and appearance of Fermi 3 and the existing facility structures. Subsection 3.1.1 provides an overview of the existing site, including layout, location and a brief description of the surrounding areas. Subsection 3.1.2 describes the Fermi 3 arrangement, including visual impacts from areas adjacent to the site and general aesthetic principles that will be applied.

3.1.1 Existing Fermi Site Description

The 1260 acre Fermi site is located on the western shore of Lake Erie. The Fermi site grade is approximately 581.8 ft NAVD 88. The grade at the power block area where the Category I structures are located is approximately 589.3 ft NAVD 88. Lake Erie supplies the makeup water requirements for the site.

The existing site arrangement includes Fermi 1 and Fermi 2. Fermi 1 is no longer operational; the unit has been defueled and will be dismantled. Fermi 2 is in operation. During construction of Fermi 2, the initial plan was to also construct and operate a third unit. Unit 3 originally was to be located north of Fermi 2, between Fermi 2 and the two natural draft cooling towers. The plans for the original Unit 3 were halted prior to construction. A complete description of the existing site is provided in the Fermi 2 Updated Safety Analysis Report (Reference 3.1-1). The buildings for Fermi 2 have a natural concrete exterior, neutral gray in color, which tends to reduce visual impact (Reference 3.1-2).

Figure 2.1-4 shows the building layout and site property boundary. Figure 2.1-4 indicates the presence of Fermi 1; although, as discussed above, the plan is to remove this Unit. Figure 2.4-2 provides a topographical map of the site and vicinity with the site property boundary indicated.

Two concrete natural draft cooling towers are used for heat dissipation for Fermi 2. Each tower is approximately 450 ft in diameter at the base; the maximum elevation is 400 ft above the grade elevation. As shown on Figure 3.1-2 through Figure 3.1-8, the natural draft cooling towers for Fermi 2 are the predominant visible structures on the site and are visible from outside the site property boundaries. On Figure 3.1-2 through Figure 3.1-8, the cooling towers for Fermi 2 are the two towers that have a visible plume.

Security fences surround the immediate Fermi 2 area. In addition, the Owner Controlled Area (OCA) is fence-lined to the west and south sides of the property boundary. Visitor and employee parking are currently located inside the OCA fence-line, with access to the plant through a security gate house that is controlled on a 24-hour per day basis.

The site is located within the Detroit River International Wildlife Refuge (DRIWR) as shown on Figure 2.2-2. As shown on Figure 2.1-4, the northern and southern areas of the site feature large lagoons, while the western portion contains some forested areas and Quarry Lake. Quarry Lake served as the rock quarry for the construction activities for Fermi 2. The eastern portion of the site adjacent to Lake Erie contains the power plant structures. The grounds in the immediate vicinity of the plant buildings are attractively landscaped.

The site is accessible by Lake Erie, road, and rail. Personnel access to the site is via Fermi Drive. Fermi Drive provides access to the site from Dixie Highway. Dixie Highway runs, generally, parallel to the western side of the site boundary. The major highways and rail lines in the area are found mainly west of the site, and a number of smaller state and county roads serve the area. Dixie Highway provides access to the Fermi site from Interstate 75. Interstate 75 connects Detroit, Michigan, to the north with Toledo, Ohio, to the south. Figure 2.1-2 and Figure 2.1-3 show the major highways and rail lines in the vicinity of the site.

Figure 2.1-3 provides an overhead aerial photograph of regions in the vicinity of the Fermi site. Figure 2.2-2 also shows the immediate vicinity of the site. The land within five miles of the Fermi site is primarily agricultural with the exception of small beach communities and the small Newport-Oldport residential area to the northwest. As shown on Figure 2.2-2, Estral Beach, Stony Point, Detroit Beach, and Woodland Beach are small towns located along the Lake Erie shore within five miles of the Fermi site. These communities are blended summer resort and permanent residential areas. The nearest of these is Stony Point, about two miles south of the Fermi site.

3.1.2 **New Facility Arrangement**

Fermi 3 is an ESBWR, a light water-cooled reactor. Fermi 3 will be located southwest of the Fermi 2.

The ESBWR standard plant layout is shown in the ESBWR Design Control Document (DCD Figure 1.1-1) (Reference 3.1-3). The locations of the major structures of Fermi 3 on the Fermi site are shown on Figure 2.1-4. Figure 2.4-2 provides a topographical map of the site and vicinity with the site property boundary indicated. A discussion of radioactive and non-radioactive waste release locations are provided in Section 3.5 and Section 3.6, respectively. Chapter 4 discusses impacts due to construction, and provides an overview of the areas affected by the construction activities.

Figure 4.2-1 shows the construction affected areas, including areas that were impacted by previous construction activities. Figure 4.3-1, Figure 4.3-2, and Figure 4.3-3 show the impacts to undeveloped areas, including which impacts are considered to be temporary and which impacts are permanent. Also shown are the terrestrial communities within each of these areas.

Fermi 3 will share certain support structures such as office buildings, potable water supply and sanitary discharge offsite with Fermi 2. Paved site roadways will connect Fermi 3 to the remainder of the Fermi site, providing routine and non-routine access onsite with minimal disturbance of the area.

The normal power heat sink (NPHS) for Fermi 3 will be provided by a concrete natural draft cooling tower. Lake Erie will 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 from Lake Erie for Fermi 3 will be adjacent to the intake for Fermi 2, i.e., located between the two groins that protrude into Lake Erie. The outfall from the Fermi 3 CIRC and PSWS will be off-shore via an underwater discharge line.

Existing infrastructure will be modified to integrate Fermi 3 with Fermi 2; however, none of the Fermi 2 structures or facilities that directly support power generation will be shared. The electrical switchyard for Fermi 3 is separate from the Fermi 2 switchyard. The transmission lines from the Fermi 3 and Fermi 2 switchyards share common transmission towers as the lines leave the ~~facility~~ site. The existing Fermi 2 protected area will be expanded to include Fermi 3. Existing administrative buildings, warehouses, and other minor support facilities will be used, expanded, or replaced, based on prudent economic and operational considerations.

Figure 3.1-1 provides a low, oblique aerial photograph view of the site with the Fermi 3 major features superimposed. As shown on Figure 3.1-1, Fermi 3 is located relatively close to Fermi 2. The major plant structures are located, for the most part, on areas that were environmentally altered for construction and operation of Fermi 1 and Fermi 2. Aesthetic principles and concepts used in the design and layout of Fermi 3 include the following:

- The overall plant arrangement for Fermi 3 is such that building configurations and structural designs minimize the building volumes and quantities of bulk materials consistent with safety, operational, maintenance, and structural needs to provide an aesthetically pleasing effect.
- Locating the major plant structures on areas that were previously environmentally altered.
- Locating the major plant structures at least 1000 ft from the shoreline.
- Placing the intake structure in the existing developed section of shoreline.

These considerations and the relative proximity of the Fermi 3 plant structures to the existing Fermi 2 plant structures provide an integrated design for the site.

The Fermi site environmental conditions are described in Chapter 2. The land within five miles of the Fermi site is primarily agricultural with the exception of the small beach communities discussed above and the small Newport-Oldport residential area to the northwest. Visual impacts from the site to these areas are limited to the immediate residents and traffic on the Dixie Highway and the smaller arterial roads. The site does not impact areas that have a high degree of visitor use or recreational areas.

As discussed previously, the site currently has two natural draft cooling towers of comparable size. Figure 3.1-2 through Figure 3.1-8 show the visual effects of the site from various offsite locations. These photographs are taken from near the site boundary, providing views of the site from all directions (looking north, east and south). These points of view would encompass the visual effects to any other facilities that are located farther away from the site. As can be clearly seen in these photographs, the visually predominant existing structures are the two natural draft cooling towers. The vegetation on the site helps to shield the power plant structures from public viewing. As Fermi 3 will be located in the same general vicinity as Fermi 2, this same vegetation will help to provide seclusion for Fermi 3. Similar to Fermi 2, the most visually obtrusive structure under consideration for the new facility is the natural draft cooling tower. The height of the new natural draft cooling tower is approximately 600 ft. For visual comparison, the relative location of Fermi 3 and the new natural draft cooling tower is super-imposed on the photographs on Figure 3.1-2 through Figure 3.1-8. These photographs, including the oblique aerials, provide comparison of the seasonal effects on the visual impact. That is, the photographs on Figure 3.1-2 through Figure 3.1-8 are taken during the time of year when the vegetation has the minimal shielding effect. Due to increased amounts of vegetation cover, visual impacts during other times of the year would be less than those shown in these figures.

Because the Fermi site is already aesthetically altered by the presence of an existing nuclear power plant and construction impacts would be temporary, significant adverse impacts to visual aesthetics of the site and vicinity are not expected from the construction or operation of Fermi 3.

3.1.3 **References**

3.1-1 Detroit Edison, "Fermi Unit 2 Updated Safety Analysis Report," Revision 14, November 2006.

3.1-2 Detroit Edison, "Fermi Unit 2 Environmental Report," Supplement 5, January 1979.

3.1-3 GE-Hitachi Nuclear Energy, "ESBWR Design Control Document – Tier 2," Revision ~~4,~~ 5 ~~September 2007~~ May 2008.

Figure 3.1-1 Aerial View of Fermi Site Looking North - Fermi 3 Superimposed

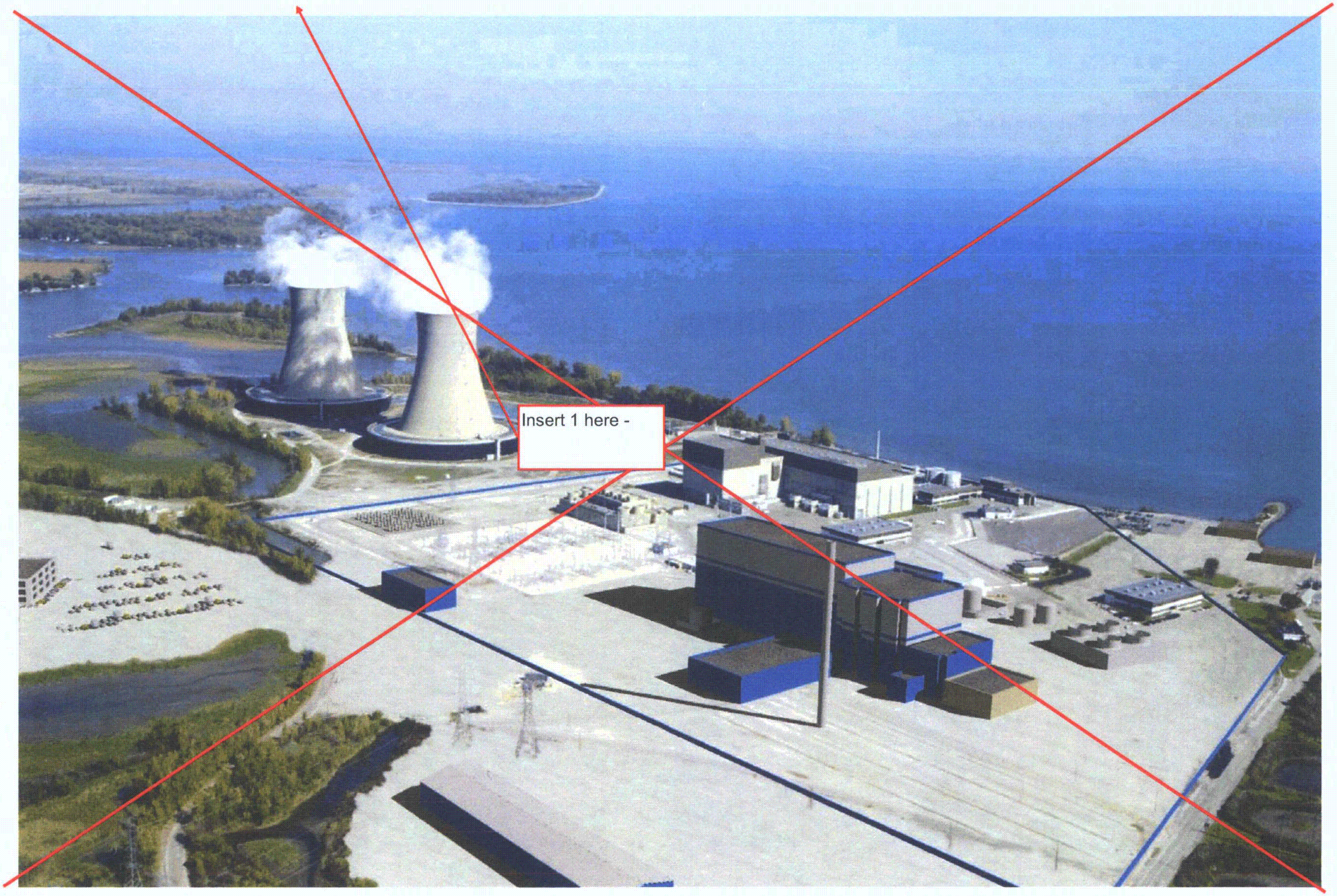


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Figure 3.1-1 Aerial View of Fermi Site Looking North - Fermi 3 Superimposed

Figure 3.1-2 View of Fermi Site from Dixie Highway Looking East

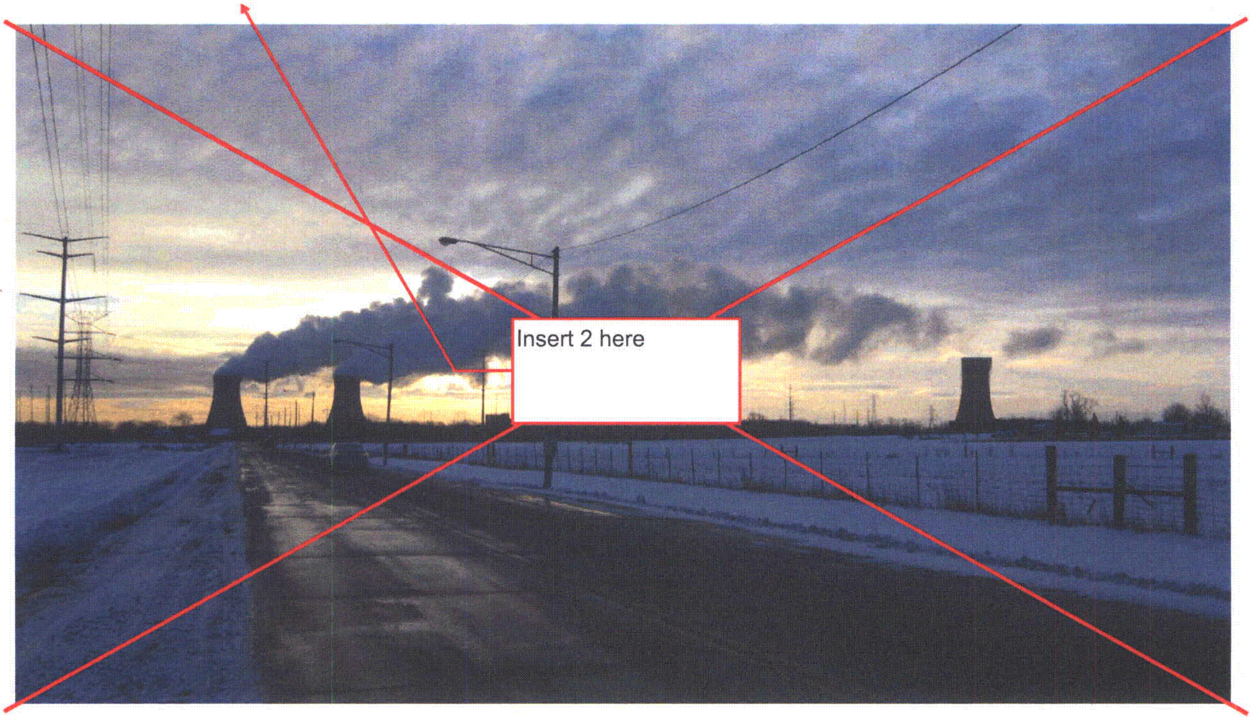

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Figure 3.1-2 View of Fermi Site from Dixie Highway Looking East

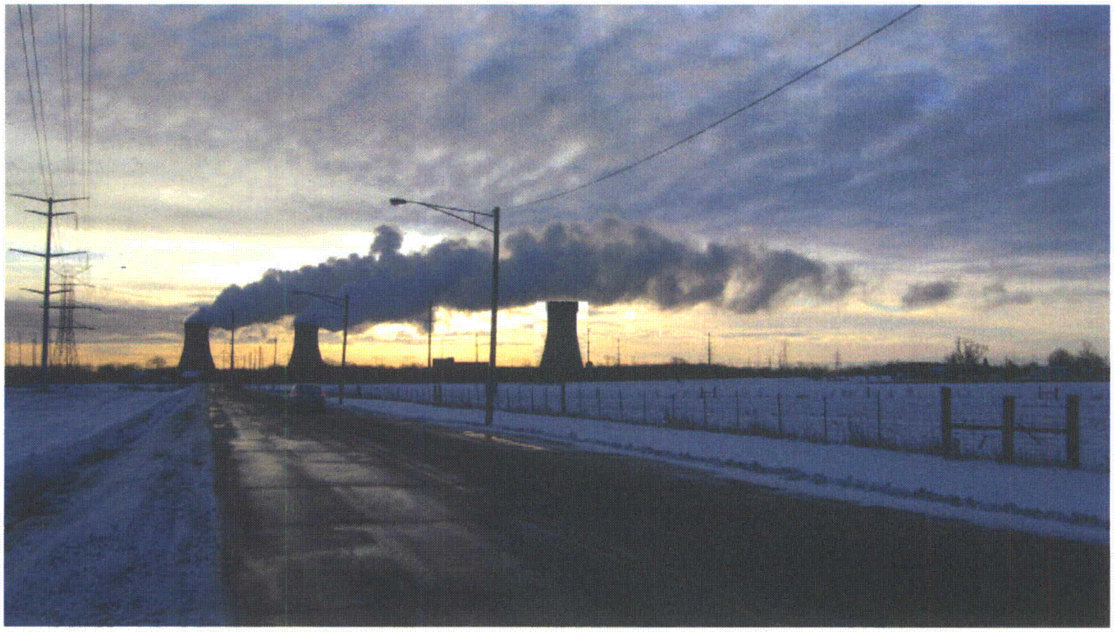

Figure 3.1-3 View of Fermi Site from Dixie Highway Looking Southeast

Figure 3.1-4 View of Fermi Site from Post Road Looking Southeast

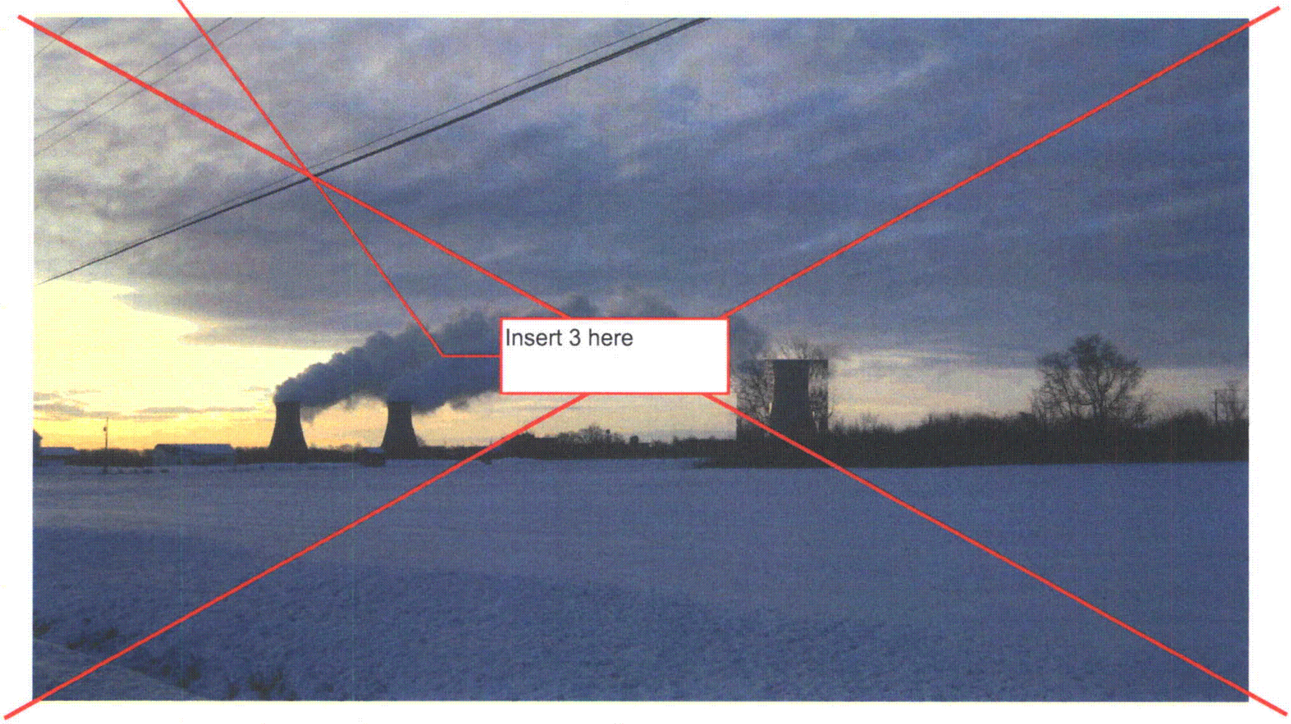

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Figure 3.1-4 View of Fermi Site from Post Road Looking Southeast

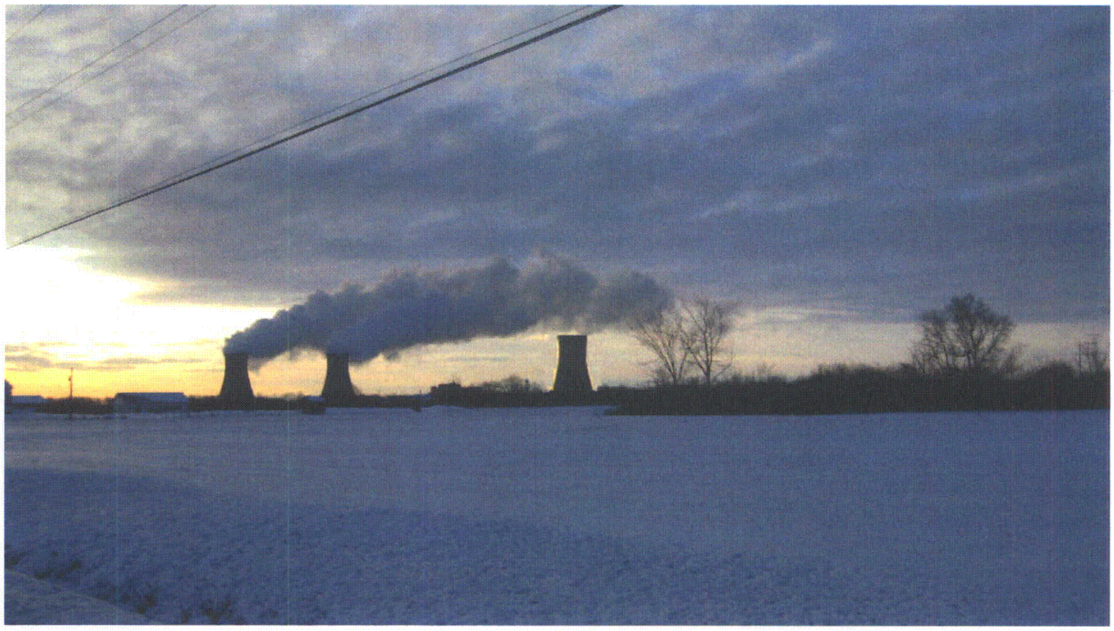

Figure 3.1-5 View of Fermi Site from Swan Creek Road Looking Southeast

Figure 3.1-6 View of Fermi Site from Toll Road Looking East

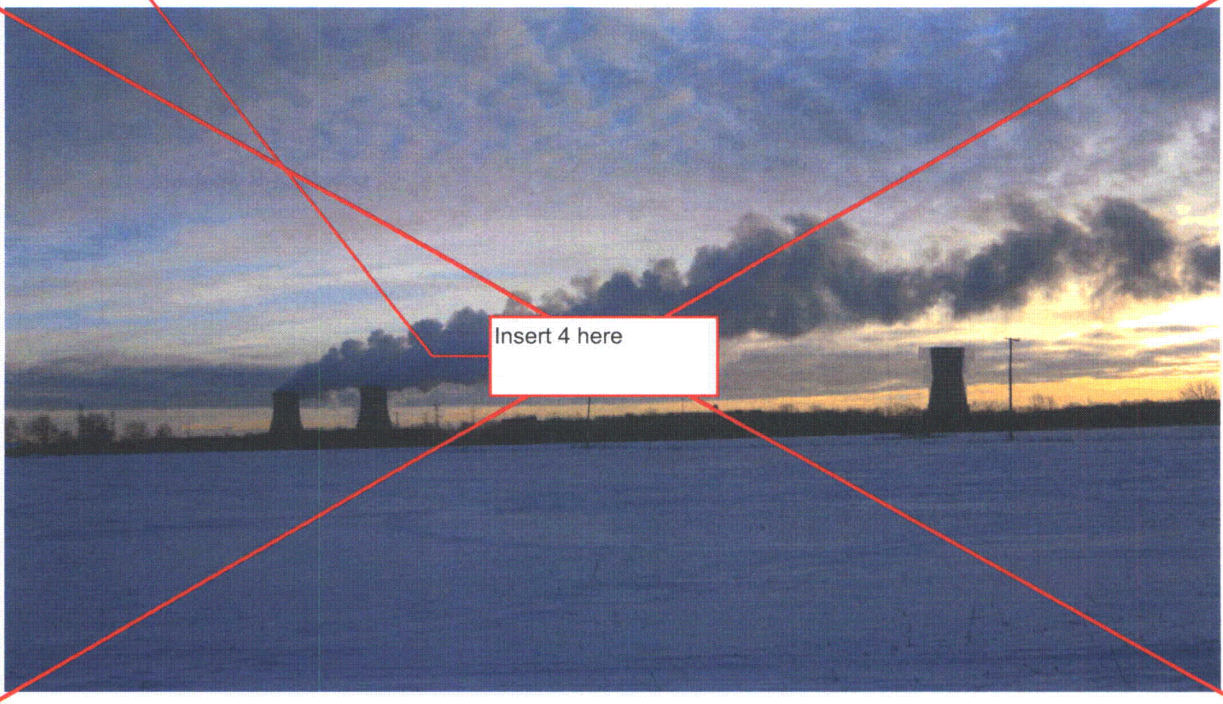

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Figure 3.1-6 View of Fermi Site from Toll Road Looking East

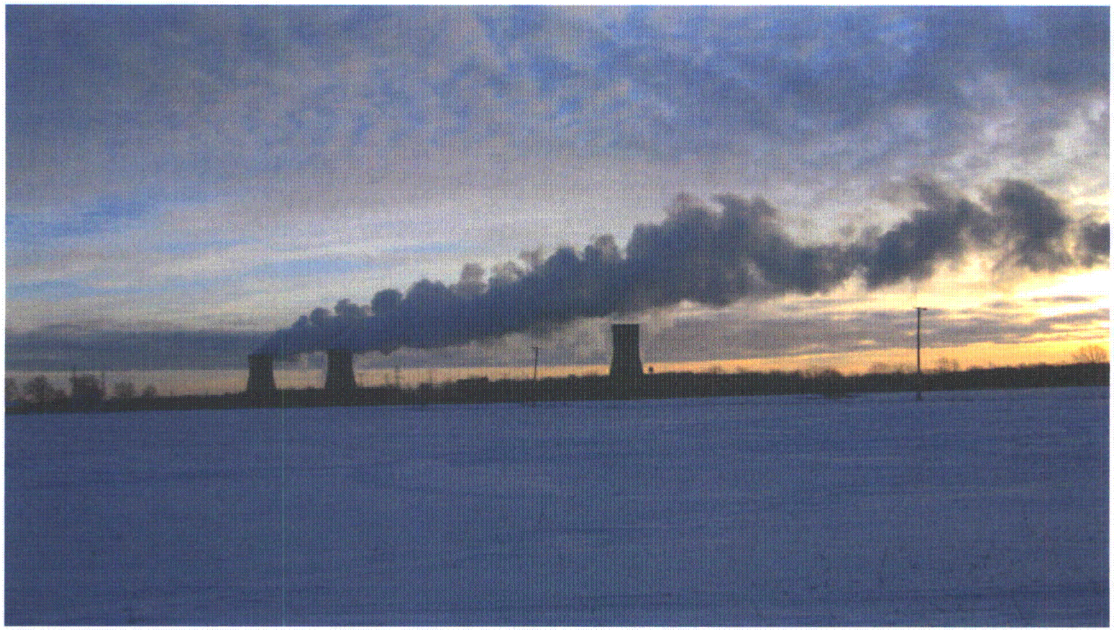

Figure 3.1-7 View of Fermi Site from Pointe Aux Peaux Road Looking North

Figure 3.1-8 View of Fermi Site Taken from Pointe Mouille Marsh State Game Area Approximately 6 Miles from Site*

* Location of Pointe Mouille Marsh State Game Area is shown on Figure 2.2-2.

3.4.2.3 **Heat Dissipation System**

The main source of heat dissipation is the NPHS. The NPHS is a natural draft cooling tower, as shown on Figure 3.4-3. The AHS consists of two mechanical draft cooling towers. The AHS is further discussed in FSAR Subsection 9.2.1.

Makeup flow to the NPHS cooling tower basin is supplied by the SWS through the intake structure located on Lake Erie. The NPHS is located approximately ~~5000~~ 2200 ft from the pump house intake structure. At the cooling tower basin, there are four CIRC pumps, each 25 percent capacity, which supply a total flow of 740,000 gpm. The flow is directed to the main condenser, and is then directed back to the cooling towers so that the heat can be rejected to the atmosphere. The cooling tower basin is located approximately ~~4800~~ 1100 ft from the main condenser.

The NPHS cooling tower discharges water to the basin, which receives makeup from Lake Erie. Intake water temperatures from Lake Erie can be seen in Subsection 2.3.1, and meteorological data can be found in Section 2.7. Cooling tower performance curves for wet bulb temperature and evaporation, as well as wet bulb and cold water temperature are seen on Figure 3.4-4 and Figure 3.4-5. The information in Table 3.4-1 is developed using these cooling tower performance curves. The design of the heat dissipation system does not present any major departures from acceptable cooling system design practices, nor does it contain any additional components for consideration, beyond the NPHS in the form of a natural draft cooling tower. This system is consistent with good engineering practices.

The PSWS and AHS are discussed in FSAR Section 9.2 and FSAR Table 9.2-201.

3.4.3 **References**

3.4-1 Edison Electric Institute, “Electric Power Plant Environmental Noise Guide,” New York, 1978.

3.4-2 GE-Hitachi Nuclear Energy, “ESBWR Design Control Document – Tier 2,” Revision 4, September 2007.

points of interconnection on the 345 kV, 230 kV, and 120 kV portions of the system. The study also finds if Fermi 2 and Fermi 3 have switchyards tied together, that unstable conditions may arise. In addition to the new transmission lines and switchyard, upgrades to existing transmission (and possibly subtransmission) lines will be needed to facilitate the new generation on the system.

Transmission line and switchyard design will meet or exceed the requirements established in the National Electrical Safety Code (NESC) (Reference 3.7-2), which provides rules for electrical safety, electrical clearances, structural design loadings, and material strength factors. Modifications to the existing system will comply with relevant local, state, and industry standards including NESC and various American National Standards Institute/Institute of Electrical and Electronic Engineers, Inc. standards. The standards include the rules in Sections 23, 25, and 26 of the NESC.

3.7.3 Construction Methods

The Fermi 3 switchyard will be located ~~adjacent to Fermi 3 but~~ approximately 3500 ft to the west of the Fermi 3 reactor, and will be separate from the existing 345 kV and 120 kV switchyards utilized by Fermi 2.

The new transmission lines from the Fermi 3 switchyard will be 345 kV lines and will be located in existing corridors to the Milan substation.

The study performed by ITC*Transmission* indicated the use of towers, steel poles and/or combinations of these structures will be used in the construction of the new transmission lines. (Reference 3.7-1) The three 345 kV lines for Fermi 3 will run in a common corridor, with transmission lines for Fermi 2, to a point just east of I-75. From the intersection of this Fermi site corridor and I-75, the three Fermi-Milan lines will run west and north for approximately 12 miles in a corridor shared with other non-Fermi lines. From this point, all non-Fermi lines turn north and continue on to their respective destinations and the three Fermi-Milan lines will continue west for approximately 10 miles to the Milan substation.

3.7.4 Transmission Line Noise

There are two categories of electrical noise effects of power transmission lines: corona effect caused by electrical stresses at the conductor surface resulting in air ionization noise, and field effects caused by induction to objects in proximity to the conductors. The audible noise produced by corona effect and ground level electric field effect are the primary concerns.

Audible noise is typically at its maximum during or following rain or during fog. The maximum noise level is kept below the level which would result in a number of complaints (approximately 52.5 dB(A) per Reference 3.7-3) through the use of typical design standards to properly size conductors and specify corona-free hardware.

Ground level electric field effects of overhead power transmission lines relate to the possibility of exposure to electric discharges from objects in the line's field. The likely range of maximum vertical electric field is 4-6 kV/m (Reference 3.7-3) for a 345 kV transmission line.

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

Construction activities include the following general types of activities:

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

This applies to any of the following SSCs and facilities:

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

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

4.1 Land-Use Impacts

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

4.1.1 The Site and Vicinity

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

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

The total new construction area anticipated to be disturbed for onsite construction activities is approximately 189 ~~264~~ acres. Impacts will be confined to designated areas as outlined on Figure 2.1-4. About 27 ~~116~~ acres permanent impact areas will be lost to other uses until after decommissioning of Fermi 3. The remaining 162 ~~145~~ acres will be disturbed on a short-term, temporary basis. Most of the land that will be occupied by Fermi 3 and associated facilities was disturbed during construction of Fermi 1 and Fermi 2; however, some construction will occur in areas that have been undisturbed for longer periods of time. Figure 2.1-4 indicates the areas proposed for use during Fermi 3 construction.

The conversion of 2 ~~123~~ acres of the Lagoona Beach Unit of the Detroit River International Wildlife Refuge (DRIWR) from wetland and forest to developed use for Fermi 3 and associated structures constitutes the main irreversible and irretrievable land use impact for Fermi 3 construction. More than 90 percent of Lake Erie coastal wetlands have been lost to development in Monroe County, emphasizing the importance of the remaining land uses of this type (Reference 4.1-1).

4.1.1.1 Site and Vicinity Land Use Impacts

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

Table 2.2-1 and Table 2.2-2 list land uses on the Fermi site and in the vicinity before construction of Fermi 3. During construction of Fermi 3, there will be a slight reduction (approximately 2 to 3 ~~84~~ acres) in wetland and forested areas and a corresponding increase in the developed area acreage attributable to permanent impacts of construction activities on the Fermi site.

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

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

New construction for Fermi 3 would have an impact in the construction areas because forest and wetland areas that are part of the DRIWR would be cleared for construction of several facilities and construction areas associated with Fermi 3 and the relocation of the Fermi 2 parking and warehouse area. Note - These Fermi 2 relocations may be carried out independently or in conjunction with activities related to Fermi 3. 290

Of the approximately ~~433~~ total acres estimated to be disturbed for the construction of Fermi 3, approximately ~~209~~ acres overlap currently developed or previously altered areas. It is estimated that approximately 12 acres would contain the permanent structure footprint associated with Fermi 3 (primarily the power block area, cooling tower area, intake area, and auxiliary structures, as 243
108 shown in Figure 2.1-4). Acreage not containing permanent structures would be reclaimed after construction to the maximum extent possible and, where practicable, would be replanted or allowed to revegetate naturally. The combined Fermi 2 and Fermi 3 projected acreage for permanently 290
affected areas (excluding temporary impacts) is approximately ~~300~~ acres. The ~~433~~ total acres of impact onsite from Fermi 3 construction and the ~~123~~ acres of land use (that would permanently change from wildlife refuge to high density development) are both substantially less than the 1235 acre threshold that the NRC considers a SMALL impact (refer to NUREG-1555, Section 4.1.1). It can therefore be concluded that the Fermi 3 land use impact during construction would be SMALL, and would not require mitigation. 2

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

4.1.1.2 **Land Use Plan and Zoning Compliance**

4.1.1.2.1 **Local Monroe County and Frenchtown Township Land Use**

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

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

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

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

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

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

4.1.1.2.2 **Agricultural and Soil Issues**

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

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

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

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

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

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

In addition, as described in Section 4.2, several different structural controls may be used to avoid degradation of the quality of the stormwater runoff to Swan Creek, onsite wetlands, and Lake Erie during construction activities. The final location of these controls would be based on site conditions prior to and during construction activities.

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

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

Aggregate and equipment storage may be located in the possible laydown area shown on Figure ~~4.2-1.~~ 2.1-4

The excavated material from the power block and circulating water pipe runs will be processed and used as backfill and structural fill for the cooling tower and circulating water pipe run area. Other than these excavated areas, no onsite borrow pit is anticipated to be used for Fermi 3 construction. An estimated quantity of 500,000 yd^3 of excavated material is expected to be excess, which will be disposed of in an onsite area. This onsite disposal area is likely to be an expansion of one of the areas previously used for Fermi 2 spoils disposal. Alternatively, it is possible that a new spoils disposal area may be designated onsite. The use of an onsite construction landfill is not anticipated.

Therefore, it is anticipated that the land use impact from excavated material will be SMALL due to the relatively small net excess of spoils materials disposed and the availability of disposal areas previously used for the same purpose during Fermi 2 construction.

Dredged material excavated during water intake structure and barge slip or dock construction is expected to be returned to the Spoils Disposal Pond encircled by Boomerang Road, as shown on Figure ~~4.2-1.~~ 2.1-4

According to the Natural Resources Conservation Service (NRCS), soil types that are considered prime farmland are present on the Fermi site, as discussed in Section 2.2. NRCS online soil survey data and maps show several small areas of prime farmland (Subsection 2.2.1.2.3.1) that may be temporarily or permanently affected by Fermi 3 construction (Reference 4.1-2). These small areas of prime farmland are currently on agricultural land in the west-southwest portion of the site. ~~If the~~ The northern portion agricultural land in the west-southwest portion of the site ~~is~~ will be used for ~~construction~~ the Fermi 3 switchyard, ~~it~~ would be ~~only~~ used as a surface to store construction materials. ~~No permanent impacts should occur to this area, and~~ otherwise

~~It should~~ The majority of the land would be usable as agricultural cropland again after construction of Fermi 3 is complete. Land use in this area of the site would temporarily change for the duration of construction (about five years), but would then revert to agricultural use with the exception of the approximate 10 acre Fermi 3 switchyard area.

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

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

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

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

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

The DRIWR Lagoona Beach Unit comprises 656 acres of the 1260 acre Fermi site. The U.S. Fish and Wildlife Service (USFWS) manages the DRIWR and has published a Comprehensive Conservation Plan for the refuge (Reference 4.1-3). The Comprehensive Conservation Plan states that there are several options for acquisition of land for the refuge other than outright purchase of land. One of these alternative methods, a cooperative agreement, was used for acquisition of the Lagoona Beach Unit of the DRIWR on Fermi property (Reference 4.1-3). Detroit Edison has a 2003 Cooperative Agreement with the USFWS for the onsite portion of the DRIWR that allows Detroit Edison and the USFWS to share management of the refuge areas, but that allows Detroit Edison to retain ownership and control of those areas. The agreement allows Detroit Edison to withdraw from or revise the agreement at any time. Detroit Edison expects to revise the agreement to reflect the approximately 534 acres expected to be available for inclusion in the refuge after construction. This revision in the size of the Lagoona Beach Unit of the DRIWR is consistent with the 2003 Cooperative Agreement, the Comprehensive Conservation Plan, and land acquisition procedures for the refuge. Even though Fermi 3 will reduce the acreage that can be included in the DRIWR, Fermi 3 construction would be compatible with the plans and agreements governing the

DRIWR. Therefore, construction impacts on land use plans would be SMALL, and no mitigation measures are needed.

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

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

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

4.1.1.3 **Transportation and Rights-of-Way**

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

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

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

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

4.1.1.4 Site Restoration and Management Actions

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

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

4.1.2 Transmission Corridors and Offsite Areas

As stated in NUREG-1555, Section 4.1.2:

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

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

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

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

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

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

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

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

Land use impacts from constructing the new transmission lines are anticipated to be SMALL due to the placement of the new transmission lines and structures largely through land already used or planned for transmission and utility use. There could be impacts to forest, agricultural lands, wetlands and streams, residences, undeveloped land, and recreational uses within the assumed 300-foot corridor ROW. These construction impacts are expected to be alleviated to the extent practicable through the use of environmental stewardship, best management and industry practices, and conformance with applicable laws and regulations pertaining to ground-disturbing activities, such as forest and wetlands protection and stormwater controls. Based on the description in Subsection 2.2.2, the transmission corridors are expected to have SMALL impacts on urban areas, state parks, and federally regulated wetland areas. The new transmission route does not cross federal lands. The land use for 0.5 miles around all transmission corridors, including the newly developed portion, is shown on Figure 2.2-3. On the figure, the new section and the 0.5-mile area around it are outlined in blue to distinguish the newly developed lines from the previously developed lines serving Fermi.

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

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

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

The Fermi 3 ~~substation will be constructed to the south of the existing Fermi 2 substation to accommodate Fermi 3 power output. This new switchyard area will be adjacent to the 104 acre Fermi 3 area outlined on Figure 2.1-4.~~ switchyard will be separate from the Fermi 2 switchyard. The location of the Fermi 3 switchyard is shown on Figure 2.1-4.

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

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

Overall, transmission construction impacts to land use in the vicinity of Fermi 3 and the new transmission route are expected to be SMALL because of the use of existing and maintained corridors already dedicated to transmission use and the short-term nature of construction impacts

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

	Area Acres
Total Site	1260[2]
Current Fermi 2 Total Developed Area	209
Nuclear Training Center and Nuclear Operations Center	1.5
Spoils Area (surrounded by Boomerang Road)	12
Decommissioned Fermi 1 Area	7
Transmission Line Corridors (onsite 345 kV and 120 KV) (all lines offsite along Fermi Drive to Dixie Highway)	45 (to western site boundary) 54 (western site boundary east to Dixie Highway)
New Construction Areas Affected	
Fermi 3 Power Block (Fabrication Area, Construction Offices, and Batch Plant included in this area)	104
Fermi 2 New Parking and Warehouse	53
Fermi 3 Construction Parking	73
Possible Construction Laydown Area	69
Fermi 3 Cooling Tower	69
Total Onsite New Construction Areas Affected (not including Fermi 2 developed area)	261
Newly Developed Offsite Transmission Corridor[3]	1069

Notes:

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

Insert A

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

Notes:

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

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

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

4.1.2.4 Corridor Restoration and Management Actions

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

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

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

4.1.3 Historic Properties

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

The value of an archaeological resource lies with its ability to contribute information on the prehistory or history of an area, i.e., to provide answers to research questions. Impacts to archaeological resources are most often assessed with regard to direct damage to a site or site element. Impacts to archaeological sites, i.e., below-ground resources, focus almost exclusively on the impacts associated with ground-disturbing activities in locations such as excavation areas, access roads, and laydown areas.

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

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

4.1.3.1 **Site and Vicinity**

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

4.1.3.1.1 **Archaeological Sites**

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

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

resources

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

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

Section 2.5.3.5 states: An assessment is in progress to determine Fermi 1 NRHP eligibility.

4.1.3.1.2 **Above-Ground Resources Sites**

in

No above-ground resources within the Fermi 3 project area have been assessed as to NRHP eligibility; therefore, Fermi 3 construction activities would have no impact on resources that are

in

listed ~~on~~ the NRHP or that have been determined eligible for listing ~~on~~ the NRHP. ~~Fermi 1 has not been assessed as to its NRHP eligibility~~. The plan to deconstruct Fermi 1 as part of the Phase 1 construction activities is dependent, in part, upon a decision by the SHPO as to whether Fermi 1 is NRHP eligible (see Subsection 2.5.3.5)

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

4.1.3.2 **Transmission Corridors and Offsite Areas**

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

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

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

4.1.4 References

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

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

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

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

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

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

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

4.2.1.2 **Construction Activities**

This section identifies construction activities that could result in impacts to the hydrology at the Fermi 3 site. Fermi 3 construction is anticipated to disturb approximately ~~474~~ 290 acres, which includes the Fermi 2 developed area. Figure 4.2-1 shows the various areas that will be affected by construction. The following construction activities are identified:

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

4.2.1.3 **Construction Water Sources**

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

Figure 4.2-1 Construction Affected Areas

Insert 1

Figure 4.2-1 Construction Affected Areas

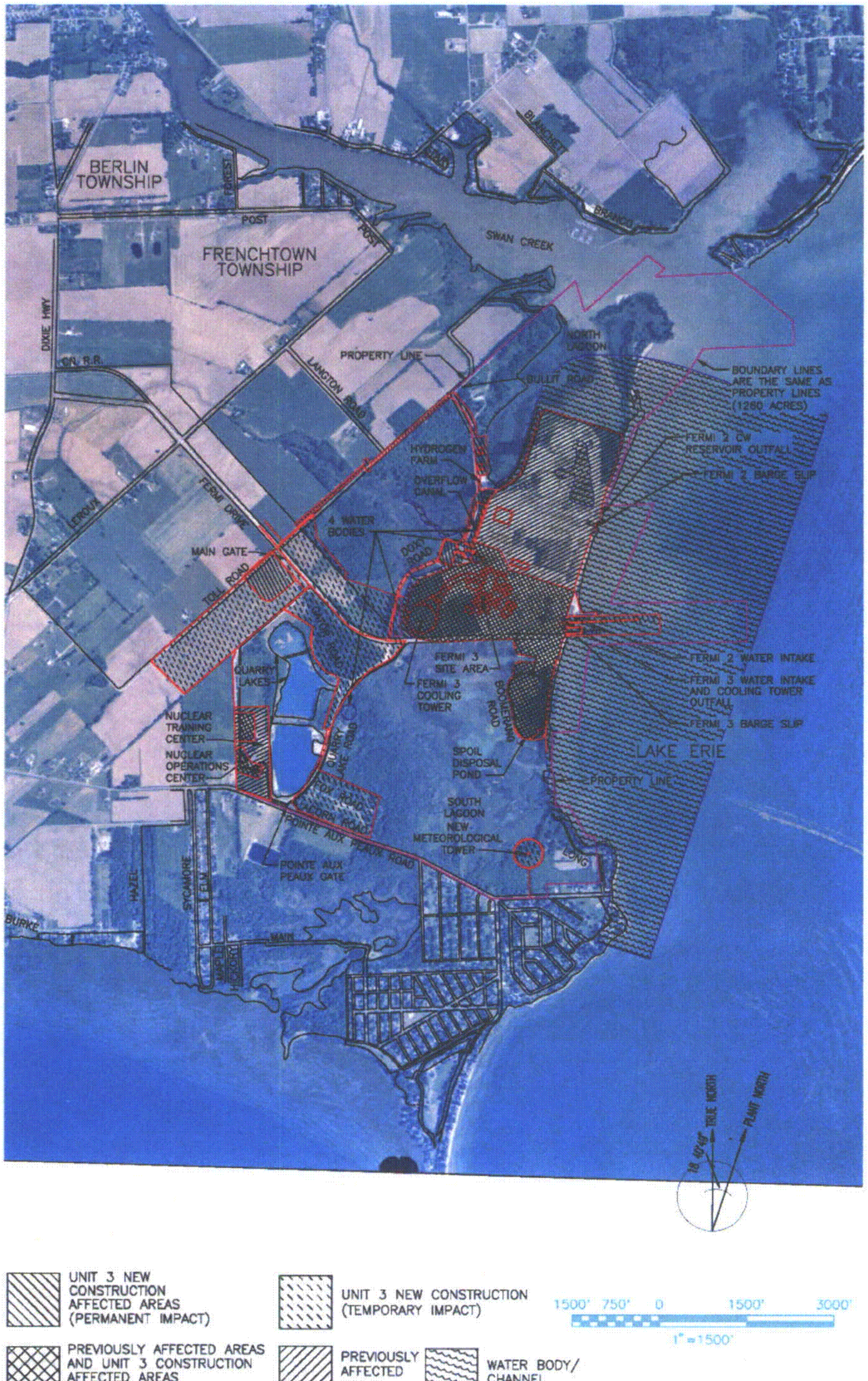

Figure 4.2.1–1 Fermi Property Boundary

4.3 Ecological Impacts of Construction

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

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

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

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

4.3.1 Terrestrial Ecosystems

This subsection describes the impacts of construction on the existing terrestrial ecosystem as described in Subsection 2.4.1. Figure 4.3-1 shows the undeveloped areas that would be impacted by the construction of Fermi 3. The site layout for Fermi 3 is shown in Figure 2.1-4. The total impact area for Fermi 3 is ~~433~~ 290 acres, which includes the aquatic area impacts, as discussed in Subsection 4.3.2. Fermi 3 construction would disturb approximately ~~261~~ 189 acres of terrestrial habitat

27 189

on the Fermi site. ~~The remaining 172 acres, or 40 percent of the area, is already developed and occupied by structures, pavement, or otherwise maintained areas.~~ The terrestrial habitats impacted are illustrated in Figure 4.3-2. Of this ~~264~~ acres area, permanent impacts are expected to occur to approximately ~~116~~ acres and temporary impacts to approximately ~~145~~ acres. Temporarily disturbed sites are to be replanted following completion of construction. 162

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

4.3.1.1 Terrestrial Communities

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

4.3.1.1.1 Vegetation on the Site and in the Vicinity

Construction activities would result in the permanent clearing and grubbing of portions of the impact area shown in Figure 4.3-1. No impacts are expected in the site vicinity, with the exception of those areas associated with the transmission system, as discussed in Subsection 4.3.1.5. Permanent and temporary impacts to plant communities on the Fermi site are summarized in Table ~~4.3-1. New~~ 27 development would affect approximately ~~264~~ acres of undeveloped land; ~~116~~ acres would be permanently impacted and ~~145~~ acres would be temporarily impacted. The overall and cumulative impacts of Fermi 3 construction activities to terrestrial vegetative communities are considered SMALL, and no further mitigation measures are warranted. 189 162

162 86

Notwithstanding the above conclusion, it is Detroit Edison's intention that about ~~50~~ percent, or approximately ~~145~~ acres, would be restored by re-vegetation using species native to the Fermi vicinity. Areas available for restoration are shown in Figure 4.3-2 and labeled as temporary impact areas. The restoration would alleviate any adverse impacts to these communities by planting species native to the region and appropriate for the area being re-vegetated. The restored habitat is expected to provide improved species composition in the plant communities and enhanced wildlife habitat by providing both improved forage and shelter for wildlife in the area. Other activities directed at protecting the environment will include using BMPs to reduce the risk of stormwater runoff, erosion, and pollutant spills, as outlined in the SESC Plan and the PIPP for the Fermi 3 site. The requirements for the SESC Plan and the PIPP are described in more detail in Subsection 4.2.1.

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

2.3

Approximately one acre could be permanently impacted by the construction of the new meteorological tower.

less than 0.2

one

Coastal Emergent Wetland (Vegetated)

Approximately ~~five~~ acres of this community would be permanently impacted. This represents ~~two~~ percent of the 238 acres of the community present onsite and ~~0.3~~ percent of the 1550 acres found in the vicinity. Most of these areas are located at the periphery of the impact area. The boundaries of these areas are identified on Figure 2.4-19. Whenever possible, construction activities will be restricted in these areas to further minimize permanent impacts to these important habitats. The impact areas along the west and south edge of the current spoils disposal area (adjacent to Lake Erie) are not expected to be impacted due to soil disturbance but may receive secondary impacts from alterations in water discharges from the spoils area. These impacts are discussed in Subsection 4.3.2. The project impacts to this community are considered SMALL, and no mitigative measures are needed.

construction worker

, of which approximately 26 acres

project

Grassland: Right-of-Way

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

7.3

Grassland: Idle/Old Field/Planted

19

11.5

majority of the

Approximately ~~49~~ acres of this community present onsite would be impacted, ~~32~~ acres permanently and ~~8~~ acres temporarily. Onsite there are about 75 acres of this community present. The permanent impacts are associated with the power block and cooling tower construction. Temporary impacts ~~are~~ associated with the Fermi 3 construction parking area and will be re-vegetated following construction. As discussed in Subsection 2.4.1.1.1, these grassland habitats occupy mostly land that was previously disturbed and are composed of early succession and often non-native plant species. In addition, these grasslands provide poor quality wildlife habitat, primarily due to a lack of forage species. About 6,932 acres of this community occurs in the vicinity. The permanent loss of ~~32~~ acres represents about ~~0.5~~ percent of the community in the vicinity. The project impacts to this community are considered SMALL, and no mitigative measures are needed.

primarily

11.5

0.2

Approximately 10 acres of row crop would be permanently impacted by the construction of the new switchyard.

Grassland: Row Crop

all 70

Approximately ~~65~~ acres of this community present onsite would be impacted, representing less than one-half of one percent of the 23,465 acres present in the vicinity. Portions of the area would be graveled for parking or equipment and materials storage during construction. Following construction, the area could be used once again for crop production. Since this impact is temporary, effects on a project basis are considered SMALL, and no mitigative measures are needed.

<u>Shrubland</u>

Approximately ~~4~~ 30 percent of this community present onsite would be impacted, ~~one~~ approximately three acres permanently and ~~three~~ 31 acres temporarily. This is an early succession community that has developed on lands that were previously disturbed (cleared or filled) during the construction of Fermi 2 as discussed in Subsection 2.4.1.1.1. While some wildlife utilizes the area for shelter, other habitats in the immediate and surrounding vicinity provide opportunities for shelter and perhaps better foraging. On the Fermi site, 113 acres of this community were mapped during site visits. The onsite acreage of Shrubland habitat is unclear because of inconsistencies between USGS data and onsite observations. USGS data indicate 95 acres of Shrubland in the vicinity (refer to Table 2.2-2), which is less than the observed habitat (113 acres). One possible explanation is that USGS data were collected before subsequent expansion of Shrubland had occurred, resulting in the recent larger estimate. However, because this is an early succession community, the project impacts to the community are considered SMALL, and no mitigation measures are needed.

<u>Thicket</u>

Approximately ~~87~~ 26 percent of the 23 acres (i.e., approximately 6 acres) of this community present onsite would be temporarily impacted~~, 2.4 acres permanently and 17.6 acres temporarily~~. This is an early succession community that has developed on lands that were previously disturbed (cleared or filled) during the construction of Fermi 2 as discussed in Subsection 2.4.1.1.1. Wildlife use of the area is mostly for shelter. ~~The permanently impacted area is associated with the cooling tower construction.~~ Temporarily impacted areas ~~south of the Fermi 3 cooling tower and in the~~ are primarily associated with construction parking areas and will be re-vegetated following construction. Due to the small area of ~~permanent~~ temporary loss and early succession character of this community, the project impacts to the community are considered SMALL, and no mitigative measures are needed.

<u>Forest: Lowland Hardwood</u>

Approximately ~~37~~ 25 acres of this community present onsite would be temporarily impacted~~, 18.3 acres permanently and 18.7 acres temporarily. The permanent impacts represent 20 percent of this community present onsite and about 0.5 percent of the 3331 acres present in the vicinity~~. As described in Subsection 2.4.1.1.1, this is a natural community and probably represents the most mature plant community on the Fermi site. Wildlife use the community for shelter, and some foraging is available due to the presence of mast producing species, mostly oaks. The area to be ~~permanently~~ temporarily impacted is associated with the ~~cooling tower construction~~ construction laydown areas. ~~The southern portion of this~~ This same area will be re-vegetated following construction. ~~Although the permanent loss of this habitat is unavoidable, the~~ The temporary loss to the community from the project is considered SMALL based on the amount of similar community in the vicinity, and no mitigative measures are needed.

<u>Forest: Woodlot</u>

Approximately 117 acres of this community are present onsite. Of this total, 5 ~~64~~ percent (i.e., approximately 6 acres) would be temporarily affected by Fermi 3 construction~~, 57.5 acres would be permanently and 13.5 acres temporarily impacted, while 46 acres would not be affected. The community permanently affected onsite represents about 1.7 percent of the 3318 acres present in the vicinity~~. As described in

Subsection 2.4.1.1.1, this community occurs entirely on previously cleared and/or filled land. The plant species present are mostly not representative of native forested areas in the region but local wildlife do utilize the area for shelter and limited foraging. ~~The area to be permanently lost would be used for parking and warehouse facilities for Fermi 2.~~ The temporarily impacted areas, those associated with the Fermi 3 construction parking area, would be re-vegetated following construction. Due to the early succession character of this community, the project impacts to the community are considered SMALL, and no mitigative measures are needed.

Forest: Coastal Shoreline

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

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

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

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

Takes or Displacement of Wildlife

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

Fugitive Dust and Equipment Emissions

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

Bird Collisions with Elevated Construction Equipment

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

Pollutant Spills

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

Noise

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

4.3.1.2 **Important Terrestrial Species and Habitats**

Subsection 2.4.1 describes the important terrestrial species and habitats located within the Fermi 3 site and vicinity, and transmission corridors. No Federally protected plant or animal species or designated critical habitat listed by the USFWS under the Endangered Species Act (Reference 4.3-2) would be impacted. The Michigan Department of Natural Resources (MDNR) stated that while there are no occurrence records for these species in the vicinity, terrestrial species may occur in the vicinity. Field studies in 2007 identified one animal and one plant that are State listed that occur on the Fermi site. Table 4.3-2 provides a list of the protected species occurring or potentially occurring on the Fermi site. Following are discussions of the State protected species and important habitats.

4.3.1.2.1 **Important Species**

Bald Eagle

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

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

American Lotus

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

Construction activities are not expected to affect the North Lagoon and, therefore, no American lotus in this area should be affected. American lotus occurring along the west edge of the south lagoon may be temporarily affected by the ~~construction of the Fermi 3 cooling tower~~ construction and utilization of the laydown area southeast of the Fermi 3 cooling tower area. Because state populations of American lotus are healthy, MDNR endangered species specialists have indicated that plants expected to be impacted by Fermi 3 construction activities should be transplanted to other areas of the lagoons on the Fermi site or possibly offsite to minimize adverse impact. Detroit Edison intends to engage in further consultation with the MDNR in developing the appropriate mitigation strategy that will ensure that the impact to this species will be SMALL.

Arrowhead

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

Eastern Fox Snake

The eastern fox snake (a Michigan threatened species) has not been observed on the Fermi property, but the potential for its occurrence on the property does exist. The Michigan Natural Features Inventory has recorded nine occurrences for Monroe County, with the most recent report in 2007 (Reference 4.3-5). If present, the snake would most likely be found along the cattail marshes or wetland shorelines around woody debris. The life history of the eastern fox snake is discussed in Subsection 2.4.1.2.2.1. Fermi 3 construction activities are primarily located away from potential habitat for the eastern fox snake and the snake would be expected to move away from these activities. Therefore, the impact to this species from the project is considered SMALL, and no mitigative measures are needed.

4.3.1.2.2 **Important Habitats**

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

Detroit River International Wildlife Refuge

The DRIWR Lagoona Beach Unit is located entirely within the Fermi property and includes a total of 656.4 acres (Figure 2.4-6). The Fermi 3 construction impact area includes approximately ~~208~~ 61 acres, or about ~~37~~ 9 percent of the Lagoona Beach Unit as illustrated in Figure 4.3-3; ~~122.7~~ 2 acres would be permanent impacts and ~~85.3~~ 59.3 acres temporary impacts. The area of each section of the Lagoona Beach Unit and the area of that unit to be impacted is provided in Table 4.3-3. The agreement between Detroit Edison and the USFWS that established the wildlife refuge allows for modifications to the agreement (such as Fermi 3) by either party at any time (Reference 4.3-6). The construction impacts of reducing the effective area of the DRIWR are principally land-use impacts, which discussed in Subsection 4.1.1.1. The importance of DRIWR as an ecological habitat is principally due to it being a wetlands area. Accordingly, the construction impacts are bounded by the overall wetlands impacts, as discussed below.

Of this acreage, approximately 39.44 acres (80 percent) are temporary impacts that would be restored following construction.

Wetlands

49.47

Detroit Edison conducted a wetlands investigation to delineate wetland boundaries and assess functions and values of the wetlands present on the Fermi property. The results of the wetland investigation are summarized in Subsection 2.4.1.2.3. Impacts to approximately ~~169~~ acres of wetland and open water habitat regulated by the MDEQ and USACE are anticipated within the construction impact area at the Fermi property (see Figure 4.3-5). This acreage includes ~~49.49~~ 13.32
17.37 acres of emergent marsh (PEM), ~~98.83~~ acres of forested wetland (PFO), ~~7.64~~ acres of scrub-shrub wetland (PSS), ~~and 15.41~~ acres of open water. 4.10
14.68 Characteristics of these wetlands are discussed in Subsection 2.4.1.2.3. Delineation data from the wetland investigation will be submitted to the MDEQ and USACE for a Jurisdictional Determination (JD) of the wetlands. In sum, the construction impacts are projected to be MODERATE. Accordingly, Detroit Edison will prepare a mitigation plan for Fermi construction activities that will be submitted to the MDEQ and USACE.

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

parking lot construction

4.3.1.3 Other Projects within the Area with Potential Impacts

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

4.3.1.4 Regulatory Consultation

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

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

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

Plant Community	Permanent Impacts (acres)	Temporary Impacts (acres)	Total Area of Community Onsite (acres)	Total Area of Community in Vicinity[1] (7.5 mile radius) (acres)	Percent of Community in Vicinity Permanently Impacted
Coastal Emergent Wetland (CEW) Open Water	0	0	35	66,520	0
Coastal Emergent Wetland (CEW) Vegetated	~~5~~ 2.3	~~10~~ 0.8	238	1550	~~6.8~~ 0.1
Grassland: Right-of-Way (GRW)	0	~~20~~ 25.8	29	1209	0
Grassland: Idle/Old Field/Planted (GOF)	~~33~~ 11.5	~~8~~ 7.3	75	6932	~~0.4~~ 0.2
Grassland: Row Crop (GRC)	~~0~~ 9.5	~~55~~ 60	~~55~~ 70	23,465	~~0~~ <0.1
Shrubland (SHB)	~~4~~ 3.3	~~3~~ 31	113	95 *(Note a)*	*Note a*
Thicket (TKT)	~~2.4~~ 0	~~17.6~~ 6.3	23	*Note b*	--
Forest: Coastal Shoreline (FCS)	0	0	47	*Note c*	--
Forest: Lowland Hardwood (FLH)	~~18.3~~ 0	~~16.7~~ 24.9	92	3331	~~0.5~~ 0
Forest: Woodlot (FWL)	~~57.5~~ 0	~~13.5~~ 6.3	117	3318	~~1.7~~ 0
~~Developed Areas (DA)~~	~~[172][2]~~	~~0~~	~~206~~	~~19206~~	~~NA~~
Lakes, Ponds, Rivers (LPR)	0	0	44	*Note d*	--
Lake Erie (main body)	*Note e*	*Note e*	186	*Note d*	--
Totals	~~116.2~~[2] 26.6	~~144.8~~ 162.4	~~1260~~		

Total Impacts (Permanent + Temporary) = ~~261~~[2] 189 acres

1. Figures taken from Subsection 2.2.1.2.3
2. ~~Developed Area is not included in impact total, because impacts are irrelevant to vegetated area totals~~

Notes:

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

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

Refuge Unit	Area Size (acres)	Area Impacted (acres) Permanent	Area Impacted (acres) Temporary
NE	161.7	0	0
NW	161.1	~~53.[illegible]~~ 1	~~52~~ 32.9
SE	311.2	~~69.7~~ 1	~~33.3~~ 4
SW	22.4	0	~~0~~ 22.4
Totals	656.4	~~122.7~~ 2	~~85.3~~ 59.3

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

Insert 1

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

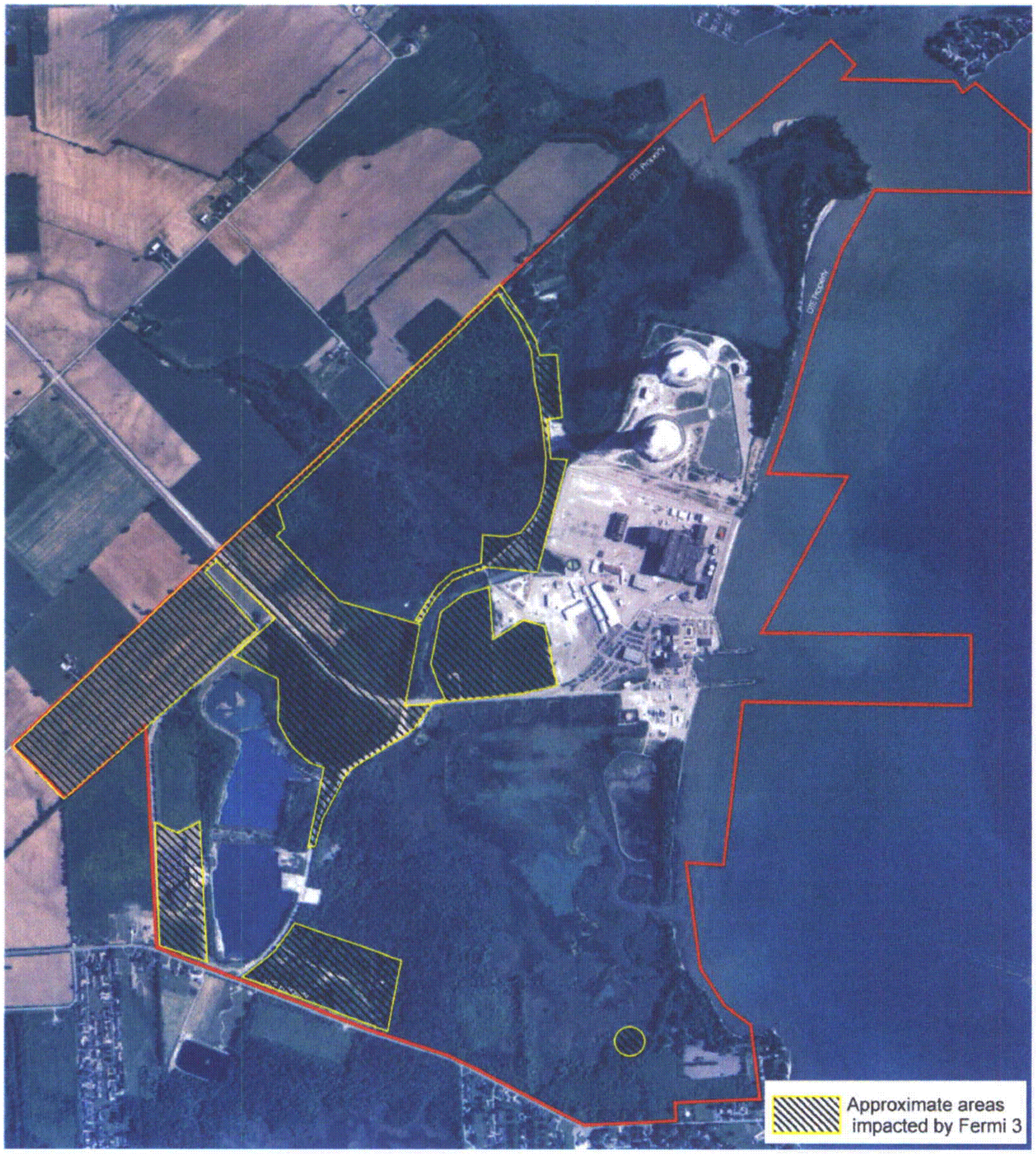

Figure 4.3-2 Permanent and Temporary Impacts to Undeveloped Areas from Fermi 3 Construction Overlaid on Existing Terrestrial Communities

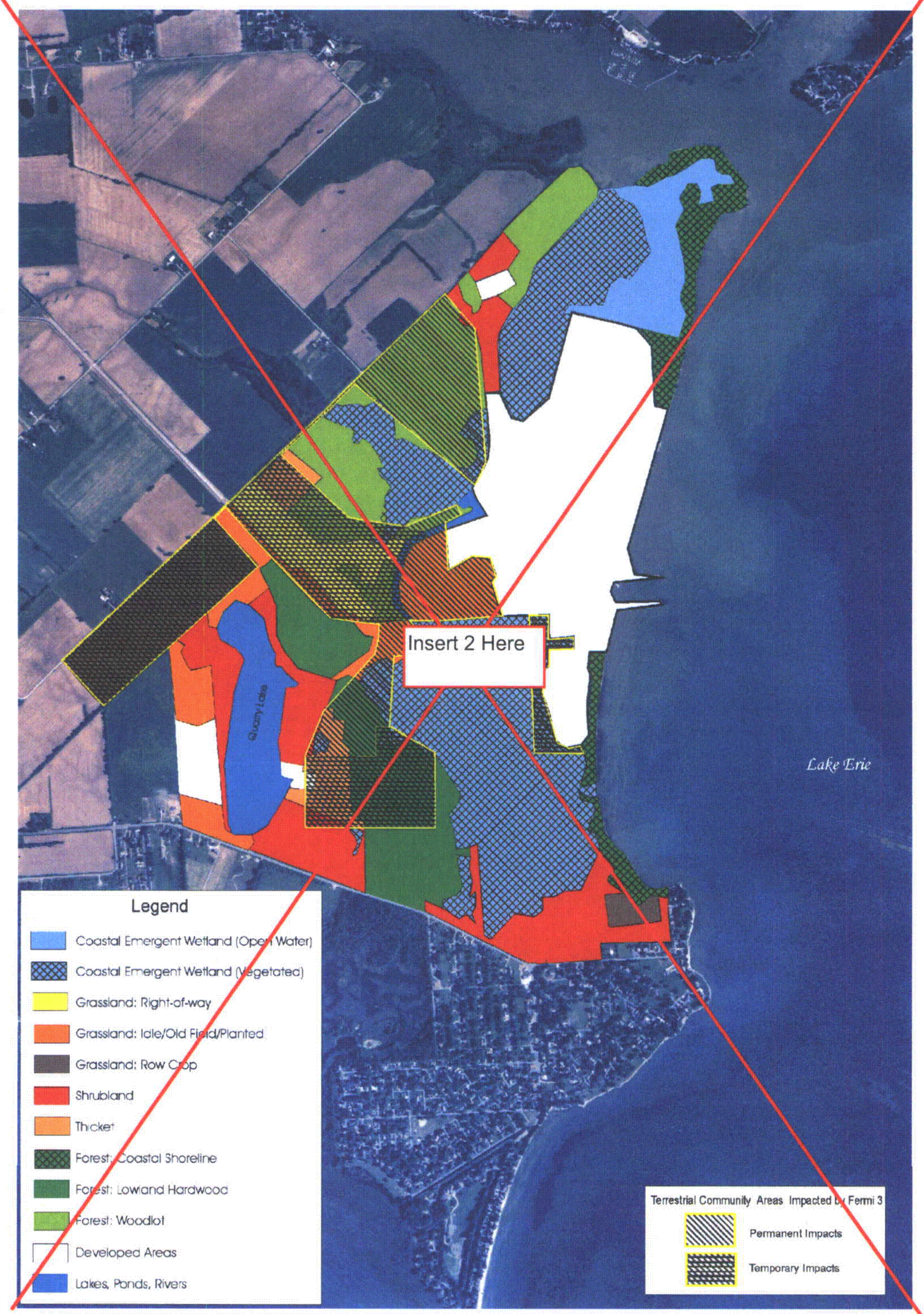

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Figure 4.3-2 Permanent and Temporary Impacts to Undeveloped Areas from Fermi 3 Construction Overlaid on Existing Terrestrial Communities

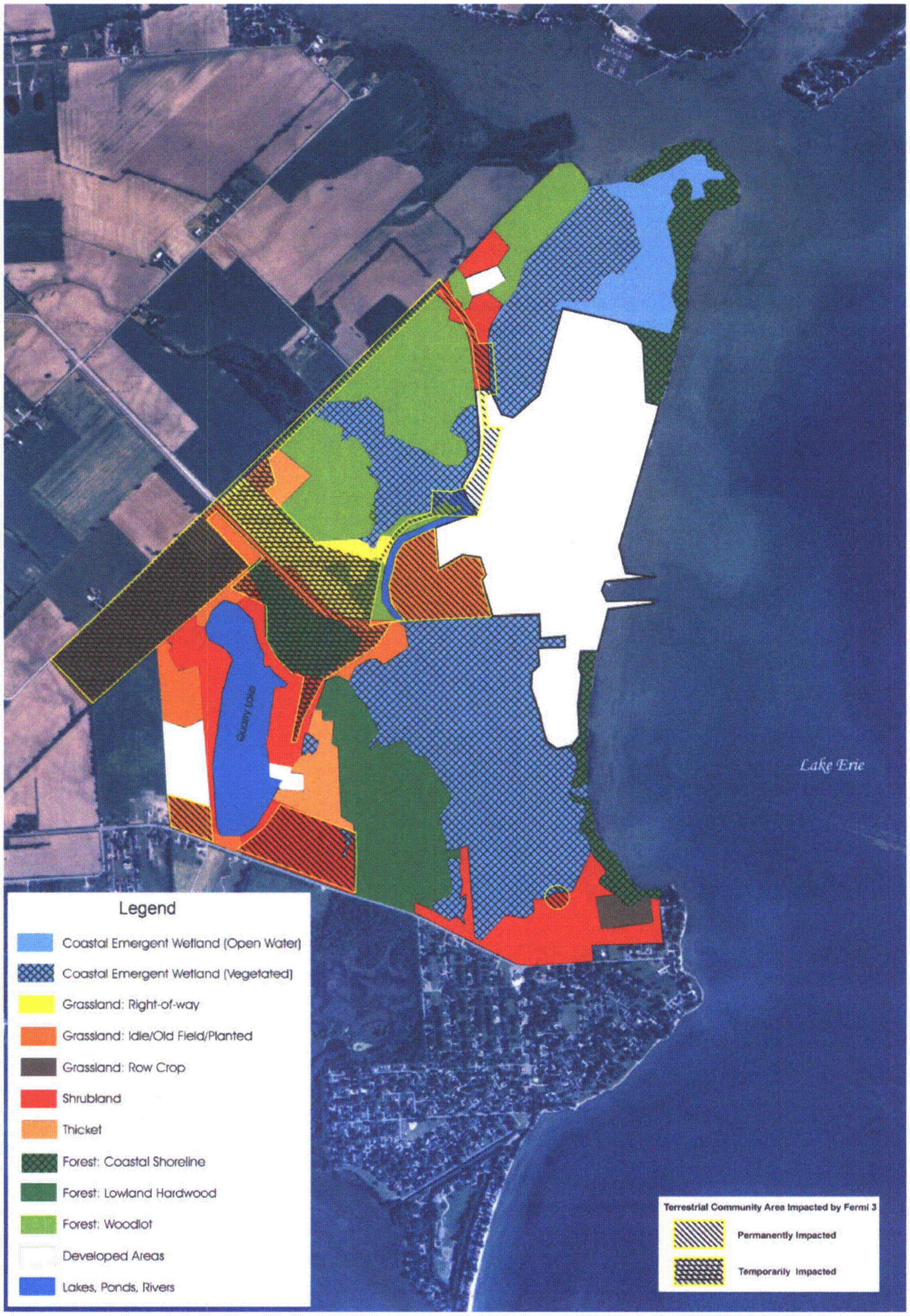

Figure 4.3-3 Permanent and Temporary Impacts to DRIWR, Lagoona Beach Unit from Fermi 3 Construction Overlaid on Existing Terrestrial Communities

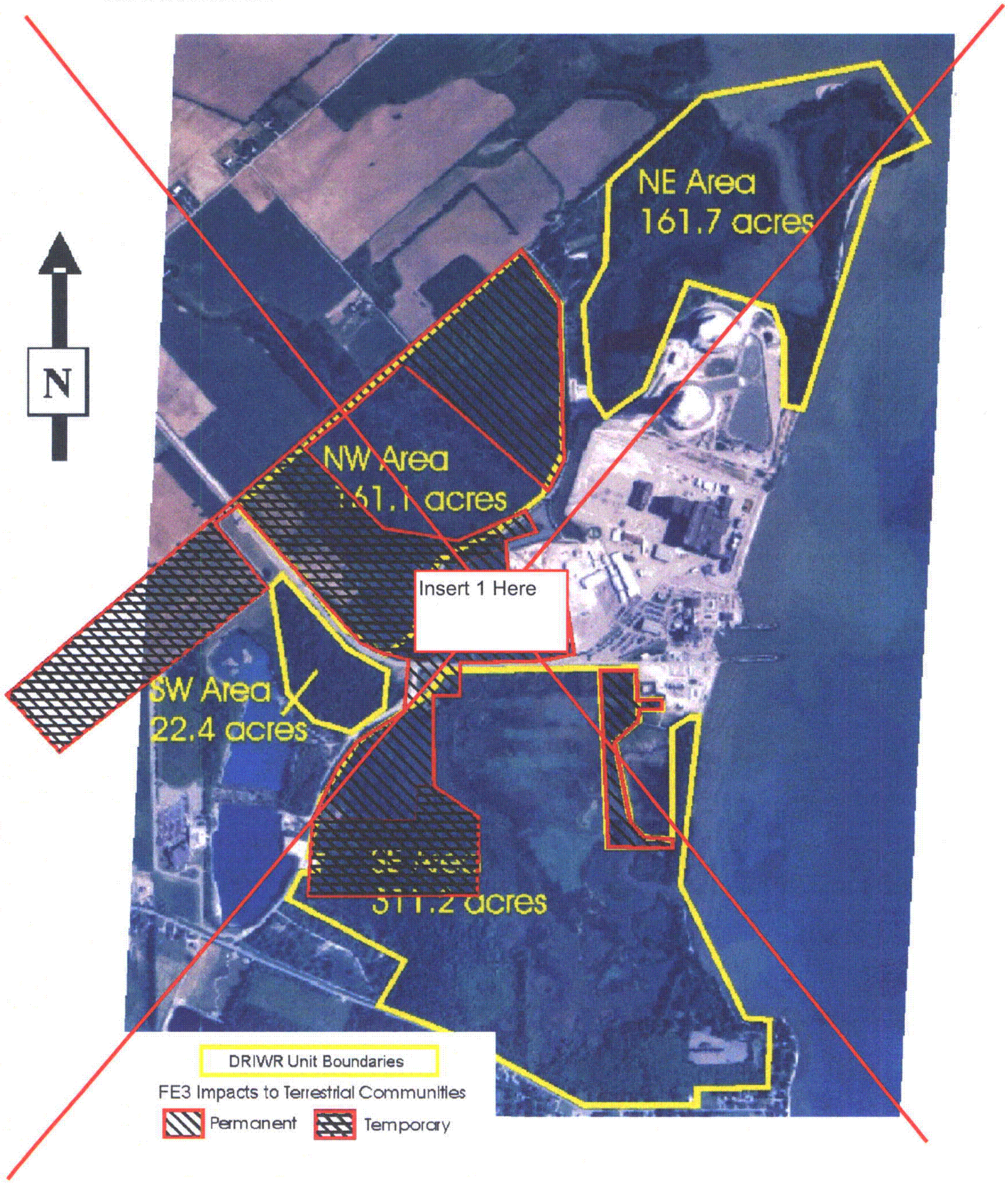

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Figure 4.3-3 Permanent and Temporary Impacts to DRIWR, Lagoona Beach Unit from Fermi 3 Construction Overlaid on Existing Terrestrial Communities

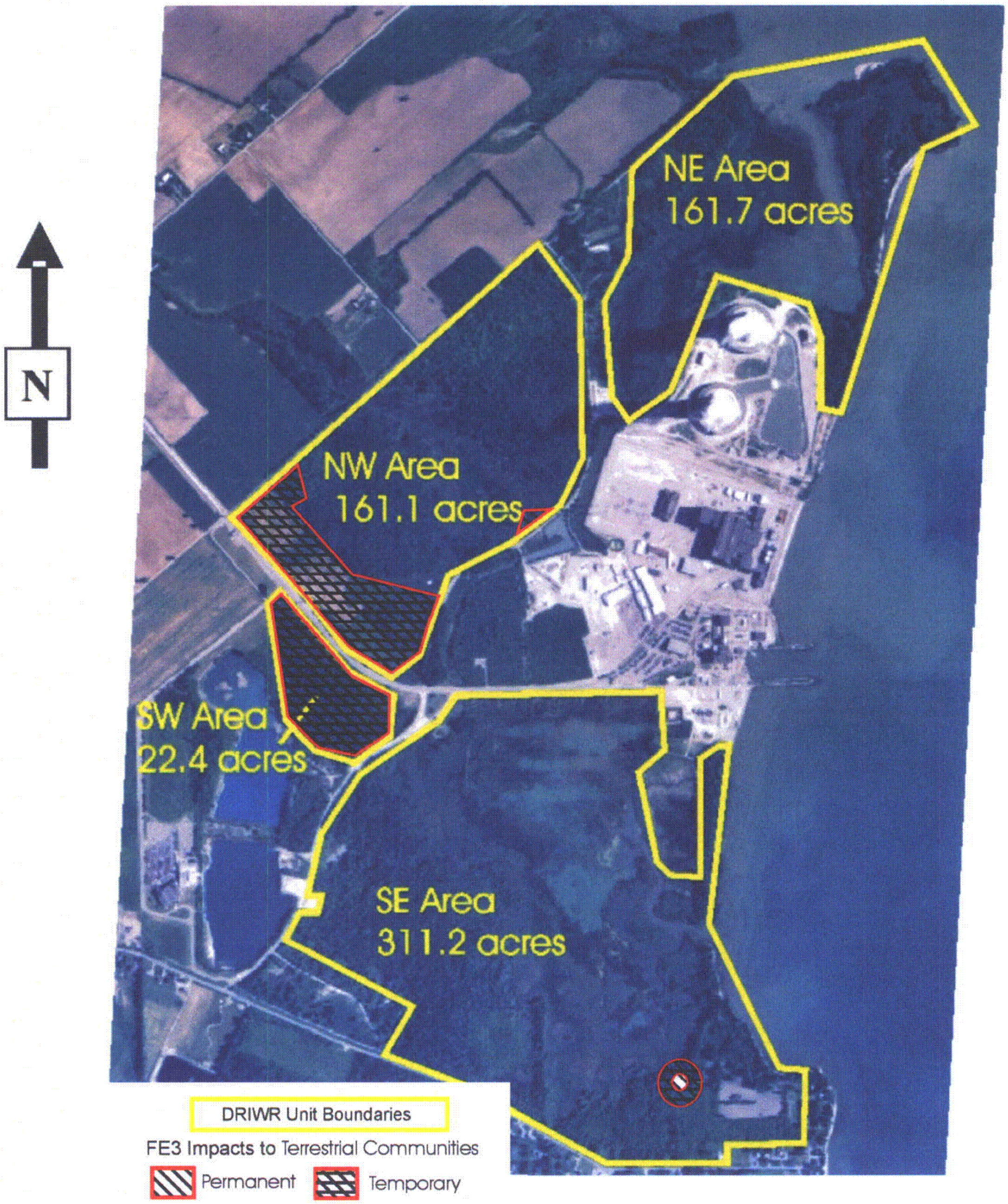

Figure 4.3-5 Potential Wetlands Construction Impacts

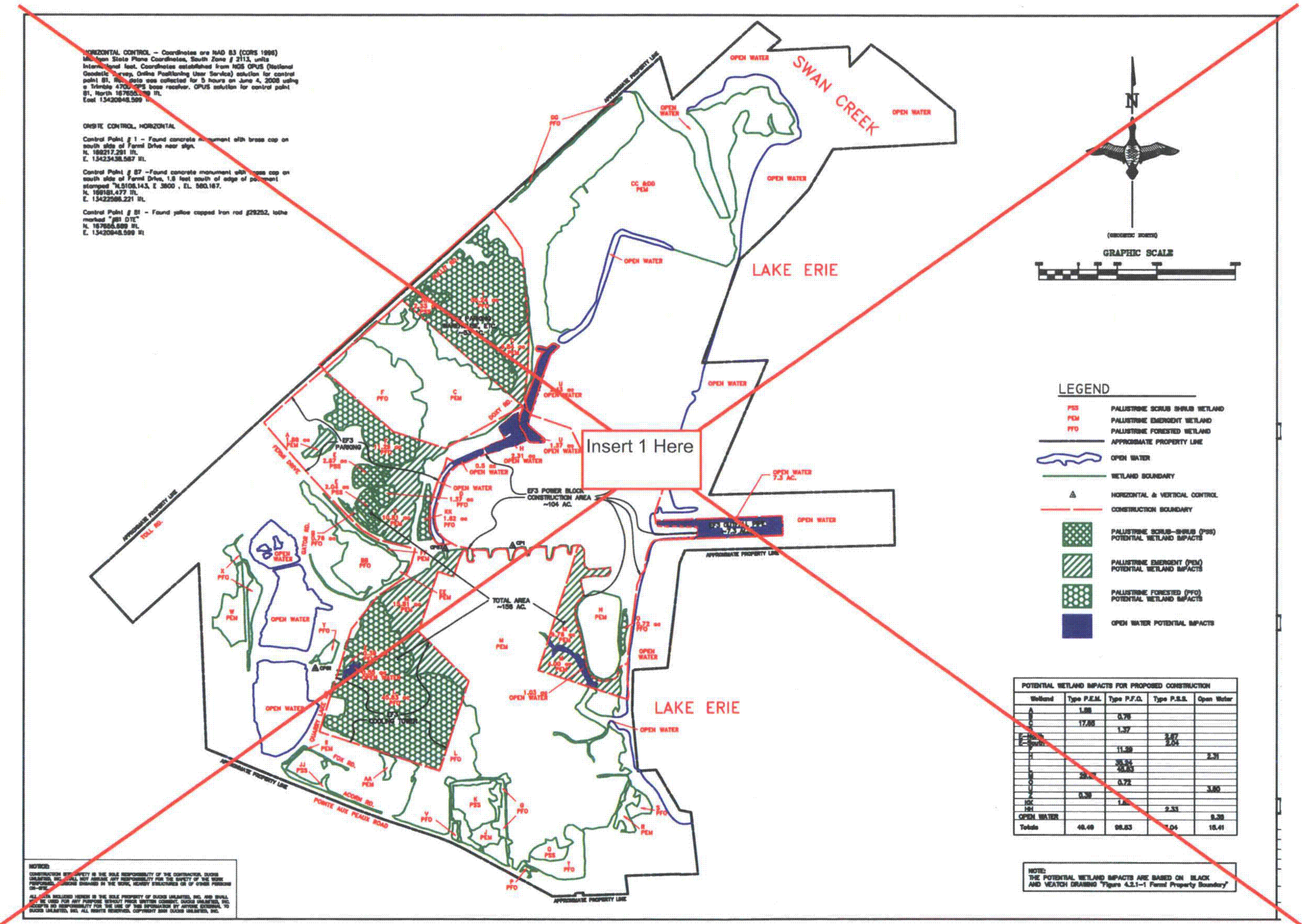

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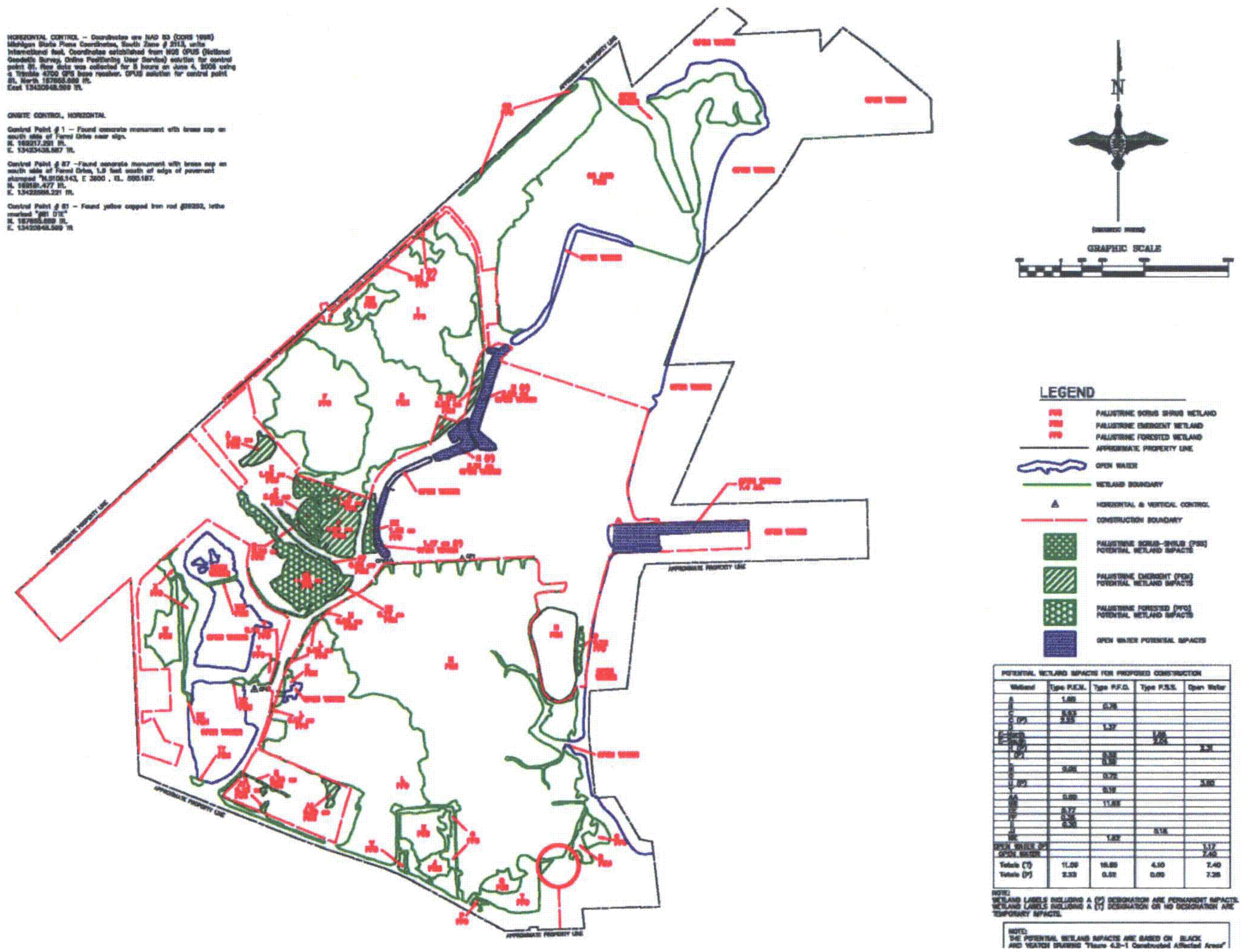
Figure 4.3-5 Potential Wetlands Construction Impacts



4.3.1.5.5 **Other Projects within the Area with Potential Impacts**

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

4.3.1.5.6 **Regulatory Consultation**

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

4.3.2 **Aquatic Ecosystems**

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

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

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

Insert 1 Here

~~Permanent loss of aquatic habitat is limited to the areas affected by the construction of the Fermi 3 natural draft cooling tower (NDCT) and its associated structures, and the station water intake structure. The cooling tower will be constructed within portions of the DRIWR located south of Fermi Drive. This area is commonly referred to as the lagoon and supports a significant wetland community comprised predominantly of American lotus and phragmites. The American lotus is listed as a threatened species by the State of Michigan. This species is further discussed in Subsection 4.3.1. The station water intake structure will be located within the existing intake bay for Fermi 2. This area is comprised of predominantly open water habitats that support limited aquatic life (Figure 4.3-4).~~

Additional construction impacts to aquatic habitats will result from dredging of the existing barge slip and station water intake embayments. Dredging of the barge slip and intake structure embayment will result in the temporary loss of benthic biota due to disturbance of substrate, physical impacts to individuals, as well as short-term declines in phytoplankton productivity and zooplankton density due to increased turbidity. Additional discussion of these impacts is provided in Subsection 4.3.2.2.

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Permanent loss of aquatic habitat is limited to the areas affected by the construction of the station water intake structure, barge slip, parking garage, and the EF2/EF3 common warehouse (Figure 4.3-4). The station water intake structure is located within the existing intake bay for Fermi 2 and will require additional dredging and construction of bulkheads within the intake bay resulting in potential loss of aquatic habitat. The barge slip will also be constructed within the existing intake bay for Fermi 2. However, the area does not support established aquatic habitat (i.e. vegetation, structure) and species diversity within the area is generally low; therefore, impacts will be small.

Insert 2 Here

These indirect impacts are accounted for in the temporary impacts identified on Figure 4.3-4.

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

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

To reduce sediment loading and effluent runoff into onsite water bodies, a construction SESC plan and PIPP will be developed and in place prior to the start of construction. ~~Measures will include implementing BMPs that comply with county, State, and Federal permits.~~

All applicable BMPs will be incorporated into appropriate construction plans and procedures.

4.3.2.1 Impacts to Impoundments and Streams

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

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

Vegetation, associated with the onsite drainage systems, canals, and wetlands, functions as filters and barriers that trap silt and sediment (refer to Subsection 4.3.1 for vegetation listing). Plants growing in these types of habitats thrive in high nutrient conditions, making these areas ideal buffer zones for sediment and silt runoff. The filtering capacity of these plants also aids in the removal of potentially harmful nutrients from construction effluents and run-off. Effects to the aquatics of the onsite drainage systems and canals would be similar to those naturally occurring to this system during periods of heavy inundation and flooding, and therefore impacts would be expected to be SMALL.

Wetland and coastal habitats, such as those identified within the DRIWR, routinely experience habitat changes associated with heavy rains and flooding events. These episodic events are representative of those expected as a result of surrounding construction activities (erosion, increased sedimentation and turbidity). The aquatic biota found in these types of habitats are highly adapted to survive in dynamic aquatic regimes, and therefore can be expected to recover from

Add Insert 2 – beginning of page 4-50

Construction of the parking garage and the EF2/EF3 common warehouse will include completely filling in the isolated central canal and portions of the north and south canals. Impacts from filling in these areas will result in the loss of aquatic communities and aquatic organisms that currently reside in these areas. These include the loss of fringing wetland habitats, aquatic vegetation, fish and benthic species as well as reptile and amphibians. Impacts to the isolated central canal are considered SMALL due to the isolated nature of aquatic organisms living there. This system has no hydrological connection with the other on-site waterbodies and supports a low diversity and low abundance of organisms. The partial filling of the north and south canal systems will result in mostly habitat loss along the canal banks. Loss of aquatic organisms will be SMALL due to their ability to leave the affected area into other portions of the north and south canals, Swan Creek and the southern lagoon.

these effects quickly without significant decreases in overall health and sustainability. Wetlands are further discussed in Subsection 4.3.1.2.2.

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

Construction activities associated with Fermi 3 Construction ~~building the NDCT and associated components~~ as well as transferal of Fermi 2 structures will permanently impact approximately 2.23 ~~169~~ acres of wetland and 7.28 acres of open water habitats (see Figure 4.3-5). This acreage includes 2.75 ~~49.49~~ acres of emergent marsh (PEM), and 0.52 ~~93.83~~ acres of forested wetland (PFO)~~, 7.04 acres of scrub-scrub wetland (PSS), and 15.41 acres of open water~~. In addition, construction may lead to soil erosion and sedimentation into onsite drainage systems, canals, Swan Creek, and other waters within the DRIWR. Erosion and sedimentation may cause some temporary disruption and modification of the onsite drainage systems and may provide a surface conveyance of silt and sediment to aquatic habitats. This input of materials will be minimized and controlled through the use of BMPs established in the SESC Plan. BMPs include the utilization of silt fencing, hay bales, turbidity curtains, and sediment traps. BMPs are discussed in more detail in Section 4.3. These measures will be installed prior to the start of construction activities and will be maintained on a routine basis. Accordingly, impacts to these habitats will be SMALL,

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

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

4.3.2.2 **Impacts to Lake Erie**

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

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

Construction activities associated with Fermi 3 will be restricted almost entirely to the existing plant property. However, the construction of the intake structure for Fermi 3 and discharge line to Lake Erie will require temporary dredging and maintenance dredging of the existing water intake bay and construction of the intake structure and associated components. Additional dredging will also be required at the existing barge terminal to allow access for equipment and materials that will be barged to the site. Construction of the intake structure and discharge line will result in a minimal permanent loss of benthic habitat associated with the intake structure. Impacts to other aquatic species associated with the station water intake structure are considered to be SMALL.

Dredging impacts of the existing barge slip and the intake embayment are expected to be similar to ongoing operations and maintenance (O&M)[1] dredging activities utilized to maintain the existing intake embayment under an existing USACE permit and include increased turbidity, siltation, and temporary loss of benthic habitat and associated biota (see Subsection 2.4.2 for benthic biota speciation). These dredging activities are expected to be similar to those utilized to maintain these areas. Therefore, impacts to the biota are expected to be temporary, consistent with activities to which local populations of organisms have adapted.

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

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

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

4.3.2.3 **Impact to the Transmission Corridors and Offsite Areas**

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

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

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

4.3.2.3.1 **Aquatic Communities and Principal Aquatic Species**

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

4.3.2.3.2 **Important Aquatic Species**

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

4.3.2.3.3 **Important Habitats**

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

4.3.2.3.4 **Other Projects within the Area with Potential Impacts**

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

4.3.2.3.5 **Regulatory Consultation**

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

4.3.2.4 **Impact on Important Aquatic Species**

4.3.2.4.1 **Threatened and Endangered Species**

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

No threatened and endangered aquatic species have been observed or recorded as being located onsite. However, the presence of the American lotus is a specific case. The American lotus is a hydrophilic plant growing in open water areas on the site. Although the American lotus is listed as a threatened species by the State of Michigan, it is prevalent throughout much of the United States, and even considered an invasive weed in some areas. However, because it's roots require soil, the American lotus is being treated as a terrestrial species and impacts associated with this species are addressed in detail in Subsection 4.3.1. In summary, the impacts to threatened and endangered aquatic species are expected to be SMALL.

4.3.2.4.2 **Commercial and Recreational Aquatic Species**

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

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

4.3.2.4.3 **Other Important Species**

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

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

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

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

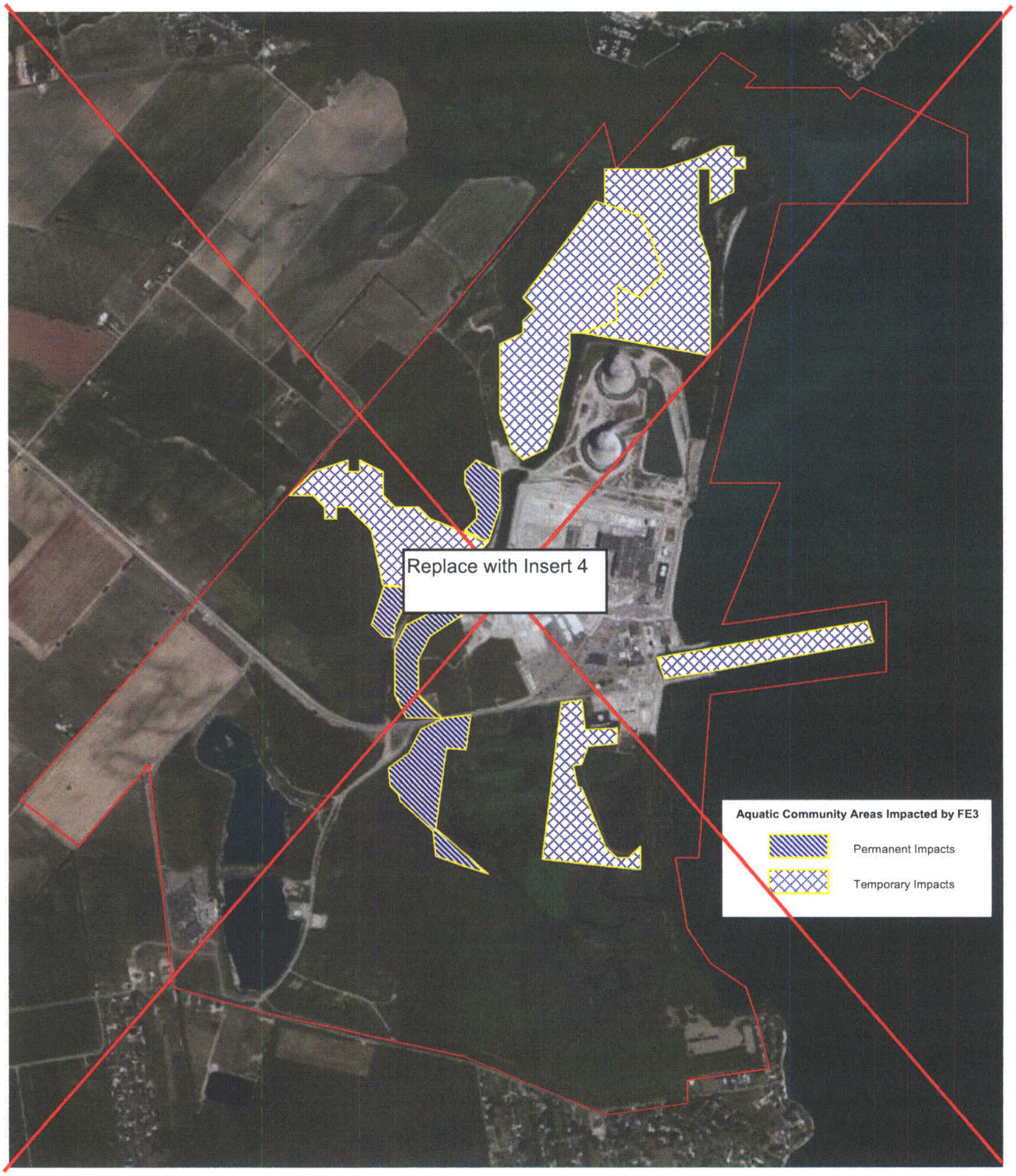
4.3.2.5 **Summary**

Construction activities that may cause erosion that could lead to deposition in aquatic water bodies would be of short duration, permitted and overseen by state and federal regulators, and guided by an SESC Plan. Any small spills of construction-related hazardous fluid would be mitigated according to the PIPP. Impacts to aquatic communities from construction activities are expected to be SMALL.

4.3.3 **References**

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

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



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

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Figure 4.3-4 Permanent and temporary impacts to undeveloped areas of the Fermi property (red line) from the EF3 project overlaid on the existing aquatic communities.

Figure 4.5-1 Radiation Sources from Fermi 2

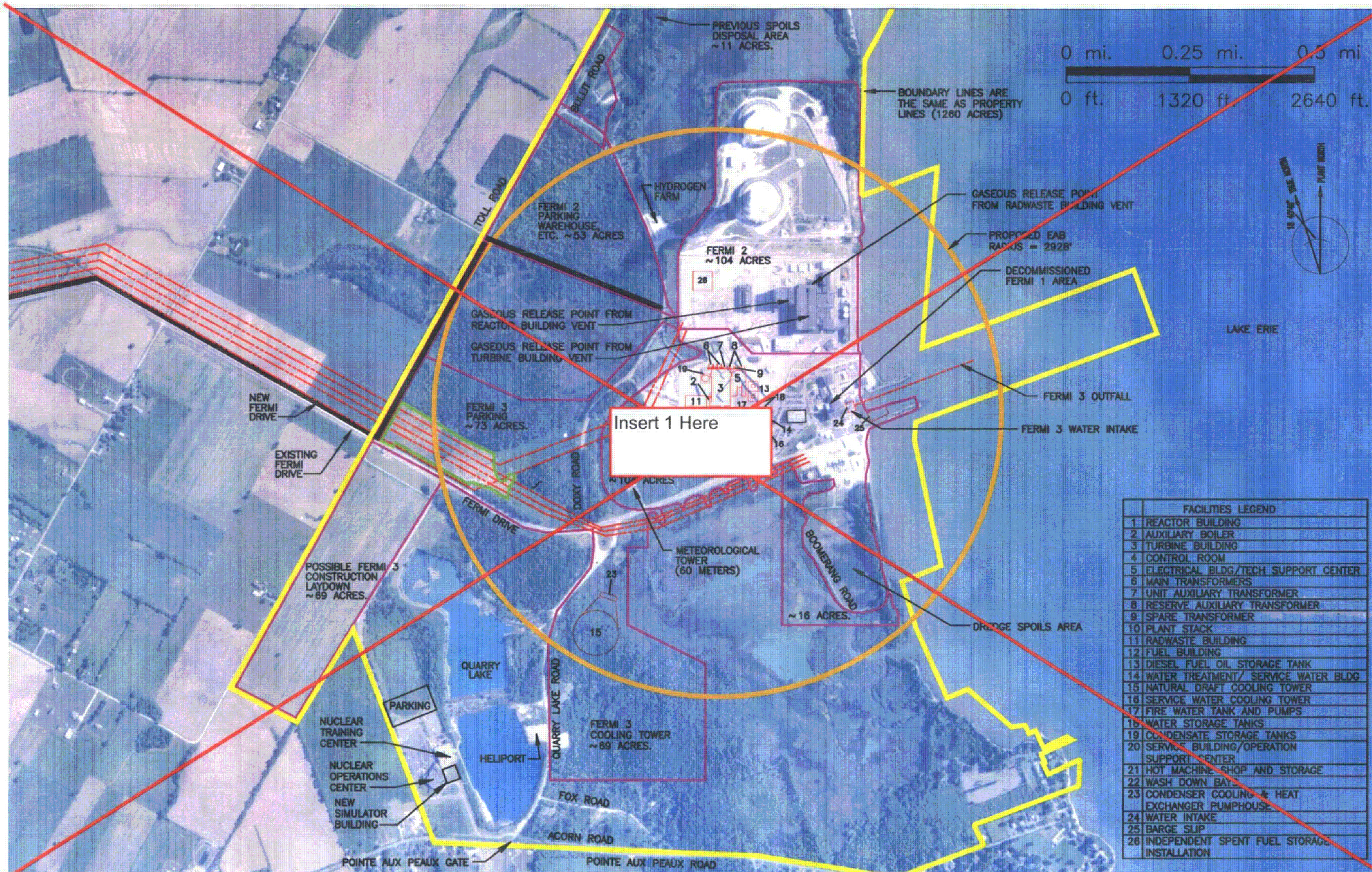

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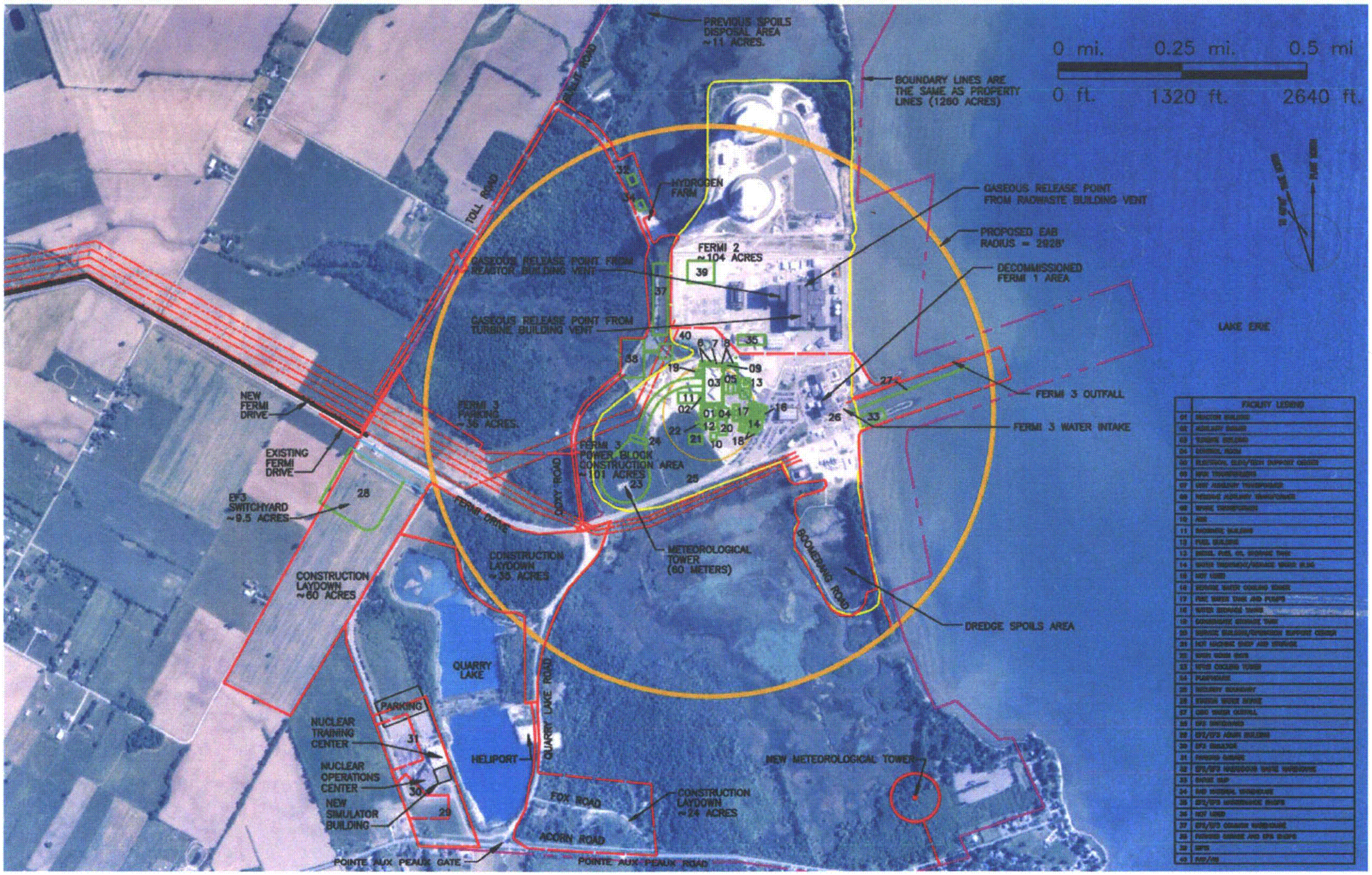
Figure 4.5-1 Radiation Sources from Fermi 2



4.7 Cumulative Impacts of Construction

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

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

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

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

4.7.1 Land Use

For purposes of this analysis, the geographical area considered for cumulative impacts to land use resulting from construction is a circular area within 7.5 miles of the existing facility, centered on the proposed Fermi 3 location. Approximately ~~471~~ 290 acres of the existing 1260-acre Fermi site will be used for construction of Fermi 3. Of the ~~471~~ 290 acres required, ~~172~~ approximately 108 acres already are developed and contain structures, pavement or other maintained areas; the remainder is composed of various terrestrial habitats as discussed in Subsection 4.3.1 and shown on Figure 4.3-2. The construction and operation of Fermi 2 did not stimulate substantial industrial growth in Monroe County, and impacts from construction of Fermi 3 are expected to be similar. Land use in the undeveloped portions of the Fermi site is devoted almost exclusively to the DRIWR. Actions to reduce land use impacts would include re-vegetation using native species to improve forage and shelter quality for wildlife use. Rural and agricultural land uses are dominant near the Fermi site. These land uses will not be affected by Fermi 3 construction, except for the offsite transmission corridor, which is in existing right-of-way (ROW). No other Federal or major construction projects are known in Monroe County during the same time as Fermi 3 construction.

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

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

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

4.7.2 Air Quality

For purposes of this analysis, the geographical area considered for cumulative impacts to air quality resulting from construction is Monroe County, and the focus includes Fermi 3 along with other sources of similar emissions. The Fermi site is in an area that is in attainment for criteria pollutants and the proposed construction is not likely to jeopardize that rating. A temporary increase in air pollution will occur from construction activities, primarily onsite engine exhaust from worker vehicles and machinery, fugitive dust, and increased commuter traffic. Apart from Fermi 3, the only known major construction project planned in Monroe County is the installation of scrubbers at the Monroe Power Plant. The effects of Fermi 3 and Monroe Power Plant construction are anticipated to be contained within the respective sites by various regulatory and permit requirements. Additionally, the bulk of the Monroe Power Plant scrubber work is projected to be completed prior to the commencement of Fermi 3 construction. Accordingly, the temporary impact of construction activities should not produce noticeable air quality impacts or elevate air pollutant levels. The vehicles and machinery used onsite will comply with applicable government standards during construction activities and dust control procedures will be employed. The rural nature of the construction area will help prevent a marked impact on air quality beyond the site. However, the cumulative impact on air quality in Monroe County during construction is projected to be temporary and SMALL, and no mitigative measures are needed.

4.7.3 Hydrology, Water Use, and Water Quality

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

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

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

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

4.7.3.1 Surface Water Use

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

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

4.7.3.2 **Surface Water Quality**

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

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

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

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

4.7.3.3 **Groundwater Use**

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

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

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

As noted above in Subsection 4.7.3, dewatering effluent (groundwater within the overburden and Bass Islands aquifer) will be discharged to a local surface water effluent location during the construction excavation phase. The construction dewatering impact is discussed in Section 4.2. Once details related to construction are determined following final project design, the drawdown impact on groundwater users in the affected area will be further investigated before dewatering is started.

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

4.7.3.4 **Groundwater Quality**

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

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

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

4.7.4 **Ecology**

The Fermi 3 site layout and construction plan was designed to minimize site-specific and cumulative impacts to the terrestrial ecosystem to the greatest feasible extent while meeting the project purpose. Currently developed and previously disturbed land will be preferentially used wherever practicable. Approximately ~~169~~ 2.75 acres of wetlands and 7.28 acres of open water habitats would be permanently ~~lost.~~ impacted.

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

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

4.7.4.1 **Terrestrial Ecology**

The geographic area evaluated for cumulative effects to terrestrial resources (vegetation and wildlife) is the vegetation or species-specific habitat within one mile of the Fermi 3 site and along the offsite transmission corridor. Existing terrestrial resources are described in Subsection 2.4.1, and the potential impacts to these resources are discussed in Subsection 4.3.1. As noted in Subsection 4.3.1, aside from developed or temporarily impacted areas, Fermi 3 construction will impact ~~approximately 42.5 acres of undeveloped, forested land,~~ ~~169~~ 2.75 acres of wetlands ~~(including 15 acres of other waters)~~. In the region (50-mile radius) there are ~~294,528 acres and~~ 910,711 acres of ~~these~~ this habitats~~, respectively,~~ where the ~~total forest acreage was derived by combining deciduous, evergreen and mixed forest acreage, and~~ total wetland acreage was derived by combining open water, emergent herbaceous and woody wetland acreage (Table 2.2-7). As a percentage of the regional acreage, approximately ~~0.028~~ 0.001 percent of the total disturbance will be in ~~forested or~~ wetland habitats. These impacts are the minimum needed to satisfy the project need and purpose and impacts will have been reduced by avoiding adverse effects to protected species, wildlife resources, wetlands, and other resources as discussed in Subsection 4.3.1. Construction work is subject to regulatory compliance requirements, which further promotes impact avoidance. Terrestrial resource use in the region will not be dramatically shifted from agricultural to industrial or urban uses because of the addition of another nuclear unit to the Fermi site. Thus, the cumulative impacts to terrestrial resources from construction of Fermi 3 are considered SMALL, and no additional mitigative measures are needed.

Coastal Emergent Wetlands and other wetlands yet to be identified will be avoided to the extent feasible. Approximately ~~153~~ 2.75 acres of wetland, composed of forested wetland (~~97~~ 0.52 acres), and emergent wetland (~~49~~ 2.23 acres), ~~and shrub-shrub wetland (7 acres)~~ associated with DRIWR, would be permanently impacted. An additional ~~15~~ 7.28 acres of ~~other~~ open waters also would be permanently impacted. Wetland acreage filled for Fermi 3 construction may require separate mitigation. Cumulative impacts to wetlands are expected to be MODERATE. The type and extent of wetland mitigation will be determined during the Clean Water Act Section 404 permitting process.

The cumulative impacts from offsite transmission line construction were assessed using desktop research and ground studies. Detroit Edison does not own the offsite ROW and does not control the construction or operation activities in the offsite transmission corridor. Resource agency consultation is expected by ITC*Transmission* during the final stages of offsite transmission route development. This will allow for measures to be taken to avoid or minimize impacts. However, line routing uses already developed lands as much possible, including avoiding protected species, wetlands and other important terrestrial resources wherever feasible. Because wildlife impacts from construction, including wildlife displacement, fugitive dust and noise from construction are localized, temporary and minimized in accordance with regulatory limitations, they are considered cumulatively SMALL, and no mitigative measures are needed.

state

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

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

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

4.7.4.2 **Aquatic Ecology**

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

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

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

4.7.7 Radiological Impacts

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

Based on available data reviewed, dosage levels would be low, averaging 26 percent of the maximum allowable dose (Table 4.5-5). Exposure to construction workers experiencing annual doses attributable to operation of Fermi 2 would be SMALL because exposure would be within 10 CFR 20 and 10 CFR 50 Appendix I limits. Thus, monitoring of individual construction workers will not be required. Construction workers will be treated as if they were members of the public in unrestricted areas. Access to restricted areas generally will not be provided to construction workers. Radiological impacts to workers and the public will be SMALL, and no mitigative measures are needed.

4.7.8 Conclusion

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

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

4.8 Summary of Construction and Pre-Construction Activities

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

The table provides a reference to each section within Chapter 4 that provides potential impacts and significance determination. The potential impacts and significance determination utilized the three significance levels of SMALL (S), MODERATE (M), and LARGE (L) as defined in Footnote 3 of Table B-1 of 10 CFR 51. As indicated in the Introduction to Chapter 4, the chapter sections do not individually distinguish between pre-construction and construction impacts; therefore, the identified potential impacts and significance determination was determined evaluating the combined impact of pre-construction and construction activities. The Estimated Impacts Percentage provides a relative estimate of impacts to the environment attributable to either pre-construction or construction activities. The Basis for Estimate provides the supporting justification for the estimated impacts percentage.

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

Section Reference	Potential Impacts and Significance[(a)]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Section 4.1 Land Use Impacts				
Subsection 4.1.1.1 The Site and Vicinity, Site and Vicinity Land Use Impacts	S – Land Use	10%	90%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., ~~260~~ 290 acres, excluding offsite electric transmission lines)
Subsection 4.1.1.2.1 Local Monroe County and Frenchtown Township Land Use	S – Land Use	10%	90%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., ~~260~~ 290 acres, excluding offsite electric transmission lines)
Subsection 4.1.1.2.2 Agricultural and Soil Issues	S – Land Use	10%	90%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., ~~260~~ 290 acres, excluding offsite electric transmission lines)

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

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts Percentage		Basis for Estimate
		Construction	Pre-Construction	
Subsection 4.1.1.2.3 Federal, Regional, and State Land Use Plans	S – Land Use	10%	90%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., ~~260~~ 290 acres, excluding offsite electric transmission lines)
Subsection 4.1.1.3 The Site and Vicinity, Transportation and Rights-of-Way	S – Land Use	70%	30%	Estimates are based on the area of land use that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). Estimates also based on percent of man hours expected to be dedicated to the construction of activities within the definition of construction of SSC as this provides a measure of impacts to vicinity and transportation relative to land use.
Subsection 4.1.2 Transmission Corridors and Offsite Areas, Planning and Zoning	S – Land Use	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.
Subsection 4.1.2.1 Planning and Zoning	S – Land Use	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.
Subsection 4.1.2.2 Transmission Corridors and Offsite Areas, Transportation and Rights-of-Way	S – Land Use	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.

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

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

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

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

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

		Estimated Impacts Percentage		
Section Reference	**Potential Impacts and Significance[(a)]**	**Construction**	**Pre-Construction**	**Basis for Estimate**
Subsection 4.2.2.4 Water-Use Impacts, Water Quality Changes Due to Substratum Exposure	S – Water	25%	75%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in the discharge of water from the Spoil Disposal Pond and impacts to the intake and discharge areas.
Subsection 4.2.2.5 Water-Use Impacts, Effects of Alterations on Other Water Users	S – Water	95%	5%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's to the need for dewatering.
Section 4.3 Ecological Impacts of Construction				
Subsection 4.3.1.1.1 Vegetation on the Site and in the Vicinity	S – Terrestrial Ecosystems	10%	90%	Estimates are based on the acreage that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1).It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., ~~260~~ acres, excluding offsite electric transmission lines) 290
Subsection 4.3.1.1.2 Wildlife on the Site and in the Vicinity	S – Terrestrial Ecosystems	10%	90%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in takes or displacement of wildlife, fugitive dust emissions, bird collisions with elevated construction equipment, pollutant spills, and noise.

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

Section Reference	Potential Impacts and Significance[(a)]	Estimated Impacts Percentage: Construction	Estimated Impacts Percentage: Pre-Construction	Basis for Estimate
Subsection 4.3.1.2.1 Important Species	S – Terrestrial Species	10%	90%	Estimates are based on the area of land use and potential presence of important species within those areas dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1). It is assumed that the construction of SSC's will occur on no more than approximately 25 acres of the project area being developed (i.e., ~~260~~ 290 acres, excluding offsite electric transmission lines)
Subsection 4.3.1.2.2 Important Habitats	M – Terrestrial Habitats	5%	95%	Estimates are based on the expected acreage of land delineated as wetlands that that will be dedicated to Structures, Systems and Components (SSC) with a reasonable nexus to radiological health and safety and common defense and security, and meet the criteria in 10 CFR 50.10(a)(1).
Subsection 4.3.1.5 Terrestrial Ecosystems, Transmission Corridors and Other Offsite Areas	S – Terrestrial Ecosystems	0%	100%	Activities within transmission corridors are not included within the definition of construction of SSC's.
Subsection 4.3.2.1 Aquatic Ecosystems, Impacts to Impoundments and Streams	S – Aquatic Ecosystems	25%	75%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in increased sedimentation and turbidity, increased sediment/silt loads into onsite impoundments, surface drainages, site clearing and grading, loss of vegetated buffer zones, and site dewatering.
Subsection 4.3.2.2 Aquatic Ecosystems, Impacts to Lake Erie	S – Aquatic Ecosystems	5%	95%	Estimates based upon the expected contribution of activities within the definition of construction of SSC's resulting in dredging activities within Lake Erie and dewatering.

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

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

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

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

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

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

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

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

Notes:

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

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

Tower-Specific Data

Tower-specific data includes information pertaining to the type of cooling tower, dimensions of the tower housing, cell exhaust diameter, heat load, drift rate, design air flow, and orientation of the cooling tower cells with respect to the 16 available representative wind directions. Tower-specific data included in the SACTI cooling tower model are provided in Table 5.3-17.

Water-Specific Data

Water-specific data includes the CIRC total dissolved solids (TDS) concentration, salt density, and the size distribution of the water droplets in the cooling tower drift. The cooling water is expected to go through two cycles of concentration before requiring blowdown. Multiplying the Lake Erie water TDS of 210 ppm by two cycles of concentration yields a cycled TDS concentration of 420 ppm or 0.00042 g salt/g solution.

5.3.3.1.1 **Length and Frequency of Elevated Plumes**

Cooling tower plume lengths are calculated by the SACTI cooling tower model as the frequency of occurrence of a given plume length from the cooling tower for each of 16 wind directions.

Table 5.3-18 describes the expected plume lengths by wind direction for the NDCT on an annual and seasonal basis. The longest average plume lengths are predicted to occur during the winter months and the shortest are predicted to occur during the summer months. Considering all wind directions, the model predicts an average length of approximately 1.5 miles in winter and 0.24 miles in the summer.

On an annual frequency basis, as presented in Table 5.3-19, the SACTI cooling tower model predicts the plume lengths from the NDCT to be less than approximately 1000 m (3281 ft) roughly 50 percent of the year considering all wind directions of plume travel. This length is also known as the median plume length (i.e., that length which the plume is predicted to be longer or shorter than for 50 percent of the year). The median plume length, which is predicted to occur approximately 50 percent of the year, only extends past the nearest property boundary (~~724~~ 843 m) by less than ~~300~~ 200 m. Additionally, the highest probability of a visible plume over a particular location is approximately 11 percent of the year in an area 100 to 300 m (328 to 984 ft) east of the NDCT. The highest probability plume will not reach offsite as the nearest property boundary to the new tower is approximately ~~720~~ 843 m (~~2400~~ 2766 ft). At a distance equal to the closest point of the property boundary to the proposed tower (~~720~~ 843 m) the highest probability of a visible plume from the NDCT is only ~~7.81~~ 7.33 percent in any particular direction. The above model output indicates that the percent frequency of occurrence of long cooling tower plumes in any particular direction is very SMALL and, as such, does not warrant mitigation.

5.3.3.1.2 **Frequency and Extent of Ground Level Fogging and Icing In the Site Vicinity**

Cooling Tower Plume-Induced Fogging

Ground level fogging occurs when the visible plume from a cooling tower contacts the ground. Studies conducted by Broehl (Reference 5.3-27), Zeller (Reference 5.3-28), and Hosler

(Reference 5.3-29) indicate that surface fogging from natural draft towers does not present a significant problem. Broehl and Zeller found no cases of cooling tower plumes reaching the ground, while Hosler noted only one in a two year study at the Keystone Power Plant, near Shelcota, in western Pennsylvania. As such, the SACTI cooling tower model assumes that the occurrence of fogging from natural draft towers is an insignificant event and thus does not predict estimates of plume induced, ground level fogging from such towers (Reference 5.3-25).

While the SACTI model assumes no occurrences of fogging hours from the NDCT, sometimes the meteorological conditions that are favorable for the occurrence of natural fog events can be conducive to cooling tower plume-induced fogging as well. As such, should the NDCT produce an induced fog, it may likely occur simultaneously with a natural fog event and thereby further alleviate the relative impact potentially caused by cooling tower plume-induced events (of which the model assumes to be insignificant as previously discussed). Climatologically, natural fog (that which restricts visibility to less than ¼ of a mile) occurs an average of 17.7 days per year in the Fermi region based on meteorological data from Detroit Metro Airport (Reference 5.3-30). This means a minimum of 17.7 hours of naturally occurring fog in the vicinity of Fermi (conservatively assuming that reported fogging events last for only one hour per day). Any cooling tower plume-induced fogging event that may occur would be a fraction of fog events that occur naturally.

For the reasons described above, it is predicted that the operation of the NDCT will result in no increased fogging at the site. Any event that may occur is likely to be coincident with a natural fog event and transient in nature similar to the existing NDCTs, which currently do not disrupt onsite operations. Any impact should only be aesthetic in nature. Therefore, the impacts of cooling tower plume-induced fogging are anticipated to be negligible to SMALL, and do not warrant mitigation.

Cooling Tower Plume-Induced Icing

Ground level plume icing is a coating of small granules of ice formed when small water droplets in the cooling tower plume-induced fogging (discussed above) freeze rapidly on the ground during periods of below freezing temperatures. Temperature measurements at nearby Detroit Metro Airport indicate that, on average, the area experiences 129.8 days per year where the minimum ambient temperature drops below freezing (Reference 5.3-30).

However, as discussed previously, the SACTI cooling tower model assumes that natural draft towers do not produce ground level plume-induced fogging. Thus, ground level icing from natural draft cooling towers is not predicted by SACTI. Icing may be possible from the operation of the AHS, but given their small size impacts are expected to be contained on site and SMALL. Therefore, impacts from the new cooling towers are anticipated to be negligible to SMALL, and do not warrant mitigation.

5.3.3.1.3 **Solids Deposition (i.e., Drift Deposition) in the Site Vicinity**

As discussed in Subsection 3.4.1.6, the NDCT will use drift eliminators to minimize the amount of water lost from the tower via drift. Some droplets are, nevertheless, swept out of the top of the cooling tower in the moving air stream. Initially, these droplets rise in the plume's updraft, but due to their high settling velocity, they eventually break away from the plume, and then evaporate, settle downward, and are dispersed by atmospheric turbulence. This drift essentially has the same concentrations of dissolved and suspended solids as the water in the cooling tower basin. The maximum expected TDS (due to two cycles of concentration) in the circulating water system were discussed and given above in Subsection 5.3.3.1.

NUREG-1555, Section 5.3.3.2, provides the following guidance on analyzing operational impacts from salt drift:

- Deposition of salt drift (NaCl) at rates of 1 to 2 kg/ha/mo (0.9 to 1.8 lb/acre/mo) is generally not damaging to plants.
- Deposition rates approaching or exceeding 10 kg/ha/mo (9 lb/acre/mo) in any month during the growing season could cause leaf damage in many species.
- Deposition rates of hundreds or thousands of kg/ha/yr could cause damage sufficient to suggest the need for changes of tower-basin salinities or a re-evaluation of tower design, depending on the amount of land impacted and the uniqueness of the terrestrial ecosystems expected to be exposed to drift deposition.

The solids deposition analysis conservatively assumed that all TDS was salt. The results are discussed below.

both switchyards lie

Table 5.3-20 through Table 5.3-24 present the annual and seasonal SACTI cooling tower model predicted average monthly salt deposition rates for the NDCT. The maximum predicted annual salt deposition rate is 0.01 kg/km^2/mo and occurs between 4200 and 9400 meters (13,779 and 30,840 ft) east-northeast of the NDCT. Due to the high initial plume of the NDCT, no solids are deposited within 4100 meters (13,451 ft) of the NDCT. Because of the low drift loss, low solids concentrations in the water, and small number of cycles of concentration, the average salt deposition within the radius containing the maximum value (i.e., 4500 meters) is below the models predicting threshold and registers as 0.00 kg/km^2/mo. The maximum seasonal impact occurs during the winter (Table 5.3-21) with 0.02 kg/km^2/mo predicted to occur between 4400 and 9400 meters (14,436 and 30,840 ft) east-northeast of the NDCT. These maximum predicted impacts are well within the NUREG-1555 acceptable levels and generally not damaging to plants. Average annual salt deposition isopleths from the NDCT are shown in Figure 5.3-9. Additionally, no salt deposition either at the existing Fermi 2 switchyard is predicted as ~~it lies~~ within 4100 meters of the cooling tower.

or the planned location of the Fermi 3 switchyard

According to NUREG-1555 Section 5.3.3.2, the risk of soil salinization from cooling towers is generally considered to be low. Soil salinization is of most concern in arid areas (deserts) where salts could accumulate in soils over long time intervals. The Fermi location is not located in an arid area.

The use of drift eliminators to minimize drift directly results in the minimization of salt deposition impacts given above. In sum, the impacts from salt deposition are anticipated to be SMALL, and do not require mitigation.

The predicted minimal impact due to salt deposition from the Fermi 3 NDCT is further substantiated by historical data from the operation for the Fermi 2 NDCTs. Fermi 2 uses two NDCTs which are located North of Fermi 3. Studies have been performed to determine if the operation of the Fermi 2 NDCTs have had an adverse impact to the vegetation in the vicinity of the site. These studies concluded that the emissions from the NDCTs have not previously contributed to adverse impacts to the vegetation.

5.3.3.1.4 **Cloud Formation, Plume Shadowing, and Additional Precipitation**

Cloud Formation and Plume Shadowing

The potential for cloud development and plume shadowing due to the operation of cooling towers exists. Natural draft cooling tower plumes at several power plant sites have been observed to cause broken cloud decks to become overcast, make thin clouds thicker, and create separate cloud formations several thousand feet above ground (Reference 5.3-31). Although the plumes from natural draft cooling towers at several power plants have been observed to increase cloud cover several thousand feet above the ground, mechanical draft cooling towers, such as that proposed for the AHS are not known to produce such cloud development effects (Reference 5.3-32).

Regardless of whether from cloud development or from the cooling tower plume itself, plume shadowing is an important phenomenon especially for agricultural areas. Because there are agricultural areas in the vicinity of the Fermi site, an analysis of plume shadowing is presented here. Cooling tower plume shadowing is determined by the SACTI cooling tower plume model by calculating the average number of hours the cooling tower visible plume causes shadowing of the sun on the ground.

Table 5.3-25 presents the five-year total hours of predicted shadowing caused by the visible plume associated with the NDCT. The SACTI model predicts that maximum shadowing will occur 200 m (656 ft) north of the NDCT for an average of 348 hours per year. Beyond a radius of 800 m (2625 ft) from the NDCT, the SACTI model predicted that the average annual hours of shadowing (considering all directions of plume travel) would be less than 100 hours, or approximately less than
843 2.3 percent of the daylight hours per year. Additionally, the average hours per year of plume shadowing beyond ~~724~~ 3 m (nearest property boundary distance) is predicted to be 92 hours per year (2.1 percent of the daylight hours per year) from the NDCT (considering all plume directions in the table).

The resulting hours per year of shadowing (especially at the nearest property boundary) are predicted to be an insignificant fraction of the total daylight hours for agricultural purposes. Additionally shadowing events are not expected to occur at significantly far downwind locations reaching agricultural areas. Thus, the plume shadowing impacts are expected to be SMALL, and do not warrant mitigation.

Additional Precipitation

As presented by Huff, light drizzle and snow occasionally have been noted within a few hundred meters downwind from cooling towers, but these phenomena are very localized and should have no effect outside the site boundary. Huff compared the flux of water vapor and air from natural draft cooling towers with those occurring in natural convective showers. His results indicate that some enhancement of small rain showers might be expected, as tower fluxes are within an order of magnitude of the shower fluxes (Reference 5.3-33). This implies that large thunderstorms, with their much greater flux values, should not be significantly affected.

In addition to triggering additional precipitation events, another potential environmental impact resulting from the discharge of cooling tower moisture is the regional augmentation of natural precipitation. In estimates made by Huff, the total contribution to surface precipitation from cooling towers, based on a 2200 MWe station, was found to be only 0.4 inches annually (Reference 5.3-34). Precipitation augmentation from a cooling tower is assessed in SACTI as water deposition. Water deposition from a cooling tower occurs when the airborne water droplets coalesce and precipitate out downwind of a cooling tower. The pattern of water deposition and the distance of maximum water deposition from the cooling tower are a function of the physical size of the water droplets in the drift, prevailing wind direction, orientation of the cells, and the airflow rate through the cooling tower.

As shown in Table 5.3-26, the SACTI cooling tower plume model predicted that the maximum cooling tower water deposition from the NDCT will occur approximately 4500 to 9300 m (15,000 ft to 31,000) east northeast of the NDCT at a rate of 5.9 kg/km^2/mo. The average water deposition within the largest radius containing the maximum impact (9300 m) is predicted to be 2.2 kg/km^2/mo (considering all wind directions or plume travel).

A potential effect of water deposition on vegetation species is the increased threat of plant fungal diseases associated with the increased precipitation. Based on historical meteorological data for Detroit Metro Airport, the average monthly rainfalls for the driest month (February) and the wettest month (June) are 48 mm and 90 mm, respectively. Conservatively assuming no evaporation of the falling cooling tower drift droplets, the precipitation rate equivalent of the maximum SACTI model predicted water deposition rate (5.9 kg/km^2/mo) is approximately 0.00001 mm per month. By comparison, this precipitation rate is less than 0.0001 percent of the average monthly rainfall of even the driest month. Thus, impacts due to water deposition (additional precipitation) are expected to be SMALL, and do not warrant mitigation.

Induced snowfall due to operating cooling towers has been observed. However, the accumulation was found to be less than one inch of very light, fluffy snow. Other documented induced snowfall occurrences generally preceded actual snowfall occurrences. An investigation into the climatic conditions conducive to induced snowfall indicated that a very cold, stable atmosphere with light winds optimized this situation (Reference 5.3-35). While this type of meteorological condition occurs at the Fermi site, literature indicates that snow amounts are light (less than one inch) and would be only a small fraction of the typical snowfalls the area receives. There is no reason to expect the Fermi 3 cooling tower to significantly alter local meteorology, especially because the site and surrounding area are not adversely affected by the existing natural draft cooling towers.

5.3.3.1.5 Interaction of Vapor Plume with Existing Pollutant Sources Located Within 1.25 Miles of the Site

The existing NDCTs at the Fermi site are located approximately ~~0.95~~ 0.58 and ~~1.10~~ 0.73 miles to the northeast of the planned location for the Fermi 3 cooling tower on opposite sides of the central power block. The interaction between the plumes from the existing NDCTs and that for the Fermi 3 cooling tower is expected to be insignificant because usually the plumes will travel in parallel, non-intersecting directions. Given this distance and the fact that the cooling towers will not be situated in line as to additively affect plant operations (i.e., the towers are situated such that only one set of towers (new or existing) can impact the facility operations on the main power block during a given wind direction), there is expected to be little concern for cumulative effects with existing operations. As for the potential offsite cumulative interaction of new and existing cooling tower plumes, the large separation distance means that only a very discrete and narrow set of wind directions/angles (on the order of 10 degrees or less of the possible 360 degrees of potential wind angles) would allow the plumes to overlap.

There is also the potential for vapor plume interaction with existing and proposed combustion sources such as diesel generators, auxiliary boilers, diesel fire pumps, etc. However, these sources are typically low level stack point source releases that operate infrequently (i.e., not typically during normal plant operation). Additionally, they do not typically contain the same pollutants within their exhaust streams (e.g., NO_x, SO_2, CO) as the cooling tower vapor plumes (particulates). There are no other pollutant sources of significance located within 1.25 miles of the site. Therefore, interaction effects are expected to be SMALL, and do not warrant mitigation.

5.3.3.1.6 Data and Information on Similar Heat Dissipation Systems

The nearest and thus most representative similar heat dissipation systems are the existing NDCTs at the Fermi site located just north of the main power block approximately ~~0.95~~ 0.58 and ~~1.10~~ 0.73 miles from the Fermi 3 NDCT. The predicted minimal impact due to salt deposition from the Fermi 3 NDCT is further substantiated by historical data from the operation for the Fermi 2 NDCTs. Fermi 2 uses two NDCTs which are located North of Fermi 3. Studies have been performed to determine if the operation of the Fermi 2 NDCTs have had an adverse impact to the vegetation in the vicinity of the site. These studies concluded that the emissions from the NDCTs have not previously contributed to adverse impacts to the vegetation.

The NRC described impacts from mechanical and natural draft cooling towers in the GEIS (Reference 5.3-1). The analyses in the GEIS encompass all operating light-water power reactors. For each type of environmental impact, the GEIS attempts to establish generic finding covering as many plants as possible. This document generally concludes that continued operation of similar heat dissipations systems at various facilities is of little concern for impacts upon plants and birds (discussed herein in Subsection 5.3.3.2). Additionally, there are no apparent special circumstances of the site or the design of the Fermi 3 NDCT that invalidates the generic conclusions related to environmental effects of heat dissipation systems on the atmosphere in the GEIS.

5.3.3.1.7 Ground Level Humidity Increase in the Site Vicinity

In the vicinity of the NDCT vapor plume, both the absolute and relative humidity aloft is increased as evidenced by model-predicted frequency of visible plume occurrence. As discussed in Subsection 5.3.3.1.1, the impacts from the occurrence of visible plumes are expected to be SMALL. Thus, absolute humidity at the surface would be increased only slightly. However, relative humidity near the tower may be increased more during colder months due to relatively low moisture-bearing capacities of cold air. However, any increases in humidity during cold periods is likely to be localized and short-lived as air masses move and further mix with surrounding drier air which is immensely more voluminous than the air flow from the NDCT. For an overwhelming majority of the time, contribution of water vapor from the cooling tower is insignificant when compared with the humidity values that are naturally experienced in the region (Subsection 2.7.1.2.3). Therefore, increases in ground level humidity are expected to be SMALL, and do not warrant mitigation.

5.3.3.2 Terrestrial Ecosystems

NUREG-1555 Table 2.4.1.1 defines important species and habitats. There are no records of occurrence of any Federally-listed species in the area. However, three species listed as State-threatened are known to occur on the Fermi site; two animals (the bald eagle and Eastern fox snake) and one plant (the American lotus). While the USFWS delisted the bald eagle as Federally-threatened under the Endangered Species Act, effective August 8, 2007, it is protected by other Federal acts and is listed as State-threatened. The American lotus is also listed as State-threatened and is abundant in the South and North Lagoons on the Fermi site. However, because the species is so common, the impact of the project to the overall population present on the Fermi site is expected to be SMALL. Other animal and plant species listed as State-threatened are potentially in the area of the project site, but have not been observed on the Fermi site. Additionally, no critical habitats are currently known to occur on the Fermi site or in the vicinity (presented in more detail in Subsection 2.4.1).

Although no Federally-listed terrestrial species or critical habitat exists at the Fermi site or in the vicinity, an analysis of the NDCT's potential impacts upon terrestrial ecosystems is presented here to assure minimal impacts to any existing species. Cooling towers can potentially impact terrestrial ecosystems through salt drift, vapor plumes, icing, shadowing, precipitation augmentation, noise, and bird collisions with the cooling towers themselves.

5.3.3.2.1 Salt Drift

Vegetation in the vicinity of the NDCT may experience salt deposition due to plume drift. As salinity levels increase, growth of intolerant plants declines, and yields are reduced. Some plant families tend to show either high or low limits of salt survival. Growth suppression is sometimes accompanied by leaf injury.

As discussed in Subsection 3.3.1.6, the tower will use drift eliminators to minimize the amount of water lost from the tower via drift. Some droplets are, nevertheless, swept out of the tops of the cooling tower in the moving air stream. Initially, these droplets rise in the plume's updraft, but due to their high settling velocity, they eventually break away from the plume, and then evaporate, settle downward, and are dispersed by atmospheric turbulence. This drift essentially has the same concentrations of dissolved and suspended solids as the water in the cooling tower basin and is thus the source of the potential salt deposition onto vegetation. An analysis of potential salt drift from the cooling tower was discussed and presented in Subsection 5.3.3.1.3.

As discussed in detail in Subsection 5.3.3.1.3, NUREG-1555, Section 5.3.3.2, provides the following guidance on analyzing operational impacts from salt drift:

- Deposition of salt drift (NaCl) at rates of 1 to 2 kg/ha/mo (0.9 to 1.8 lb/acre/mo) is generally not damaging to plants.
- Deposition rates approaching or exceeding 10 kg/ha/mo (9 lb/acre/mo) in any month during the growing season could cause leaf damage in many species.
- Deposition rates of hundreds or thousands of kg/ha/yr could cause damage sufficient to suggest the need for changes of tower-basin salinities or a re-evaluation of tower design, depending on the amount of land impacted and the uniqueness of the terrestrial ecosystems expected to be exposed to drift deposition.

The solids deposition analysis conservatively assumed that all TDS was salt. As given in Subsection 5.3.3.1.3, the maximum predicted annual salt deposition rate is 0.01 kg/km^2/mo. This value is well within (i.e., several orders of magnitude less than) the NUREG-1555 acceptable levels of generally not damaging to plants.

Additionally, monitoring results from a sample of nuclear plants, in conjunction with the literature review and information provided by the natural resource agency and agricultural agencies in all states with nuclear power plants, have revealed no instances where cooling tower operation has resulted in measurable degradation of the health of natural plant communities (Reference 5.3-1).

According to NUREG-1555, Section 5.3.3.2, the risk of soil salinization from cooling towers is generally considered to be low. Soil salinization is of most concern in arid areas (deserts) where salts could accumulate in soils over long time intervals. The Fermi site is not located in an arid area.

The use of drift eliminators to minimize drift directly results in the minimization of salt deposition impacts given above. In sum, the impacts from salt deposition are anticipated to be SMALL, and do not warrant mitigation.

5.3.3.2.2 **Vapor Plumes**

As concluded in Subsection 5.3.3.1.1, on a frequency basis, the SACTI cooling tower model predicts the plume lengths from the NDCT to be less than 1000 m (3281 ft) for 50 percent of the year, considering all wind directions of plume travel. Additionally, the highest probability of a visible plume over a particular location is approximately 11 percent of the year in an area 100 to 300 m (328 to 984 ft) east of the NDCT.

The median plume length, which is predicted to occur approximately 50 percent of the year, only extends past the nearest property boundary (~~724~~ 843 m) by less than ~~300~~ 200 m. The highest probability

2766 plume will not reach offsite as the nearest property boundary to the new tower is approximately ~~720~~ 843 m (~~2400~~ ft). In fact, at a distance equal to the closest point of the property boundary to the proposed tower (~~720~~ m), the highest probability of a visible plume from the NDCT is only ~~7.81~~ 7.33 843 percent in any particular direction. The above model output indicates that the percent frequency of occurrence of long cooling tower plumes in any particular direction is SMALL and, as such, does not warrant mitigation.

5.3.3.2.3 **Icing**

Ground level plume icing is discussed in detail in Subsection 5.3.3.1.2. As discussed previously, the SACTI cooling tower model assumes that natural draft towers do not produce ground level plume-induced fogging. Thus, ground level icing from natural draft cooling towers is not predicted by SACTI. Therefore, impacts are anticipated to be SMALL, and do not warrant mitigation.

5.3.3.2.4 **Plume Shadowing**

Plume shadowing is an important phenomenon especially for agricultural areas. Because there are agricultural areas near the Fermi site, an analysis of plume shadowing is presented in detail in Subsection 5.3.3.1.4.

As presented in Subsection 5.3.3.1.4, the SACTI model predicts that maximum shadowing will occur 200 m (656 ft) north of the NDCT for an average of 348 hours per year. Beyond a radius of 800 m (2625 ft) from the NDCT, the SACTI model predicted that the average annual hours of shadowing (considering all directions of plume travel) would be less than 100 hours, or 843 approximately less than 2.3 percent of the daylight hours per year. Additionally, the average hours per year of plume shadowing beyond ~~724~~ m (nearest property boundary distance) is predicted to be 92 hours per year (2.1 percent of the daylight hours per year) from the NDCT (considering all plume directions in the table).

The resulting hours per year of shadowing (especially at the nearest property boundary) are predicted to an insignificant fraction of the total daylight hours for agricultural purposes. Thus, the plume shadowing impacts are expected to be SMALL, and do not warrant mitigation.

5.3.3.2.5 **Precipitation Augmentation**

In addition to triggering additional precipitation events, another potential environmental impact resulting from the discharge of cooling tower moisture is the regional augmentation of natural precipitation. An analysis of this phenomenon is presented in detail in Subsection 5.3.3.1.4.

As given in Subsection 5.3.3.1.4, the SACTI cooling tower plume model predicted that the maximum cooling tower water deposition from the NDCT will occur approximately 4500 to 9300 m (15,000 ft to 31,000) east northeast of the NDCT at a rate of 5.9 kg/km^2/mo. The average water deposition within the largest radius containing the maximum impact (9300 m) is predicted to be 2.2 kg/km^2/mo (considering all wind directions or plume travel).

A potential effect of water deposition on vegetation species is the increased threat of plant fungal diseases associated with the increased precipitation. Based on historical meteorological data for

Figure 5.3-9 Annual Salt Deposition Isopleths from NDCT Operation

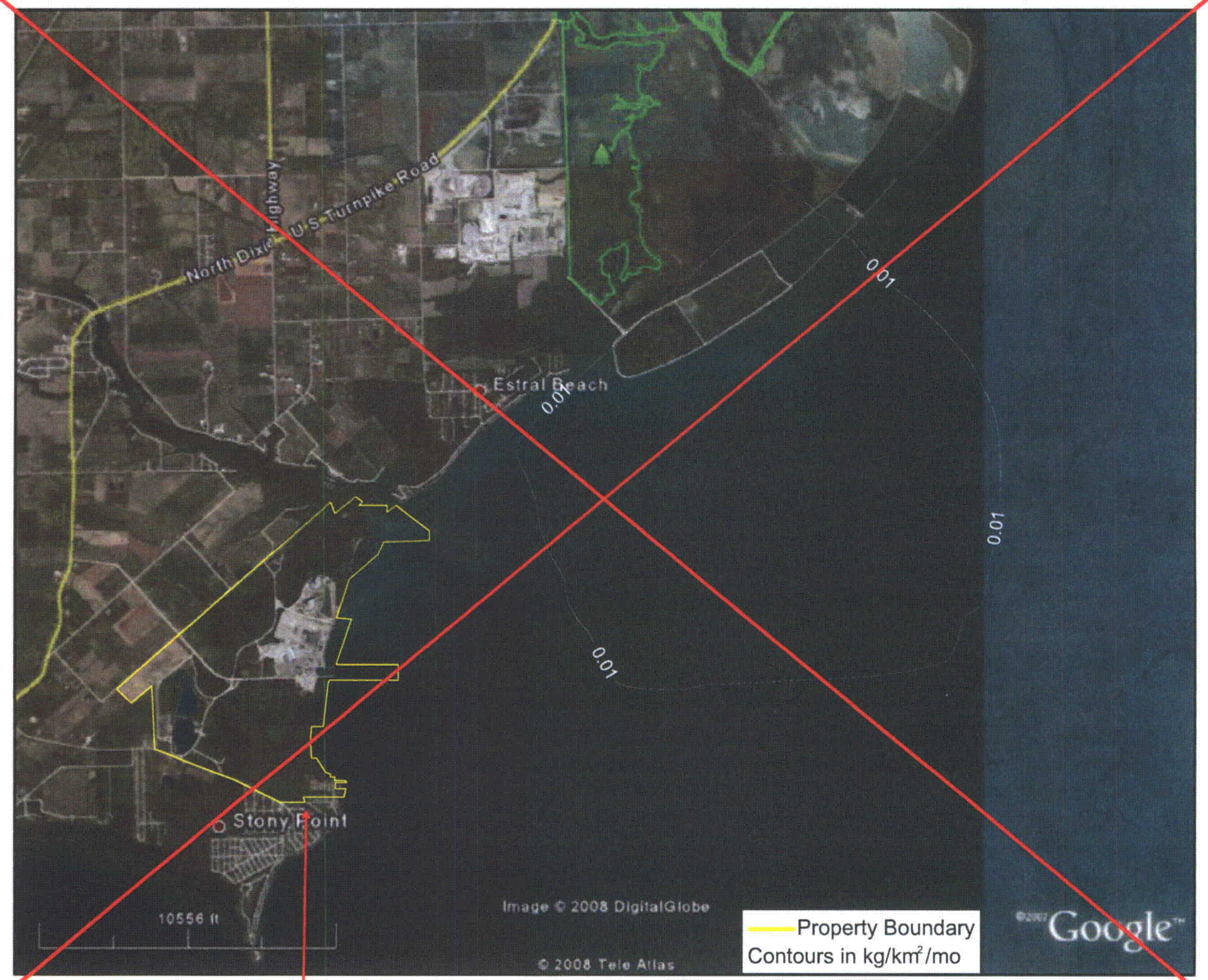

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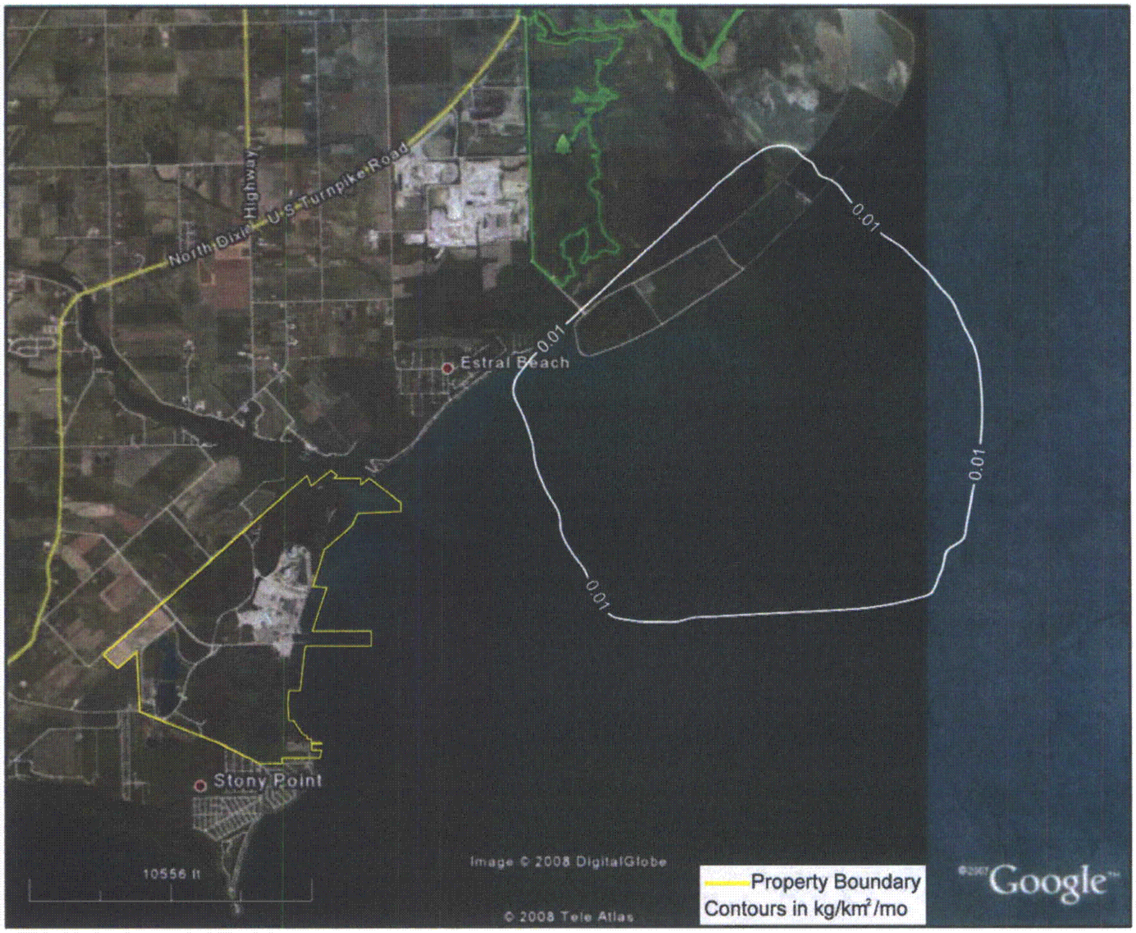
Figure 5.3-9 Annual Salt Deposition Isopleths from NDCT Operation



likely to be a concern for agricultural producers because most cooling tower drift impacts will be confined to the site, with minimal drift reaching beyond the site property boundary.

5.11.1 Land Use

The geographic area considered for potential cumulative impacts to land use from Fermi 3 operation encompasses a 7.5-mile area centered on the Fermi site (Figure 2.1-2).

Cumulative impacts to land use include new development to accommodate workers and worker-related services. Development would result in land conversion from forested and agricultural land to various development types, such as housing, gas stations and shopping centers. Impacts from general work force changes are expected to be minor since the operations work force is expected to relocate from a wider area than Monroe County, which may include the metro regions of Detroit, Michigan and Toledo, Ohio. Because the work force will be dispersed over these larger cities in the labor supply region, the induced impacts on land use (from operations of a new unit at the Fermi site) can be easily absorbed within the surrounding region. The exception is the vicinity of the Fermi site. Historically, the area contained within the Fermi site was agricultural and undeveloped lands undergoing slow development. Therefore, cumulative impacts would accrue with more effect, positive or negative, within Frenchtown Township nearest the Fermi site.

As discussed in Subsection 4.1.1, approximately 125 ~~140~~ ~~acres of the~~ Fermi site will be permanently occupied by facilities associated with Fermi 3 until the unit is decommissioned. The existing Fermi 2 facility occupies 172 acres, including the remaining Fermi 1 structures. Proposed operation of Fermi 3 will contribute to changing land use within the Fermi site. Fermi 3 operation is not likely to encourage offsite industrial or urban development on a scale similar to Fermi 2, in part because of county and township zoning, which favors preservation of agricultural and rural land use. No large-scale industrial or commercial projects are planned near the Fermi site. Following construction of Fermi 2, Monroe Country did not experience increased development and similar results are expected for Fermi 3. Fermi 3 has a projected commercial in-operation date of 2020, which will spread any projected impacts over a greater length of time, making it less likely to have any discernible cumulative impacts. Because Fermi 3 construction will comply with all applicable county and township land use and zoning regulations, the cumulative impacts from Fermi 3 operation are anticipated to be SMALL.

As noted in Subsection 2.2.2.2, an ITC*Transmission* study has indicated that a separate switchyard and three new transmission lines will be needed for power output from the proposed Fermi 3. It is assumed that the existing Milan Substation may be expanded from its current size of 350 by 500 feet to an area approximately 1,000 by 1,000 feet to accommodate the addition of the three new transmission lines. This expansion would be into maintained grass and agricultural areas. The proposed expansion of the transmission corridor would affect predominately agricultural or forested land along the approximate 29.4-mile route.

The new transmission route would pass through Monroe, southwest Wayne, and southeast Washtenaw Counties along an assumed 300-foot wide corridor currently used or previously characterized for transmission purposes, thereby avoiding environmentally sensitive areas, such as population concentrations, National Forest lands, military installations, large bodies of water, wildlife preserves and refuges, state parks, state commemorative areas and major transportation facilities. The transmission upgrades within the previously developed eastern 18.6 miles of corridor are expected to be minimal, since the reconfiguration of existing conductors would largely allow for the use of existing infrastructure to create the new lines, access for installing additional lines is good, and the ROW is maintained. Impacts from construction are primarily limited to the western 10.8 miles of the corridor where both tower and steel pole installation could occur and some clearing will be required. Potential impacts are limited to wetlands within the assumed 300-foot wide ROW during construction, and SMALL operational impacts to the offsite transmission corridor are anticipated.

The operational impact of Fermi 2 was found to be small in previous studies. All known planned major projects, principally Fermi 3 and the offsite transmission corridor, would be subject to applicable state or federal environmental review and compliance requirements. Only minor impacts to land use in Monroe County were identified from past Fermi activities and land use impacts projected into the future in Monroe, Wayne and Washtenaw Counties are expected to be SMALL. Mitigation for unavoidable impacts will be subject to permit and regulatory compliance requirements.

5.11.2 **Air Quality**

This analysis focuses on air impacts to Fermi site and contributions to the region by Fermi 3 operation. The Fermi site is located in an attainment area for all EPA listed criteria pollutants. Impacts to air quality would primarily be from backup and emergency equipment (e.g. diesel generators and fire fighting equipment) and the cooling tower. Combustion sources burning fossil fuels are not typically sources of odor emissions as effluent streams rich in odorous compounds such as hydrogen sulfide are not processed. Additionally, no open burning will occur during the operational phase. Vehicle traffic would contribute to emissions, both directly from vehicle operation and from fugitive dust on unpaved surfaces, but these emissions are considered temporary and negligible.

Air emissions of criteria pollutants from Fermi 2 and Fermi 3 will be minor given the lack of significant gaseous exhausts of effluents to the atmosphere by nuclear facilities under normal operating conditions. Sources of air emissions for the proposed Fermi 3 facility are two standby diesel generators, an auxiliary boiler, a diesel fire pump, a natural-draft cooling tower, and a mechanical draft cooling tower. The combustion sources used are selected for efficiency and operated with good combustion practices on a limited basis throughout the year (often only for testing). Given their small size and infrequent operation, these emissions will not only have little effect on the Fermi vicinity, but will have minimal impact on local and regional air quality. Final emissions will depend on specific equipment selected for implementation, but emissions from all equipment will be within air quality regulatory guidelines set by federal and state agencies. Emissions of criteria pollutants from Fermi 3 will be cumulative with the impacts of the similar equipment of Fermi 2. Since such equipment is operated intermittently, the cumulative impact is considered SMALL.

The proposed cooling tower for Fermi 3 will not be a source of typical combustion-related criteria pollutants or other toxic emissions. However, small amounts of salt and particulate matter will be emitted as drift. The tower will be equipped with drift eliminators designed to limit drift to levels low enough to avoid adverse effects to vegetation, including crops. The height of the tower will allow for good drift dispersion and prohibit localized concentrations of particulate matter. The minor nature of cooling tower effects on visibility and air quality, including potential for increases in ambient temperature and moisture, icing, fogging and salt deposition, are discussed in further detail in Subsection 5.3.3.

During Fermi 3 operation, no impacts associated with fugitive dust are expected near the Fermi site. Access and maintenance roads within the site are infrequently traveled and any fugitive dust is a temporary and limited discharge that will not affect regional air quality or result in non-attainment.

Air emissions at Fermi 3 will be controlled in accordance with local, state and federal laws. Emissions are also subject to the compliance requirements and conditions of the Fermi 3 air permit issued by the MDEQ. Cooling tower salt deposition and drift impacts would not significantly affect surrounding agricultural lands or vegetation since most such material would be contained within the site.

Similarly, impacts from future potential industrial expansion in the Fermi vicinity would be SMALL due to the restrictions under MDEQ and EPA new facility air permitting programs and associated control and modeling criteria. Operational impacts to air quality at the site and in the vicinity would not affect land use on the site or near Fermi 3; therefore, cumulative impacts to air quality from Fermi 3 operation would be SMALL and further mitigation is not warranted.

5.11.3 **Water Use and Quality**

This section focuses on water usage from Lake Erie as the primary surface waterbody supplying and receiving Fermi water, and as the body of water that provides liquid pathways for both radiological and non-radiological effluents. Groundwater impacts also are discussed.

The geographical area for surface water in this analysis is the Lake Erie segment immediately adjacent to Fermi. The evaluation area for groundwater is Monroe County.

5.11.3.1 **Surface Water Use**

Michigan State law was amended effective February 28, 2006, to better manage water withdrawals. The amendments changed reporting, registration, environmental protection standards and permitting requirements for large quantity withdrawals from groundwater and surface water, including the Great Lakes. A large quantity withdrawal generally is a withdrawal greater than 100,000 gallons per day (GPD) averaged over a consecutive 30-day period. New or increased large quantity withdrawals are prohibited from causing an "adverse resource impact." An adverse resource impact is defined as altering the ability of a waterbody to support a characteristic fish population, as determined by comparing the groundwater contribution to stream flow against the size of the watershed. In general, taking too much water from a waterbody changes the types of fish expected to be found in that waterbody.

The amended law requires development of a water withdrawal assessment tool, which has not yet been completed. Until this tool is available, there is a rebuttable presumption that a new or increased large quantity withdrawal will not cause an adverse resource impact if the withdrawal location is farther than 1320 feet from the banks of a designated trout stream or if the withdrawal depth of the well is at least 150 feet. There must be strong evidence that a new or increased large quantity withdrawal has caused or is likely to cause an adverse resource impact.

The Fermi 3 withdrawal for cooling water will qualify as a large quantity withdrawal from Lake Erie (greater than 100,000 GPD withdrawn from a Great Lake) and a permit from MDEQ for the new intake installation will be required. In addition, because the water withdrawal assessment tool is not available and the Fermi 3 site is not near a designated trout stream segment, adverse resource impacts from Fermi 3 withdrawals are not likely. All water withdrawn (less consumptive use) will be returned to Lake Erie.

Lake Erie will be the primary source of water for Fermi 3, including an estimated maximum makeup flow withdrawal of approximately 34,000 gpm (Subsection 3.3.1.1). Discharge to Lake Erie would be approximately 17,000 gpm during normal operations and much reduced when on standby (Subsection 5.2.1).

The nearest user of Lake Erie water is the Frenchtown Township municipal water system. However, because of the immense volume of water in Lake Erie and the extremely small proportion of Lake Erie water that would be utilized, use conflicts are unlikely.

The cumulative impacts of Fermi 3 and other water withdrawal on Lake Erie water use will be SMALL.

5.11.3.2 **Surface Water Quality**

Western Lake Erie receives major inflows from the Detroit River, Huron River, River Raisin and Rouge River and from smaller drainages including Swan Creek and Stony Creek. The River Raisin, Huron River and Rouge River drain into the western basin of Lake Erie, affecting western basin water quality near the Fermi site. However, Fermi does not impact the water quality in these streams (Subsection 2.3.3). Lake Erie and Swan Creek are the two waterbodies most likely to be directly affected by Fermi 3 operation (Subsection 2.3.1.1.3.1). Swan Creek receives discharges from the Fermi 2 plant which then enter Lake Erie, while Fermi 3 will discharge directly to Lake Erie.

The Fermi site lies within the Swan Creek Watershed. Land use and human activities greatly influence water quality in this watershed. The most important parameters affecting water quality in the Swan Creek Watershed are nutrient enrichment, pesticide contamination, sedimentation and chemical contaminants such as organochlorine compounds, mercury and polychlorinated biphenyls (PCBs). Stormwater runoff contributes to elevated herbicide and nutrient concentrations (Reference 5.11-2). The potential water pollutant predicted during Fermi 3 construction is sediment or dust entering Lake Erie, the surrounding streams or groundwater.

A review of water quality data collected by the U.S. Geological Survey (USGS) and the MDNR from Lake Erie and the streams near the Fermi site demonstrates that impairments exist (described in

Subsection 2.3.3). The water quality data review (Subsection 2.3.3.1) identified turbidity, nutrients, persistent organics, metals, and oils as challenges to Lake Erie water quality. Fermi discharges are not a contributor to Lake Erie impairment, as noted in Section 5.2.

Fermi 2 water discharged to Lake Erie has not had a measurable water quality impact, based on the results of ongoing monitoring programs. The existing Fermi 2 wastewater discharge permit includes conditions intended by the MDEQ to be protective of Lake Erie water quality and the streams receiving stormwater. These conditions are based on an evaluation of facility operations, facility wastewater discharges, and state and federal regulations and guidance (Subsection 5.2.2). Fermi 3 operations will include similar impacts to those currently regulated and monitored for Fermi 2. Because of the volume of Lake Erie water, the assimilation ability of Lake Erie for discharge wastewater from Fermi 3 is expected to be scarcely affected by the addition of the new facility. The continuing limitations on the discharges from Fermi and other discharges to Lake Erie by NPDES discharge permits and continuing regulation of water quality criteria in Lake Erie by the MDEQ and EPA provide a regulatory system to manage impacts to water quality, reducing significant cumulative impacts to a negligible level.

Based on the above factors, the expected cumulative impacts of discharges to Lake Erie water quality from the continuing operation of Fermi 2 and the addition of Fermi 3 are expected to be SMALL.

5.11.3.3 **Groundwater Use**

The main water source used during Fermi 3 construction will be Lake Erie. There will be no major hydrologic alterations from construction activity. Except for dewatering during construction, no groundwater use will occur during Fermi 3 operation, so impacts to groundwater are limited to effluent discharges, which are regulated by the MDEQ.

5.11.3.4 **Groundwater Quality**

Existing operations of Fermi 2 have not resulted in significant, adverse impacts to groundwater quality. Groundwater sampling for a variety of physical and chemical parameters conducted in 2007 (summarized in Subsection 2.3.3.2) did not indicate apparent impacts from Fermi 2 operations.

Potential radioactivity release is monitored at Fermi 2 in compliance with the terms of the NRC license and NRC regulations and is reported annually to the NRC (10 CFR 20). This monitoring includes semiannual sampling of radioactivity in groundwater up-gradient and down-gradient from the Fermi site. Monitoring program results indicate the levels of radionuclides monitored continue to remain similar to results obtained in previous operational and pre-operational years.

The above information indicates that Fermi 2 has had no significant impact on groundwater quality. Similarly, impacts from Fermi 3 operations are expected to be negligible. The following demonstrate the minimal opportunities for impacts to occur:

- Storage and use of chemicals and other potential groundwater pollutants are very limited at Fermi.

- Process operations and materials storage are in sealed buildings with monitored containment and discharge points.
- Spills, leaks and releases of materials are prevented or managed by active programs at the site, such as the SWPPP, SPCC Plan, use of appropriate chemical storage systems, and inspection of material storage systems.
- Discharges from the site are controlled by the NPDES permit.
- Semi-annual groundwater monitoring for radioactivity will continue under terms of the existing Fermi 2 NRC license and an anticipated license for Fermi 3.
- There are no other significant sources of radionuclides (i.e., other nuclear facilities) in the area of consideration.

The cumulative impacts to groundwater from the operation of Fermi 2 and Fermi 3 are expected to be SMALL.

5.11.4 **Ecology**

For this analysis, the geographic region encompassing past, present, and foreseeable future actions is the 7.5-mile diameter area immediately surrounding Fermi. After construction for Fermi 3 is complete, temporarily affected aquatic and terrestrial ecosystems are expected to return to predominantly pre-construction conditions. No other past, present, or future actions in Monroe County were identified that could affect wildlife and wildlife habitat in ways similar to Fermi 3 operation (e.g., cooling tower noise; adverse effects to agricultural crops, ornamental vegetation or native plants from cooling tower drift; or avian cooling tower collisions).

Cumulative impacts to terrestrial and aquatic ecosystems are discussed in more detail below.

5.11.4.1 **Terrestrial Ecology**

Construction and operation of Fermi 3 were evaluated to determine the relative contribution to regional impacts on terrestrial resources. Determinations for construction were discussed in Section 4.7. In this section, evaluations for operation of Fermi 3 are made concerning resource attributes normally affected by cooling tower operation, transmission line operation and right-of-way maintenance.

Impacts to terrestrial resources may include habitat alteration or conversion, adverse effects on crops or ornamental vegetation, impediment to wildlife movement through habitats (travel corridors), adverse effects to threatened or endangered species, changes in land use related to traffic, noise, dust or suspended particulate matter, and maintenance activities, both onsite and in offsite transmission corridors.

Habitat within the Fermi site is discussed with more detail in Subsection 2.4.1. The primary habitats present are forested areas, wetlands and agricultural fields, along with previously developed areas (e.g., Fermi 1 location) that will be re-developed for the Fermi 3 project. Forested and wetland habitats will be reduced in extent because of Fermi 3 construction (Subsection 4.7.1), but Fermi 3 operation would not extend the changes to areas unaffected by past activities, construction of Fermi

3 or operation of Fermi 2. Areas west and south of the Fermi site are zoned for agricultural and residential use and would be minimally affected by Fermi 3 operations. Fermi 3 would have no impact on area planning and zoning designations and will comply with local development plans, further limiting any impacts. While the acreage of some terrestrial habitats would be slightly reduced, extensive areas of similar habitat nearby would remain. County zoning prevents large-scale development from converting natural habitats to developed areas, as has been observed with Fermi 2 operations and a lack of related industrial or commercial development in the region. In the case of wetland habitats, mitigation would be undertaken to replace lost functions. Wetland mitigation requirements will be subject to Clean Water Act Section permits administered by the USACE and MDEQ after a Jurisdictional Determination is completed by USACE.

As described in Subsection 2.4.1.1.2, the Fermi 3 operation is not expected to block wildlife movement through existing travel corridors, because Fermi 3 is being developed close to the existing facility and existing transmission corridors are being used for linear facilities as much as possible. This limits the degree to which undeveloped habitats would be affected by any new construction or operations. Because wildlife have already adapted to the presence of Fermi 2 and the existing transmission corridor, the addition of Fermi 3 is not a substantial change resulting in destabilization of habitats. Insert 1 here

~~No 'critical habitat' as defined by the USFWS is known to occur on the Fermi site or nearby. As described in Subsection 2.4.1.2.1, correspondence from USFWS did not list any Federal protected plants or wildlife as occurring on or near the Fermi Site. The MDNR indicated that two State-listed species, American lotus and bald eagle, are present on or near the Fermi site. Both species have been observed at the site. American lotus would be affected by Fermi 3 construction, as discussed in Subsection 4.3.1.2.1; however, operation of Fermi 3 is not expected to affect this species. Bald eagles nested onsite recently and areas with a nest will be avoided during construction. No effects from Fermi 3 operation are expected, because the species has continued to use the Lake Erie coastal environment following construction and operation of Fermi 2~~.

No additional roads would be needed to accommodate transportation needs for Fermi 3 during operation. The existing roadway infrastructure near the Fermi site has managed a fluctuating work force during construction and operation at Fermi 2, including outages and refueling. Adding a slightly smaller work force dedicated to Fermi 3 operation will likely result in minor increases in traffic on existing public roads, mainly Dixie Highway, to and from the Fermi site during normal commuting hours. However, by the time Fermi 3 operations begin in 2020, various planned road improvement projects for local roads in the Fermi vicinity will have been completed, alleviating possible congestion. Occasional deliveries via the Canadian National spur to the Fermi site would continue during Fermi 3 operation, as it has during Fermi 2 operation.

Unpaved roads at Fermi may release minor quantities of dust when driven under dry conditions, especially if they are subjected to increased traffic by heavy vehicles. During operation, impacts associated with dust will be confined to the Fermi site because of gravel surfacing on most roads and nominal use of the roads (mostly single vehicles spaced apart in time). Measures such as spraying the roads with water or adding more gravel to road surfaces may be used to reduce fugitive dust emissions when traffic use is increased.

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No designated critical habitat as defined by the USFWS is known to occur on the Fermi site or nearby. As described in Subsection 2.4.1.2.1, correspondence from USFWS did not report any federal protected plants or wildlife as occurring on or near the Fermi site. The MDNR indicated that two state-listed protected species, American Lotus and Bald Eagle, are present on or near the Fermi site. In April 2009, the Bald Eagle was delisted in Michigan, but it is still protected by two federal laws. Both species have been observed at the site. In addition, the Eastern Fox Snake, a state-listed threatened species, was observed at the site.

American Lotus would be affected by Fermi 3 construction, as discussed in Subsection 4.3.1.2.1. Construction-related impacts would be mitigated by transplantation or other mitigation measures. Operation of Fermi 3 is not expected to affect the onsite population of this species.

Bald Eagles nested onsite successfully in 2008 and 2009. No effects from Fermi 3 operation are expected, as the Bald Eagle has continued to use Lake Erie coastal environment during Fermi 2 operation. The most active nest location is less than 750 feet from the Fermi 2 natural draft cooling towers, demonstrating a tolerance of mechanical noise and human activity. Fermi 3 will be located inland of Fermi 2, further isolating it from the current Bald Eagle nest location.

The Eastern Fox Snake may be temporarily displaced during Fermi 2 construction. However, Fermi 3 operation is not expected to affect populations of these species on the site based on measures taken to reduce impacts during construction.

6.4 Meteorological Monitoring

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The current Fermi onsite meteorological monitoring program has been in place since it was implemented for Fermi 2 pre-operational meteorological assessment beginning in June 1975. Starting in June 1975, the onsite meteorological monitoring program has met the requirements of NRC Regulatory Guide 1.23. ~~Since June 1975, some of the meteorological monitoring program components have been upgraded. (Reference 6.4-1) This section will describe the current state of the onsite meteorological measurement program. The Fermi 2 meteorological monitoring program provides the basis for the Fermi 3 meteorological pre-application monitoring, site preparation and construction monitoring, pre-operational monitoring, and operational monitoring programs. In addition, data from the onsite meteorological tower is used as the sole input for models that describe the atmospheric transport and diffusion characteristics of the site, as provided for in NRC Regulatory Guides 1.111 and 1.21. A description of the model used to analyze the atmospheric transport and diffusion conditions of the site is described in Subsection 5.4.1.2.~~

~~6.4.1 Onsite Meteorological Measurement Program~~

The purpose of this section is to identify that the onsite meteorological measurements program and other data-collection programs used by Fermi 3 are adequate to: (1) describe local and regional atmospheric transport and diffusion characteristics within 50 mi (80 km) of the plant, (2) ensure environmental protection, and (3) provide an adequate meteorological database for evaluation of the effects of plant operation. This discussion includes an analysis of the following meteorological monitoring system elements:

- The location of the meteorological tower and instrument siting
- Meteorological parameters measured
- Meteorological sensors
- Instrument surveillance
- System accuracy
- Data recording and transmission
- Data acquisition and reduction
- Data validation and screening
- Data display and archiving
- Data recovery rate and annual and joint frequency distribution of data

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6.4.1.1 Tower and Instrument Siting

Figures showing the location of the onsite meteorological tower in respect to offsite meteorological stations and surrounding topography are provided in Figure 2.7-1 and Figure 2.7-56 through Figure 2.7-59, respectively. Figure 2.1-4 provides the location of the Fermi site structures in relation to the current onsite meteorological tower. The existing onsite meteorological open-latticed tower is located approximately 1113 feet west-southwest of the Fermi 3 reactor containment building and

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Since June 1975, some of the meteorological monitoring program components have been upgraded (Reference 6.4-1). Subsection 6.4.1 describes the current state of the onsite meteorological measurement program. The Fermi 2 meteorological monitoring program provides the basis for the Fermi 3 preapplication meteorological monitoring program. In addition, data from the onsite meteorological tower is used as the sole input for models that describe the short- and long-term atmospheric transport and diffusion characteristics of the site, as provided for in NRC Regulatory Guides 1.145 and 1.111, respectively. A description of the model used to analyze the short- and long-term atmospheric transport and diffusion conditions of the site is described in Subsections 2.7.6.1 and 2.7.6.2.

The NDCT for Fermi 3 will be built in the approximate location of the current onsite meteorological tower. Thus, a new meteorological tower will be erected in the southeast corner of the Fermi site as displayed in Figure 2.1-4. Subsection 6.4.2 will describe the construction, pre-operational, and operational meteorological monitoring program for Fermi 3.

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6.4.1 Fermi 3 Preapplication Meteorological Monitoring Program

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has a height of 197 feet above plant grade. This location is within a distance that is less than 10 times the height of the Fermi 3 reactor building, and therefore does not fully meet the siting criteria of NRC Regulatory Guide 1.23. ~~Accordingly, the existing meteorological tower will require relocation in conformance with Regulatory Guide 1.23 prior to construction of Fermi 3 structures.~~ The meteorological parameters specified in NRC Regulatory Guide 1.23 are measured by instrumentation mounted at two levels (10-m (33-ft) and 60-m (197-ft)) on the tower. The 10-m and 60-m elevations were selected to approximate the heights of release of activity emanating from ground level and the plant's heat dissipation system, respectively. The meteorological sensors are mounted on booms, which are greater than one tower width away from the tower and are oriented normal to the prevailing wind direction. The meteorological sensor types, heights, and location in reference to structures are in conformance with NRC Regulatory Guide 1.23.

The influence of terrain near the base of the tower on temperature measurements is minimal. The tower is situated in a relatively flat area. A small climate-controlled instrument shelter is located at the base of the tower. The tower is situated in an area undisturbed by trees or bushes and is sufficiently close to the shoreline of Lake Erie such that it can measure the dynamic onshore flow conditions that could affect gaseous effluent releases. This effect on the dispersion conditions is representative of the site because the facility itself is located along the western shoreline of Lake Erie.

6.4.1.2 **Instrumentation and Their Accuracies and Thresholds**

Meteorological Sensors

The instrumentation on the meteorological tower consists of the following: wind speed and wind direction sensors at the 10-m and 60-m levels, a 10-m air temperature sensor, a 10-m to 60-m vertical air temperature difference system (ΔT), and a 10-m dewpoint temperature sensor. In addition, a heated tipping bucket rain gauge monitors precipitation at ground level at the base of the meteorological tower. Table 6.4-1 provides a listing of the meteorological parameters monitored on the tower, the sampling height(s), as well as the sensing technique for the primary and secondary systems.

To minimize data loss due to ice storms, external heaters are installed on the primary wind sensors. The heaters are thermostatically controlled and are of the slip-on/slip-off design for easy attachment. The wind sensor specifications are not affected by these heaters. A windscreen is mounted around the precipitation gage to minimize the amount of windblown snow and debris deposited in the gage.

The accuracies and thresholds for the meteorological sensors located on the meteorological tower are presented in Table 6.4-2. The accuracies and thresholds for each sensor are within the limitations specified in NRC Regulatory Guide 1.23.

Data Recording Equipment

After the data are collected by the sensors, the output is routed through signal conditioning equipment and then directed to digital data recorders. The signal conditioning equipment and

Insert 3

Accordingly, a new meteorological tower will be built prior to construction of Fermi 3. Subsection 6.4.2.1 describes the location of the new meteorological tower.

Routine data summaries are generated for each day, calendar month, and calendar year and then archived on the IPCS computers. In addition, joint frequency distributions of wind speed and wind direction for each Pasquill stability category are created from the 1-hour blocked averages. The format of the annual onsite meteorological data summaries and joint frequency distribution tables conforms to the recommended format found in NRC Regulatory Guide 1.23.

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~~6.4.2 Pre-Operational and Operational Program~~

~~As described in Section 6.4 of NUREG-1555, the current meteorological program for Fermi 2 establishes a baseline for identifying and assessing the environmental impacts during pre-application, site preparation and construction, pre-operating, and operating stages of Fermi 3. Therefore, at this point, the current monitoring program will continue and be used as the basis for recording the necessary meteorological observations during the pre-operation/construction phase of Fermi 3, as well as the operation phase of Fermi 3. Should Detroit Edison choose to install a new meteorological monitoring tower either during the pre-operational or operational phases of Fermi 3, the tower will be sited, installed, and operated in accordance with the provisions of NRC Regulatory Guide 1.23. The transition to the new meteorological tower will be planned and accounted for in the existing monitoring plan.~~

6.4.3 References

6.4-1 Detroit Edison, “Fermi 2 Updated Final Safety Analysis Report,” Revision 14, November 2006.

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Insert 4

6.4.2 Fermi 3 Construction, Pre-Operational, and Operational Onsite Meteorological Monitoring Program

As described in Section 6.4 of NUREG-1555, the current meteorological program establishes a baseline for identifying and assessing the environmental impacts during preapplication meteorological monitoring. The NDCT for Fermi 3 will be built in the approximate location of the current onsite meteorological tower. Thus, a new meteorological tower will be erected in the southeast corner of the Fermi site prior to construction of Fermi 3. The new meteorological tower will be operational for at least one year and possibly two years prior to the decommissioning of the existing onsite meteorological tower. The meteorological data recorded concurrently from the current and new onsite meteorological towers will undergo a detailed analysis to ensure the meteorological parameters measured at the new meteorological tower are representative of the atmospheric conditions at the Fermi site. Actual and perceived data biases between the current and new meteorological towers will be documented and evaluated. The construction, pre-operational, and operational onsite meteorological monitoring program is described in greater detail in the following subsections.

6.4.2.1 Tower and Instrument Siting

The new meteorological tower will be a guyed open-latticed tower built to ANSI/TIA/EIA-222-G standards and will have a height of 60 m (197 ft). The location of the new onsite meteorological tower in respect to the current onsite meteorological tower and Fermi 3 site layout is provided in Figure 2.1-4. Regulatory Guide 1.23 estimates that a meteorological tower located at least a distance of 10-building-heights horizontal distance downwind from a nearby structure will not have adverse wake effects exerted by the structure. The reactor building is located approximately 1341.1 m (4400 ft) north-northwest of the new onsite meteorological tower. The height of the reactor building is approximately 48.2 m (158 ft) above plant grade. Using the method suggested by Regulatory Guide 1.23 the zone of turbulent flow created by the reactor building will be limited to approximately 481.6 m (1580 ft). The 4-cell MDCT will be located approximately 1235.5 m (4054 ft) north of the new onsite meteorological tower. The height of the MDCT will be considerably lower than the reactor building, and will exert a smaller zone of turbulent flow. Therefore, the reactor building and MDCT are located at distances that will not produce adverse wake effects on the wind direction and speed measurements at the new meteorological tower.

Other structures near the location of the new meteorological tower include a NDCT and water tower. The NDCT is hyperbolically shaped and has a maximum width at the base of the tower, which has an outer diameter of 140.2 m (460 ft). The downwind wake zone for hyperbolically shaped and sloping structures is expected to be smaller than for structures that are square or rectangular and have sharp edges. 40 CFR 51.100(ii)(3) defines good engineering practices (GEP) stack height as that which ensures that emissions from a stack do not result in excessive concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures, or nearby terrain features. "Nearby structures" is defined in 40 CFR 51.100(jj)(1) as that distance up to five times the lesser of the height or width dimension of a structure. Furthermore, the wake zone area becomes increasingly smaller as the height to width ratio of a structure increases (Reference 6.4-2). For the NDCT the lesser dimension is the width, which is the base width. Therefore, a conservative method to calculate the outermost boundary of influence exerted by the NDCT is to multiply the maximum width by five.

Using this method, with a maximum width of 140.2 m (460 ft) at the base of the tower, the downwind wake effect is estimated to extend 701.1 m (2300 ft) from the base of the NDCT. The NDCT is located approximately 1268 m (4160 ft) northwest of the new meteorological tower. Thus, the new meteorological tower is at a distance that will not be affected by the wake zone of the NDCT.

The water tower near the location of the new meteorological tower has a height of 44.2 m (144.9 ft) and a maximum width of approximately 16.2 m (53.3 ft) at the equator of the tank head. The tank head of the water tower structure is spherical and has a sloping surface and like the NDCT exerts a downwind wake zone that is conservatively estimated as five times the maximum width of the water tank head. Thus, for the water tower with a maximum width of 16.2 m (53.3 ft), the outermost boundary of influence exerted by the water tower is conservatively estimated to be 81 m (265.8 ft). The water tower is located approximately 210.9 m (692 ft) southeast of the new meteorological tower. Thus, the new meteorological tower is at a distance that will not be affected by the wake zone of the water tower.

Natural obstructions that can influence wind measurements near the new meteorological tower include trees that are taller than 5 m (16 ft). The location of the new meteorological tower is wooded and contains trees that would influence wind measurements if left at their current height. However, prior to installing the new meteorological tower the trees will be trimmed to a height less than 5 m (16 ft) outwards to a distance that satisfies the 10-building-height distance of separation stated in Regulatory Guide 1.23.

NRC Regulatory Guide 1.23 indicates that ΔT should be measured at 10 m and 60 m, and if necessary at 10 m and a higher level that is representative of diffusion conditions from release points higher than 85 m (278.9 ft). The atmospheric release heights above plant grade for Fermi 3 are 52.6 m (172.6 ft) for the reactor building/fuel building stack, 71.3 m (233.9 ft) for the turbine building stack, and 18 m (59.1 ft) for the radwaste building stack. All release heights for Fermi 3 are below 85 m (278.9 ft); therefore, the new meteorological tower will have meteorological sensors located at 10 m and 60 m elevations to estimate dispersion conditions for ground-level and the plant's heat dissipation system. The meteorological sensors will be mounted on booms, which will be greater than one tower width away from the tower and will be oriented normal to the prevailing wind direction.

The influence of terrain near the base of the new meteorological tower on temperature measurements is expected to be minimal. The area surrounding the new meteorological tower will not be paved or contain temporary land disturbances, such as plowed fields or rock piles. In addition, the tower will be situated in a relatively flat area that will be at a similar elevation as the plant structures. A climate-controlled instrument shelter will be installed on a concrete slab at the base of the tower; however, materials that minimize influence on the measurements will be used to construct the shelter. The new meteorological tower will be built close to the shoreline of Lake Erie such that it can measure the dynamic onshore and offshore flow conditions within the thermal internal boundary layer. Fermi 2 and Fermi 3 are located at similar distances to the western shoreline of Lake Erie, such that measurements made at the new meteorological tower will be representative of atmospheric dispersion conditions that could affect gaseous effluent releases.

6.4.2.2 Instrumentation

Meteorological Sensors

The instrumentation on the new meteorological tower will consist of the following: wind speed and wind direction sensors at the 10 m and 60 m levels, a 10 m air temperature sensor, a 10 m to 60 m ΔT, and a 10 m dewpoint temperature sensor. To minimize data loss due to ice storms, external heaters will be installed on the primary wind sensors. The heaters will be thermostatically controlled and of the slip-on/slip-off design for easy attachment. The wind sensor specifications are not affected by these heaters. In addition, a heated tipping bucket rain gauge will be mounted at ground level on a concrete slab at the base of the meteorological tower away from any potential obstructions. A windscreen will be mounted around the precipitation gage to minimize the amount of windblown snow and debris deposited in the gage.

Redundant, secondary sensors at the 10 m and 60 m levels will also be installed on the new meteorological tower for air temperature, vertical wind speed, horizontal wind speed, and wind direction measurements. Table 6.4-1 provides a listing of the meteorological parameters that will be monitored on the new meteorological tower, the sampling height(s), as well as the sensing technique for the primary and secondary systems.

For the new meteorological tower the applicant intends to use meteorological instrumentation that matches the manufacturer and model numbers in use on the current meteorological tower. The accuracies and thresholds for each meteorological sensor located on the current onsite meteorological tower are presented in Table 6.4-2. The accuracies and thresholds for each sensor on the new meteorological tower will be within the values specified in NRC Regulatory Guide 1.23.

Data Recording Equipment

The data recording process planned for the new meteorological monitoring program will mirror the data recording process for the preapplication monitoring program as described in Subsection 6.4.1.2. The manufacturer and model numbers for the data recording equipment that is listed in Table 6.4-2 will be used for the new meteorological monitoring program. One exception is that the signal conditioning equipment used for the current meteorological monitoring program is no longer available from the manufacturer. Therefore, the signal conditioning equipment for the new meteorological monitoring program will be replaced with signal conditioning equipment that has accuracies that are equal or better than the accuracies listed for the current signal conditioning equipment.

Electrical power for the new meteorological monitoring program will continue to be supplied to the primary and secondary systems by independent power supplies. One source of power will be Fermi 2; the other will be an offsite source. If one supply fails, the other automatically supplies the necessary power for both systems. The new meteorological tower will be built with two precautions to minimize lightning damage to the system. Two of the three legs of the tower will be grounded and the signal cables will be routed through a lightning protection panel. Each signal line will be protected by transient protection diodes specifically designed to stay below the individual line voltage breakdown point.

6.4.2.3 Instrument Calibration, Service, and Maintenance

The instrument calibration, service, and maintenance procedures in place for the current meteorological monitoring program will continue for the new meteorological monitoring program. Subsection 6.4.1.3 provides a description of the instrument calibrations program, while Subsection 6.4.1.4 provides a description of the instrument service and maintenance program. System components that collect, transmit, process, record, and display the meteorological data will be inspected, calibrated, serviced, and maintained such that at least 90% data recovery is achieved for the new meteorological monitoring system.

6.4.2.4 Data Reduction, Transmission, Acquisition, and Processing

The method of data reduction, transmission, acquisition, and processing that is described in Subsections 6.4.1.5 and 6.4.1.6 for the preapplication monitoring program will be used for the construction, pre-operational, and operational monitoring programs.

Insert 5

6.4-2	U.S. Environmental Protection Agency, "Guideline for Determination of Good Engineering Practice Stack Height, Technical Support Document for the Stack Height Regulations," EPA-450/4-80-023, Revision, June 1985

management weekly and deficiencies addressed immediately. Such compliance is expected to diminish the potential for impacts to the terrestrial environment.

In accordance with baseline studies performed during the pre-application period discussed in Subsection 2.3.3 and Subsection 2.4.1 and consideration of impacts discussed in Subsection 4.3.1, no additional monitoring programs are proposed for the following:

- Bird collisions with plant structures, elevated construction equipment, cooling towers, and transmission structures
- Salt deposition impacts on vegetation and habitats

6.5.1.3 **Operational Monitoring**

American lotus monitoring will be established, as needed, through consultation with the MDNR, as discussed in Subsection 6.5.1.2.

It is expected that the USFWS will continue annual monitoring of the bald eagle. Accordingly, no monitoring by Detroit Edison is warranted.

The creation, restoration or enhancement of wetlands to mitigate for impacts to these resources is expected to be completed prior to the operational phase of the project. Monitoring the success of these activities will occur over a period of five years and this time period is expected to extend into the operational phase of the project. Mitigation monitoring sampling periods, methods, and success criteria will be established through the preparation of a wetland mitigation monitoring plan in consultation with the USACE and MDEQ during the wetlands permitting process.

No other required continuous monitoring programs are anticipated for terrestrial ecology resources.

6.5.2 **Aquatic Ecology**

The following subsection provides information regarding potential ecological monitoring for aquatic ecology likely to be affected by site preparation, construction, and operation of Fermi 3. The monitoring program throughout the various stages of project implementation has been designed based on anticipated environmental impacts that may potentially affect important aquatic species and habitats as described in Subsection 2.4.2.

The aquatic resources at the Fermi site and vicinity are described in Subsection 2.4.2. Impacts to aquatic resources from construction of Fermi 3 are described in Subsection 4.3.2. Impacts to aquatic resources from operation of the cooling system are described in Subsection 5.3.1.2 and Subsection 5.3.2.2. In summary, the only important aquatic habitat impacted by Fermi 3 construction and operation is portions of the DRIWR.

American lotus is the only important species that resides within the DRIWR. The monitoring program for the American lotus is discussed in Subsection 6.5.1.

6.5.2.1 **Pre-Application Monitoring**

This program includes evaluations and analysis made for the licensing and permitting of Fermi 2 and additional current and historical information gathered and reviewed for preparation of this Environmental Report. Pre-application monitoring consisted of evaluating historical Fermi 2 data, data collected and reported in Subsection 2.4.2, and Fermi 2 impingement and entrainment studies. Additional pre-application monitoring includes onsite biological surveys consisting of current Fermi 2 impingement and entrainment studies as described in Subsection 2.3.3, Subsection 2.4.1, and Subsection 2.4.2.

Collectively, these sources provided data describing the ecological resources existing on the Fermi site and in the vicinity. Sampling locations and methods are described in Subsection 2.4.2.

Fermi 2 Current Monitoring

Fermi 2 current monitoring includes the monitoring of chemicals used to control zebra mussel (*Dreissena polymorpha*) densities. As described in Subsection 2.4.2 and Subsection 4.3.2, the zebra mussel is a bio-fouling agent commonly known to clog intake and discharge components of cooling water make-up systems. The monitoring and control program prevents zebra mussel build-up in the intake clarifier and clarifier components of the cooling tower make-up water system. It is anticipated that this monitoring and control program will continue to be implemented in future Fermi NPDES permits.

Summary of Pre-Application Evaluations

The evaluations and surveys described in Subsection 2.4.2 provide established baseline data for the resources located on the Fermi site and in the vicinity to support evaluation of potential impacts, as outlined in Subsection 4.3.2, Subsection 5.3.1, and Subsection 5.3.2.

6.5.2.2 **Site Preparation and Construction Monitoring**

Site preparation and construction impacts to aquatic habitats (wetlands) are anticipated, as discussed in Subsection 4.3.1.2.2. A mitigation plan will be developed through consultation with the MDEQ and USACE. It is expected that BMPs and associated inspections will be implemented at all construction sites to prevent construction effluent (either planned or accidental) from entering aquatic resources on and near the Fermi site. Candidate BMPs include, but are not limited to, silt fencing and/or hay waddles around fill and soil refuse piles, tarp covers over fill and soil refuse piles when not actively in use, and silt fencing barriers along exterior perimeters of construction projects. An NPDES Stormwater Construction Permit, Soil Erosion and Sedimentation Control (SESC) Plan, and Pollution Incident Prevention Plan (PIPP) would detail measures ensure water quality, and thereby to protect aquatic resources. Proper functionality of BMPs and adherence to the NPDES Stormwater Construction Permit, SESC Plan, and PIPP would be monitored for construction activities at the Fermi site.

~~Fermi 3 construction impacts are not anticipated to cause any adverse effects to aquatic species; therefore,~~ Additional aquatic resource monitoring is expected to be limited to the DRIWR, which is the only important aquatic habitat located onsite and in the vicinity. Limited biological surveys within the DRIWR will be considered.

6.5.2.3 **Pre-Operational Monitoring**

Discharged effluents would continue to be monitored and necessary parameters recorded continuously as established in existing and future NPDES permits. Such monitoring would ensure that cumulative effluents from the construction and operation of Fermi 3 would continue to meet permit standards. These parameters conform to Michigan water quality standards designed to prevent adverse impacts to environmental resources and protect important aquatic species.

6.5.2.4 **Operational Monitoring**

As discussed in Section 6.1, the MDEQ requires continuous monitoring/recording of discharge water temperature. NPDES permit monitoring/recording of the concentration of chemical constituents in waters discharged at all Fermi permitted outfalls is also required, as discussed in Section 6.6 (see Figure 5.3-1). It is expected that the existing Fermi 2 monitoring requirements will be similarly implemented for the operation of Fermi 3.

The operational monitoring program is anticipated to be a continuation of Fermi 2 operational programs described in Subsection 6.5.2.1 including the zebra mussel monitoring and control program. This is justified because the operational impacts to Lake Erie and the DRIWR are expected to be small. Moreover, with respect to Lake Erie, the previous Fermi 2 fish impingement and entrapment studies did not underscore a need for an operational Fermi 2 monitoring program on Lake Erie. Because the Fermi 3 intake design is comparable to Fermi 2 from the standpoint of fish impingement and entrapment potential, there is similarly no need for an ongoing Fermi 3 operational monitoring program.

6.5.3 **References**

None.

9.2.3.1 **Coal-Fired Generation**

In general, the environmental impacts of constructing a typical coal-fired power plant are well known because coal, as discussed earlier, is the most prevalent type of central generating technology in the United States. The impacts of constructing a large coal-fired power plant at a "greenfield" site can be substantial, particularly if it is sited in a rural area with considerable natural habitat (Reference 9.2-2).

9.2.3.1.1 **Land Use and Related Impacts to Ecology**

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Since this alternative would involve new construction, one key environmental impact area is land use. In Reference 9.2-2 it is estimated that approximately 1700 acres would be needed for a 1000 MWe coal-fired power plant. This estimate would be scaled up for the approximately 1600 MWe capacity of the proposed coal-fired alternative (i.e., 2720 acres), which is considerably larger than that required for Fermi 3 (approximately ~~275~~ acres total, including permanent and temporary impacts). The Fermi site is approximately 1260 acres total, as noted in Section 2.2. Thus, the current site would not support a comparable sized coal-fired power plant.

Since large quantities of coal and lime (or limestone) would be delivered via rail line, new construction would be required to support railcar turnaround facilities. Given the substantial land use (relative to Fermi 3), the associated impacts related to land clearing, erosion and sedimentation, air quality from construction vehicles, impact to the ecology, etc., would be proportionally much greater for the coal-fired alternative.

In Reference 9.2-2, it is estimated that approximately 22,000 acres would be affected for mining the coal and disposing of the waste to support a 1000 MWe coal-fired power plant during its operational life. Thus, the equivalent land usage requirement for 1600 MWe coal-fired production would be approximately 35,200 acres. In contrast, based on estimates discussed in Reference 9.2-2, uranium mining and processing required to supply fuel during the operating life of a nuclear facility of 1600 MWe capacity would be approximately 1600 acres.

9.2.3.1.2 **Waste Generation and Emissions**

It is assumed that the new coal-fired power plants would primarily use western sub-bituminous coal – similar to the current fleet of Detroit Edison coal-fried power plants. It is estimated that the proposed power plant would consume approximately 7 million tons/yr of pulverized sub-bituminous coal with corresponding ash content (determined from information in Reference 9.2-14 for Detroit Edison historical coal usage versus power generation). Lime or limestone, used in the scrubbing process for control of sulfur dioxide emissions, is injected as a slurry into the hot effluent combustion gases to remove entrained sulfur dioxide. The lime-based scrubbing solution reacts with sulfur dioxide to form calcium sulfite, which precipitates and is removed from the process as sludge.

As discussed in Reference 9.2-27, coal combustion products (CCP) are among material targeted by the U.S. Environmental Protection Agency (EPA) Resource Conservation Challenge (RCC). The RCC is designed to facilitate changes in the economics and practice of waste generation, handling, and disposal (e.g., by promoting market opportunities for beneficial use). Currently, the most common beneficial uses for CCPs are as a replacement for virgin materials in concrete and cement making, structural fill and gypsum wallboard. Reference 9.2-27 summarizes results from the most recent survey of generators of CCPs. These results show the application uses for the CCPs along with the total utilization rate for each of the CCPs. For example, the utilization rate for gypsum from the flue gas desulphurization (FGD) process accounts is approximately 77 percent, the majority of the use of FGD gypsum is as a substitute for virgin gypsum in wallboard manufacturing. The total CCP utilization rate for all CCPs combined is 40 percent. The EPA goals discussed in Reference 9.2-27 include achieving an overall 50 percent beneficial use of CCPs by 2011.

Even with current recycling levels and the EPA goals for increasing the recycling levels, there is still a considerable amount of waste products for disposal. Waste impacts to groundwater and surface-water could extend beyond the operating life of the power plant if leachate and runoff from the waste storage area occurs (Reference 9.2-14).

9.2.3.1.3 **Air Quality and Human Health**

Dust emissions from construction activities for a coal-fired power plant would be similar to those from any similar construction project. Such emissions would be temporary, mitigated using best management practices, and therefore SMALL.

During its operating life, the emissions profile regarding air quality from coal-fired generation will vary significantly from that of a nuclear power generation because of emissions of sulfur oxides, nitrogen oxides, carbon monoxide, particulates, and other constituents. A coal-fired power plant would also have unregulated carbon dioxide emissions that many scientists believe contribute to global warming. The assumed plant design would minimize air emissions through a combination of boiler technology and post-combustion pollutant removal. By scaling levels from Reference 9.2-15, estimates for the coal-fired alternative emissions for particulate matter (PM), nitrogen oxides (NOx), sulfur oxides (SOx), carbon dioxide (CO_2), and mercury are as follows (Table 9.2-5):

- PM – 946 tons per year.
- NOx – 13,724 tons per year
- SOx – 37,400 tons per year
- CO_2 – 8,912,000 tons per year
- Mercury – 0.174 tons per year

The acid rain requirements of the Clean Air Act (42 U.S.C. 7491) capped the nation's sulfur dioxide emissions from power plants. An operator would have to obtain sufficient pollution credits either from a set-aside pool or purchases on the open market to cover annual emissions from the plant. The market based allowance system used for sulfur dioxide emissions is not used for NOx emissions. A new coal-fired power plant would be subject to the new source performance standard for such plants (40 CFR 60.44a(d)(1)), which limits the discharge of any gases that contain NOx (expressed as nitrogen dioxide).

It is further noted that coal-fired power plants are expected to be subject to some form of additional cost related to carbon dioxide. As discussed in Reference 9.2-3:

> The urgent problem of global climate change is expected to be addressed at the federal level within the next five years. While there are no known state proposals to tax carbon dioxide, discussion at the federal level is heating up, and it would be imprudent not to consider that such a tax, or other greenhouse gas controls, could emerge in the near future.

As further noted, carbon dioxide emissions regulation could substantially raise the cost of electricity produced by conventional coal. In addition to the expected federal actions, the State of Michigan is also considering implementing actions to reduce emissions. By order of the Governor of the State of Michigan, the Michigan Climate Action Council (MCAC) was established as an advisory board to the Michigan Department of Environmental Quality (MDEQ). Reference 9.2-28 provides an interim report providing short-term, mid-term, and long-term emissions reduction goals for Michigan.

A new coal-fired power plant in southern Michigan would likely need a prevention of significant deterioration permit and an operating permit under the Clean Air Act. The plant would need to comply with the new source performance standards for such plants in 40 CFR 60 Subpart Da. The standards establish emission limits for particulate matter and opacity (40 CFR 60.42a), sulfur dioxide (40 CFR 60.43a), and nitrogen oxide (40 CFR 60.44a).

The EPA has various regulatory requirements for visibility protection in 40 CFR 51, Subpart P, including specific requirements for review of any new major stationary source in an area designated as attainment or unclassified for criteria pollutants under the Clean Air Act (40 CFR 51.307(a)) and areas designated as nonattainment under the Clean Air Act (40 CFR 51.307(b)). The majority of Michigan has been classified as attainment or unclassified for criteria pollutants (40 CFR 81.323). Nonattainment areas for the 8-hour ozone standard include Monroe county and seven other counties in the Detroit-Ann Arbor area. Also, nonattainment areas for PM2.5 include Monroe and six other counties in the Detroit-Ann Arbor area.

Section 169A of the Clean Air Act establishes a national goal of preventing future and remedying existing impairment of visibility in mandatory Class I Federal areas when impairment occurs because of air pollution resulting from human activities. In addition, EPA regulations provide that, for each mandatory Class I Federal area located within a State, the State must establish goals that provide for reasonable progress toward achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility for those days on which visibility is most impaired over the period of the implementation plan and ensure no degradation in visibility for the least visibility-impaired days over the same period (40 CFR 51.308(d)(1)). If a new coal-fired power plant were located close to a mandatory Class I area, additional air pollution control requirements could be imposed. Isle Royale National Park and Seney National Wildlife Refuge are Class I areas in the State of Michigan where visibility is an important value (40 CFR 81.414). Both of these areas are located in the Upper Peninsula of Michigan. Air quality in these areas would not likely be affected by a coal-fired power plant at an alternate site in southern Michigan in the vicinity of the Fermi site. In addition, there are no Class I areas in the State of Ohio. (Reference 9.2-17)

Reference 9.2-2 did not quantify emissions from coal-fired power plants, but implied that air impacts would be substantial. Reference 9.2-2 also mentioned global warming from unregulated carbon dioxide emissions and acid rain from sulfur oxides and nitrogen oxide emissions as a potential impact. Adverse human health effects, such as cancer and emphysema, have been associated with the products of coal combustion.

Overall, it is concluded that air quality impacts from coal-fired generation would be MODERATE. The impacts would be clearly noticeable, but would not destabilize air quality.

9.2.3.1.4 **Cooling System Considerations, Water Use, and Related Impacts to Ecology**

The NRC evaluated the coal-fired power plant with both open and closed cycle cooling systems (Reference 9.2-2). In general, in either case, intake and discharge would be designed to comply with state and federal standards. As discussed in Reference 9.2-2, the closed-cycle system would require slightly more land, but the difference is insignificant relative to the overall land use requirement noted above. The open-cycle system, with a higher intake and discharge flow rate, could have greater potential impacts, e.g., impingement and entrainment of fish and thermal impacts, to the aquatic ecosystem. The closed-cycle system would typically rely on large natural draft cooling towers or mechanical fan-cooled cooling towers. The trade-off in this case would be the evaporation, drift, and other impacts from the cooling tower, including discharge of dissolved solids to Lake Erie of cooling tower blowdown. The decreased intake flow rate of the closed-cycle system would have less impact on the aquatic ecosystem (e.g., impingement and entrainment mortalities) and less thermal impact on the receiving water body. Water use impacts depend on the volume of water required and the characteristics of the receiving body.

Similar to Fermi 3, the bulk of the coal-fired power plant's raw water makeup is assumed to come from Lake Erie. As shown on Figure 2.1-4, a new cooling system intake structure on the lake would be required, resulting in temporary impact during construction. However, as evaluated for Fermi 3 in Chapter 4 and Chapter 5, neither the construction nor operation of the coal-fired power plant's intake would be expected to have a significant impact on surface-water. The coal-fired power plant's discharge to the lake would be expected to have impacts comparable to those of Fermi 3, i.e., not significant.

If the coal-fired power plant were placed on an alternate site, there could be impacts depending on available surface-water and groundwater sources. In any case, appropriate permits would govern and limit surface-water and groundwater use and impacts. Overall, the impacts are expected to be SMALL.

9.2.3.1.5 **Socioeconomics**

The coal-fired power plant would require an estimated construction work force of 2500 workers over a five year period. Thus, surrounding communities would experience demands for housing and public services. And following the conclusion of construction, the communities would then experience the loss of some portion of these construction jobs. With this workforce, area roads would experience increased traffic loads to and from the construction site (Reference 9.2-2). Fermi 3 expects a construction workforce of 2900 over a comparable five to six year period.

With the slightly smaller construction workforce (2500 vs. 2900), socioeconomic impacts could be expected to be slightly smaller in comparison to Fermi 3. As was the case in the construction of Fermi 2, these impacts related to the workforce would likely be dispersed over a relatively large geographic area that includes the southern suburbs of Detroit. While the commuting workforce would come from communities surrounding the construction site, many would likely originate from Detroit and Ann Arbor suburban area due to services available there. Based on an assessment of current highway capacities around the Fermi site and considering reasonable assumptions regarding carpooling and management of shift changes (Subsection 4.4.2), there would be little overall difference in impacts between the coal-fired alternative and Fermi 3.

Providing some offset to these impacts would be benefits related to construction and operation. In the short term, during construction, some portion of surrounding communities could be expected to find employment in construction jobs at the site. In the long term, the tax base would increase for affected communities. Both of these benefits would be proportionally larger for Fermi 3. Thus, while the Fermi 3 workforce is greater than that of the coal-fired power plant, the impacts will be short term and mitigated by dispersion over several relatively populous counties and improved transportation routes. Impacts would be offset, to some degree, by a proportionally larger employment opportunity and tax base associated with Fermi 3.

Fermi 3 was evaluated to have no significant adverse environmental or human health impacts; therefore, no potential disproportionate impacts to low income and/or minority groups are expected. See the review of environmental justice in Section 4.4 and Section 5.8 for additional detail. These conclusions would be unchanged for a coal-fired power plant.

9.2.3.1.6 **Transportation and Fuel Cycle Impacts of a Project Compared to the Coal-Fired Alternative**

Table S-3 of 10 CFR 51.51 summarizes environmental impact data associated with the uranium fuel cycle. Section 5.7 demonstrates the applicability of the Table S-3 environmental and human health effects for Fermi 3.

The environmental impacts associated with transporting fresh fuel to and spent fuel and waste from a 1000 MWe light water reactor (LWR) are summarized in Table S-4 of 10 CFR 51.52. Section 3.8 demonstrates that the environmental impacts of transportation of fuel and radioactive wastes for Fermi 3 SMALL.

Both Table S-3 and S-4 compilations are based on reference LWR reactors with a specific MWe output. Therefore, the environmental impacts are scaled appropriately to estimate impacts associated with the target site capacity of 1600 MWe of Fermi 3. However, in general, given the assessments of Fermi 3 provided in Section 3.8 and Section 5.7, it can be concluded that the expected impacts associated with the uranium fuel cycle and transportation of nuclear fuels for Fermi 3 would be consistent with that compiled by the NRC in Tables S-3 and S-4. Thus, given the assessments in Section 3.8 and Section 5.7 and in consideration of the above discussion of coal-fired power plant waste generation, impacts to air quality, and human health, the coal-fired power plant would not be expected to be an environmentally preferable alternative.

9.2.3.1.7 **Coal-Fired Generation Conclusion**

In conclusion, as discussed above, coal-fired generation is not expected to be an environmentally preferable alternative. This conclusion is based on significantly increased air emissions and land usage requirements.

9.2.3.2 **Natural Gas-Fired Generation**

The environmental impacts of the natural gas-fired alternative are examined in this subsection, considering both the Fermi site and an unnamed alternate site. The analysis assumes a closed-cycle cooling system since the once-through system is considered to have greater overall environmental impacts (for reasons discussed in the preceding analysis of the coal-fired alternative).

9.2.3.2.1 **Land Use and Related Impacts to Ecology**

As reported in Subsection 2.2.1.2.7, the closest natural gas pipeline is approximately 10 miles west of the Fermi site. Thus, for the case in which the natural gas-fired power plant is built at (or near) the Fermi site, there would be an associated considerable impact related to pipeline construction. For the purposes of this assessment, without performing more detailed evaluations of pipeline capacity, it is assumed that the capacity of this closest pipeline would be sufficient. This provides a conservative assessment as this assumption minimizes the potential land use and ecological impacts.

In Reference 9.2-2, it is estimated that approximately 110 acres would be needed for a 1000 MWe natural gas-fired power plant. This estimate would be scaled up for the approximately 1600 MWe capacity of the natural gas-fired alternative, resulting in 176 acres. The natural gas-fired power plant likely could be sited on the Fermi site on land that was previously disturbed in the construction of Fermi 1 and 2 and on land previously not disturbed. ~~Assuming the natural gas-fired power plant uses a closed-cycle cooling system (as discussed below), an additional land area of 70 acres is required for cooling towers and support systems (similar to Fermi 3), thus bringing the total estimated footprint to 246 acres.~~ From Reference 9.2-18, approximately 100 acres would be impacted by a new five mile gas pipeline. Thus, the 10 miles of new pipeline need to locate a natural gas-fired power plant at the Fermi site would impact an additional 200 acres. Thus, the total land use commitment (for siting the natural gas-fired power plant at the Fermi site) would be approximately ~~446 acres.~~ 376

Fermi 3 is expected to require approximately 125 acres. Thus, the natural gas-fired power plant's footprint (if sited at the Fermi site) is larger than the Fermi 3 land use (~~246~~ 176 acres vs. 125 acres). This does not include land impacted by transmission changes. Impacts to transmission will be similar for either the natural gas-fired power plant or Fermi 3. As the land permanently impacted for either a natural gas-fired power plant or the proposed project is approximately equivalent, the impacts to wildlife would also be approximately equivalent. Therefore, in sum from this perspective, the natural gas-fired power plant would not be considered environmentally preferable to Fermi 3.

approximately 165

In addition to the use of 125 acres for permanent structures for Fermi 3, up to ~~150~~ additional acres could be affected (temporarily) during construction of Fermi 3. Land used temporarily during construction would be subject to standard mitigation procedures to minimize impact. Appropriate measures would also be taken to restore the land, and long-term impact is not expected. Temporary land use during construction of the natural gas-fired power plant was not available. The 176 estimated total natural gas-fired power plant operational footprint (~~240~~ acres) is larger than that of Fermi 3. In addition, accounting for the land temporarily affected by installation of the new gas pipeline, the total land affected is even greater for a natural gas-fired power plant. The natural gas-fired power plant construction and operational impact could be larger if placed at another site requiring additional gas supply pipeline right-of-way and construction. Without specific data on land temporarily impacted during natural gas-fired power plant construction, further assessment is not possible. However, it can be assumed that even with the use of standard mitigation procedures and the temporary nature of these impacts, it is not likely that construction land use and the associated impacts to ecology would make the natural gas-fired power plant environmentally preferable to Fermi 3.

Additional land could be required for natural gas wells and additional infrastructure to support gas processing, treatment, regulations and metering. Based on estimates in Reference 9.2-2, approximately 5760 acres would be required to support a natural gas-fired power plant of approximately 1600 MWe. Uranium mining and processing could require approximately 1600 acres for the operating life of a nuclear facility of 1600 MWe capacity. Given this consideration and the relatively larger land use related to fuel source (and the related impacts to the ecology), the natural gas-fired alternative would not be environmentally preferable to Fermi 3.

9.2.3.2.2 **Air Quality**

Natural gas is a relatively clean-burning fuel. When compared with a coal-fired power plant, a natural gas-fired power plant would release similar types of emissions but in lower quantities.

A new natural gas-fired power plant in southern Michigan would likely need a prevention of significant deterioration permit and an operating permit under the Clean Air Act. The plant would need to comply with the new source performance standards for such plants in 40 CFR 60 Subpart Da. The standards establish emission limits for particulate matter and opacity (40 CFR 60.42a), sulfur dioxide (40 CFR 60.43a), and nitrogen oxide (40 CFR 60.44a).

The EPA has various regulatory requirements for visibility protection in 40 CFR 51, Subpart P, including specific requirements for review of any new major stationary source in an area designated as attainment or unclassified for criteria pollutants under the Clean Air Act (40 CFR 51.307(a)) and areas designated as nonattainment under the Clean Air Act (40 CFR 51.307(b)). The majority of Michigan has been classified as attainment or unclassified for criteria pollutants (40 CFR 81.323). Nonattainment areas for the 8-hour ozone standard include Monroe county and seven other counties in the Detroit-Ann Arbor area. Also, nonattainment areas for $PM_{2.5}$ include Monroe and six other counties in the Detroit-Ann Arbor area.

Chapter 10 Environmental Consequences of the Proposed Action

Section 102(c) of the National Environmental Policy Act (NEPA) specifies three special NEPA requirements that an Environmental Impact Statement (EIS) must evaluate. This chapter evaluates these three requirements, listed below, as well as a benefit-cost analysis (BCA), associated with constructing and operating Fermi 3. The three requirements, as well as the BCA, are evaluated in the following four sections:

- Unavoidable Adverse Environmental Impacts (Section 10.1)
- Irreversible and Irretrievable Commitments of Resources (Section 10.2)
- Relationship between Short-term Uses and Long-term Productivity of the Human Environment (Section 10.3)
- Benefit-Cost Balance (Section 10.4)

10.1 Unavoidable Adverse Environmental Impacts

This section presents the unavoidable adverse environmental impacts of constructing and operating Fermi 3. Unavoidable adverse impacts are those environmental impacts that remain after implementation of practical mitigation measures, or for which no practical mitigation measure exists. This section describes unavoidable adverse impacts of construction (Chapter 4) and operation (Chapter 5) of Fermi 3 and the associated transmission system. The rated power of Fermi 3 is 4500 megawatts thermal (MWt), and the gross electrical power is 1600 megawatts electric (MWe).

The 345 kV transmission system and associated corridors are exclusively owned and operated by ITC*Transmission*. Detroit Edison has no control over the construction or operation of the transmission system. Since the transmission corridors are controlled and operated by ITC*Transmission*, the impacts and measures discussed are considered as typical.

10.1.1 Unavoidable Adverse Environmental Construction Impacts

Construction impacts are described in detail in Chapter 4. Construction impacts (temporary and permanent), as well as measures and controls to reduce or eliminate the adverse impact, are summarized in Table 4.6-1. This section describes those adverse impacts associated with the construction of Fermi 3 and the associated transmission system that cannot be avoided. Impacts are generally relatively small and short-term, and effects can be either partially mitigated, or may dissipate after construction is complete.

Anticipated impacts and the mitigation measures that may reduce these impacts are summarized in Table 10.1-1. Unavoidable adverse impacts from construction of the new unit and onsite and offsite transmission corridors for Fermi 3 include those impacts associated with land use, hydrological and water use, ecological resources (terrestrial and aquatic), socioeconomics, radiation exposure, atmospheric and meteorological dynamics, and environmental justice.

10.1.2 Unavoidable Adverse Environmental Operational Impacts

Operational impacts of Fermi 3 are discussed in detail in Chapter 5. Operational impacts (temporary and permanent), as well as measures and controls to reduce or eliminate the adverse impact, are summarized in Table 5.10-1. This section describes those adverse impacts associated with the operation of Fermi 3 and the associated transmission system that cannot be avoided.

Operational impacts endure over a longer period of time than construction impacts, and some effects of operation are long-term. Impacts are generally relatively small and are associated with land use, hydrological and water use, ecological resources (terrestrial and aquatic), socioeconomics, radiation exposure, atmospheric and meteorological dynamics, and environmental justice. These expected impacts and the mitigation measures and controls that may reduce these impacts are summarized in Table 10.1-2.

10.1.3 References

None.

Table 10.1-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 1 of 5)

Impact Category	Adverse Impact	Potential Actions to Mitigate Impacts	Unavoidable Adverse Impact
Land Use	Construction of new buildings and impervious surfaces clears vegetation, disturbs area soils, and increases stormwater runoff. Soils are stockpiled onsite. Land is not available for other uses. Many of these impacts continue into the operational phase.	Limit ground disturbances to the smallest amount of area practical to construct Fermi 3 (approximately ~~261~~ 290 acres). Use Best Management Practices (BMPs) and minimize footprint of the designated construction area. Restrict soil stockpiling and reuse to designated areas within the construction footprint on the Fermi site. Conduct ground-disturbing activities in accordance with permit requirements. Implement erosion control measures described in the Fermi 3 Soil Erosion and Sedimentation Control (SESC) Plan. Limit vegetation removal to those areas designated for construction activities. Restore temporarily disturbed areas to allow their inclusion in the Detroit River International Wildlife Refuge on the Fermi site. The material to be dredged will be disposed in the onsite Spoil Disposal Pond, which is isolated from the surrounding environment. If it becomes necessary to remove the dredged material from the Spoil Disposal Pond, the dredged material would be subjected to chemical analysis to ascertain if the material can be disposed via land application or if an alternate disposal method is required.	Disturbance of ~~261~~ 290 acres of land occupied by one ESBWR unit and ancillary structures. Mitigation measures allow ~~some~~ most of this land to return to its pre-disturbed state. Much of the land is currently dedicated to Fermi 1 and 2 uses.

Table 10.1-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 2 of 5)

Impact Category	Adverse Impact	Potential Actions to Mitigate Impacts	Unavoidable Adverse Impact
	Construction of new transmission towers and stringing of new line in a new (maintained) corridor will cause a reduction in agricultural land use and habitats. Much of these impacts continues into operational phase and constitutes a long-term commitment of resources.[1]	Limit vegetation removal and construction activities in the new portion of the 345 kV route to Milan Substation to the existing maintained corridor. Revegetate disturbed areas with native species. Restrict transmission corridor/ROW access for construction vehicles to designated routes.[1] Minimize potential impacts through avoidance and compliance with permitting requirements, BMPs, and applicable laws and regulations Minimize land use impacts through the use of an existing transmission corridor, use of a maintained ROW for the new 10-mile portion of the line, and use of existing access roads.[1] Plan and schedule construction activities to minimize temporary disturbance/ displacement of crops and interference with farming activities.	Long-term commitment of land for the transmission corridor. Mitigation measures allow some of the disturbed land to be returned to its pre-disturbed state, and allow agricultural uses to continue on portions of the corridor.[1]
	Construction debris is disposed in permitted landfills; this will occur through the construction phase.	Establish waste minimization program to reduce the volume of debris that is generated. Recycle debris, where possible.	Some land is used to the long-term disposal of construction debris and is not available for other uses. This impact constitutes a commitment of land.
Hydrological and Water Use	Construction and ground disturbing activities could erode soils and increase sedimentation in area surface waters, degrading water quality. These impacts are temporary and short-term.	Comply with applicable permits, plans, and regulations. Minimize area and duration of disturbance, identify controls to minimize onsite and offsite erosion, and establish an inspection and maintenance schedule.	Minimal or no unavoidable adverse impact.
	Construction equipment spills of petroleum or other chemicals that could enter area surface waters. This impact occurs through the construction phase.	Implement measures and controls contained in the Pollution Incident Prevention Plan (PIPP) that would be prepared specifically for Fermi 3 construction activities.	Minimal or no unavoidable adverse impact.

Table 10.1-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 3 of 5)

Impact Category	Adverse Impact	Potential Actions to Mitigate Impacts	Unavoidable Adverse Impact
Terrestrial Ecology	Vegetation clearing and grading would disturb/destroy habitat and displace/kill wildlife. Some of these impacts would dissipate after construction is complete, while others would continue through the operations phase.	Minimize disturbance to habitat and species, as practical. Use previously disturbed areas as practical during construction.	Minimal or no unavoidable adverse impact.
	Construction near or in threatened and endangered (T&E) species' habitat could remove habitat or T&E species.	Mitigate State threatened species (American lotus).	Unavoidable adverse impact that could be mitigated through transplanting.
	Construction noises may startle animals, displacing them temporarily. This impact will occur intermittently through construction.	Minimize noise levels by using modern equipment designed to reduce noise.	Minimal or no unavoidable adverse impact.
	Birds may collide with tall construction equipment.	Impact is expected to be small. No mitigation measures are expected to be necessary.	Minimal or no unavoidable adverse impact.
	Wetlands may be impacted by construction.	A wetland delineation ~~is planned to determine~~ was performed to determine wetland resources. Wetland impacts are minimized through planning. Impacts are mitigated through the wetland mitigation monitoring plan, developed in consultation with the USACE and MDEQ during the wetlands permitting process.	Potential for unavoidable adverse impacts.
Aquatic Ecology	Shoreline/bed/benthic erosion from construction/dredging near Lake Erie could degrade aquatic habitat (short-term impacts).	Implement measures in the SESC Permit/MDEQ NPDES Permit. Implement measures outlined in the U.S. Army Corps of Engineers (USACE) Permit.	Minimal or no unavoidable adverse impacts.
	Possible spills from construction and/or construction equipment could degrade aquatic habitat (short-term impacts).	Implement measures and controls contained in the PIPP that would be prepared specifically for Fermi 3 construction activities.	Minimal or no unavoidable adverse impacts.

Table 10.1-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 4 of 5)

Impact Category	Adverse Impact	Potential Actions to Mitigate Impacts	Unavoidable Adverse Impact
Socioeconomics	Construction workers and local residents are exposed to an increase in noise, dust, exhaust, and emissions from construction and related equipment. These impacts continue through construction.	Implement standard noise control measures for construction equipment (silencers). Limit the types of construction activities during nighttime and weekend hours. Establish a construction noise monitoring program.	Small unavoidable impacts.
		Use dust control measures such as watering, stabilizing disturbed areas, and covering trucks.	
	Construction workers and local residents experience traffic that continues through the construction phase.	Detroit Edison will undertake a Level of Service analysis at an appropriate time prior to construction, and will coordinate with the Michigan Department of Transportation and Development (MDOT), the Monroe County Road Commission, and other appropriate agencies regarding the performance of the studies and mitigation activities. Encourage carpooling and stagger shifts. Post signs to notify the public of high traffic areas near construction areas.	Potential for unavoidable adverse impacts.
	Influx of construction workforce (short-term).	Housing shortages could be mitigated by new home construction. This action is not under the control of the applicant.	Minimal or no unavoidable adverse impacts.
	Initially, public services, infrastructure, and area schools are strained by the short-term population influx.	Increased tax revenues can fund additional services, improvements, and schools (or portable classrooms) to mitigate the effects of populations. These actions are not under the control of the applicant.	Some services may be slightly strained and schools could experience crowding. The potential for effect is minimal and short-term.
Radiological	Construction workers may be exposed to radiation sources (through direct radiation, gaseous effluents, or liquid effluents) from the routine operations of Fermi 2.	Monitor doses received by workers to ensure they are within regulatory limits. The site will be in accordance with all radiation safety regulations to ensure that the construction workers are protected.	Small unavoidable adverse impact of radiation exposure for construction workers from existing unit.

Table 10.1-1 Unavoidable Adverse Environmental Impacts of Construction (Sheet 5 of 5)

Impact Category	Adverse Impact	Potential Actions to Mitigate Impacts	Unavoidable Adverse Impact
Environmental Justice	Some activities affect minority or low-income populations.	There is no disproportionate impact on minority or low income populations.	No unavoidable adverse impacts that require mitigation.

Notes:

1. The 345 kV transmission system and associated corridors are exclusively owned and operated by the ITC*Transmission*. The applicant has no control over the construction or operation of the transmission system. The construction impacts are based on publicly available information and reasonable expectations on the configurations and practices that ITC*Transmission* is likely to use based on standard industry practice. Such efforts would likely include transmission design considerations and Best Management Practices that would minimize the effects on land use.

approximately 290 acres (permanent and temporary)

Table 10.1-2 Unavoidable Adverse Environmental Impacts of Operation (Sheet 1 of 4)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Impact
Land Use , and 1069 acres with the transmission corridor.	Commitment of ~~207 acres~~ for uses related to Fermi 3 onsite ~~and within the transmission corridor~~.[1] This impact will occur for the operational life of Fermi 3.	The major plant structures are located, for the most part, on areas that were environmentally altered for construction and operation of Fermi 1 and Fermi 2. Uses are consistent with land use plans. Some of the disturbed land is revegetated following construction and after maintenance activities in the corridor.	Continued commitment of land use for the operational life of Fermi 3.
	Operation of Fermi 3 increases radioactive and nonradioactive wastes that are stored onsite (temporarily) and disposed of in permitted disposal facilities or landfills. Mixed waste generation and disposal occurs long-term through operation.	The established waste minimization program minimizes waste.	Land dedicated for the disposal of Fermi 3 waste is not available to other uses. This effect is long-term.
	New Independent Spent Fuel Storage Installation (ISFSI) for Fermi 3 will increase quantity of spent fuel storage onsite.	The ISFSI is sited to minimize radiation exposure to plant staff.	Land dedicated for spent fuel storage is not available to other uses for the operational life of Fermi 3.
	The cooling tower is visible from nearby locations and constitutes a small visual impact. The transmission corridor also constitutes a small visual impact.[1] These impacts occur through the operational phase.	Station operation does not contribute an additional impact to the viewshed, and no measures or controls are necessary.	The viewshed continues to be impacted over the operational phase but no more so than at the present.
	Archeological sites could be obscured or damaged through ground-disturbing activities related to operation and maintenance. This potential exists through the operational phase.	The shoreline is sensitive for archaeological resources. Shoreline stabilization may be required if NRHP-eligible archaeological resources are encountered during station operation. Continued station operation is unlikely to impact significant archaeological sites, and no measures or controls are necessary.	Minimal or no unavoidable adverse impacts.

Table 10.1-2 Unavoidable Adverse Environmental Impacts of Operation (Sheet 2 of 4)

Although not expected, dredging may be

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Impact
Hydrological and Water Use	Consumptive use of Lake Erie surface water represents a commitment of water resources. This commitment continues through the operation of Fermi 3.	No mitigation measures are expected to be necessary.	Water lost to evaporation (and thus not returned to Lake Erie) represents an unavoidable impact. Evaporated water is unavailable for other purposes.
	~~Dredging could be~~ necessary to deepen the barge canal from Fermi 3 to the navigation channel. Periodic maintenance dredging could be required to remove sediment from the intake bay. The dredging activities would result in a temporary increase in turbidity in Lake Erie.	Maintenance dredging occurs approximately every 4 years. Impacts to the water quality from turbidity are temporary. Lake Erie quickly assimilates turbid waters. No mitigation measures are expected to be necessary.	Minimal or no unavoidable adverse impact.
	The discharge of process liquid radwaste to Lake Erie.	Prior to its release, liquid radwaste is monitored for radioactivity, as is the outfall to Lake Erie. Water quality affects are expected to be small and mitigation measures are not needed.	Minimal to no unavoidable adverse impact.
	Blowdown from cooling tower operations.	Constituents discharged directly or indirectly to Lake Erie are expected to be at or below NPDES permitted levels. They are projected to be very low based on the dilution effects of Lake Erie.	
	Cooling water discharges to Lake Erie results in a thermal plume throughout the operational life of Fermi 3. The maximum effluent temperature is 86°F.	The thermal plume will be minimal when compared with the breadth of the western basin of Lake Erie.	Minimal or no unavoidable adverse impact.
Terrestrial Ecology	Operating noise has minor impact to wildlife.	The potential effect is expected to be minor, and mitigation is not expected to be necessary.	Minimal or no unavoidable adverse impact.
	Small quantities of waste salts and chemicals are discharged into the atmosphere for the duration of operation.	Concentrations are not high enough to adversely impact soil, air, or vegetation. No mitigation measures are expected to be necessary.	Minimal or no unavoidable adverse impact.
	Birds may collide with the cooling towers or power lines.	Collisions do not present a substantial problem, and mitigation is not expected to be necessary.	Minimal or no unavoidable adverse impact.

Table 10.1-2 Unavoidable Adverse Environmental Impacts of Operation (Sheet 3 of 4)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Impact
Aquatic Ecology	Some species are killed by impingement or entrainment by the intake system.	The low intake velocity (≤ 0.5 fps), appropriate intake screen design, and closed cycle cooling system significantly reduce adverse effects from impingement and entrainment.	There is a small impact to aquatic species. The closed-loop cooling system reduces the effects on aquatic species.
	Scouring at the intake structure temporarily reduces water quality. This effect will occur episodically for the duration of operation.	Intake equipment is situated and used in a manner that reduces scouring and turbidity. Riprap is configured around the discharge pipe to prevent intake scouring.	Minimal or no unavoidable adverse impacts.
	Discharge of wastewater effluent and potential for chemical or petroleum spills near water that could affect aquatic organisms over the operational life of Fermi 3.	The NPDES permit limits are established to prevent adverse effects to aquatic species. Consolidated environmental emergency response plans currently implemented for Fermi 2 would apply to Fermi 3.	Minimal or no unavoidable adverse impacts.
	During certain times of the year, blowdown is discharged at temperatures exceeding the water quality standard for the duration of operation.	The diffuser minimizes the size of the thermal mixing zone, in both lateral and vertical extent. No additional mitigation measures are expected to be necessary.	Minimal or no unavoidable adverse impacts.
Socioeconomics	The population of nearby counties will grow as Fermi 3 begins operation. This growth increases traffic, school populations, and places additional burden on community infrastructure and services. These impacts are short-term and are expected to dissipate over time.	As needed, fund additional community facilities and infrastructure, police, and fire protection through increased revenues that result from housing construction. No further mitigation measures are deemed necessary.	Minimal or no unavoidable adverse impacts.
	Air pollution, emissions, and effluents can affect humans in the primary impact area.	Emissions are within limits allowed by the permits. Monitor the release of waste emissions and effluents. No additional mitigation measures are expected to be necessary.	Minimal or no unavoidable adverse impacts.

Table 10.1-2 Unavoidable Adverse Environmental Impacts of Operation (Sheet 4 of 4)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Impact
	Potential adverse impact to traffic flows on highways and access roads to the Fermi site. Traffic at the site and on surrounding roadways would increase as operational staff for the two units commute to the Fermi site.	Level of service analysis conducted by the applicant would indicate potential impacts and appropriate traffic mitigation.	Potential for unavoidable adverse impacts depending on the level of service analysis results. It is expected, however, that adequate mitigation measures such as staggering work shifts and encouraging carpooling, will reduce traffic impacts to acceptable levels and mitigate the potential for unavoidable adverse impacts.
	Episodic loud noises are generated by Fermi 3 operation and routine maintenance on corridors may impact adjacent workers and residents for the duration of operation.	Noise levels do not typically exceed background levels. Sound attenuation measures (as part of facility and transmission corridor equipment design) reduce noise impacts.[1] Protective equipment is provided to employees. No mitigation measures are expected to be necessary.	Minimal or no unavoidable adverse impacts.
Radiological	Discharges of small amounts of radioactive liquid and gases within regulatory limits.	Potential doses to workers and public will be within regulatory limits. No mitigation measures are necessary.	Small unavoidable adverse impact of radiation exposure.
Atmospheric and Meteorological	Cooling towers emit water vapor plumes that cause fogging/icing, cloud formation, plume shadowing, humidity, and additional precipitation.	The occurrence of plumes and fogging are low. Use Best Available Technology for installing and operating the cooling tower. No mitigation measures are expected to be necessary. The plumes cause little to no effect on humans or surrounding vegetation. No mitigation measures are expected to be necessary.	Minimal or no unavoidable adverse impacts.
	Small quantities of waste salts and chemicals are discharged into the atmosphere.	No mitigation measures are expected to be necessary.	Minimal or no unavoidable adverse impacts.

Notes:

1. The 345 kV transmission system and associated corridors are exclusively owned and operated by the ITC*Transmission*. The applicant has no control over the construction or operation of the transmission system. The construction impacts are based on publicly available information and reasonable expectations on the configurations and practices that ITC*Transmission* is likely to use based on standard industry practice. Such efforts would likely include transmission design considerations and Best Management Practices that would minimize the effects on land use.

10.2 Irreversible and Irretrievable Commitments of Resources

This section describes the expected irreversible and irretrievable environmental resources used during construction and operation of Fermi 3. Environmental resources are considered "irreversible" when they are changed by the construction or operation of Fermi 3 and cannot be restored at some later time to the resource's pre-construction or pre-operation state (such as the permanent use of land). Irretrievable resources are generally materials (such as petroleum) that are used for Fermi 3 in such a way that the materials could not be, by practical means, recycled or restored for other uses.

Impacts from construction and operation of Fermi 3 will be similar to that of any major construction project, and the expected loss of resources used in construction is anticipated to be of small consequence with respect to the availability of such resources. The main resource irretrievably committed by operation of Fermi 3 is uranium, which is available in sufficient quantities such that the irreversible and irretrievable commitment of uranium would be of small consequence. The irreversible and irretrievable commitments of resources and materials resulting from construction and operation of Fermi 3 are discussed below and summarized in Table 10.2-1.

10.2.1 Irreversible Environmental Resource Commitments

Irreversible environmental commitments resulting from construction and operation of Fermi 3 encompass the following:

- Land Use Productivity
- Alteration of Terrestrial and Aquatic Habitat and Biota
- Socioeconomic Changes
- Degradation of Water and Air Quality
- Resource Commitments of the Uranium Fuel Cycle

10.2.1.1 Land Use Productivity

As described in Chapter 4 and Chapter 5, construction and operation of Fermi 3 temporarily and permanently modifies land uses on the Fermi site. Land uses onsite and in the transmission corridor are committed to Fermi 3 facility and electrical transmission uses, and are largely unavailable for other uses. Approximately ~~207~~ 125 acres from Fermi 3 are lost to other uses until after decommissioning of Fermi 3 (Fermi 2 occupies approximately 172 acres). Once Fermi 3 ceases operations and is decontaminated and decommissioned in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements, the land that supports the facilities may be returned to other industrial or non-industrial or similar uses.

Fermi 3 generates radioactive, chemical, and nonhazardous waste during operations that requires storage and disposal. Chemical wastes are accumulated onsite and transferred offsite to licensed/permitted facilities. Hazardous, mixed, and radioactive wastes are disposed of in permitted landfills or facilities. An irreversible commitment of land occurs because this land cannot be used for other purposes.

Fermi 3 construction activities

59 acres (temporary) and 2 acres (permanent)

10.2.1.2 **Alteration of Terrestrial and Aquatic Habitat and Biota**

2.75

Construction activities disrupt or destroy flora and fauna in areas of and adjacent to the Fermi 3 site and the associated transmission corridor. As discussed in Section 4.3, approximately ~~208 acres~~ of the Lagoona Beach Unit of the Detroit River International Wildlife Refuge (DRIWR) will be ~~affected~~ by construction. Fermi 3 construction activities will permanently convert ~~122.7~~ acres of wetland ~~and forest~~ to Fermi 3 uses, which constitutes an irreversible commitment of resources. ~~The remaining 85.3 acres~~ will ~~be~~ temporarily impact~~ed~~ ~~and~~ could return to their pre-construction condition.

and 7.28 acres of open water

39.44 acres of wetlands that

American lotus specimens that occur along the western edge of the South Lagoon will be affected by the construction of the Fermi 3 cooling tower. The American lotus will be subject to a construction mitigation strategy to be established through consultation with MDNR, as discussed in Subsection 4.3.1.2.1. Specific plants that perish during transplanting, or specimens located below-ground that are not identified for transplanting and consequently perish during construction, will be irreversibly committed. Healthy populations of American lotus, however, exist across this area of Michigan.

Minimal impact on mammals, reptiles, and aquatic species occur during construction and operation of Fermi 3. Although losses of these individual species represent an irreversible commitment of resources, the overall populations of terrestrial and aquatic biota will remain healthy at the site and in the region.

10.2.1.3 **Socioeconomic Changes**

Short-term and long-term changes in the population and the local socioeconomic structure of Monroe County, and perhaps neighboring counties, will occur as a result of Fermi 3. Construction and operation of Fermi 3 will lead to an increase in population of these areas, which in turn, will spur increased housing construction and increased tax revenue. Impacts to infrastructure, schools, and community services will be mitigated by using the increased tax revenue to fund necessary improvements. Changes in noise levels, traffic congestion, and crime rates may only be partially mitigated resulting in potentially long-term changes in the overall community character.

10.2.1.4 **Degradation of Water and Air Quality**

In order to minimize environmental impacts, Detroit Edison intends to operate Fermi 3 as a zero-release radioactive liquid effluent plant. However, Fermi 3 will be configured for monitored radioactive liquid effluent releases, should it become necessary. Such releases will be in compliance with all applicable regulations and all necessary permits will be obtained.

Water quality can become slightly degraded as treated effluents containing small quantities of chemical and radioactive constituents enter area surface waters. Some chemical constituents are easily broken down and dissipate quickly; however, others may persist for longer periods of time. Radionuclides also vary in how long they remain in an area, depending on their half-life and total suspension time in the air.

Air quality can also become slightly degraded as chemical and radioactive air emissions enter the atmosphere. The degree of impact depends on how quickly a chemical or radioactive constituent breaks down and is filtered out of the air.

Chemical and radioactive emissions and effluents occur in accordance with applicable permits and are regularly monitored. As a result, water and air quality are not expected to be substantially impacted.

10.2.1.5 **Resource Commitments of the Uranium Fuel Cycle**

The Uranium Fuel Cycle is defined as the total of those options and processes associated with the provision, utilization, and ultimate disposition of fuel for nuclear power reactors. This cycle inherently contributes to environmental effects. Table 5.7-2 presents environmental effects related to uranium mining, conversion, and enrichment; fabrication of nuclear fuel; use of this fuel; and disposal of the spent fuel.

10.2.2 **Irretrievable Commitments of Material Resources**

Irretrievable environmental commitments resulting from construction and operation of Fermi 3 encompass the following:

- Construction Materials
- Water Consumption
- Energy Consumption
- Uranium Fuel Consumption

10.2.2.1 **Construction Materials**

The irretrievable commitment of material resources during construction of Fermi 3 would be generally similar to commitments associated with other large power-generating facilities, such as hydroelectric and coal-fired power plants that are constructed throughout the United States. A U.S. Department of Energy report (Reference 10.2-1) estimates the materials used during new reactor construction. The report provides the following new reactor construction estimates:

- 12,239 cubic yards of concrete and 3107 tons of rebar for a reactor building
- 2,500,000 linear feet of cable for a reactor building
- 6,500,000 linear feet of cable for a single unit
- Up to 275,000 linear feet of piping (>2.5") for a single 1300 MWe unit

Table 10.2-2 compares these estimates of common irretrievable commitments of materials against overall production. While the amount of materials used in construction is large, the irretrievable commitment of construction materials in these quantities would be of small consequence given the availability of such resources.

10.2.2.2 **Water Consumption**

Lake Erie is the primary source of water for Fermi 3. As discussed in Section 5.2, the maximum withdrawal from Lake Erie to support operations of Fermi 3 is approximately 34,000 gpm which is equivalent to 49 MGD. Just over half of this withdrawal, 25 MGD, is returned to Lake Erie under normal operating conditions. Therefore, the resulting water loss from Lake Erie is approximately 24 MGD. Lake Erie has an average flow rate of about 130,400 MGD, and Fermi 3 has a daily water consumption of 24 MGD. The net water loss from the normal operation of Fermi 3 represents 0.019 percent of the total daily flow for Lake Erie.

Given the small water loss from Lake Erie, the longevity of Lake Erie as regional water supply and surface water resource is not affected by the additional Fermi 3 water consumption. While impacts to Lake Erie are small, about 24 MGD of Lake Erie water is consumed by Fermi 3 and, thus, will be unavailable for other uses.

10.2.2.3 **Energy Consumption**

Construction and operation of Fermi 3 requires energy (fuels and electricity) to be consumed. Overall, the total amount of energy consumed during construction and operation is small in comparison to the total amount of energy consumed in the United States. Although energy is irretrievably committed during construction and operation, it is important to note that Fermi 3 produces far more energy than is required to construct and operate the unit. As such, use of fossil fuel supplies is reduced or avoided by the operation of Fermi 3.

10.2.2.4 **Uranium Fuel Consumption**

Uranium is irretrievably committed by the operation of Fermi 3. The U.S. Department of Energy estimates that production of uranium concentrate by the United States increased 10 percent in 2007 compared with 2006 production estimates (Reference 10.2-2). Estimates indicate that sufficient uranium resources exist in the United States to fuel all operating reactors, reactors under construction, and reactors being planned for the next 10 years at a uranium oxide cost (1996 dollars) of $30.00/lb or less. These quantities of uranium can be supplied from the resource categories designated as reserves and estimated additional resources—the two most certain resource categories (Reference 10.2-3).

The World Nuclear Association, which studies supply and demand of uranium, states that the world's present measured resources of uranium (5.5 Mt), in the cost category somewhat below present spot prices and used only in conventional reactors, are enough to last for over 80 years. There was very little uranium exploration between 1985 and 2005, so the significant increase in exploration that is currently being conducted could readily double the known economic resources. On the basis of analogies with other metal minerals, a doubling in price from present levels could be expected to create about a tenfold increased in measured resources over time (Reference 10.2-4). The uranium that would be used to generate power at Fermi 3, while irretrievable, would not affect the long-term availability of uranium worldwide.

10.2.3 References

10.2-1 U.S. Department of Energy, "Application of Advanced Construction Technologies to New Nuclear Power Plants," MPR-2610, Rev. 2, September 24, 2004, (Table N-2, N-6, and N-9), http://www.ne.doe.gov/np2010/reports/mpr2610Rev2Final924.pdf, accessed 2 May and 13 May 2008.

10.2-2 Energy Information Administration, "Domestic Uranium Production Report Quarterly," Data for 4th Quarter, 2007, http://www.eia.doe.gov/cneaf/nuclear/dupr/qupd.html, accessed 13 May 2008.

10.2-3 Energy Information Administration, "Uranium Industry Annual 1996," April 1997, http://tonto.eia.doe.gov/FTPROOT/nuclear/047896.pdf, accessed 13 May 2008.

10.2-4 World Nuclear Association, "Supply of Uranium," March, 2007, http://www.world-nuclear.org/info/inf75.html, accessed 18 July 2008.

10.2-5 National Ready Mix Concrete Association, http://www.nrmca.org/concrete/2008.htm, accessed 13 May 2008.

10.2-6 U.S. Census Bureau, Economics and Statistics Administration, "Steel Mill Products: 2006", Issued July 2007, http://www.census.gov/industry/1/ma331b06.pdf, accessed 13 May 2008.

10.2-7 U.S. Census Bureau, Economics and Statistics Administration, "Insulated Wire and Cable: 2006", Issued June 2007, http://www.census.gov/industry/1/ma335j06.pdf, accessed 13 May 2008.

Table 10.2-1 Summary of Irreversible and Irretrievable Commitment of Environmental Resources (Sheet 1 of 2)

Environmental and Material Resources	Irreversible	Irretrievable
Land Use Productivity	Land committed to the operation of Fermi 3, the transmission corridor[1], and waste disposal is unavailable to other uses. After decommissioning, the land that supports the Fermi 3 facilities may be returned to other industrial or non-industrial uses.	
Alteration of Terrestrial and Aquatic Habitat and Biota	Construction temporarily or permanently alters habitat near the Fermi 3 site and in the transmission corridor.[1] Some habitat areas are revegetated and return to their pre-construction state during operation. Individual specimens of American lotus perish during construction.	
Socioeconomic Changes	Short-term and long-term changes in the population and the local socioeconomic structure of Monroe County, and perhaps neighboring counties, occur. Some impacts on infrastructure and services are temporary, while others may irreversibly change the socioeconomic character and structure.	
Degradation of Air and Water Quality	Small adverse alterations of air and water quality occur as chemical and radioactive air emissions and water effluents are released.	
Construction Materials		Materials are irretrievably committed to the construction and operation of Fermi 3. These materials cannot be reused or recycled if they become contaminated or irradiated during operation.
Water Consumption		Cooling water taken from Lake Erie is lost through evaporation. The overall impact to Lake Erie is relatively small; however, this quantity of water is not available for other uses.
Energy Consumption		Fuels and electricity is consumed during the construction and operation of Fermi 3.

Table 10.2-1 Summary of Irreversible and Irretrievable Commitment of Environmental Resources (Sheet 2 of 2)

Environmental and Material Resources	Irreversible	Irretrievable
Uranium Fuel Consumption		The operation of Fermi 3 contributes a relatively small increase in the depletion of uranium.

Notes:

1. The 345 kV transmission system and associated corridors are exclusively owned and operated by the ITC*Transmission*. The applicant has no control over the construction or operation of the transmission system. The construction impacts are based on publicly available information and reasonable expectations on the configurations and practices that ITC*Transmission* is likely to use based on standard industry practice. Such efforts would likely include transmission design considerations and Best Management Practices that would minimize the effects on land use.

Table 10.2-2 Commitment of Materials

Material	Quantities Used 1300 MWe unit	U.S. Production Estimated per Year
Concrete for Reactor Building	12,239 cubic yards	413,251,000 cubic yards of ready mix concrete
Rebar for Reactor Building	3,107 tons	6,969,893 metric tons
Cable for Reactor Building	2,500,000 linear feet	315,030 thousands of pounds (copper-containing) 308,173 thousands of pounds (aluminum-containing)
Cable for Single Unit	6,500,000 linear feet	315,030 thousands of pounds (copper-containing) 308,173 thousands of pounds (aluminum-containing)
Pipe >2.5 in. diameter	275,000 linear feet	1,151,882 metric tons (alloy steel: oil country goods and line pipe; mechanical tubing)

Source: Reference 10.2-1, Reference 10.2-5, Reference 10.2-6, Reference 10.2-7

10.3 Relationship Between Short-Term Uses and Long-Term Productivity of the Human Environment

This section presents a discussion of the Fermi 3 short-term uses of the environment and their relationship to long-term environmental productivity. This discussion includes an evaluation of the extent to which the proposed project's use of the environment would preclude options for future use of the environment. For the purposes of this section, "short-term" refers to the period from start of construction to end of plant life, including prompt decommissioning, and "long-term" refers to the period extending beyond the end of plant life, including the period up to and beyond that required for delayed plant decommissioning.

Short-term uses of the environment for the construction and operation of Fermi 3 include the unavoidable adverse impacts identified in Section 10.1. These uses include the development of land that would not be available for other uses until the facilities are decommissioned, impacts to lands that provide habitat for wildlife, the consumptive use of water during construction, the loss of aquatic biota at the intake structure and barge slip during construction of these structures, the loss of aquatic biota at the intake structure during plant operations, and temporary impacts to the aquatic ecosystem due to periodic maintenance dredging at the intake bay during the life of the project and possibly maintenance dredging of the barge canal from Fermi 3 to the navigation channel. Other short-term uses of the environment include the irreversible and irretrievable commitments of resources identified in Section 10.2, with the exception of those commitments that involve the consumption of depletable resources as a result of plant construction and operation, which would be considered long-term uses of the environment.

10.3.1 Benefits of Construction and Operation

The benefits of construction and operation of Fermi 3 are evaluated and presented in Section 10.4. The principal short-term benefit of construction and operation of a new unit would be the production of electrical energy and the economic productivity of the site. The jobs created by the construction and operation of a new facility would represent a significant input of resources to the local economy. In addition, tax revenues from the facility would present an economic stimulus to Monroe County, the region, and the State of Michigan.

The areas to be developed for Fermi 3 are adjacent to Fermi 2; therefore, the use of the land is precluded from commercial development and agriculture. In the absence of Fermi 3, some proposed construction areas at the site could potentially be used for silviculture or wildlife habitat. However, the economic benefit of the electrical production project would be relatively LARGE compared with the productivity from any other potential uses.

Additional benefits from the construction and operation include the reduction of air pollutant emissions and greenhouse gases. Modern nuclear reactors produce relatively small levels of pollutant air emissions when compared to the principal viable energy alternatives, coal and natural gas (Reference 10.3-1). Currently, nuclear power is the only available and proven technology that provides a viable alternative to fossil-fired plants for baseload electrical generation without emitting large volumes of greenhouse gases (Reference 10.3-2).

10.3.2 Construction of Fermi 3 and Long-Term Productivity

Section 10.1 summarizes the potential unavoidable adverse environmental impacts of construction of Fermi 3 as well as mitigation measures to reduce the impacts. While some impacts will remain following construction, none should preclude the future use of the site following decommission.

Fermi 3 is being constructed on the existing Fermi nuclear power plant site. Thus, construction activities and permanent structures will be consistent with the established use of the site. Construction activities will occupy an area somewhat larger than the permanent structures required for operations because of the need for additional construction work force parking, equipment and material lay-down areas, and temporary construction buildings for the contractors.

The acreage to be disturbed includes existing grassland, shrubland, thicket, lowland hardwood, woodlot, coastal shoreline forest, and coastal emergent wetland. Current plans call for replanting those areas affected by construction. Areas available for restoration are shown in Figure 4.3-2 and are identified as temporary impact areas. The restoration would alleviate any adverse impact to these communities by planting species native to the region and appropriate for the area being re-vegetated. These mitigation measures will limit terrestrial impacts and protect long-term productivity.

Groundwater and surface water (Lake Erie) will be temporarily impacted during construction due to dewatering activities for building foundation construction and surface water withdrawal for construction activities (e.g., concrete batch plant). Once construction is complete these temporary impacts will cease and the groundwater should recharge to pre-construction levels with no long-term loss of subsurface water resources. Due to Lake Erie's vast capacity, the withdrawal of construction water will have no long-term loss of this surface water resource.

Potential archaeological sites located in the construction area for Fermi 3 will be managed in cooperation with the Michigan State Office of Historic Preservation. Appropriate mitigation measures will be implemented as needed.

Construction of the new barge facilities, intake structure, and discharge structure will temporarily disturb sediments within the embayment area. Once construction is complete these temporary impacts to the aquatic ecology will cease and they will not affect the long-term ecological productivity of Lake Erie in the vicinity of the Fermi site.

10.3.3 Operation of Fermi 3 and Long-Term Productivity Impacts

The maximum long-term impact to productivity from other uses of the land within the Fermi site would result if the facility were not decommissioned in a timely manner. The result of any delay in decommissioning would be that the land occupied by facility structures would not be available for any other use. Compliance with the requirements in 10 CFR 50.82 dictates that a nuclear facility would be decommissioned in a timely manner following the end of its useful life. Typical of current industry approaches for multi-unit sites, the decommissioning of Fermi 3 would be expected to include other facilities on-site. It is reasonable to expect that the site would be released for unrestricted use and that such actions would be undertaken in a timely manner, thus minimizing the impact to long-term productivity.

The loss of forested and wetland habitats would be considered a long-term preemption because it is unlikely that the current soil productivity supporting this habitat would be restored in a reasonable time frame. It is likely that the site would be used for other industrial uses following decommissioning and not be reverted back to use as wildlife habitat. There are no other significant land use preemptions.

As stated in Section 10.4, the operation of Fermi 3 would also result in a long-term benefit to air quality and CO_2 levels (which many scientists believe contributes to global warming) through emissions avoidance by not relying on natural gas-fired, coal-fired, or other fossil-fueled electrical generation.

The uranium fuel provides a short-term supply of relatively clean energy. Spent uranium fuel must be managed as a high-level radioactive waste and either reprocessed or, more likely, isolated in a geological repository. This represents a long-term commitment of the disposal area and geological formation.

Overall, the enhancement of regional productivity resulting from the electrical energy produced by Fermi 3 would not be equaled by any other use of the site. In addition, most long-term impacts resulting from land use preemption by plant structures would be eliminated by removing these structures or by converting them to other productive uses.

10.3.4 Summary of Relationship between Short-Term Uses and Long-Term Productivity of the Human Environment

The short-term and long-term benefits of the construction and operation of Fermi 3 outweigh the short-term and long-term impacts to environmental productivity. The short-term benefit of the production of electrical energy and the economic productivity of the site would be relatively LARGE compared with the productivity of the Fermi site from any other probable uses. The construction and operation of Fermi 3 would result in the positive long-term enhancement of regional productivity through the generation of electrical energy, with benefits that would likely extend beyond the life of the project.

Table 10.3-1 compares the project's principal short-term uses to the long-term productivity of the human environment.

10.3.5 References

10.3-1 Massachusetts Institute of Technology, "The Future of Nuclear Power, An Interdisciplinary MIT Study," 2003, http://web.mit.edu/nuclearpower/, accessed 15 February 2008.

10.3-2 University of Chicago, "The Economic Future of Nuclear Power; A Study Conducted at The University of Chicago," August 2004, http://www.ne.doe.gov/np2010/reports/NuclIndustryStudy-Summary.pdf, accessed 15 February 2008.

Table 10.3-1 Comparison of Short-Term Uses to Long-Term Productivity (Sheet 1 of 3)

	Short-Term Uses and Benefits	Relationship to Maintenance and Enhancement of Long-Term Environmental Productivity
Land Use	The construction and operation of Fermi 3 would preclude these lands from being available for other uses.	Construction and operation of Fermi 3 does not necessarily represent a long-term impact to productivity of the human environment as the land might be available for other uses after the nuclear facility is decommissioned.
	The construction and operation of a new transmission route[1] would convert 242 acres of agricultural land use and wildlife habitat.	The construction and operation of new transmission lines does not result in any significant impact to agricultural land use or wildlife impact. New transmission lines will use existing transmission corridor infrastructure to the maximum extent possible. The acreage might be available again for agriculture production and wildlife habitat if the transmission lines are decommissioned upon decommissioning of the nuclear facility.[1]
Hydrological and Water Use	Construction is expected to require an anticipated maximum quantity of 600,000 GPD from Lake Erie. The water withdrawal from Lake Erie for the operation of Fermi 3 is approximately 34,000 gpm. The Frenchtown Township, which obtains its water from Lake Erie, will be the source of potable water for Fermi 3. The daily potable water consumed during construction is approximately 8700 gallons per day. Construction of the building foundations will require dewatering of groundwater.	The consumptive use of water during construction and operations does not result in any significant long-term impacts to water resources. Upon decommissioning of Fermi 3, the water would be available for other uses. Dewatering activities will not affect the long-term productivity of the groundwater aquifer. Dewatering is a temporary activity.

Table 10.3-1 Comparison of Short-Term Uses to Long-Term Productivity (Sheet 2 of 3)

	Short-Term Uses and Benefits	Relationship to Maintenance and Enhancement of Long-Term Environmental Productivity
Ecological		
--Terrestrial Flora and Fauna	The construction of Fermi 3 and its associated infrastructure results in the impacts to habitat for plants and animals. Fermi 3 construction will permanently impact ~~146~~ acres of undeveloped land, inclusive of wetlands, designated wildlife refuge, forest land, and grassland. The potential for impacts to wildlife is small but, for instance, could include the temporary displacement of animals due to noise or bird collisions with tall equipment. 27	The construction of Fermi 3 and the associated offsite transmission lines would result in the long-term loss of biologically productive habitat as soil conditions could take hundreds of years to redevelop. Temporarily disturbed sites would be replanted with native vegetation following completion of the project. The wildlife species found on the Fermi site, in the region, and along the transmission route are not rare and would recover from displacement by the project. Wetlands impacts will be mitigated as required by USACE and the MDNR.
--Aquatic	Impacts to the aquatic ecosystem due to construction of a new intake structure and barge slip; and dredging at the intake bay.	The construction and operation of Fermi 3 does not result in any significant long-term impacts to biota or their habitats. Upon decommissioning of Fermi 3, the use of the intake structure and dredging would cease; thus, it is anticipated the aquatic ecosystems would return to a natural state.
Socioeconomic	Electrical power generation.	The long-term benefits of electrical power generation include helping to meet growing industrial, commercial, and residential baseload needs; the effects of which are expected to live beyond the life of the project. Additional long-term benefits include those related to air emissions avoidance by not relying on natural gas-fired or coal-fired electrical generation to meet energy demands.
	Increased state and local tax revenues, plant expenditures, and employee spending in the community during construction and operations results in both short-term and long-term growth in the local economy.	Tax revenues, plant expenditures, and employee spending leads to long-term growth in the local economy, infrastructure (e.g. roads), and services that may continue after Fermi 3 is decommissioned.

Table 10.3-1 Comparison of Short-Term Uses to Long-Term Productivity (Sheet 3 of 3)

	Short-Term Uses and Benefits	Relationship to Maintenance and Enhancement of Long-Term Environmental Productivity
Irradiated Spent Fuel	The uranium provides a short-term supply of relatively clean energy	The spent fuel must be managed as a high-level radioactive waste and either reprocessed or isolated in a geological repository. Storage of the waste in a geological repository represents a long-term commitment of the disposal area and geological formation.
Other Radioactive Waste	The radioactively contaminated reactor vessel and equipment are required for the short-term production of nuclear energy	The contaminated waste would be disposed in a low level radioactive waste facility. This represents a long-term commitment of the disposal area.

Notes:

1. The 345 kV transmission system and associated corridors are exclusively owned and operated by the ITC*Transmission*. The applicant has no control over the construction or operation of the transmission system. The construction impacts are based on publicly available information and reasonable expectations on the configurations and practices that ITC*Transmission* is likely to use based on standard industry practice. Such efforts would likely include transmission design considerations and Best Management Practices that would minimize the effects on land use.

10.4 Benefit-Cost Balance

This section summarizes the benefits and costs associated with construction and operation of Fermi 3. Benefits are discussed in Subsection 10.4.1. Costs are discussed in Subsection 10.4.2. A summary is provided in Subsection 10.4.3. The benefits and costs associated with construction and operation of the proposed Fermi 3 are summarized in Table 10.4-1 and Table 10.4-2, respectively. Section 9.2 addresses different alternatives to the proposed project.

10.4.1 Benefits

The evaluation of monetary and non-monetary benefits associated with construction and operation of Fermi 3 are described in this section and summarized in Table 10.4-1.

10.4.1.1 Monetary Benefits

The States of Michigan and Ohio and the counties surrounding Fermi 3 would experience an increase in the amount of taxes collected from labor, services, construction materials, and supplies purchased for the project. These projected expenditure increases and financial benefits from construction and operation of Fermi 3 are discussed in Subsection 4.4.2 and Subsection 5.8.2, respectively. The large tax revenues and local expenditures generated from construction and operation of Fermi 3 would benefit the state and local government agencies because they would support the development of infrastructure and services that support the community, and promote further economic development.

There will be employment and income multiplier impacts arising from the construction jobs at the Fermi site and the local expenditures made by the construction workforce and the purchase of materials, supplies, and services during the construction phase. As discussed in Subsection 4.4.2, the RIMS II model was used to analyze the employment and income multiplier impacts to the region.

As discussed in Subsection 4.4.2, it is assumed that 2465 of the peak construction workers will be from the existing workforce in the primary impact area. The project is expected to create 8173 man-years of employment and $366 million in direct earnings (2006 dollars). Based upon RIMS II analyses, the $366 million in direct annual construction earnings is projected to generate total primary impact area earnings of $585.5 million, and the 8173 man-years of employment will generate a total of 13,986 man-years of regional employment.

As discussed in Subsection 5.8.2, the anticipated number of full-time employees for Fermi 3 is 900. The 900 full-time positions (including contract staff) will create direct economic benefits to the region, as these will be stable, high paying positions that will be much sought after. The periodic maintenance staff needed to support the refueling and maintenance requirements of Fermi 3 will provide additional direct employment and wage benefits to the vicinity. Over and above the 900 full-time employees, Subsection 5.8.2 assumes that 100 workers represent a levelized, full-time equivalent maintenance staff. The average direct salary for the Fermi 3 operational staff, based on 2006 dollars, is $62,640. Over the first 30 years of Fermi 3 operations, the direct payroll for Fermi 3 full-time and workforce staff would exceed $1.88 billion.

In addition, there will also be secondary or indirect jobs created on a long-term basis due to the economic multiplier effects of Fermi 3 operation. As discussed in Subsection 5.8.2, these employment and earnings impacts were estimated through the RIMS II model. The RIMS II model results indicate that, over a 30-year period, more than 51,000 man-years of employment will be generated and total income effects will be $3.0 billion (2006 dollars). For the primary impact area, Fermi 3 operations would constitute a MODERATE to LARGE benefit.

10.4.1.2 **Non-Monetary Benefits**

The following discussion considers the non-monetary benefits of constructing and operating Fermi 3.

The need for new generation is discussed in Chapter 8. Net generating capacity for Fermi 3 is approximately 1500 MWe. Based on an assumed operating capacity factor of 90 percent, this provides an annual average 12,000,000 MW-hrs total generation. The additional generation from Fermi 3 will help maintain system reliability by increasing the availability of baseload power.

As discussed in Section 4.6, it is projected that the construction of Fermi 3 will employ, at peak construction, about 2900 people, 2465 people will be hired locally and 392 families will relocate to the primary impact area. Temporary construction workers and their families increase rental and property demand, spending on goods and services, and sales taxes that benefit the local economy. The operation of Fermi 3 requires additional people, beyond that necessary to operate Fermi 2, whose benefit to the region will extend through the life of the plant.

In addition to providing the new generation capacity and moving towards meeting the projected need for power in the State of Michigan, and the positive regional impacts there are other significant benefits associated with Fermi 3. These other benefits, discussed in Subsection 8.4.2, include:

- Fuel diversity
- Dampened price volatility
- Enhanced reliability
- Reduced reliance on fossil fuels and reduction in associated emissions

Section 9.2 analyzes alternatives to the proposed action, such as coal-fired and natural gas-fired plants. As discussed in Table 10.4-2, Fermi 3 has a SMALL impact due to air emissions. The emissions from coal-fired and natural gas-fired plants would be much greater than Fermi 3.

Section 10.3 describes the relationship between short-term uses and long-term productivity of the human environment. Additional benefits of Fermi 3 include an associated reduction in dependence on foreign energy sources and vulnerability to energy disruptions.

As the nation's import of liquefied natural gas increases, there is a related impact on the "energy security" of the country. With greater reliance and import of natural gas, there is a related economic impact on the nation's balance of trade. Energy generation from Fermi 3 represents a potential for reducing the foreign trade deficit by way of decreased reliance on imported natural gas and other fuels. Lastly, the operation of Fermi 3 has the effect of reducing the rate of depletion of the nation's finite fossil fuel supplies.

10.4.2 **Costs**

The following discussion identifies both internal and external costs associated with the construction and operation of Fermi 3. The term "internal" generally refers to the monetary costs associated with a project, while the term "external" refers to non-monetary environmental costs of constructing and operating a new plant. These costs are summarized in Table 10.4-2.

Many of the cost attributes described in this subsection are detailed in Section 10.1 (Unavoidable Adverse Environmental Impacts), Section 10.2 (Irreversible and Irretrievable Commitments of Resources), and Section 10.3 (Relationship Between Short-term Uses and Long-term Productivity of the Human Environment).

10.4.2.1 **Internal Costs**

This discussion describes the monetary costs of constructing and operating Fermi 3. Internal costs include capital costs of the plant and transmission lines, operating costs, including staffing and maintenance, fuel, and decommissioning costs.

10.4.2.1.1 **Construction**

The projected internal monetary costs related to the construction of Fermi 3 are provided in Part 1 of this COLA.

10.4.2.1.2 **Operation**

The U.S. Department of Energy study (Reference 10.4-1) estimates the annual O&M costs of a 1340 MWe ESBWR plant to be $74,178,482, which is calculated as $6.83 per MW-hr. This cost is expressed in units of electric net generation, or megawatts electric, and reflects all costs that are incurred to operate and maintain the plant. Included in this cost are salaries and benefits for the plant staff, parts, material and equipment costs for maintaining plant equipment, fees, insurance, overhead costs, and short-term contract services.

Nuclear fuel cost and decommissioning are calculated separately. Reference 10.4-2 estimates that the average fuel cost for a nuclear generating plant is $4.64 per MW-hr at a five percent discount rate. A decommissioning cost estimate is provided in Part 1 (General and Administrative Information).

Reference 10.4-2, Chapter 3, includes a comparison of levelized generation costs for coal-fired, natural gas-fired and nuclear power plants. The cost elements in the total levelized generation cost include investment (including refurbishment, decommissioning and interest during construction), O&M and fuel. At a five percent discount rate the total generation cost for nuclear compares favorably with coal and is substantially less than that for natural gas. The generation costs considered in Reference 10.4-2, Chapter 3, for the coal-fired and natural gas-fired plants do not consider projected additional costs placed on carbon emissions. As discussed in Appendix 10 to Reference 10.4-2, consideration of additional costs placed on carbon emissions would increase the total generation costs for coal-fired and natural gas-fired plants. The impact is more significant for coal-fired than for natural gas-fired generation due to the higher levels of carbon emissions associated with coal-fired generation. To summarize, as shown in Reference 10.4-2, the total generation cost associated with nuclear power is equivalent to, or lower, than other baseload load fuel sources, especially when additional costs associated with carbon emissions are included.

Measures to control adverse impacts related to operation are discussed in Section 5.10. There are monetary costs associated with the design and implementation of these measures which include such activities as training employees in environmental compliance and safety; treatment, storage, and disposal of any chemical wastes generated; and acquisition and compliance with required operational permits and environmental requirements.

10.4.2.2 **External Costs**

This discussion describes the external (non-monetary) environmental and social costs of constructing and operating Fermi 3. The environmental impacts of construction and operation of Fermi 3 are described in Section 4.6 and Section 5.10, respectively. Section 10.1 also provides details regarding potential mitigation and the unavoidable adverse impacts after mitigation measures have been considered. Several mitigation measures would be built into the project design, such as scheduling to ensure that construction is completed in the shortest possible time; using construction best management practices to limit erosion, fugitive dust, runoff, spills and air emissions; and providing first-aid stations at the construction site.

10.4.2.2.1 **Land Use**

Approximately ~~207~~ 27 acres will be affected by the construction of Fermi 3 as a result of permanent facilities. An additional ~~145~~ 162 acres will be disturbed on a short-term basis as a result of temporary activities and construction of temporary facilities and laydown areas. Clearing and removal of trees growing within the Fermi site will be required. Loss of land use is an external cost of the construction of Fermi 3. A detailed description of land use is provided in Section 4.1. As discussed in Subsection 9.2.3, the cost in land use for a nuclear-powered generating plant is about the same as that for a natural gas-fired power plant and less than that for a coal-fired power plant of comparable generation capacity. As discussed in Subsection 9.2.3, when overall land use requirements are considered, the cost in land use for a nuclear-power generation plant is less than that for both a coal-fired and natural gas-fired plant.

10.4.2.2.2 **Hydrological and Water Use**

Section 4.6 and Section 5.2 describe hydrologic alterations for construction and operation, respectively. As discussed in these sections, there are costs associated with providing water for various needs during construction and operation. The majority of water used for Fermi 3 operations would be surface-water drawn from Lake Erie. This water use represents only a small fraction of available water and is judged to be SMALL. There are also costs associated with potable water consumption that will be provided by the Frenchtown Township. Use of surface-water by the site should not impact off-site users in terms of either water availability or water quality. Relatively small levels of non-radioactive and radioactive effluents are introduced into Lake Erie (after treatment). It is noted that Fermi 3 is designed with the capability to recycle 100 percent of the liquid radioactive waste (zero liquid effluent). Detroit Edison intends to operate Fermi 3 with zero liquid effluent. Water quality effects of chemical effluents discharged to Lake Erie during Fermi 3 operations are discussed in Subsection 5.2.2 and are judged to be SMALL. Cooling water blowdown that discharges to Lake Erie will result in a thermal plume. Impacts of the thermal plume on Lake Erie is SMALL and localized.

10.4.2.2.3 **Terrestrial and Aquatic Biology**

Ecological effects related to plant construction and operations are described in Section 4.3 and Section 5.3 respectively. Some cost due to mortality of wildlife during construction is anticipated. Impacts to important habitats such as wetlands onsite may occur within the construction impact area. These are discussed in Subsection 4.3.1.2.2. As discussed therein, measures would be taken to avoid impacts and when that is not possible, impacts would be minimized to the greatest extent possible. Any losses of wildlife are not expected to be large enough to affect the long-term stability of the populations. The cooling system, including the station water intake structure, is designed to reduce loss of aquatic biota as a result of impingement and entrainment. The construction of the new intake structure and dredging for the intake structure, barge slip, and outfall pipe will result in only minor and temporary effects to aquatic biology. As discussed in Subsection 9.2.3 and Table 9.2-7, impacts to terrestrial and aquatic species from nuclear-powered plants are smaller than impacts from comparably sized coal-fired or natural gas-fired power plants. Impacts to terrestrial and aquatic species from Fermi 3 construction and operations are anticipated to be SMALL.

Relatively small amounts of air emissions from diesel generators, auxiliary boilers and equipment, and vehicles are generated from nuclear power plant operation.

Cooling towers produce an atmospheric vapor plume. Cooling tower drift deposits some salt on the surrounding vicinity, but the level is unlikely to result in any measurable impact on plants and vegetation (Section 5.4).

Small amounts of chemical effluents are components of the Fermi 3 water discharges into Lake Erie. Relatively small amounts of hazardous wastes would be generated that need to be managed and disposed of pursuant to the Resource Conservation and Recovery Act (RCRA). Section 3.6 discusses non-radioactive waste systems.

10.4.2.2.4 **Chemical and Radioactive Emissions, Effluents, and Wastes**

Operation of Fermi 3 will include minor radioactive air emissions to the atmosphere. Relatively small levels of radioactive effluents may be generated and discharged into Lake Erie.

Low-level radioactive wastes will be generated that need to be stored, treated, and disposed of in a licensed landfill. High-level radioactive spent fuel would be generated that needs to be isolated in an interim spent fuel storage facility, a geological repository for tens of thousands of years, or possibly reprocessed into reusable fuel. FSAR Chapter 11 discusses the radioactive waste management systems.

10.4.2.2.5 **Materials, Energy, and Uranium**

Construction of Fermi 3 will result in an irreversible and irretrievable commitment of materials and energy (Section 10.2). Operation of Fermi 3 contributes to the depletion of uranium.

10.4.2.2.6 **Potential for Nuclear Accident**

The potential effects of various types of nuclear accidents are discussed in Chapter 7. The analysis concluded that the potential environmental impacts from a postulated accident from the operation of Fermi 3 would be SMALL.

10.4.2.2.7 **Socioeconomic Costs**

Section 4.4 and Section 5.8 describe socioeconomic costs related to construction and operation of Fermi 3, respectively. Additional public and social services may be required to meet the demands of people moving into the area during construction and operation of Fermi 3. These impacts are SMALL because of the disbursement of the population and housing impacts over a large and populated area that already has a well developed infrastructure. The positive LARGE socioeconomic benefits from the added employment opportunities (direct and indirect) and expenditures would more than outweigh any negative impacts.

10.4.3 **Summary**

As discussed in Section 8.4, there is a growing baseload demand and growing baseload supply shortfall for the region of interest. Without additional capacity, the electric network will fail to maintain an adequate reserve margin. Fermi 3 will help meet the growing baseload shortfall in the region by supplying an average annual electrical-energy generation of approximately 12,000,000 MW-hrs.

Fermi 3 will generate electricity with significantly reduced CO_2 emissions with respect to comparably-sized coal-fired or natural gas-fired alternatives. Fermi 3 would also have important strategic implications in terms of lessening the dependence of the United States on foreign fuel imports, fuel supply disruptions, and vulnerability to price volatility or politics. While the additional direct and indirect creation of jobs places some minor temporary burden on local services and infrastructure, the annual taxes and revenue generated by the new workers contribute to the local economy and stimulate future growth.

On balance, the benefits of Fermi 3 would significantly outweigh the economic, environmental and socioeconomic costs.

10.4.4 **References**

10.4-1 U.S. Department of Energy, “Study of Construction Technologies and Schedules, O&M Staffing and Costs, Decommissioning Costs and Funding Requirements for Advanced Reactor Designs,” May 27, 2004.

10.4-2 International Energy Agency, Organisation for Economic Co-operation and Development, "Projected Costs of Generating Electricity," 2005 Update, http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1472, accessed 15 February 2008.

Table 10.4-1 Monetary and Non-Monetary Benefits of Fermi 3

Category of Benefit	Description of Benefit
Net Electrical Generating Benefits	
Net Generating Capacity	~1500 MWe
Electricity Generated (operating at 90% capacity)	~12,000,000 MW-hrs (Annual Average)
Taxes and Revenue During Plant Operation Period (Transfer Payments – Not Independent Benefits)	
Estimated Annual Property Taxes	$19.1million
Estimated Annual Direct Sales Taxes	$1.2 million
Estimated Annual Indirect Sales Taxes	$4.5 million
Effects on Regional Productivity	
Construction Workers	Approximately 2900 workers (peak) create an incremental increase of 2060 indirect jobs, within the region. 85% of construction workers are projected to be from existing workforce in the primary impact area.
Operational Workers	Approximately 900 workers create an incremental increase in 640 indirect permanent jobs within the region for at least 40 operating years.
Socioeconomics	Increased tax revenue supports improvements to public infrastructure and social services. The increased revenue spurs future growth and development.
Technical and Other Non-Monetary Benefits	
Fuel Diversity	Reduces exposure to supply and price risk associated with reliance on any single fuel source
Price Volatility	Dampens potential for fuel price volatility
Fossil Fuel Supplies	Offsets usage of finite fossil fuel supplies
Electrical Reliability	Enhances electrical reliability
Emissions Reduction	Significant beneficial impact in terms of avoidance of air emissions as discussed in Section 8.4
Carbon Dioxide (CO_2) Emissions	Baseload generation with no CO_2 emissions
Wastes	Compared with fossil-fueled plants, nuclear plants produce less non-radioactive waste products

Table 10.4-2 Internal and External Costs of Fermi 3 (Sheet 1 of 2)

Category of Cost	Description of Cost
Internal Costs	
Construction (Overnight Cost)	\$3000 to \$4000 per kW
Operation	\$6.83 per MW-hr for O&M \$4.64 per MW-hr for fuel cycle
Decommissioning (NRC Minimum)	\$518,033,205
External Costs	
Land and Land Use	SMALL Fermi 3 will occupy approximately ~~110~~ 125 acres of the 1260 acres existing Fermi site.
Hydrological and Water Use	SMALL There are some costs associated with providing water for various needs during construction and operation. Cooling water will be taken from Lake Erie. Relatively small levels of chemical and/or radioactive effluents will be introduced into Lake Erie. Thermal plume resulting from cooling water blowdown will be discharged to Lake Erie. The effect of consumption of cooling water is relatively small.
Terrestrial and Aquatic Species	SMALL Some cost to wildlife due to mortality during construction operations is anticipated. However, these costs do not affect long term wildlife populations. Wildlife mortality, including aquatic biota, during operations is expected to be minimal.
Radioactive Effluents and Emissions	SMALL Radioactive waste will be generated. The plant will produce radioactive air emissions. Relatively small levels of radioactive effluents may be introduced into Lake Erie.
Chemical and Radioactive Waste	SMALL Storage, treatment, and disposal of high-level radioactive spent nuclear fuel. Commitment of underground geological resources for disposal of radioactive spent fuel.

Table 10.4-2 Internal and External Costs of Fermi 3 (Sheet 2 of 2)

Category of Cost	Description of Cost
External Costs (continued)	
Air Emissions	SMALL Air emissions from diesel generators, auxiliary boilers and equipment, and vehicles that have a small impact on workers and local residents. Cooling tower drift that deposits some salt on the surrounding vicinity, but the salt levels are unlikely to result in any measurable impact on plants and vegetation. Cooling tower atmospheric plume discharge abated with design.
Materials, Energy, and Uranium	SMALL Irreversible and irretrievable commitments of materials and energy, including depletion of uranium.
Potential Nuclear Accident	SMALL Potential risks are small.
Socioeconomics	SMALL Construction of Fermi 3 may pose minor additional costs to public and social services in the area. However, these costs are more than offset by increased tax revenues generated directly and indirectly by plant construction and operation.

**Attachment 3
NRC3-09-0017**

Response to RAI letter related to Fermi 3 ER

RAI Question GE4-1

NRC RAI GE4-1

Provide the draft Environmental Protection Plan (EPP).

Supporting Information

Information in the EPP will be reviewed and incorporated into analyses presented in the EIS. The final EPP will be included as an attachment and condition to the combined license.

Response

The Fermi 3 Environmental Protection Plan (EPP) is being developed in association with the Environmental Protection Plan Template proposed by the NRC Environmental Technical Support Branch, Division of Site and Environmental Reviews, Office of New Reactors in the November 20, 2008 memo to the Director, Division of Site and Environmental Reviews, Office of New Reactors (ML083180815). The NRC staff is currently reviewing comments associated with the EPP Template which were presented to the Director, Division of Site and Environmental Reviews, Office of New Reactors in a February 26, 2009 letter from Nuclear Energy Institute (NEI), Senior Director, New Plant Deployment, Nuclear Generation Division (ML090750309, ML090750326). Detroit Edison shall develop the Fermi 3 EPP upon mutual resolution of the EPP Template comments presented by NEI (ML090750309, ML090750326).

Proposed COLA Revision

None

Attachment 4
NRC3-09-0017

Response to RAI letter related to Fermi 3 ER

RAI Question AQ2.7-1
RAI Question AQ4.4.1-1

NRC RAIs

Since RAIs AQ2.7-1 and AQ4.4.1-1 both address interrelated aspects of air emissions, Detroit Edison is providing these two RAIs in one combined response.

A – RAI AQ2.7-1

Provide a general conformity analysis for construction and operation activities of the proposed Fermi 3 project due to nonattainment status of the area for 8-hour ozone and PM2.5.

Section 2.7.2.1 of the ER states that "Monroe County and the counties that include the Detroit metropolitan area are ruled as non-attainment areas for the USEPA's PM2.5 and 8-hour ozone standard." Accordingly, the site is subject to a general conformity analysis under 40 CFR 51, Subpart W. Provide a conformity analysis for ozone and PM2.5 associated with construction and operation of Fermi 3, along with quantifying direct and indirect emission rates.

B – RAI AQ4.4.1-1

Provide expected CO2 emission rates during the worst year of construction. Emission sources considered should include engine exhaust emissions from heavy equipment and worker/delivery/ support vehicles, and other fossil fuel combustion emissions.

CO2 emissions during construction are needed for the climate change analysis to be presented in the EIS. Emissions from the worst year (i.e., the year when CO2 emissions are expected to be highest) will provide a conservative estimate of climate change impacts.

Combined Response

Environmental Report (ER) Section 2.7.2.1 indicates that Monroe County, the location of the Fermi 3 project, is designated as a non-attainment area for the 8-hour ozone and $PM_{2.5}$ standards. On June 29, 2009, the Michigan Department of Environmental Quality (MDEQ) petition to re-designate Monroe County as an attainment area for the 8-hour ozone standard was accepted by the U.S. Environmental Protection Agency (USEPA). As a result, Monroe County is now considered a maintenance area for the 8-hour ozone standard.

40 CFR 51 Subpart W requires that a federal action must undergo a general conformity determination for non-attainment or maintenance areas where the emissions of the criteria pollutant or its precursor(s) would equal or exceed emission thresholds set forth in the regulation. Since Monroe County is a non-attainment area for $PM_{2.5}$ and a maintenance area for 8-hour ozone (outside an ozone transport region), a general conformity determination is required only if the project-related emissions of the non-attainment and maintenance area pollutants or their precursors (i.e., $PM_{2.5}$, NO_x, SO_2, or VOC) equal or exceed the 100 tons/year conformity determination threshold on a pollutant-by-pollutant basis. The paragraphs that follow discuss

estimates of direct and pre-cursor emissions for $PM_{2.5}$ and ozone expected to result from the construction and operation of Fermi 3. This estimate is also known as the conformity applicability analysis. Since the activities associated with construction and operation will not occur simultaneously, the emissions from each of the phases are analyzed separately in the conformity applicability analysis to establish if Subpart W is triggered and a general conformity determination is required for either phase.

Additionally, due to the similar nature of RAI AQ4.4.1-1, estimated emissions of CO_2 from the construction phase are also being included in this response.

Construction

Various types of construction activities and their associated equipment will emit $PM_{2.5}$, NO_x, SO_2, VOCs, and CO_2 during Fermi 3 construction activities. The following analysis evaluates the emissions associated with construction of Fermi 3 and estimates that annual emissions of $PM_{2.5}$, NO_x, SO_2, and VOC would not exceed the 100 tons/year conformity determination thresholds for ozone and $PM_{2.5}$ (and their pre-cursors). Therefore, a general conformity determination would not be required for construction of Fermi 3.

Generally, emissions of $PM_{2.5}$, NO_x, SO_2, VOC, and CO_2 during construction activities are expected from one of two processes; 1) combustion of fuels in engines which propel or otherwise operate mobile equipment and 2) fugitive dust activities which entrain particles into the air through the disturbance of materials.

Mobile engines (both on-road and off-road) include things such as:

- Construction workers traveling to their designated onsite parking area
- Trucks delivering construction materials to areas on the Fermi site
- Operation of heavy equipment such as cranes, bulldozers, and scrapers
- Use of support vehicles to transport materials around the site
- Operation of marine and locomotive engines
- Operation of other miscellaneous mobile fossil-fuel combustion sources such as generators necessary for construction of Fermi 3

Activities creating fugitive dust emissions (in the form of direct $PM_{2.5}$ emissions) include such things as:

- Ground clearing, grading, and excavation
- Bulk handling of materials such as spoils, backfill, and aggregate
- Wind erosion
- On-site concrete batch plant
- Entrainment from the movement of vehicle tires over paved and non-paved surfaces

ER Section 4.4.1.3 provides a discussion of the State of Michigan's Administrative Code R 336.1372, which contains provisions to control fugitive dust emissions. The construction practices for dust control during construction of Fermi 3 will be consistent with the state requirements to control fugitive dust.

In order to estimate emissions from the above activities, a preliminary monthly construction schedule and equipment list was developed. The construction schedule assumes construction commences in the spring and lasts 62 months (18 months of site preparation activities and 44 months of construction activities). Emissions were conservatively estimated based on the preliminary construction schedule and equipment list along with the following assumptions:

- 10-hours/day, 7 days/week construction schedule
- 2,900 (peak period) construction workers arriving daily throughout the entire construction timeframe
- Construction equipment operation based on a 75 percent utilization factor assuming that all equipment does not operate continuously over the full 10-hour shift
- Operation of a single on-site concrete batch plant
- Barge delivery of aggregate for use in concrete batch plant
- Transport and handling of aggregate from barge area to concrete batch plant
- Outdoor storage of materials for use in concrete batch plant
- Vehicle miles traveled were derived using an average vehicle speed (differs for different equipment) and a 10-hour work day assuming the vehicles are continuously driven during the entire work shift

Emissions estimates from the various construction activities discussed above were derived using the following USEPA-provided emission factor databases: MOBILE6.2 for on-road vehicle emissions, NONROAD2008 for non-road mobile equipment and vehicle emissions, and AP-42 for fugitive dust emissions. USEPA's Tier standards were also used to develop emissions estimates for marine and locomotive engines subject to emission limits by regulation.

The emission estimates developed for this response were limited to those activities under the NRC's jurisdictional authority (activities regulated by the NRC under the Atomic Energy Act). This was accomplished by using the air quality and dust impact factors presented in ER Table 4.8-1 which separated "Pre-Construction" activities (activities for which the NRC has no jurisdictional authority) and "Construction" activities (those requiring approval from the NRC). As discussed in ER Section 4.8, the Estimated Impact Percentages provides a relative estimate of impacts to the environment attributable to either pre-construction or construction activities. As provided in ER Table 4.8-1, 70 percent of the air quality impacts and 50 percent of the dust impacts are assumed to come from construction (or NRC regulated) activities.

Estimated maximum annual emissions during the construction phase of the project are provided in Table 1.

Table 1

Estimated Maximum Annual Emissions of $PM_{2.5}$, NO_x, SO_2, VOC, and CO_2 from Construction of Fermi 3 (tons/year)

	$PM_{2.5}$	NO_x	SO_2	VOC	CO_2
Mobile Equipment	4.1	85.8	0.1	36.7	10,180
Fugitive Dust Activities	25.6	--	--	--	--
Total Estimated Emissions	29.7	85.8	0.1	36.7	10,180
Conformance Applicability Threshold for Maintenance and Non-Attainment Areas	100	100	100	100	N/A
Exceedance of Threshold for Construction	No	No	No	No	N/A

As shown in the Table 1, emissions from the construction phase of the project do not exceed the conformity applicability thresholds provided in Subpart W. As such, a conformity determination is not required for the construction phase of the project.

<u>Operation</u>

Stationary and mobile combustion sources proposed for the operation of Fermi 3 will emit $PM_{2.5}$, NO_X, SO_2, and VOC. The following evaluates the emissions from stationary and mobile sources associated with operation of Fermi 3, and estimates that annual emissions of $PM_{2.5}$, NO_x, SO_2, and VOC would not exceed the 100 tons/year conformity determination thresholds for ozone and $PM_{2.5}$ (and their precursors). Therefore, a general conformity determination would not be required for operation of Fermi 3. CO_2 emissions from the operation of Fermi 3 were provided in response to RAI 5.8.1-1 in Detroit Edison letter NRC3-09-0015 (ML093090165), dated October 30, 2009.

Stationary Sources

During the operation of Fermi 3, two standby diesel generators (SDG), two ancillary diesel generators (ADG), two diesel-driven fire pumps, an auxiliary boiler, a natural draft cooling tower (NDCT), and two 4-cell mechanical draft cooling towers (MDCT) will emit $PM_{2.5}$, NO_X, SO_2, and VOC. The response to RAI HH3.6.3-1 in Detroit Edison letter NRC3-09-0012 (ML092290662), dated July 31, 2009, provides updated annual emission estimates of $PM_{2.5}$, NO_x, SO_2, and VOC in pounds per year (lb/year) from a single SDG, ADG, diesel-driven fire pump, and auxiliary boiler. The total annual emissions of $PM_{2.5}$, NO_x, SO_2, and VOC emitted from the SDG, ADG, diesel-driven fire pumps, and auxiliary boiler can be calculated by multiplying the lb/year emissions by the number of units and then converting that value into tons per year (tons/year). The response to RAI HH3.6.3-1 also provides the estimated annual emissions of $PM_{2.5}$ from the NDCT and MDCTs. The total estimated annual emissions of $PM_{2.5}$, SO_2, NO_x, and VOC from the operation of the full complement of stationary sources discussed above are displayed in Table 2.

Mobile Sources

Various types of mobile vehicles will emit CO_2, $PM_{2.5}$, NO_x, SO_2, and VOC during Fermi 3 onsite operational activities. The expected mobile vehicle activities include worker arrivals and dismissals, deliveries of materials and fuel, and disposal of wastes. Additional emissions will come from the operation of heavy equipment and support vehicles on the Fermi site.

The annual emissions estimates associated with the operation of Fermi 3 are based on the following assumptions:

- Certain data for Fermi 3, such as the number and frequency of worker vehicles arriving at the site, mobile vehicle fuel usage, and total annual shipments/exports of fuels, materials, and wastes, are the same as those historically recorded for Fermi 2.
- Estimates of emissions from worker vehicles use a split of 50 percent passenger cars and 50 percent light-duty trucks.

In order to estimate emissions from the types of mobile equipment and activities discussed above for the operation of Fermi 3, $PM_{2.5}$, NO_x, SO_2, and VOC emission factors were obtained from the USEPA MOBILE6.2 model. The total estimated annual emissions of $PM_{2.5}$, NO_x, SO_2, and VOC from the operation of mobile sources discussed above are also displayed in Table 2.

Table 2

Estimated Annual Emissions of $PM_{2.5}$, NO_x, SO_2, and VOC from Stationary and Mobile Sources During Operation of Fermi 3 (tons/year)

	$PM_{2.5}$	NO_x	SO_2	VOC
SDGs	0.27	2.90	0.01	0.78
ADGs	0.00	0.02	0.00	0.01
Auxiliary Boiler	0.58	6.91	0.07	0.07
Diesel Driven Fire Pumps	0.00	0.08	0.03	0.08
NDCT	13.26	--	--	--
MDCT	3.68	--	--	--
Worker Vehicles	0.01	0.24	0.01	0.28
On-site Heavy Equipment and Support Vehicles	0.01	0.19	0.00	0.17
Delivery of Materials and Disposal of Wastes	0.00	0.00	0.00	0.00
Total Estimated Emissions	17.8	10.3	0.1	1.4
Conformance Applicability Threshold for Maintenance and Non-Attainment Areas	100	100	100	100
Exceedance of Threshold for Operations	No	No	No	No

As shown in Table 2, emissions from the operational phase of the project do not exceed the conformity applicability thresholds provided in Subpart W. As such, a conformity determination is not required for the operational phase of the project.

<u>Proposed COLA Revision</u>

An insert will be added to ER Section 2.7.2 to provide an evaluation of the estimated emissions of $PM_{2.5}$, NO_X, SO_2, and VOC during the worst year of construction and operations for Fermi 3. Additionally, an insert will be added to ER Section 4.4.1.2 to provide the estimated emissions of CO_2 during construction of Fermi 3.

Markup of Detroit Edison COLA
(following 4 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

during operation of Fermi 3

Insert "1" Here

2.7.2.2 **Projected Air Quality**

Air emissions of criteria pollutants will be minor given the nature of a nuclear facility and its lack of significant gaseous exhausts of effluents to the air. Sources of air emissions for Fermi 3 include two standby diesel generators, an auxiliary boiler, and a diesel fire pump, as well as a natural draft cooling tower (NDCT) and 4-cell mechanical draft cooling tower (MDCT). The combustion sources mentioned above will be designed for efficiency and operated with good combustion practices on a limited basis throughout the year (often only for testing). Given their small magnitude of size and infrequent operation, these emissions will not only have little effect on the nearby ozone and $PM_{2.5}$ non-attainment areas, but will have minimal impact on the local and regional air quality as well. The air emissions from the listed equipment are regulated by the MDEQ.

Insert "2" Here

~~Construction of Fermi 3 will lead to an increase of vehicular traffic surrounding the Fermi site prior to operations. Furthermore, increased traffic and construction activities will lead to further release of particulates prior to operation of Fermi 3. However, any increase in particulate emissions from vehicles is expected to be minor and remain local to the Fermi site.~~

The Fermi 3 cooling towers will not be a source of the typical combustion-related criteria pollutants or other toxic emissions. They will, however, emit small amounts of particulate matter as drift. The towers will be equipped with drift eliminators designed to limit drift to 0.001 percent or less of total water flow. Additionally, the primary normal heat sink (NHS) for Fermi 3 is a NDCT. The height of the tower will allow for good dispersion of the drift and not allow localized concentrations of particulate matter to be realized. The minor nature of the effects of the new cooling towers on visibility and air quality, including potential for increases in ambient temperature and moisture, icing, fogging, and salt deposition, are discussed in further detail in Subsection 5.3.3.1. In addition, Subsection 4.4.1 will discuss the emissions expected during Fermi 3 construction activities, while Subsection 5.8.1 will discuss the emissions expected during operation of Fermi 3, including the estimated work force vehicular emissions.

2.7.2.3 **Air Stagnation**

The main components of air stagnation are light winds and weak vertical mixing. Light winds can also be associated with weak or poor horizontal mixing of the atmosphere which has the general effect of leading to restrictive horizontal and vertical dispersion and thus air stagnation (Reference 2.7-22). Along with wind speed, wind direction plays a key roll in horizontal mixing as winds with non-persistent directions can also lead to poor dispersion, especially under light wind speeds when the air may re-circulate. Finally, temperature inversions are also associated with little to no vertical mixing of the atmosphere and, therefore, air stagnation. Analyses of inversions are discussed in Subsection 2.7.2.5 while the persistence of wind speeds and directions are covered in Subsection 2.7.4.3.

Air stagnation episodes typically occur when high pressure systems (anti-cyclones) have a strong influence on the regional weather for four days or more. These systems often lead to generally light winds and little vertical mixing due to a general sinking of the air in their vicinity. The region surrounding the Fermi site can expect approximately 10 days per year of air stagnation, or two

Place "Insert 1" ahead of first paragraph in section 2.7.2.2

Insert "1"

Worker vehicles and various types of construction activities and equipment will lead to releases of the non-attainment and maintenance area pollutants and their precursors (i.e., $PM_{2.5}$, NO_X, SO_2, or VOC). Since Monroe County is considered a maintenance area for the 8-hour ozone standard and a non-attainment area for $PM_{2.5}$, the Fermi 3 project-related emissions are compared to conformity applicability thresholds provided in 40 CFR 51, Subpart W. Estimated emissions of $PM_{2.5}$, NO_X, SO_2, and VOC during the construction phase of the project are not expected to exceed the conformity applicability thresholds provided in 40 CFR 51, Subpart W indicating that a conformity determination for the construction phase is not required.

Place "Insert 2" in the new second paragraph ahead of last sentence

Insert "2"

Estimated emissions during the operational phase of the project are not expected to exceed the conformity applicability thresholds provided in 40 CFR 51, Subpart W indicating that a conformity determination for the operational phase is not required.

non-attainment areas as those that record a 3-year average of the fourth highest daily maximum 8-hour average ozone concentration levels of 0.075 ppm or higher (Reference 4.4-9). For PM2.5 the USEPA considers areas in violation of the standard when the 3-year average of the weighted annual mean $PM_{2.5}$ concentration is equal to or exceeds 15 µg/m^3. Subsection 2.7.2 provides further details about the historical air quality in the Fermi vicinity.

from criteria pollutants

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

Insert "3" Here

4.4.1.3 **Dust**

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

§Rule 336.1372

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

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

   (i) Completely covering open-bodied trucks.

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

   (iii) Use of completely enclosed trucks.

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

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

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

Place Insert "3" in front of section 4.4.1.3

Insert "3"

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

Attachment 5
NRC3-09-0017

Supplemental Response to RAI letter related to Fermi 3 ER

RAI Question AQ3.6.3-1

NRC RAI AQ3.6.3-1

Provide particulate matter (PM_{10} and $PM_{2.5}$) emission estimations for the proposed natural draft cooling tower (NDCT) and the mechanical draft cooling towers (MDCT).

Supporting Information

Section 2.7.2.2 of the ER states that "Sources of air emissions for Fermi 3 include two standby diesel generators, an auxiliary boiler, and a diesel fire pump, as well as a natural draft cooling tower (NDCT) and 4-cell mechanical draft cooling tower (MDCT)." In ER Section 3.6.3-1, emissions for other equipment were presented but emissions of PM (PM_{10} and $PM_{2.5}$) as drift from the NDCT and MDCT were not included.

Supplemental Response

In Detroit Edison's original response to RAI AQ3.6.3-1 submitted in Detroit Edison letter NRC3-09-0013 (ML092400475), dated August 25, 2009, the maximum hourly and annual emissions of PM_{10} and $PM_{2.5}$ from the simultaneous operation of the Natural Draft Cooling Tower (NDCT) and Mechanical Draft Cooling Towers (MDCT) were mistakenly doubled. Based on discussions with the NRC on October 26, 2009, it was determined that the sum of the PM_{10} and $PM_{2.5}$ emissions was taken even though the PM_{10} value already included the $PM_{2.5}$ value. The corrected information is provided below.

The emission estimates of particulate matter for particle sizes of 10 and 2.5 microns (PM_{10} and $PM_{2.5}$) from the operation of the proposed NDCT and 4-cell MDCTs are displayed in the table on the following page along with design parameters that were used to derive the emission estimates. It is conservatively assumed that the $PM_{2.5}$ emissions are the same as PM_{10} emissions from the cooling towers. The drift rates for the NDCT and MDCT are based on the value provided by the proposed manufacturer of each cooling tower[1]. The water flow rates to the NDCT, as specified in ER Figure 3.3-1, will be supplied at a maximum rate of 720,000 gallons per minute (gpm). The water from the basin of the NDCT will supply the makeup water to the MDCT at a maximum flow rate of 40,000 gpm. ER Section 5.3.3.1 states that the makeup water for the NDCT is expected to have a total dissolved solids (TDS) concentration of 420 parts per million (ppm) or 0.00042 grams of salt per gram of solution. The makeup water for the MDCT will be supplied from the NDCT basin; therefore, the TDS concentration for the MDCT is also expected to be 420 ppm. The emission rate (lb/hr) for particulates emitted from the cooling towers can be calculated by taking the product of the water flow rate, weight of one gallon of water, drift rate, and TDS concentration.

[1] The proposed manufacturer of the NDCT is SPX Cooling Technologies and the design basis cooling tower is the Marley Field Erected Cooling Tower. The manufacturer of the MDCT design basis cooling towers is Cooling Tower Depot, Inc. The model number associated with the design basis MDCT is CFF-423630-4I-30.

For the purpose of providing a maximum bounded value for the emissions of particulates from the cooling towers, the calculations in the following table were developed for the operation of both the NDCT and MDCT cooling towers simultaneously for an entire year at the maximum water flow rate. While this likely over estimates the emissions of PM_{10} and $PM_{2.5}$ from the operation of the NDCT and MDCT, it provides a maximum value for the assessment of impacts from the operation of the cooling towers.

Estimated Emissions of PM_{10} and $PM_{2.5}$ From Operation of the Proposed Fermi 3 NDCT and 4-cell MDCT

	Natural Draft Cooling Tower	4-cell Mechanical Draft Cooling Tower
Drift Rate (%)	0.001%	0.005%
Water Flow Rate (gpm)	720,000	40,000
Total Dissolved Solids Concentration (ppm)	420	420
Annual Hours of Operation	8,760	8,760
$PM_{10}/PM_{2.5}$ Emission Rate (lb/hr)	1.51	0.42
$PM_{10}/PM_{2.5}$ Total Annual Emissions (tons/year)	6.63	1.84

Therefore, the maximum hourly and annual emissions of PM_{10} and $PM_{2.5}$ from the simultaneous operation of the NDCT and MDCT are expected to be 1.93 lb/hr and 8.47 tons/year, respectively.

Proposed COLA Revision

An insert will be added to ER Section 3.6.3.1 to give a description of the design parameters which were used to derive the emission estimates. A new table will be inserted after ER Table 3.6-5 which will mimic the table above.

Markup of Detroit Edison COLA
(following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

The effluent of the SWDS is sewage that is pumped from the septic tank to the Frenchtown Township Sewage Treatment Facility for ultimate disposal. The SWDS does not come into contact with any systems that may contain radioactive waste; however measures are in place to ensure that no radioactive waste could be transmitted offsite. Since the effluent from the SWDS is routed to a waste treatment facility, and not discharged to the environment, it is not necessary for the effluent to meet NPDES permit requirements. It is, however, necessary to meet the limits outlined in the Industrial/Non-domestic User Discharge permit with the Frenchtown Township Sewage Treatment Facility. Chemical treatments applied to the waste are those within the Frenchtown Township Sewage Treatment Facility, in keeping with the municipal sewage treatment standards. Further discussion of the chemical treatment of the SWDS can be found in Subsection 3.3.2.4.

3.6.3 **Other Effluents**

This subsection discusses miscellaneous solid, liquid and gaseous effluents not addressed in Subsection 3.6.1 or Subsection 3.6.2. Gaseous effluents consist of exhaust from diesel generators, diesel-driven fire pumps, and the auxiliary boiler system (Aux Boiler). Stormwater, various plant drains, and other wastes are also discussed in the following subsections.

3.6.3.1 **Gaseous Effluents**

There are three main sources of gaseous nonradioactive effluent at Fermi 3, the standby diesel generators (SDG), Aux Boiler, and the diesel-driven fire pumps. The applicable regulations, permits, and consultation required by Federal, State, regional, and potentially affected Native American tribal agencies are addressed in Section 1.2. Proper maintenance and operating procedures, described in FSAR Section 13.5, assure that emissions are controlled consistent with system design to meet the standards from Section 1.2.

There are two 17.1 MW SDG that operate approximately four hours per month. Emissions are shown in Table 3.6-3; these emissions are based on a heavy fuel oil with ash content of 0.1 percent and lube oil with ash content of 4.0 percent. The sulfur content of the fuel is 3 percent by weight (maximum). This fuel complies with 40 CFR Part 80, Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engines and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements: Final Rule.

Fermi 3 has one package Aux Boiler, rated at 50 tons of steam per hour (112 MBTU/hr or about 33 MW). The maximum expected operation on an annual basis is 30 days. Emissions are shown in Table 3.6-4, based on ASTM D-975 No. 2 fuel oil (Reference 3.6-1).

The third source of emissions at Fermi 3 are the two diesel-driven fire pumps. Each pump is approximately 200 kW and operates approximately 48 hours annually. The emissions are shown in Table 3.6-5.

Add Insert "1" Here.

3.6.3.2 **Stormwater**

Stormwater, specifically flood and probable maximum flood (PMF) are discussed in FSAR Subsection 2.4.2 and FSAR Subsection 2.4.3. Stormwater from the Fermi 3 site drains to the North

Insert 1:

In addition to the gaseous effluents emitted from the aforementioned combustion sources, a natural draft cooling tower (NDCT) and 4-cell mechanical draft cooling towers (MDCT) will emit solid particulates. The emission estimates of particulate matter for particle sizes of 10 and 2.5 microns (PM_{10} and $PM_{2.5}$) from the operation of the proposed NDCT and 4-cell MDCT are displayed in Table 3.6-X along with design parameters that were used to derive the emission estimates. It is conservatively assumed that the $PM_{2.5}$ emissions are the same as PM_{10} emissions from the cooling towers. The drift rates for the NDCT and 4-cell MDCT are based on the values provided by the associated manufacturers of each cooling tower. The water flow rate to the NDCT, as specified in ER Figure 3.3-1, will be supplied at a maximum rate of 720,000 gallons per minute (gpm). The water from the basin of the NDCT will supply the makeup water to the 4-cell MDCT at a maximum flow rate of 40,000 gpm. ER Section 5.3.3.1 states that the makeup water for the NDCT is expected to have a total dissolved solids (TDS) concentration of 420 parts per million (ppm) or 0.00042 grams of salt per gram of solution. The makeup water for the 4-cell MDCT will be supplied from the NDCT basin; therefore, the TDS concentration for the 4-cell MDCT is also expected to be 420 ppm. The emission rate (lb/hr) for particulates emitted from the cooling towers can be calculated by taking the product of the water flow rate, weight of one gallon of water, drift rate, and TDS concentration.

For the purpose of providing a maximum bounded value for the emissions of particulates from the cooling towers, the calculations in Table 3.6-X were developed for the operation of both the NDCT and 4-cell MDCT simultaneously for an entire year at the maximum water flow rate. While this likely overestimates the emissions of PM_{10} and $PM_{2.5}$ from the operation of the NDCT and 4-cell MDCT, it provides a maximum value for the assessment of impacts from the operation of the cooling towers. Therefore, the maximum hourly and annual emissions of PM_{10} and $PM_{2.5}$ from the simultaneous operation of the NDCT and 4-cell MDCT are expected to be 1.93 lb/hr and 8.47 tons/year, respectively.

Insert the following table after Table 3.6-5 Diesel-Driven Fire Pump Emissions:

Table 3.6-X Estimated Emissions of PM_{10} and $PM_{2.5}$ from Operation of the Proposed Fermi 3 NDCT and 4-Cell MDCT

	NDCT	4-Cell MDCT
Drift Rate (%)	0.001	0.005
Water Flow Rate (gpm)	720,000	40,000
TDS Concentration (ppm)	420	420
Annual Hours of Operation	8760	8760
$PM_{10}/PM_{2.5}$ Emission Rate (lb/hr)	1.51	0.42
$PM_{10}/PM_{2.5}$ Total Annual Emissions (tons/year)	6.63	1.84

Attachment 6
NRC3-09-0017

Response to RAI letter related to Fermi 3 ER

RAI Question AQ6.4-1

NRC RAI AQ6.4-1

Provide additional information or clarification regarding the following meteorological instrumentation issues identified at the site audit:

- *Distance between the meteorological tower and nearby trees;*
- *Height of nearby trees;*
- *Differences in temperature readings between the primary and secondary delta-temperature channels; and*
- *Meteorological instrumentation vendor.*

Supporting Information

Visual inspection during the site audit indicated that the distance from the meteorological tower to the nearest obstruction (i.e., the wooded area located west of the tower) is less than ten obstruction heights. This distance does not comply with requirements identified in Reg. Guide 1.23, which states "The sensors should be located over level, open terrain at a distance of at least 10 times the height of any nearby obstruction if the height of the obstruction exceeds one-half the height of the wind measurement." Detroit Edison stated that this was a self-identified issue entered into the Fermi 2 corrective action system in 2004 and was resolved as having no impact on the monitoring program based on a comparison with historic data collected during the previous 30 years. The staff would like Detroit Edison to provide a written description of the evaluation that closed out this issue.

Also, during the site audit, the Fermi 2 meteorological system engineer indicated that the secondary delta-temperature channel ($\Delta T = T_{60m} - T_{10m}$) recorded values that were consistently 0.2°C higher than the primary delta-temperature channel. This discrepancy translates to 0.4°C/100 m. Because this value is used in NRC's ΔT_{100m} method to determine the Pasquill-Gifford stability class, results from the primary and secondary monitoring systems could result in different stability class estimates. Provide an evaluation of the potential cause(s) and implication(s) of this temperature difference.

The ER incorrectly lists the instrumentation vendor (i.e., the instrumentation was provided by Climatronics, not Climet).

Response

The three onsite meteorological tower conditions addressed by this RAI; obstructions, delta-temperature data, and instrumentation vendor, are discussed below. The investigation and analysis of these issues conclude that the on-site meteorological data presented in the Fermi 3 COLA is accurate and representative of site conditions.

Onsite Meteorological Tower Obstructions
In response to a Fermi 2 Condition Assessment Resolution Document (CARD), a survey of the 60-meter meteorological tower area was performed in 2004. The 2004 survey shows that the separation between the wind instruments and the obstructions (in this case the trees) is less than ten times the obstruction height recommended in NRC Regulatory Guide 1.23. Enclosure 1 of this attachment, Figure 1, shows the relative locations and approximate heights of the trees from the 2004 survey.

The Fermi 2 UFSAR provides wind roses and stability class information for the time period from June 1, 1974 through May 31, 1975. The 2004 survey data represents 30 years of tree growth since the 1974 time frame. The 10-meter and 60-meter wind roses from the 1974/1975 time frame were compared with 10-meter and 60-meter annual wind roses from 1985, 1994, 2003, 2004 and 2005. Wind roses for these time periods are provided in Enclosure 1, Figures 2 through 10. The 10-meter and 60-meter wind roses from June 1974 through May 1975 are shown in the Fermi 2 UFSAR Figure 2.3-19, and provided as Figure 11. The comparison between the 10-meter and 60-meter wind roses in Figures 2 through 11 indicates there are no significant differences in wind direction and speed patterns between the time periods analyzed. Thus, the trees to the west and southwest of the meteorological tower have not altered the wind flow patterns measured at the Fermi meteorological tower prior to 2004. The annual wind rose from 2003 through 2007 (ER Figures 2.7-30 and 2.7- 43) indicates there are no significant differences in wind direction and speed patterns measured at the Fermi site through 2007. Data obtained from the Fermi meteorological tower indicate that the trees do not alter the wind speed and direction measurements at the Fermi site.

Environmental Report (ER) Figure 2.7-17 shows the annual wind rose for the Detroit Metropolitan Airport (Metro Airport) for 2003 through 2007. ER Figures 2.7-30 and 2.7- 43 show the Fermi site 10-meter and 60-meter (respectively) annual wind roses for this same time period. By comparison, the wind roses are similar for the Metro Airport and the Fermi site. This provides further assurance that the nearby trees do not have a significant impact on the wind speed and direction measurements at the Fermi site.

This analysis confirms that the meteorological data obtained from the onsite meteorological tower for the time period 2001-2007, and reported in the Fermi 3 COLA, sufficiently characterizes the conditions at the Fermi site and surrounding region.

Onsite Meteorological Tower Delta Temperature Data
The atmospheric stability classifications presented in the Fermi 3 COLA are determined based on the temperature difference with height (°C/100m), per NRC Regulatory Guide 1.23. At the Fermi site, this temperature difference is determined by doubling the measured temperature difference (ΔT) between the temperature indication at 60 meters and the temperature measured at 10 meters.

The Fermi meteorological data system has redundant instrumentation (i.e., primary and secondary channels). The primary ΔT data is normally reported within the plant computer system. However, when the plant computer system detects a problem with the primary channel, or when the primary channel is not otherwise available (e.g., maintenance, calibration) the secondary ΔT is used. Operability of specific meteorological monitoring instrumentation (including the ΔT indications) is controlled by the Fermi 2 Technical Requirements Manual (TRM). Daily channel checks and semi-annual (frequency of 184 days) calibrations are specified to satisfy the associated TRM surveillance requirements. A review of historical data, surveillances, calibrations, and preventative maintenance records, indicate that the calibrations for the ΔT instruments have been completed satisfactorily.

A review of meteorological data was performed to evaluate the difference between the primary ΔT and secondary ΔT data. The instantaneous data vary between the primary and secondary ΔT channels due to expected variability in instrumentation measurements. The data review indicated that there is not a consistent variance between the primary and secondary ΔT indications. That is, the secondary ΔT does not always indicate higher than the primary ΔT. Instead, the data review indicates that the instantaneous readings from the primary and secondary ΔT indications consistently follow each other over time and any difference in temperature indications is random as expected. The instantaneous primary and secondary ΔT data can be locally displayed in the meteorological tower shack. At any given time period, the primary ΔT may be different from the secondary ΔT as indicated in the display at the tower shack. At times, the primary is higher than the secondary and other times the secondary is higher than the primary. The ΔT instantaneous data are compiled into hourly averages. The primary and secondary instantaneous channel indications consistently follow delta temperature over time. The hourly average ΔT values are used for determining the stability class, which is then input into atmospheric dispersion models. Given that the primary and secondary ΔT indications follow reliably over time and do not exhibit a consistent difference between the two indications, the hourly average values for the primary or secondary channels are reliable.

Further evaluation of the meteorological instrumentation included a review of the historical atmospheric stability class frequencies recorded onsite. This was an effort to correlate any possible data inconsistencies with instrumentation replacements or modifications, as might be expected if instrumentation was malfunctioning. There was no correlation or data shifts identified with the onsite meteorological data, however a noticeable decreasing trend emerged in the frequency of neutral (Pasquill Stability Classification D) stability classification with a corresponding increasing trend in both the stable (Pasquill Stability Classification E, F and G) and unstable (Pasquill Stability Classification A, B and C) classifications. Stability information from Metro Airport for the same time period was also reviewed, and showed similar trends as the Fermi site data; i.e., decreasing trend in the frequency of neutral stability classifications with corresponding increase in the frequency of stable and unstable classifications. Although a trend in onsite stability frequencies was identified, no correlations with instrumentation change-outs or data step changes were evident, and the stability classification trend was verified to be consistent with other local meteorological data.

Review of ΔT data, system configurations, and discussions with Fermi 2 Systems Engineer and instrument vendors provided further details about the temperature instruments and software used to record onsite meteorological data. These system details were also discussed during the site audit with Fermi 2 Systems Engineer. Delta temperature is calculated from 60 meter and 10 meter temperature measurements. The ambient temperature sensors are Omega 700 series linear thermistors. Although output from the thermistors are referred to as "linear", there is an approximately +/- 0.2°C wobble within the operating range of -30 to +50°C. This wobble is linearized using a sixth order polynomial within the plant computer software. Figure 12 shows the meteorological system software coding, including the linearization function, and a description of the flowchart. The objective of the linearization equation is to apply a correction factor to both the 10 meter and 60 meter air temperatures prior to deriving the ΔT parameter for determining stability. This correction is applied to both primary and secondary data, and does not propagate variance between the channels.

The supporting information of this RAI states, in part, that "the Fermi 2 meteorological system engineer indicated that the secondary delta-temperature channel ($\Delta T = T_{60m} - T_{10m}$) recorded values that were consistently 0.2°C higher than the primary delta-temperature channel." The Fermi 2 Systems Engineer is unaware of a consistent variance in the primary and secondary channels. The system engineer does not recall discussions which indicated the consistent variance described by the RAI supporting information. The system engineer does recall discussions concerning the linearization function to correct the +/- 0.2°C wobble present in the temperature instrumentation described above, and stated that the visual display of the instantaneous delta temperature measurements at the meteorological tower shack was demonstrated at the time of the audit. The linearization function is a correction that does not propagate variance between the channels. The instantaneous ΔT data display indicates random variance as expected, calibrations and surveillances have been completed in accordance with the Fermi 2 TRM, and the ΔT channels are consistent over time, therefore the hourly average values used to determine atmospheric stability classes are reliable.

Review of ΔT data, meteorological instrumentation, calibration and surveillance requirements and historical records, system configuration, stability classification frequencies, and discussions with the Fermi 2 systems engineer identified no consistent data variance in primary and secondary channel measurements. This analysis confirms that the meteorological data obtained from the onsite meteorological tower for the time period 2001-2007, and reported in the Fermi 3 COLA, sufficiently characterizes the conditions at the Fermi site and surrounding region.

Meteorological Tower Instrumentation Vendor
It is recognized that the ER, Table 6.4-2, Sheet 1, identifies the meteorological tower instrumentation vendor as Climet. The correct vendor name is Climatronics.

Proposed COLA Revision

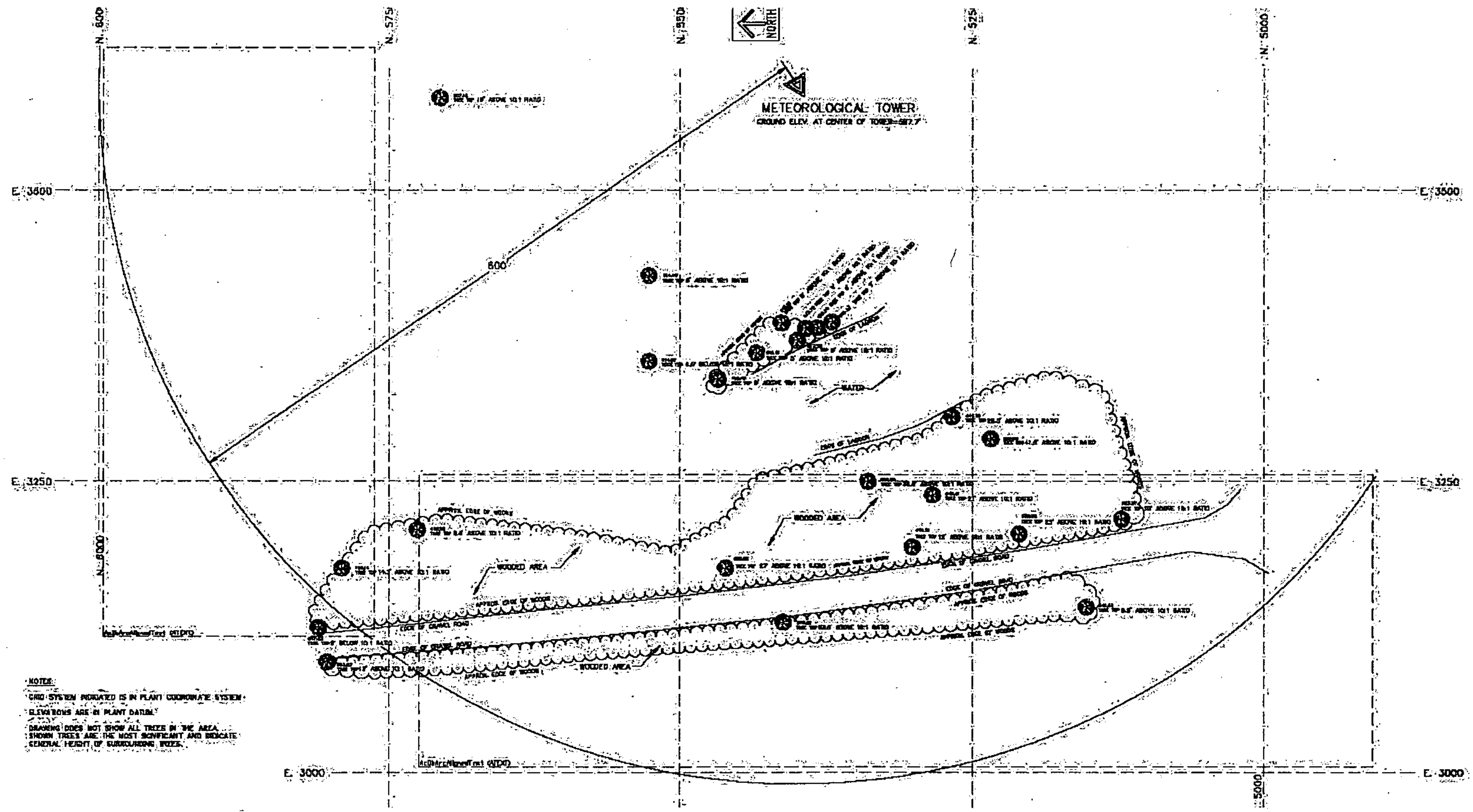
ER Table 6.4-2, Sheet 1 will be revised to indicate that the meteorological tower instrumentation vendor is Climatronics. A proposed mark-up is attached.

NRC3-09-0017
RAI Question AQ6.4-1

Enclosure 1
(following 12 pages)

Figure 1 – Onsite Meteorological Area
Figure 2 – Onsite 10 Meter Wind Rose, 2005
Figure 3 – Onsite 10 Meter Wind Rose, 2004
Figure 4 – Onsite 60 Meter Wind Rose, 2004
Figure 5 – Onsite 10 Meter Wind Rose, 2003
Figure 6 – Onsite 60 Meter Wind Rose, 2003
Figure 7 – Onsite 10 Meter Wind Rose, 1994
Figure 8 – Onsite 60 Meter Wind Rose, 1994
Figure 9 – Onsite 10 Meter Wind Rose, 1985
Figure 10 – Onsite 60 Meter Wind Rose, 1985
Figure 11 – Onsite 10-60 Meter Wind Roses, 1974-1975
Figure 12 – Thermistor Instrument Data Flowchart

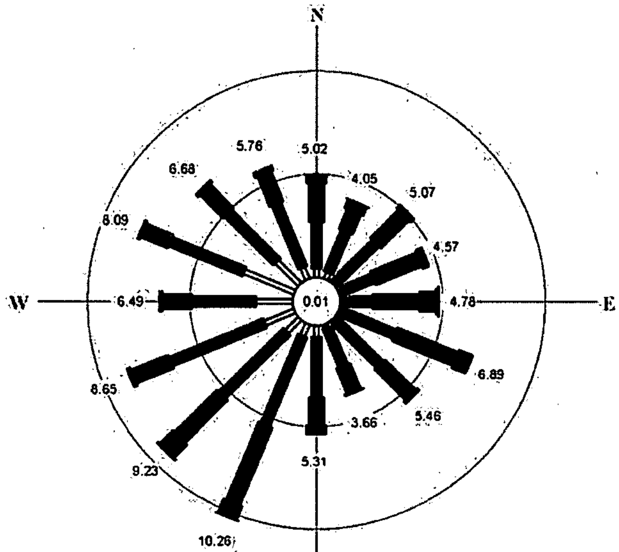
Figure 1
Meteorological Tower Area

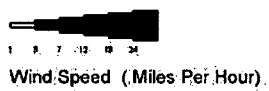


AQ6.4-1, Enclosure 1

Figure 2

Fermi 2
Joint Frequency Distribution
10 Meter Wind Rose Data for 2005





Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
No observations were missing.

PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
N	0.42	2.32	1.84	0.40	0.05	0.00
NNE	0.34	2.21	1.03	0.45	0.02	0.00
NE	0.09	2.81	1.93	0.24	0.00	0.00
ENE	0.11	1.69	2.43	0.33	0.00	0.00
E	0.06	1.52	2.28	0.79	0.13	0.01
ESE	0.09	2.89	3.18	0.73	0.00	0.00
SE	0.09	3.12	2.13	0.11	0.00	0.00
SSE	0.11	2.13	1.35	0.07	0.00	0.00

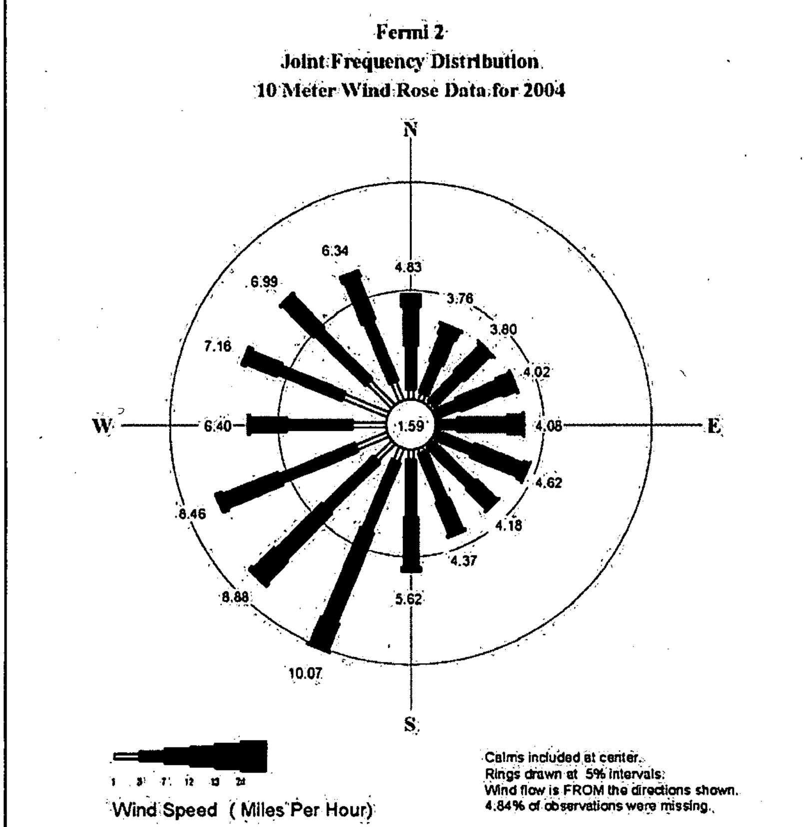
TOTAL OBS = 8761 MISSING OBS = 0

PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
S	0.54	3.02	1.37	0.38	0.00	0.00
SSW	0.63	4.77	4.11	0.74	0.01	0.00
SW	0.88	4.46	2.93	0.86	0.10	0.00
WSW	1.54	4.98	1.95	0.18	0.00	0.00
W	1.77	3.16	1.44	0.13	0.00	0.00
WNW	2.66	3.90	1.43	0.10	0.00	0.00
NW	1.58	3.38	1.56	0.16	0.00	0.00
NNW	0.63	3.36	1.55	0.23	0.00	0.00

CALM OBS = 1 PERCENT CALM = 0.01

Figure 3



PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
N	0.46	2.04	1.76	0.57	0.00	0.00
NNE	0.35	1.56	1.30	0.46	0.09	0.00
NE	0.18	1.81	1.67	0.11	0.02	0.00
ENE	0.06	1.14	2.07	0.68	0.07	0.00
E	0.03	0.96	2.31	0.73	0.05	0.00
ESE	0.08	1.82	2.41	0.30	0.01	0.00
SE	0.10	2.70	1.32	0.06	0.00	0.00
SSE	0.18	2.48	1.60	0.10	0.00	0.00

TOTAL OBS = 8785 MISSING OBS = 425

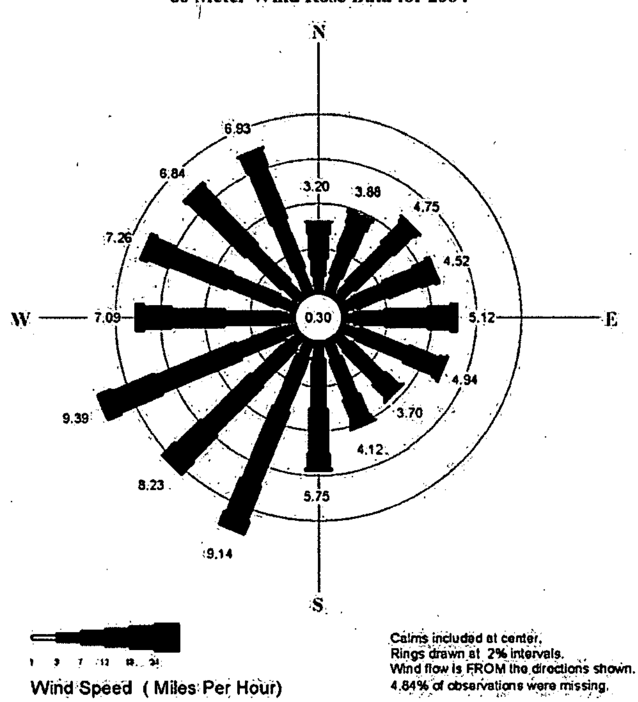
PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
S	0.43	2.75	2.25	0.18	0.00	0.00
SSW	0.65	3.51	4.51	1.39	0.02	0.00
SW	1.12	3.24	3.01	1.34	0.17	0.00
WSW	1.57	3.81	2.77	0.31	0.00	0.00
W	1.55	3.03	1.71	0.11	0.00	0.00
WNW	2.21	3.21	1.53	0.22	0.00	0.00
NW	1.60	3.26	2.06	0.07	0.00	0.00
NNW	0.93	3.05	2.05	0.31	0.00	0.00

CALM OBS = 140 PERCENT CALM = 1.59

Figure 4

Fermi 2
Joint Frequency Distribution
60 Meter Wind Rose Data for 2004



PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
N	0.07	0.72	0.80	1.10	0.50	0.01
NNE	0.05	0.88	1.16	1.22	0.46	0.13
NE	0.05	0.89	2.34	1.24	0.19	0.03
ENE	0.07	0.58	1.49	1.54	0.63	0.22
E	0.07	0.41	1.40	1.95	1.00	0.30
ESE	0.03	0.77	2.36	1.45	0.26	0.07
SE	0.06	0.68	2.01	0.83	0.10	0.01
SSE	0.03	0.84	1.89	1.02	0.27	0.06

TOTAL OBS = 8785 MISSING OBS = 425

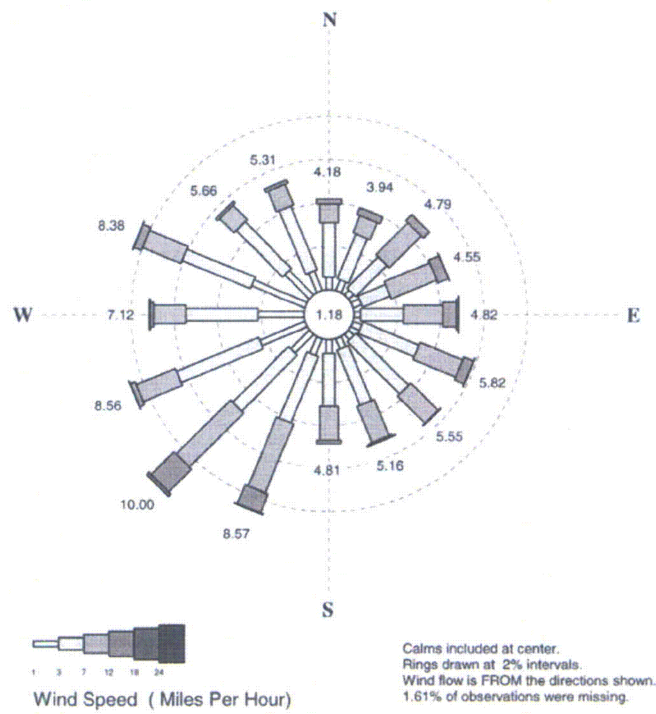
PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
S	0.05	0.69	2.23	2.03	0.66	0.09
SSW	0.02	0.71	2.57	3.57	1.65	0.61
SW	0.05	0.56	2.25	3.01	1.57	0.80
WSW	0.10	0.60	2.11	3.87	2.04	0.67
W	0.08	0.56	2.50	2.36	1.24	0.35
WNW	0.07	0.82	2.34	2.75	0.96	0.32
NW	0.13	0.89	2.15	2.50	1.00	0.17
NNW	0.06	1.21	2.32	2.53	0.76	0.06

CALM OBS = 26 PERCENT CALM = 0.30

Figure 5

Fermi 2
Joint Frequency Distribution
10 Meter Wind Rose Data for 2003



Calms included at center.
Rings drawn at 2% intervals.
Wind flow is FROM the directions shown.
1.61% of observations were missing.

PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
N	0.57	2.51	0.84	0.25	0.00	0.00
NNE	0.53	2.24	0.86	0.32	0.00	0.00
NE	0.31	2.04	2.07	0.38	0.00	0.00
ENE	0.42	1.36	2.25	0.51	0.01	0.00
E	0.31	1.96	1.80	0.62	0.11	0.01
ESE	0.43	2.77	2.11	0.48	0.02	0.00
SE	0.33	3.40	1.78	0.03	0.00	0.00
SSE	0.50	2.75	1.80	0.07	0.03	0.00

TOTAL OBS = 8761 MISSING OBS = 141

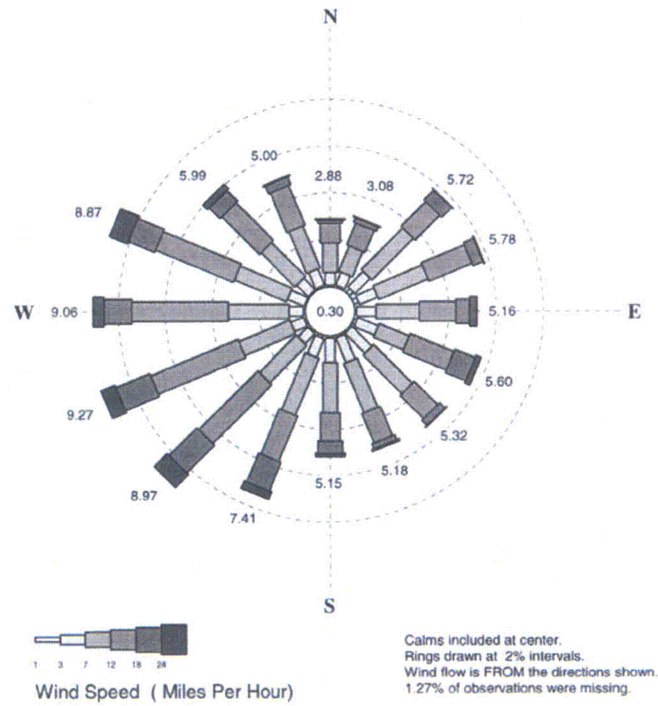
PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
S	0.64	2.44	1.56	0.16	0.00	0.00
SSW	0.83	3.31	3.45	0.94	0.05	0.00
SW	1.21	3.63	3.53	1.48	0.15	0.00
WSW	2.27	4.06	1.96	0.24	0.02	0.00
W	2.15	3.29	1.48	0.16	0.05	0.00
WNW	2.68	3.38	1.92	0.38	0.02	0.00
NW	1.59	3.04	0.92	0.11	0.00	0.00
NNW	0.97	3.16	1.02	0.16	0.00	0.00

CALM OBS = 103 PERCENT CALM = 1.18

Figure 6

Fermi 2
Joint Frequency Distribution
60 Meter Wind Rose Data for 2003



Calms included at center.
Rings drawn at 2% intervals.
Wind flow is FROM the directions shown.
1.27% of observations were missing.

PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
N	0.06	0.55	1.24	0.84	0.13	0.06
NNE	0.08	0.59	1.16	1.00	0.21	0.03
NE	0.22	0.92	2.49	1.48	0.59	0.01
ENE	0.22	0.83	2.27	1.96	0.46	0.03
E	0.07	0.82	1.85	1.53	0.58	0.31
ESE	0.14	0.94	1.38	2.01	0.92	0.22
SE	0.03	1.21	2.34	1.40	0.30	0.03
SSE	0.09	1.13	2.26	1.38	0.23	0.09

TOTAL OBS = 8761 MISSING OBS = 111

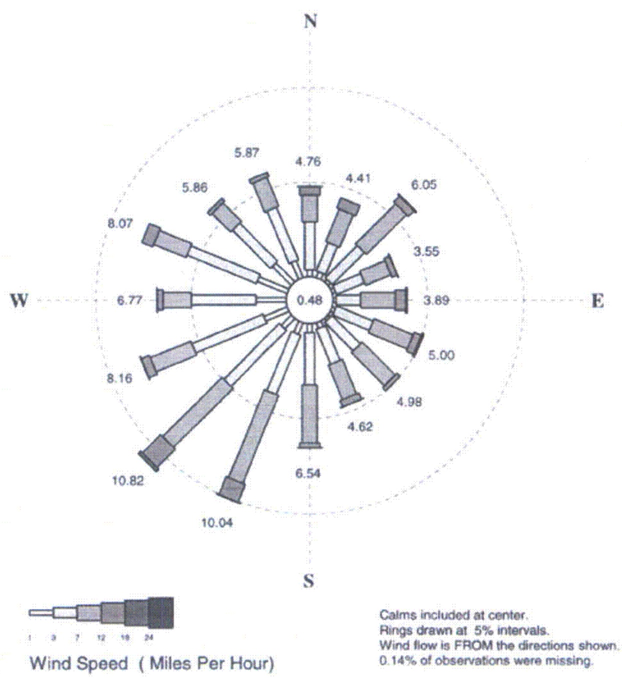
PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
S	0.07	1.05	2.13	1.21	0.54	0.15
SSW	0.13	0.84	2.63	2.12	1.34	0.35
SW	0.08	0.59	2.25	3.57	1.68	0.80
WSW	0.09	0.58	2.37	4.03	1.55	0.64
W	0.09	0.59	2.63	4.11	1.18	0.47
WNW	0.06	0.76	2.43	3.58	1.21	0.82
NW	0.06	0.70	2.05	2.27	0.65	0.26
NNW	0.08	0.74	1.93	1.84	0.37	0.05

CALM OBS = 26 PERCENT CALM = 0.30

Figure 7

Fermi 2
Joint Frequency Distribution
10 Meter Wind Rose Data for 1994



PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
N	0.35	2.56	1.39	0.45	0.01	0.00
NNE	0.32	1.64	1.87	0.57	0.00	0.00
NE	0.18	2.40	3.00	0.41	0.06	0.00
ENE	0.18	1.60	1.44	0.31	0.02	0.00
E	0.16	1.29	1.83	0.54	0.08	0.00
ESE	0.18	2.09	2.23	0.40	0.10	0.00
SE	0.15	2.13	2.45	0.24	0.00	0.00
SSE	0.31	2.00	1.94	0.35	0.02	0.00

TOTAL OBS = 8761 MISSING OBS = 12

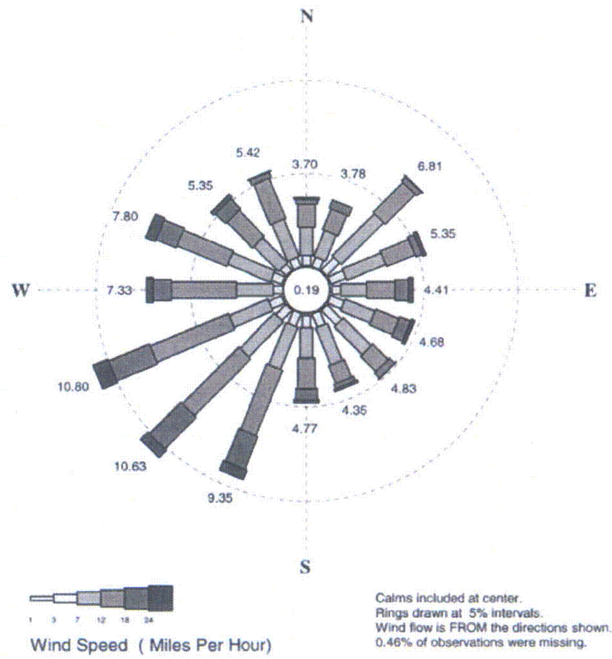
PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
S	0.48	2.74	3.05	0.26	0.01	0.00
SSW	0.65	3.37	5.00	1.00	0.02	0.00
SW	0.76	4.14	4.39	1.35	0.17	0.00
WSW	1.30	4.07	2.28	0.47	0.03	0.00
W	1.58	3.40	1.47	0.31	0.01	0.00
WNW	1.69	3.94	1.83	0.62	0.00	0.00
NW	1.42	2.86	1.37	0.21	0.00	0.00
NNW	0.96	3.02	1.64	0.24	0.00	0.00

CALM OBS = 42 PERCENT CALM = 0.48

Figure 8

Fermi 2
Joint Frequency Distribution
60 Meter Wind Rose Data for 1994



Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
0.46% of observations were missing.

PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
N	0.07	0.56	1.51	1.23	0.25	0.08
NNE	0.05	0.56	1.51	1.20	0.47	0.00
NE	0.07	0.98	3.17	2.24	0.31	0.05
ENE	0.09	0.87	2.23	1.62	0.37	0.18
E	0.11	0.47	1.38	1.50	0.72	0.23
ESE	0.06	0.80	1.70	1.32	0.60	0.19
SE	0.09	1.12	2.07	1.14	0.38	0.03
SSE	0.06	0.76	2.11	1.02	0.25	0.15

TOTAL OBS = 8761 MISSING OBS = 40

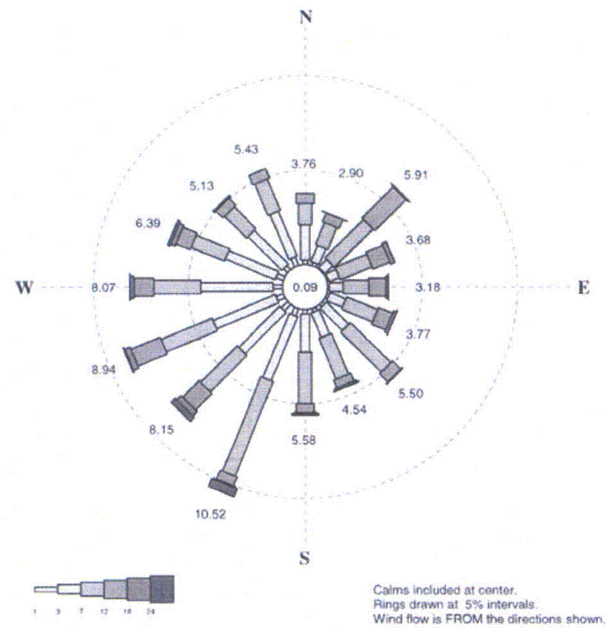
PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
S	0.13	0.66	1.60	1.62	0.58	0.18
SSW	0.03	0.76	2.40	3.73	1.87	0.55
SW	0.08	0.76	2.65	4.25	2.33	0.56
WSW	0.11	0.74	2.29	4.47	2.33	0.84
W	0.01	0.50	2.04	3.46	0.96	0.35
WNW	0.10	0.59	2.53	2.88	1.14	0.55
NW	0.07	0.46	1.89	1.96	0.75	0.22
NNW	0.05	0.55	2.16	2.32	0.31	0.05

CALM OBS = 17 PERCENT CALM = 0.19

Figure 9

Fermi 2
Joint Frequency Distribution
10 Meter Wind Rose Data for 1985



Wind Speed (Miles Per Hour)

Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
8.46% of observations were missing.

PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
N	0.22	1.88	1.13	0.53	0.00	0.00
NNE	0.18	0.92	1.28	0.50	0.00	0.01
NE	0.05	0.59	2.89	2.33	0.05	0.01
ENE	0.09	0.59	1.79	0.96	0.24	0.00
E	0.08	0.75	1.32	0.89	0.13	0.01
ESE	0.13	0.91	1.76	0.79	0.17	0.01
SE	0.17	1.67	3.00	0.60	0.06	0.00
SSE	0.19	1.42	2.35	0.43	0.11	0.03

TOTAL OBS = 8761 MISSING OBS = 741

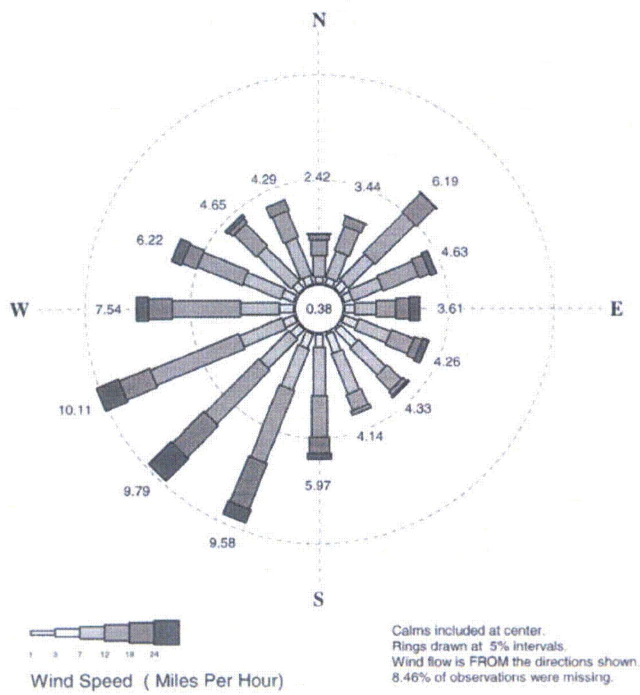
PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
S	0.22	2.03	2.72	0.47	0.06	0.09
SSW	0.41	3.68	5.40	0.53	0.07	0.45
SW	0.47	3.10	2.73	1.21	0.32	0.32
WSW	0.42	3.57	2.93	1.66	0.31	0.05
W	0.48	3.84	2.49	1.04	0.19	0.03
WNW	0.42	2.86	1.91	0.81	0.25	0.14
NW	0.30	2.55	1.66	0.54	0.09	0.00
NNW	0.49	2.59	1.80	0.55	0.00	0.00

CALM OBS = 8 PERCENT CALM = 0.09

Figure 10

Fermi 2
Joint Frequency Distribution
60 Meter Wind Rose Data for 1985



PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
N	0.06	0.30	1.02	0.75	0.25	0.05
NNE	0.05	0.32	1.34	1.26	0.47	0.01
NE	0.06	0.49	1.68	2.67	1.26	0.03
ENE	0.08	0.41	1.50	1.80	0.54	0.31
E	0.07	0.47	1.02	0.94	0.65	0.47
ESE	0.08	0.71	1.63	1.13	0.40	0.31
SE	0.10	1.11	1.83	0.96	0.23	0.10
SSE	0.10	0.96	2.08	0.80	0.21	0.00

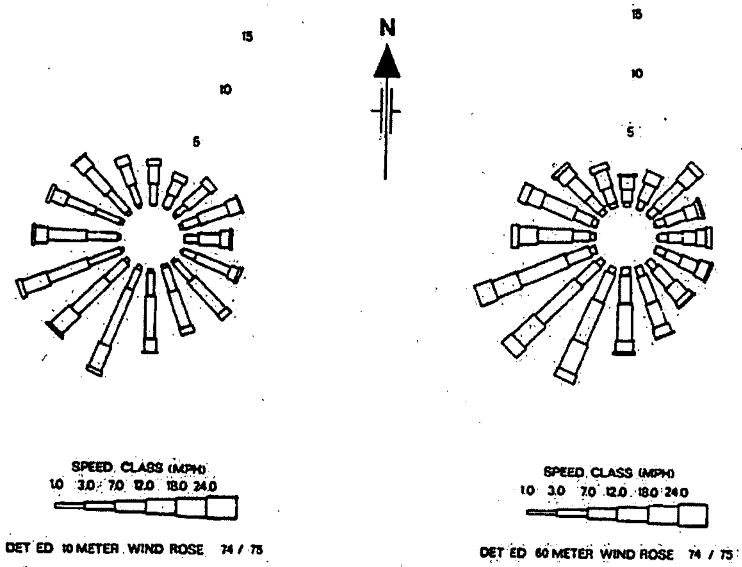
TOTAL OBS = 8761 MISSING OBS = 741

PERCENT OCCURRENCE: Wind Speed (Miles Per Hour)
LOWER BOUND OF CATEGORY

DIR	1	3	7	12	18	24
S	0.08	0.59	2.32	1.92	0.78	0.29
SSW	0.08	0.74	2.09	3.68	2.33	0.66
SW	0.07	0.55	1.96	3.62	2.09	1.51
WSW	0.09	0.58	2.23	4.51	1.56	1.14
W	0.07	0.68	1.88	3.22	1.13	0.56
WNW	0.10	0.62	1.97	2.29	0.73	0.50
NW	0.05	0.43	2.25	1.51	0.24	0.17
NNW	0.07	0.40	1.93	1.36	0.54	0.00

CALM OBS = 33 PERCENT CALM = 0.38

Figure 11

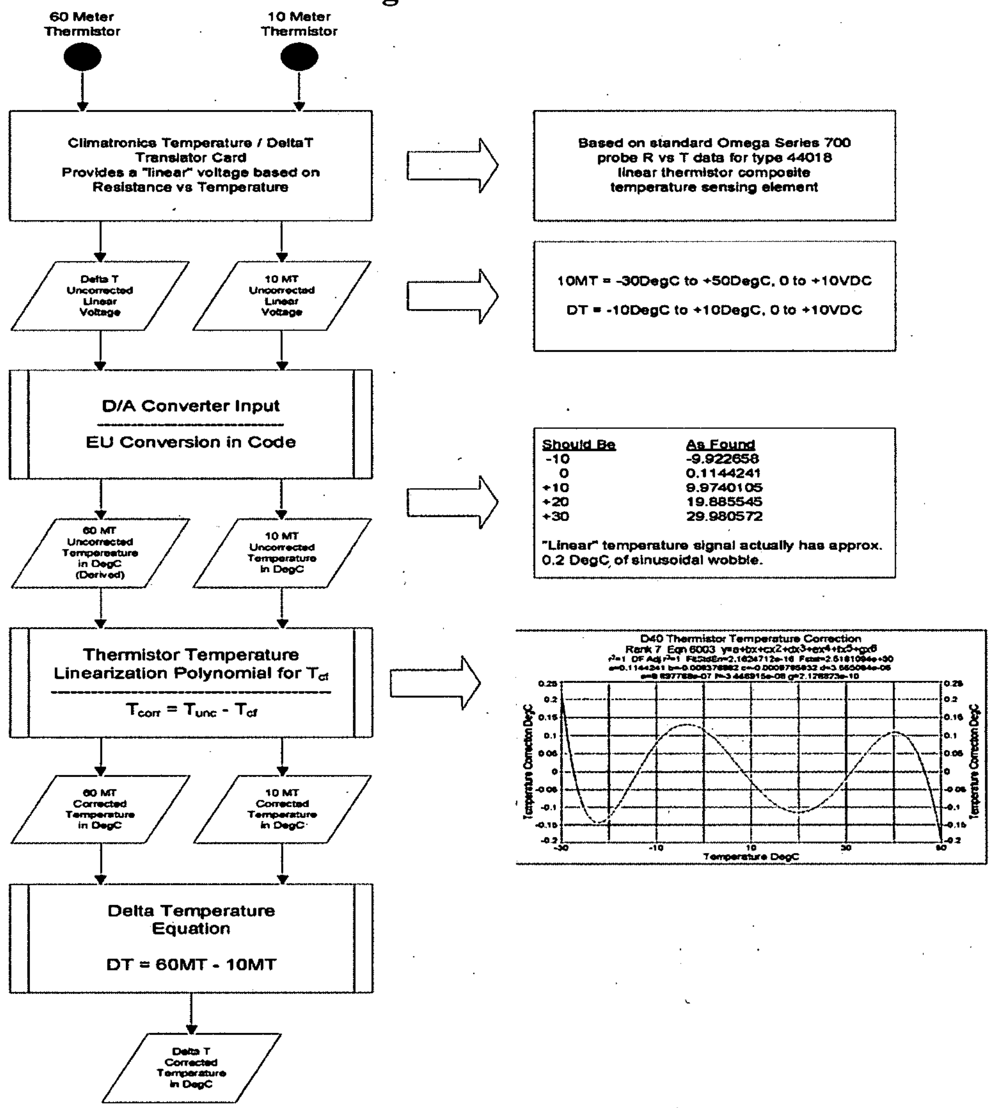


Fermi 2
UPDATED FINAL SAFETY ANALYSIS REPORT

FIGURE 2.3-19

FERMI SITE WIND ROSE DATA FOR ANNUAL PERIOD 1 JUNE 1974 – 31 MAY 1975

Figure 12



Description: The ambient temperature sensors are Omega 700 series linear thermistors. Although output from the thermistors are referred to as "linear", there is an approximately +/- 0.2°C wobble within the operating range of -30 to +50°C. This wobble is linearized using a sixth order polynomial within the plant computer software. The objective of the linearization equation is to apply a correction factor to both the 10 meter and 60 meter air temperatures prior to deriving the delta temperature parameter for determining stability.

The output from the 60 meter and 10 meter thermistors is fed into a translator card that provides a "linear" voltage based on the probe resistance vs. temperature data. The output from the translator card is an uncorrected delta temperature and 10 meter ambient temperature. The uncorrected delta temperature and 10 meter ambient temperature are used to determine the uncorrected 60 meter temperature indication. The corrected temperature is equal to the uncorrected temperature minus the calculated correction factor. The corrected delta temperature is then the difference between the corrected 60 meter ambient temperature and the corrected 10 meter ambient temperature.

Markup of Detroit Edison COLA
(following 1 page)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

Table 6.4-2 Accuracies and Thresholds for the Fermi Onsite Meteorological Monitoring Program Instruments (Sheet 1 of 3)

Wind Speed Sensors: All Levels

Sensor:	~~Climet~~ Instruments model #WS-011-1 wind speed transmitter and cup assembly	
Climatronics	Distance constant:	5 ft maximum
	Threshold wind:	0.6 mph
	Accuracy:	±0.1% or 0.15 mph, whichever is greater
Electronics:	Analog signal conditioner constructed by EG&G, Albuquerque	
	Accuracy:	±0.1% full scale
Recorder:	Digital representation of Datel Systems, Inc. model #ADC-E 3-digit (BCD) analog to digital converter	
	Accuracy:	±1% or 0.15 mph
Recorder (Backup):	Esterline Angus model #EAL1102S dual analog recorder	
	Accuracy:	±0.25% full scale
Overall System Accuracy:		±1.04% or 0.38 mph, whichever is greater

Wind Direction Sensors: All Levels

Sensor:	~~Climet~~ Instruments model #WD-012-30 wind direction transmitter and wind vane assembly	
Climatronics	Distance constant:	1 m maximum
	Damping ratio:	0.4 standard
	Threshold:	0.75 mph
	Accuracy:	±3°
Electronics:	Analog signal conditioner constructed by EG&G, Albuquerque	
	Accuracy:	±0.10% full scale
Recorder:	Digital representation of Datel Systems, Inc. model #ADC-E 3-digit (BCD) analog to digital converter	
	Accuracy:	±1/2 LSB
Recorder (Backup):	Esterline Angus model #EAL1102S dual analog recorder	
	Accuracy:	±0.25% full scale
Overall System Accuracy:		±3.2°

**Attachment 7
NRC3-09-0017**

Response to RAI letter related to Fermi 3 ER

RAI Question HY2.3.1-1

NRC RAI HY2.3.1-1

Provide maps and descriptions of the aerial extent, cross section, and depth of all existing clay dikes installed during the construction of Fermi 1 and 2.

Supporting Information

As determined during the site audit, more detailed information on geologic and hydrogeologic conditions is needed to assess the groundwater systems that could be affected by construction and operation of Fermi 3.

Response

The attached Figure 1 (Enclosure 1) shows a plan view of the Fermi site marked with the locations of dikes originally constructed to facilitate development of the Fermi site. The dike locations shown are revised from those shown on Environmental Report (ER) Figure 2.3-17 based on review of available drawings and aerial photos for Fermi 1 and 2. The dike locations are color coded to correspond to the various dike configurations that were constructed at the Fermi site. Each color code on Figure 1 represents the limits of a dike configuration. The dikes depicted are not visible at the site, as they are below the existing plant grade. The dikes were used to facilitate demucking and backfilling the site to establish the existing plant grade.

Available cross sections and one aerial view for the dike configurations are provided in Enclosure 2. The cross sections are taken from existing drawings for Fermi 1 and 2. The drawing number where a cross section was obtained is provided for each cross section. Where the plan location of a dike is shown on an existing drawing, but a cross section is not provided, Figure 1 states "unknown" along with the number of the drawing that shows the dike (configurations 9 and 10). The drawing that points to configurations 9 and 10 (6C721-24) was provided in response to RAI HY2.3.1-2, which was submitted to the NRC in Detroit Edison letter NRC3-09-0010 (ML091940218), dated June 19, 2009. For configuration 8, no information is shown on a drawing; rather this location was estimated from the aerial photo provided.

On Figure 1, there is overlap of configurations 3 and 4. Based on the drawings referenced, it is not clear which configuration is present in the overlap area; however, the configuration of the construction dike is not significant.

Impacts of the distribution of the construction dikes to overburden groundwater contours is addressed in the response to RAI HY2.3.1-4 in this letter.

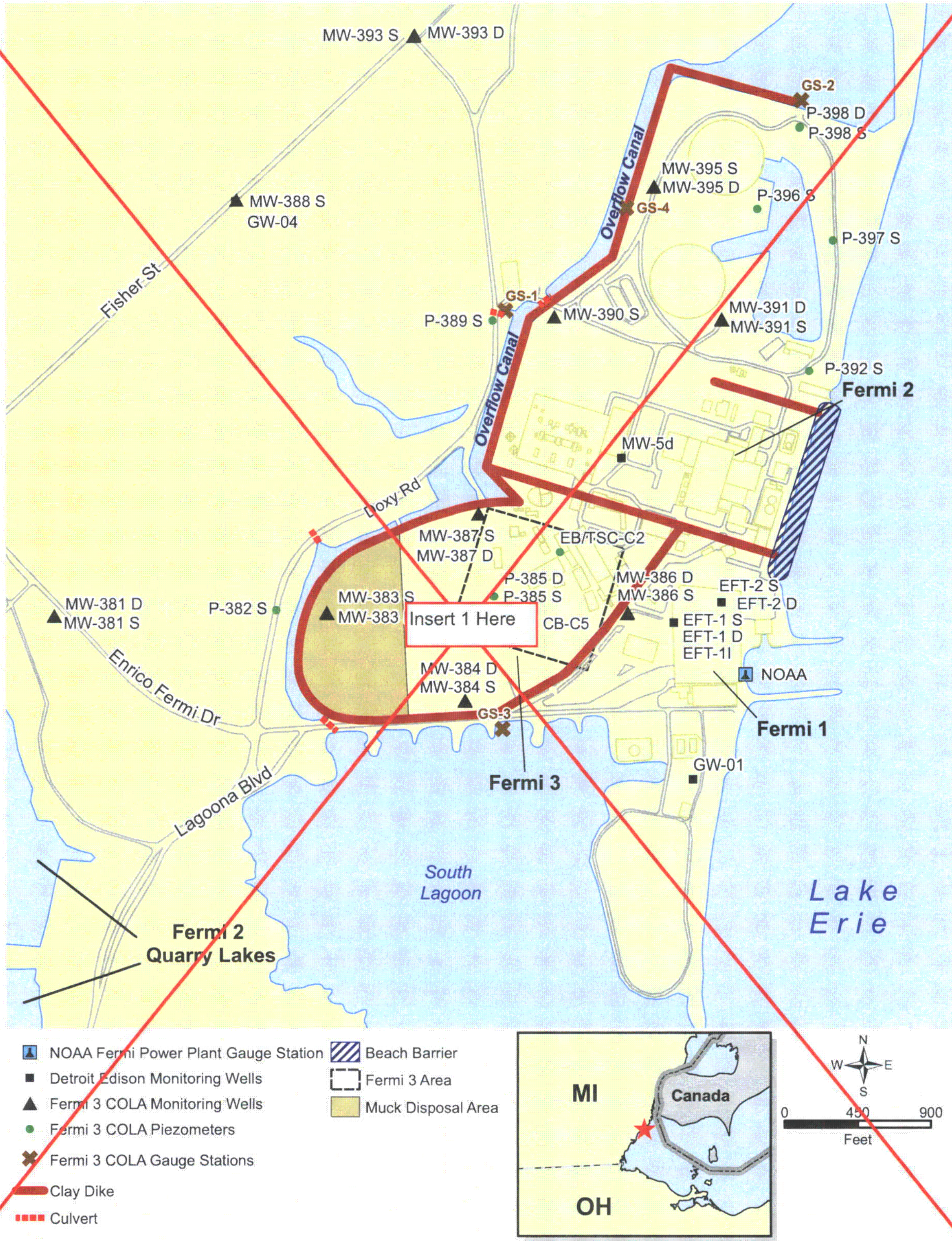
Proposed COLA Revision

ER Figure 2.3-17 will be updated. The revised construction dike configurations are shown on the attached markup.

Markup of Detroit Edison COLA
(following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

Figure 2.3-17 Site Map



Insert 1

Figure 2.3-17 Site Map

Attachment 7
NRC3-09-0017

Enclosure 1

Figure 1
(following 1 page)

Figure 1

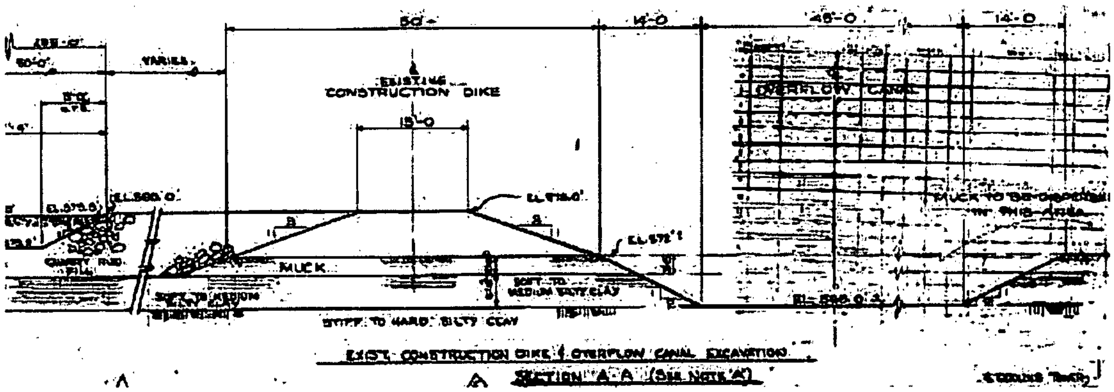
Figure 1
Estimated Construction Dike Locations/Configuration
DTE Fermi 3 RAI Response

* See Attached Cross Sections/Aerial Photo

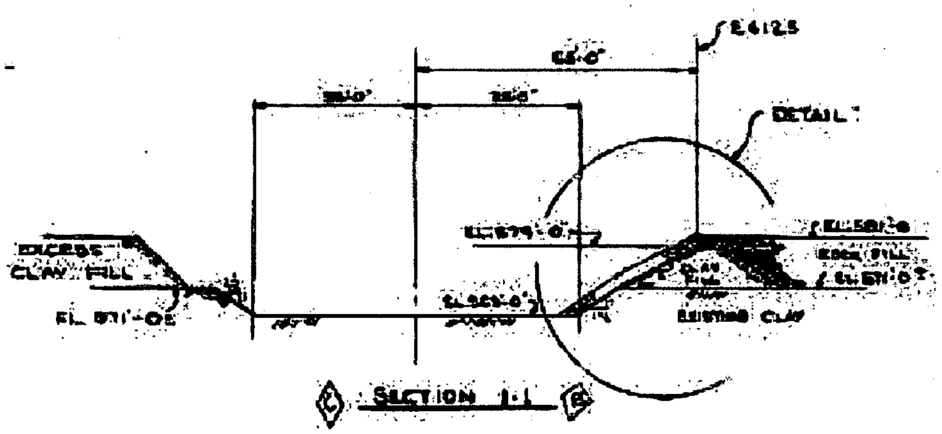
Attachment 7
NRC3-09-0017

Enclosure 2

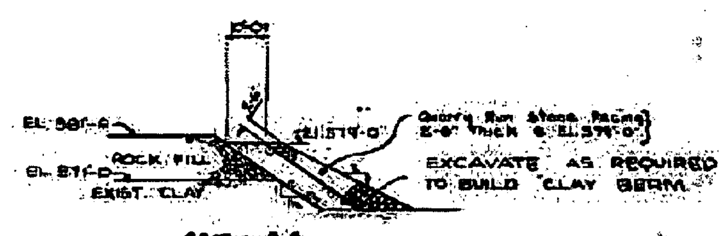
Dike Configuration Cross Sections/Aerial Photo
(following 3 pages)



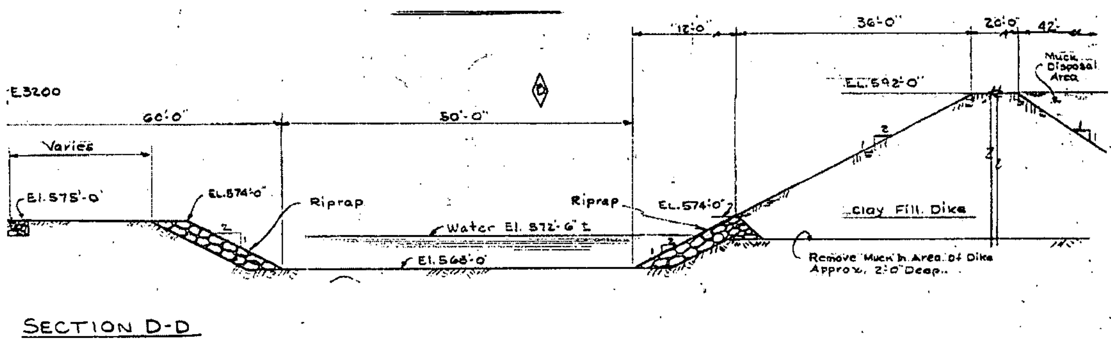
DTE Drawing No.: 6C721-32
Corresponds to Figure 1 Legend No. 1



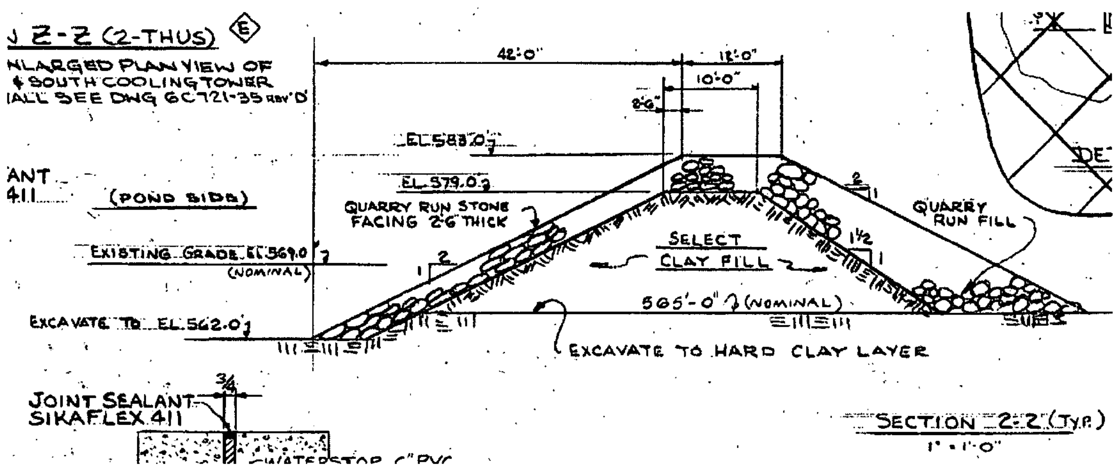
DTE Drawing No.: 6C721-24
Corresponds to Figure 1 Legend No. 2
Comments: DTE Drawing No. 6C721-32 addresses where this dike was removed.



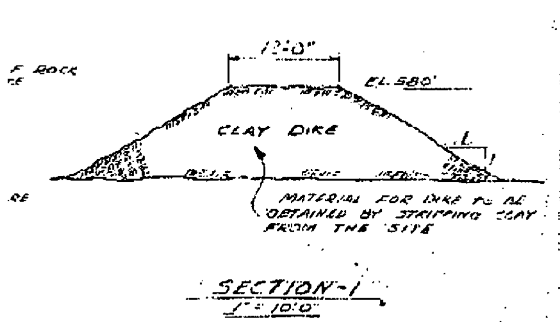
DTE Drawing No.: 6C721-24
Corresponds to Figure 1 Legend No. 3



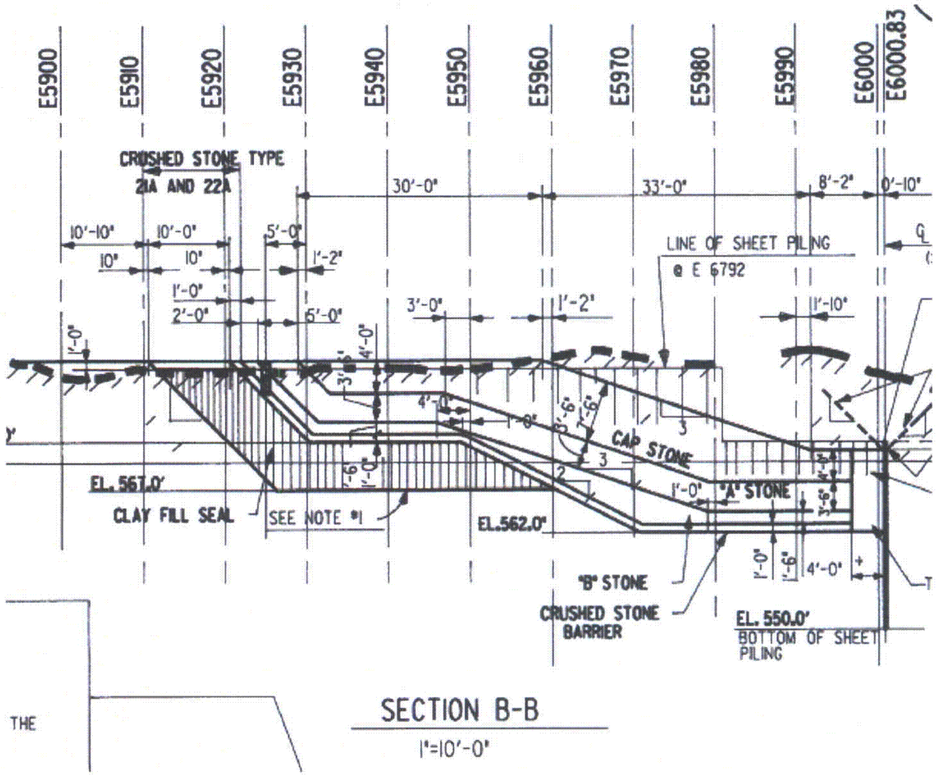
DTE Drawing No.: 6C721-30
Corresponds to Figure 1 Legend No. 4



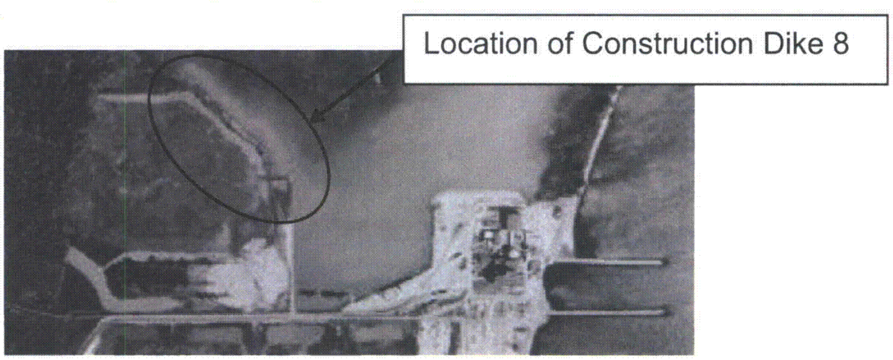
DTE Drawing No.: 6C721-33
Corresponds to Figure 1 Legend No. 5



DTE Drawing No.: 6C721-9
Corresponds to Figure 1 Legend No. 6



DTE Drawing No.: 6C721-40
Corresponds to Figure 1 Legend No. 7



Aerial Photo: FM-21-88, April 24, 1961
Corresponds to Figure 1 Legend No. 8