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Environmental Assessment Proposed Demolition of the Buildings at the Piqua, Ohio, Decommissioned Reactor Site

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U.S. DEPARTMENT OF ENERGY | Legacy Management

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Abbreviations

3D	three-dimensional
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
ADA	Americans with Disabilities Act
AEC	U.S. Atomic Energy Commission
APE	area of potential effect
CFR	*Code of Federal Regulations*
cm^2	square centimeters
D&D	decontamination and decommissioning
dBA	decibels A-weighted
DBH	diameter at breast height
DNL	day-night average sound level
DOE	U.S. Department of Energy
dpm	disintegrations per minute
EO	Executive Order
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
ft	feet
HABS	Historic American Buildings Survey
HEPA	high-efficiency particulate air
LBP	lead-based paint
LLRW	low-level radioactive waste
LM	Office of Legacy Management
LMS	Legacy Management Support
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCEMA	Miami County Emergency Management Agency
MLLRW	mixed low-level radioactive waste
MOA	Memorandum of Agreement
mrem	millirem
NAAQS	National Ambient Air Quality Standards

NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
OAC	*Ohio Administrative Code*
Ohio EPA	Ohio Environmental Protection Agency
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PFD	Piqua Fire Department
PM_{10}	particulate matter less than 10 micrometers
$PM_{2.5}$	particulate matter less than 2.5 micrometers
PPD	Piqua Police Department
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
SHPO	State Historic Preservation Officer
SWPPP	Stormwater Pollution Prevention Plan
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UW	universal waste
WWTP	wastewater treatment plant

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Executive Summary

The U.S. Department of Energy (DOE) Office of Legacy Management (LM), in coordination with the U.S. Army Corps of Engineers (USACE) and RSI EnTech, LLC, has prepared this Environmental Assessment (EA) to evaluate the potential environmental impacts from the proposed demolition of the Piqua, Ohio, Decommissioned Reactor Site. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and DOE regulations for implementing NEPA. LM has prepared a Finding of No Significant Impact as it is determined that no significant changes are necessary.

Background

The former Piqua Nuclear Power Facility, now called the Piqua, Ohio, Decommissioned Reactor Site (hereafter referred to as the site) underwent decontamination and decommissioning (D&D) by the U.S. Atomic Energy Commission (AEC) in 1968. The D&D process included the removal and offsite disposal of all high-level radioactive waste; low-level radioactive waste (LLRW) was entombed onsite in concrete. Two buildings, the reactor dome and auxiliary building, remain onsite. LM, the successor to the AEC, is responsible for long-term surveillance and maintenance of the entombed radioactive materials under authority from the Atomic Energy Act of 1954, as amended.

The Piqua site has been leased to the city of Piqua since 1969, which used the site for storage and office space until 2018. In 2018, the city notified LM that the near-term and long-term maintenance costs at the site were much greater than the city had anticipated. In addition, the location of the site and the poor configuration of the buildings did not justify the city's capital investment because the facilities did not fit within the city's long-term economic development vision. As a result, the city notified LM that it was no longer interested in utilizing the Piqua facility for any current or future city operations (see Appendix A of this EA for a letter from the city explaining this lack of interest). However, the city owns a reversionary interest in the title to the property that takes effect once radiological unrestricted release levels are achieved. LM has no current or anticipated future needs for the site beyond maintaining continued protectiveness of the entombed LLRW that remains onsite.

Purpose and Scope

The purpose and need for LM action is to identify a long-term path forward for the site that is protective of human health and the environment from risks associated with unoccupied buildings and vacant property that no longer contribute to the active LM mission, and to reduce long-term stewardship costs associated with the site.

Alternatives

NEPA requires federal agencies to consider reasonable alternatives that would achieve the stated purpose of the project. Six alternatives, including the No Action Alternative, were considered for a long-term management plan for the site. Evaluation of alternatives was conducted in two phases. Phase one was based on the following criteria: maintaining the health and safety of building occupants, compliance with the National Historic Preservation Act (NHPA), and alignment with interests of the primary stakeholder (the city). Alternatives that met all phase one

criteria were further evaluated based on the following phase two criteria: assurance of protectiveness for the entombment, acceptable implementation schedule and cost, and beneficial reuse of the site. If alternatives did not meet all phase one and phase two evaluation criteria they were eliminated from consideration. Table E-1 lists the alternatives that were retained or eliminated from consideration, with all six alternatives described in detail below.

Table E-1. Summary of Alternatives

Alternatives	
Alternative Number	**Alternative Description**
1	LM continues lease with the city of Piqua **(No Action Alternative)**
2	Full demolition of aboveground structures and protection of the entombment **(Preferred Alternative)**
Alternatives Eliminated from Further Consideration	
3	Termination of lease agreement with city and lease and/or reuse of property to or by a third party
4	Partial demolition of Piqua structures
5	Turn former reactor site into museum or visitor center
6	Full demolition of all structures including the removal of the entombment

LM determined that Alternatives 3–6 do not meet all the evaluation criteria, which are discussed in Section 2.0 of this document. As such, Alternatives 3–6 do not align with the purpose and need of this project and were eliminated from further consideration.

Alternative 1 (No Action Alternative)

The No Action Alternative would entail LM continuing the modified lease with the city. LM would be financially responsible for facility maintenance of the reactor and auxiliary buildings, and ensuring protectiveness of the entombment until applicable radiological unrestricted release levels were achieved. The city would be responsible for all other maintenance activities at the site. The site would continue to be leased to the city at no cost, and the city would be able to utilize limited portions of the site where lead-based paint (LBP) is not present. Locations at the site where LBP is present would be unoccupied and inaccessible because it presents a health and safety risk to occupants. The ownership of the land and buildings would revert to the city when radiological unrestricted release standards were achieved. The No Action Alternative was retained for evaluation to provide a baseline for comparison to the Preferred Alternative.

Alternative 2 (Preferred Alternative)

This alternative would entail the full demolition of aboveground structures at the site and the protection of the entombment. It was determined that this alternative would meet all the evaluation criteria and was therefore retained as the Preferred Alternative.

Proposed dome demolition would be accomplished by employing a conventional top-down approach utilizing a high-reach excavator with a concrete processor. Below-grade embedded beams and floor members would be pulverized with a hydraulic concrete processor. Reinforcing

steel and remnant concrete would be sawcut or torch cut and flushed as needed. Dome demolition activities would be completed in several steps:

[1] A liner fabric would be laid over the entombment area to prevent demolition debris from the dome from mixing with clean fill. Protection features would be installed above the entombment (e.g., timbers, hay bales).

[2] Puncture dome with shear attachment on high-reach excavator. Process dome down in concentric rings down to the vertical walls, making sure the remaining dome is stable at all times.

[3] Process down the vertical walls to grade level. Burn reinforcing steel flush at grade level.

The existing entombment would be modified to ensure water could not collect. The entombment would then be further encased in waterproof concrete that would be anchored to the existing entombment structure with steel reinforcement rod tie-ins. The void space between the reactor building walls and entombment would be backfilled to grade. The auxiliary building and associated utility vaults and utility lines would be removed and backfilled to grade level. Portions of the auxiliary building and utility vault foundations may remain in place for structural stability. Finally, the surface above the entombment would be protected with a riprap cover, concrete rails, and appropriate signage. The remaining footprint of the site would be graded with a paved surface to match the surrounding landscape. LM would work with the city to modify the current contract and lease, if necessary, to include restrictions (e.g., no digging) and clarify permitted land uses that would ensure protectiveness of the entombment.

All waste and debris from the demolition would be disposed of according to applicable federal, state, and local regulations. Concrete derived from demolition is not anticipated to be suitable for backfilling or recycling onsite. All construction and demolition waste would be hauled offsite to an approved landfill. It is possible that some concrete would have its painted surface abated and then reused onsite as fill.

In the absence of such contamination, the site would be backfilled and graded. The graded site would then be covered with an impermeable barrier cap (such as asphalt or other waterproof membrane) and riprap to provide a protective cover for the entombment. The final grading plan would be coordinated with the city of Piqua.

Ownership of the land would revert to the city when the entombed radiological material achieves unrestricted release standards. This alternative would ensure the lowest probability that health and safety of the public and the environment would be impacted by residual radioactivity, hazardous materials, and industrial hazards at the site by eliminating future occupancy and ensuring protectiveness of the entombment. The city would be able to utilize portions of the land postdemolition in an industrial/commercial manner like the land use on the adjacent city-owned property. The area would be gravel or paved to match the existing surrounding lot.

Alternative 3

This alternative was considered as a way to maintain a lease on the buildings similar to what the city has, in order to keep the historic structures as a visible community asset. For this to happen any third party lessee would be financially obligated to bring the facilities up to code, obtain an occupancy permit, update the fire suppression system, remove or manage hazardous material,

and maintain the building in compliance with the NHPA and the Americans with Disabilities Act (ADA). It was considered unlikely that any third party would be interested in a lease. The city has a reversionary right to the title to the property and expressed its intent to utilize the site and to retain future ownership of it. Because of the city's reversionary rights to the property, this alternative was eliminated from further consideration.

Alternative 4

This alternative would entail the demolition of either the reactor dome or the auxiliary building, but not both structures. This alternative was considered to either keep the usable part of the historic structure or keep the iconic dome of the historic structure intact. Demolishing only one structure would leave an unoccupied structure in place and would require LM to continue facility maintenance, and ensure the site complies with current laws and standards including current building codes, NHPA, and ADA.

LM has no current or anticipated future needs for the site beyond maintaining continued protectiveness of the entombed LLRW that remains onsite, and as such determined it was not in LM's best interest to maintain the facilities. Additionally, the city requested that the buildings be removed. The city's reversionary interest in the property and lack of a desire by the city or LM to maintain the structures eliminated this alternative from further consideration.

Alternative 5

This alternative would entail converting the site into a museum or visitor center, or both, with interpretive exhibits and displays that would tell the story of the former facility. This alternative was considered to maintain the site and associated history. All current hazards at the site (including LBP) would be mitigated. The facility would be required to meet all applicable guidelines for DOE visitor centers and public areas, and ensure the site complies with current laws and standards including building codes, NHPA, and ADA.

It was determined that renovating the buildings for public use was not in the best interest of DOE, and it was also determined by the city that there was no interest in continued maintenance of the site and there is negligible public interest in a museum or visitor center. The city's reversionary interest in the property and lack of a desire by the city or LM to construct and operate a museum or visitor center eliminated this alternative from further consideration.

Alternative 6

This alternative would entail the demolition of all aboveground buildings and the complete removal of the entombment of radioactive materials. The auxiliary building, dome, and entombment would be removed and backfilled at grade. All waste and debris from the demolition would be disposed of according to applicable federal state, and local regulations. There would be testing after demolition to determine that all radioactive materials have been removed from the site. The ownership of the land would revert to the city once the demolition is complete and all final testing has been complete. This alternative had higher than feasible costs associated with the higher risk of removing and transporting the entombed radioactive material. For this reason, it did not meet acceptable implementation schedule and cost screening criteria and was not considered further.

Affected Environment and Consequences

This EA describes the existing environmental conditions of the project area and the potential environmental consequences of implementing the Preferred Alternative and the No Action Alternative.

A historic building survey was conducted on the site. This historic survey resulted in LM's determination that the site is eligible for inclusion in the National Register of Historic Places under Criterion A for its association with important aspects of American history and under Criterion C for its architectural and engineering qualities; a historic district is not present at this location. The Ohio State Historic Preservation Officer (SHPO) concurred with this finding on January 30, 2018. The Preferred Alternative of demolition would constitute an adverse effect to historic property. Details of the mitigation activities proposed can be found in a Memorandum of Agreement between LM and the Ohio SHPO and Section 5.0 of this EA.

All other impacts to the affected environments would be considered negligible or result in no impact with the implementation of the Preferred Alternative.

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1.0 Introduction

The Piqua Nuclear Power Facility, now called the Piqua, Ohio, Decommissioned Reactor Site (hereafter referred to as the site) is in the city of Piqua (hereafter referred to as the city), in Miami County, Ohio (Figure 1). It was built and operated from 1963 to 1966 as a power demonstration reactor project by the U.S. Atomic Energy Commission (AEC). A local public utility company in the city applied to participate in the AEC Power Demonstration Program in 1956; AEC subsequently authorized contract negotiations to finance construction of the reactor under this program in the same year.

Figure 1. General Location of Piqua, Ohio, near the Piqua Decommissioned Reactor Site

The reactor was the first 45.5-megawatt, organically cooled and moderated, thermal reactor in the United States. The prototype's 27-foot-tall vessel was made of low-carbon steel and its 7.6-foot-diameter interior had an average wall thickness of 2 inches. The reactor produced superheated steam that was pumped to generators in the Piqua municipal power plant to augment the city's power supply through footbridge pipes across the Great Miami River.

In 1969, the facility was decommissioned by the AEC because of technical and economic considerations. AEC, a predecessor agency to the U.S. Department of Energy (DOE), removed the reactor fuel (enriched uranium), coolant, and other high-level radioactive materials from the site. Contaminated piping and equipment inside the reactor dome were removed or decontaminated. The reactor vessel and non-removable parts of the vessel containing low-level radiological materials were placed inside an 8-foot-thick concrete bioshield and further entombed belowground, onsite in concrete.

The aboveground facility structures that remain at the site include the reactor dome and a connected auxiliary building (Figure 2).

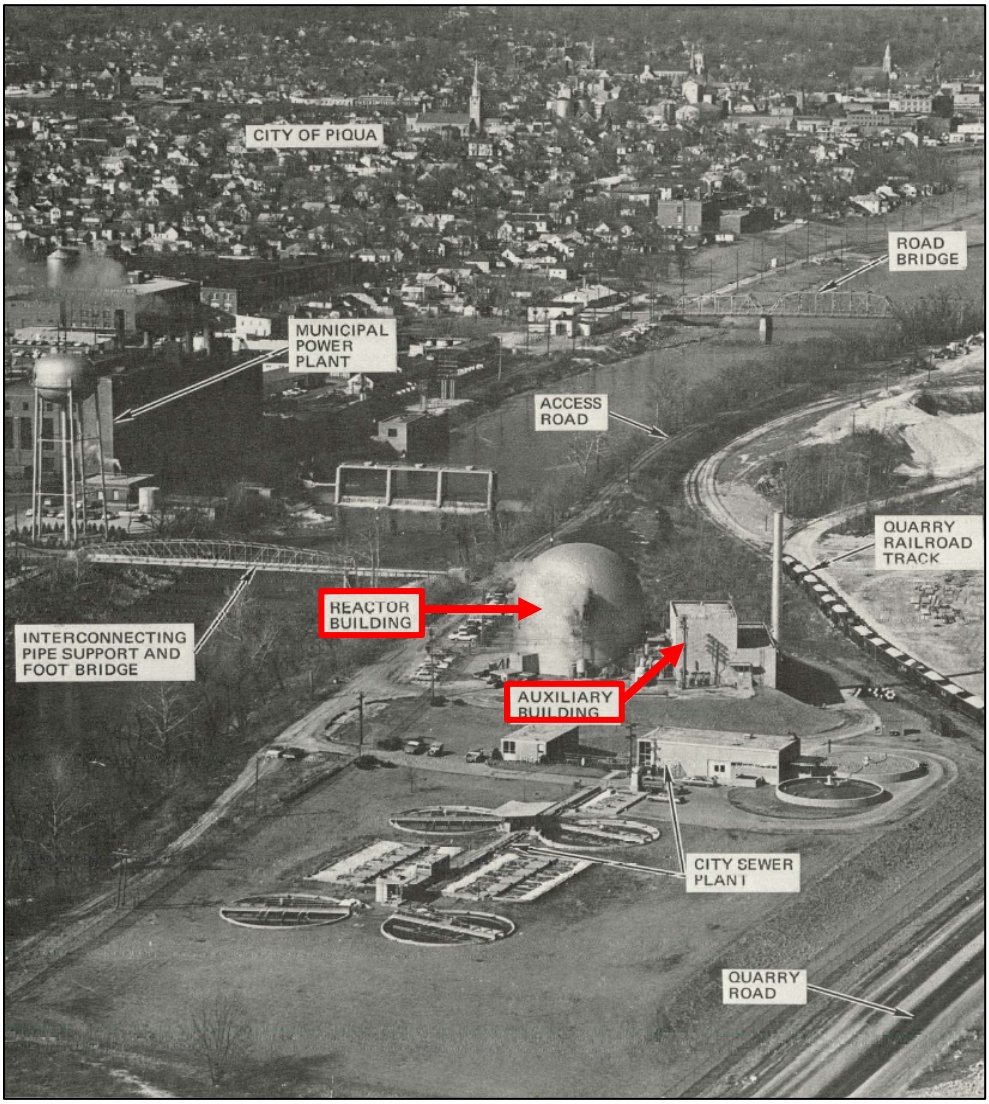

Figure 2. Aerial View of the Piqua Nuclear Power Facility (Photo from the American Nuclear Society)

Low-level radioactive waste (LLRW) (the reactor vessel, steam generating equipment, and other parts of the heat transfer system) is entombed within the concrete bioshield below the reactor dome (an upright steel and concrete cylindrical structure). This entombed LLRW are in the former reactor core below the reactor dome (Figure 3).

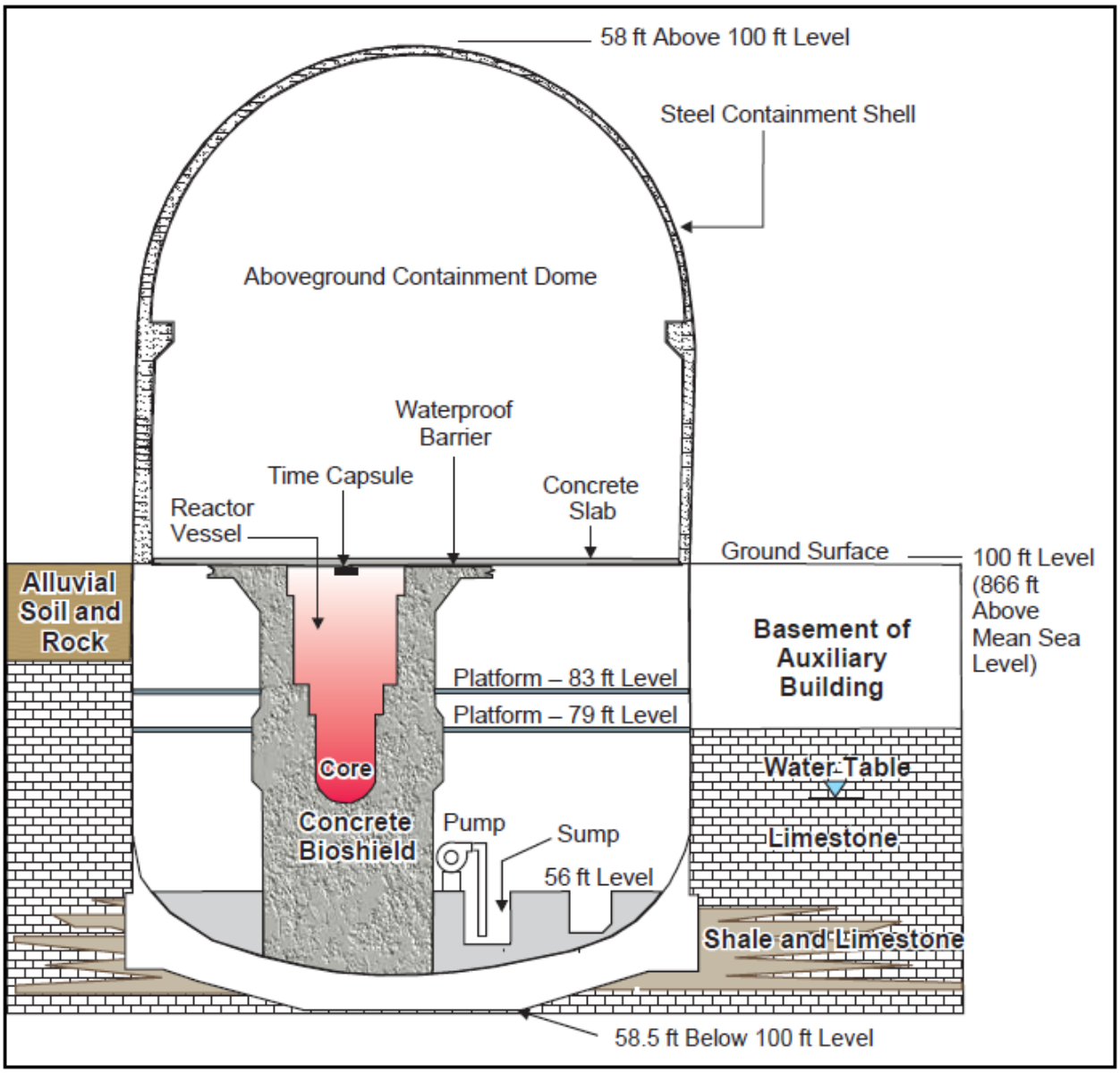

Figure 3. Cross Section Diagram of the Existing Piqua Decommissioned Reactor Building Showing Aboveground and Belowground Containment Domes

Since the facility was designed to contain radioactivity from an operating reactor, the bioshield can contain the radiological material during the radioactive decay process. More than 99% of the radioactive material entombed at the site in 1969 is in the belowground portion of the reactor complex in the reactor vessel. The AEC calculated that the radioactivity would decay to levels low enough to allow all safety constraints to be removed by 2106.

Following decommissioning, the Office of Legacy Management (LM) entered into an agreement with the city that LM would retain overall ownership of the site, which includes the portion of the land where the reactor dome was erected, and the site would in turn be leased back to the city. LM holds the title to the facility and land and is responsible for long-term stewardship of the site, including ensuring the protectiveness of the radioactive materials entombed onsite. The lease gave LM access to the site to conduct periodic inspections to ensure protectiveness of human health and the environment.

Beginning in 2013, the site was occupied by the city's underground utilities group and police department, which utilized the facilities for storage and office space. Until a January 2019 addendum to the lease, the city was responsible for nonnuclear facility maintenance and upkeep of the facilities onsite, including the administration building and reactor facility, and maintenance of the cathodic protection system and a water-level alarm for a sump pump. The modified lease states that the city may not access the premises until LM completes its work, which includes asbestos abatement or removal of structures and facilities, or both (Appendix A). The modification was preferred by the city, which is no longer interested in using the site for any operations (Appendix A) but is interested in its reversionary right to the land.

1.1 Purpose and Need

In 2018, the city notified LM that the near-term and long-term maintenance costs at the site were much greater than the city anticipated. In addition, the location of the site and the poor configuration of the buildings did not justify the city's capital investment in the site because the facilities do not fit within the city's long-term economic development vision. As a result, the city notified LM that it was no longer interested in utilizing the Piqua facility for any current or future city operations (see Appendix A for a letter from the city explaining this lack of interest). LM has no current or anticipated future needs for the site beyond maintaining continued protectiveness of the entombed LLRW that remains onsite.

The purpose and need for LM action is to identify a long-term path forward for the site that is protective of human health and the environment from risks associated with unoccupied buildings and vacant property that no longer contribute to the active DOE mission, and to reduce long-term stewardship costs associated with the site. LM established an interagency agreement with the U.S. Army Corps of Engineers (USACE) Louisville District on September 4, 2018, to assist with project management, National Environmental Policy Act (NEPA) requirements, project design, contract advertisement and award, and execution of any construction or demolition activities. This agreement ended in 2021, with all the aforementioned responsibilities turned over to the Legacy Management Support (LMS) contractor.

This Environmental Assessment (EA) provides sufficient evidence and analysis for making a determination of a Finding of No Significant Impact (FONSI), and describes the site, and the biological, cultural, and environmental resources and people that could be affected by the LM action.

2.0 Description of Alternatives

This section summarizes the range of reasonable alternatives considered while evaluating the long-term management of the site. There were six alternatives evaluated based on the selection criteria presented in Table 1. Four action alternatives were eliminated and not evaluated further because they did not meet the evaluation criteria. Alternative 2, full demolition of the aboveground structures at the site, did meet all of the evaluation criteria and is the Preferred Alternative. The No Action Alternative did not meet all the evaluation criteria but was maintained to provide a baseline of analysis, enabling decision makers to compare the magnitude of environmental effects of the preferred alternative. Effects that the No Action Alternative and Preferred Alternative would have on the environment can be found in Section 3.0.

Table 1. Evaluation Criteria for Alternative Actions Developed for the Piqua Decommissioned Reactor Site Environmental Assessment

Alternative Number	Alternative Description	PHASE ONE: Criterion 1– Maintains Acceptable Health and Safety Risk to Occupants	PHASE ONE: Criterion 2– Complies with NHPA	PHASE ONE: Criterion 3– Aligns with Primary Stakeholder (City of Piqua) Interests	Overall Result: Passes All Three Criteria
1	LM continues lease with the City of Piqua (No Action Alternative)	No – City would not maintain facilities	Yes – LM would reuse or disposition property	No – City has no interest in facilities but would like land	No
2	Full demolition of aboveground structures (Preferred Alternative)	Yes – Would be conducted in full compliance with applicable health and safety requirements; no future occupants	Yes – MOA developed with Ohio SHPO prior to demolition	Yes – City interested in utilizing land post-demolition	Yes
3	Termination of lease agreement with city and disposition or reuse of property to or by a third party	Yes – However third-party interest in the property is unlikely	Yes –MOA developed with Ohio SHPO; NHPA requirements in lease with third party	No – City interested in right to land	No
4	Partial demolition of Piqua structures	No – City would not maintain through 2106	Yes – LM would reuse or disposition property	No – City not interested in maintaining remaining structure	No
5	Turn former reactor site into museum or visitor center	No – Abatement and renovations not in best interest of DOE	Yes – Ohio SHPO and city would be involved in design; managed in accordance with NHPA	No – No public interest in museum; city not interested in maintenance but would like land	No
6	Full demolition including the removal of entombment	Yes – Would be conducted in full compliance with applicable health and safety requirements; no future occupants	Yes – MOA developed with Ohio SHPO prior to demolition	Yes – City interested in utilizing land postdemolition	Yes

Table 1. Evaluation Criteria for Alternative Actions Developed for the Piqua Decommissioned Reactor Site Environmental Assessment (continued)

Alternative Number	Alternative Description	PHASE TWO: Criterion 1 - Assurance of Protectiveness for Entombment	PHASE TWO: Criterion 2 - Acceptable Implementation Schedule and Cost	PHASE TWO: Criterion 3 - Beneficial Reuse of Site	Overall Result
2	Full demolition of aboveground structures (Preferred Alternative)	Yes – Appropriate safeguards and protective measures would be incorporated into design	Yes – Abatement, demolition and long-term stewardship of entombment through 2106 provide acceptable cost and schedule	Yes – City would use land post-demolition and ownership would revert to city in 2106	Recommended
6	Full demolition including the removal of entombment	Yes – Appropriate safeguards and protective measures would be incorporated into design	No - Abatement, demolition and removal of the entombment did not provide acceptable cost and schedule. Increased cost and time were caused by significant increases to risk of health and safety	Yes – City would use land post-demolition and ownership would revert to city in 2106	Not recommended

Note:
Evaluation occurred in two phases. If an action met all three Phase One criteria, it was considered for Phase Two evaluation criteria.

Abbreviations:
MOA = Memorandum of Agreement; NHPA = National Historic Preservation Act

2.1 ALTERNATIVE 1 (No Action Alternative) – LM Continues Modified Lease with the City of Piqua

The No Action Alternative would entail LM continuing the modified lease with the city. LM would be financially responsible for facility maintenance of the reactor and auxiliary buildings and protectiveness of the entombment until applicable radiological unrestricted release levels were achieved. The city would be responsible for all other maintenance activities at the site. The site would continue to be leased to the city at no cost, and the city would be able to utilize limited portions of the site where lead-based paint (LBP) would not present health and safety risks to occupants. The ownership of the land would revert to the city when radiological unrestricted release standards were achieved.

2.2 ALTERNATIVE 2 (Preferred Alternative) – Full Demolition of Aboveground Structures

Alternative 2, the Preferred Alternative, would entail full demolition of the aboveground structures at the site (Figure 2). The areas that would be disturbed during demolition are shown in Figure 4 and amount to approximately 1 acre of potential land disturbance, which includes a 0.1 acre portion of the primary haul road that could potentially be widened to allow easier access by large vehicles and a laydown area for equipment. If the primary haul road is not feasible, an alternate haul road has been identified (Figure 4).

Figure 4. Limits of Disturbance for the Proposed Demolition of the Piqua Decommissioned Reactor Site

Proposed dome demolition would be accomplished by employing a conventional top-down approach utilizing a high-reach excavator with a concrete processor. Below-grade embedded beams and floor members would be pulverized with a hydraulic concrete processor. Reinforcing steel and remnant concrete would be sawcut or torch cut and flushed as needed. Dome demolition activities would be completed in several steps:

[1] A liner fabric would be laid over the entombment area to prevent demolition debris from the dome from mixing with clean fill. Protection features would be installed above the entombment (e.g., timbers, hay bales).

[2] Puncture dome with shear attachment on high-reach excavator. Process dome down in concentric rings down to the vertical walls, making sure the remaining dome is stable at all times.

[3] Process down the vertical walls to grade level. Burn reinforcing steel flush at grade level.

The existing entombment would be modified to ensure water could not collect. The entombment would then be further encased in waterproof concrete that would be anchored to the existing entombment structure with steel reinforcement rod tie-ins. The void space between the reactor building walls and entombment would be backfilled to grade. The auxiliary building and associated utility vaults and utility lines would be removed and backfilled to grade level. Portions of the auxiliary building and utility vault foundations may remain in place for structural stability. Finally, the surface above the entombment would be protected with a riprap cover, concrete rails, and appropriate signage. The remaining footprint of the site would be graded with a paved surface to match the surrounding landscape. LM would work with the city to modify the current contract and lease, if necessary, to include restrictions (e.g., no digging) and clarify permitted land uses that would ensure protectiveness of the entombment.

All waste and debris from the demolition would be disposed of according to applicable federal, state, and local regulations. Concrete derived from demolition is not anticipated to be suitable for backfilling or recycling onsite. All construction and demolition waste would be hauled offsite to an approved landfill. It is possible that some concrete would have its painted surface abated and then reused onsite as fill.

In the absence of such contamination, the site would be backfilled and graded. The graded site would then be covered with an impermeable barrier cap (such as asphalt or other waterproof membrane) and riprap to provide a protective cover for the entombment (see proposed grading plan in Appendix B). The final grading plan would be coordinated with the city of Piqua.

This alternative would eliminate future building occupancy and ensure protectiveness of the entombment, thus ensuring the lowest probability of impact to public health and safety and the environment by residual radioactivity and industrial hazards. This alternative would be conducted in accordance with the National Historic Preservation Act (NHPA) and LM would not be responsible for maintaining structures to comply with building codes or the Americans with Disabilities Act (ADA) standards.

After the demolition is complete the city would be able to utilize portions of the land in a manner similar to the adjacent city-owned property. LM would work with the city to modify the contract and lease, as necessary, to include restrictions (e.g., no digging) and clarify permitted land uses

to ensure protectiveness of the entombment. Ownership of the land would revert to the city when the entombed radioactive levels achieve unrestricted release standards.

2.3 Alternatives Eliminated from Further Consideration

2.3.1 ALTERNATIVE 3 – Termination of Lease and Contract with the City of Piqua and Disposition of the Site via Lease to a Third Party

This alternative was considered as a way to maintain a lease on the buildings similar to what the city has, in an effort to keep the historic structures as a visible community asset. For this to happen, any third party lessee would be financially obligated to bring the facilities up to code, obtain an occupancy permit, update the fire suppression system, remove or manage hazardous material, and maintain the building in compliance with NHPA and ADA. It was considered unlikely that any third party would be interested in a lease. The city has a reversionary right to the title to the property and expressed its intent to utilize the site and to retain future ownership of the site. Due to the city's reversionary rights to the property, this alternative was eliminated from further consideration.

2.3.2 ALTERNATIVE 4 – Partial Demolition of Aboveground Structures

This alternative would entail the demolition of either the reactor dome or the auxiliary building, but not both structures. This alternative was considered to either keep the administration building for use as office space or keep the iconic dome of the historic structure intact. Demolishing only one structure would leave an unoccupied structure in place and would require LM to continue facility maintenance, and ensure the site complies with current laws and standards including current building codes, NHPA, and ADA. LM has no current or anticipated future needs for the site beyond maintaining continued protectiveness of the entombed LLRW that remains onsite. Additionally, the city requested that the buildings be removed. The city's reversionary interest in the property and lack of a desire by the city or LM to maintain the structures eliminated this alternative from further consideration.

2.3.3 ALTERNATIVE 5 – Convert the Site into Museum or Visitor Center

This alternative would entail converting the site into a museum or visitor center, or both, with interpretive exhibits and displays that would tell the story of the former facility. This alternative was considered a way to maintain the site and its history. All current hazards at the site (including LBP) would be mitigated. The facility would be required to meet all applicable guidelines for DOE visitor centers and public areas and ensure the site complies with current laws and standards including current building codes, NHPA, and ADA. It was determined that renovating the buildings for public use was not in the best interest of the DOE, and it was also determined by the city that there was no interest in maintaining and operating a museum or visitor center, or both. The city's reversionary interest in the property and lack of a desire by the city or LM to construct and operate a museum or visitor center eliminated this alternative from further consideration.

2.3.4 ALTERNATIVE 6 – Full Demolition of Aboveground Structures and Removal of Entombed Low Level Radiological Materials

This alternative would entail the demolition of all aboveground buildings and the complete removal of the entombment of radioactive materials. The auxiliary building, dome, and entombment would be removed and backfilled at grade level. All waste and debris from the demolition would be disposed of according to applicable federal state, and local regulations. There would be testing after demolition to determine that all radioactive materials have been removed from the site. The ownership of the land would revert to the city once the demolition is complete and all final testing has been complete. This alternative had higher than feasible costs associated with the higher risk of removing and transporting the entombed radioactive material. For this reason, it did not meet acceptable implementation schedule and cost screening criteria and was not considered further.

3.0 Affected Environment and Consequences

NEPA and the Council on Environmental Quality's NEPA implementing regulations require that an EA identify the likely environmental effects of a proposed project and that the agency determine whether those impacts may be significant. Impacts can be either beneficial or adverse and can be either directly related to the action or indirectly caused by the action. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and occur later in time or further removed in distance but are still reasonably foreseeable.

The determination of whether an impact significantly affects the quality of the human environment must consider the context of an action and the intensity of the impacts. The term "context" refers to the society, region, interests, and locality that an action will affect, and significance will vary with the setting of a proposed action. The term "intensity" refers to the magnitude of change that would result if the proposed action were implemented.

Determining whether an effect significantly affects the quality of the human environment also requires an examination of the relationship between context and intensity. In general, the more sensitive the context (i.e., the specific resource in the proposed action's affected area), the less intense an impact needs to be for the action to be considered significant. Conversely, the less intense of an impact, the less scrutiny even sensitive resources need because of the overt inability of an action to effect change to the physical environment. The consideration of context and intensity also must account for the indirect and cumulative effects from a proposed action. This section describes the existing environmental conditions in the project area (affected environment), providing a baseline for measuring expected changes that would result from implementation of the Preferred Alternative.

This section presents the adverse and beneficial environmental effects (direct and indirect) of the Preferred Alternative and the No Action Alternative. The section is organized by resource topic, with the effects of alternatives discussed under each resource topic. Impacts are quantified whenever possible. Qualitative descriptions of impacts are explained by accompanying text where used.

Qualitative definitions and descriptions of impacts as used in this section of the EA include:

- Intensity:
  - No Effect, or Negligible – A resource would not be affected, or the effects would be at or below the level of detection, and changes would not be of any measurable or perceptible consequence.
  - Minor – Effects on a resource would be detectable, although the effects would be localized, small, and of little consequence to the sustainability of the resource. Mitigation measures, if needed to offset adverse effects, would be simple and achievable.
  - Moderate – Effects on a resource would be readily detectable, localized, and measurable. Mitigation measures, if needed to offset adverse effects, would be extensive and likely achievable.
  - Significant – Effects on a resource would be obvious and would have substantial consequences. The resource would be severely impaired so that it is no longer functional in the project area. Mitigation measures to offset the adverse effects would be extensive, and success of the mitigation measures would not be guaranteed.
- Duration:
  - Short term – Temporary effects caused by the construction or implementation of a selected alternative.
  - Long term – Effects caused by an alternative that remain after the action has been completed or after it is in full and complete operation.

All potentially relevant resource areas were initially considered for analysis in this EA. Consistent with NEPA implementing regulations and guidance, some resource topics are not discussed, or discussed in limited detail, due to the resources not being present and therefore not being affected by the Preferred Alternative or No Action Alternative (Table 2). Supporting documents for resources referred to in Table 2 are in Appendix C and include the following documentation: Federal Emergency Management Agency (FEMA) floodplain map and U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory map.

Table 2. Environmental Resources Not Present in the Project Area, and Not Potentially Affected by the Preferred Alternative

Resources
Floodplains
Prime and Unique Farmland
Wetlands
Wild and Scenic Rivers

3.1 Land Use

The National Land Cover Database 2016 lists all areas that could be disturbed as occurring in developed open space (Figure 5). Land cover surrounding the site includes developed low intensity, developed medium intensity, developed high intensity, barren land, herbaceous, deciduous forest, open water, and cultivated crops (Figure 5).

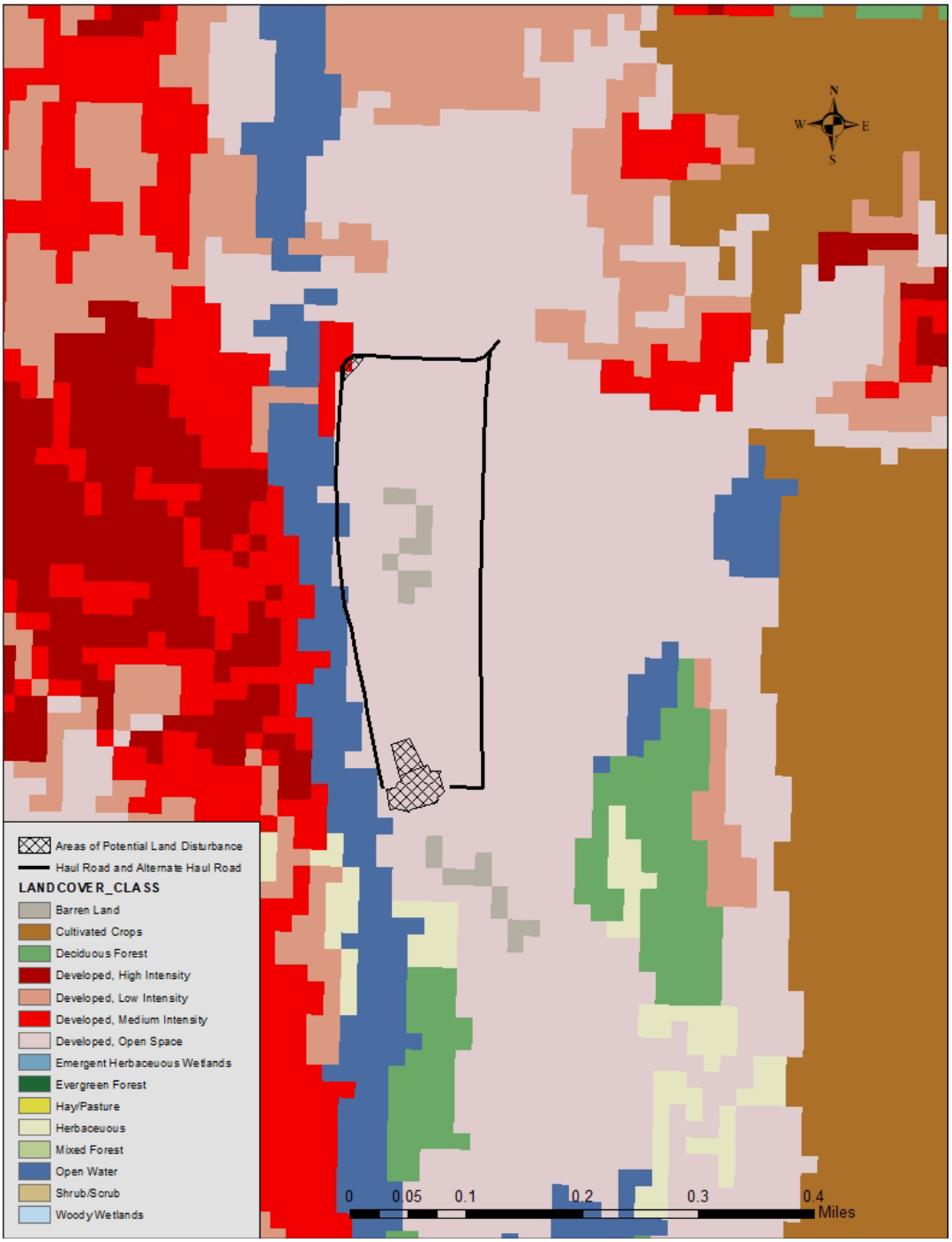

Figure 5. Land Cover Surrounding the Piqua, Decommissioned Reactor Site (Data from the National Land Cover Database 2016)

The site is not currently zoned by the city. Zoning that surrounds the site includes open space, heavy industrial, light industrial, single-family residential, and floodplain zones. City storage, the Piqua wastewater treatment plant (WWTP), and Piqua Materials Inc. (a quarry operation) surround the site. The aboveground structures proposed to be demolished were formerly used by the city for storage and are now unoccupied.

Preferred Alternative – The Preferred Alternative would have no effect on land use. It is in an industrial complex, and demolition would be contained to the limits of disturbance (Figure 4). After demolition, the site would be graded and paved or graveled to match the surrounding landscape. The surface directly above the entombment would be protected with rirap and concrete bollards or concrete rail barriers, and signage. The city would then utilize the paved site as surface storage for industrial/commercial use, as it is currently utilizing adjacent land to the north and as it has been previously used the site. Therefore, there would be no change in land use with implementation of the proposed alternative.

Adjacent land used for city storage, rock mining, and treatment of wastewater would not be impacted by the proposed demolition.

No Action Alternative – The No Action Alternative would have a long-term minor effect on land use. LM would be responsible for maintaining the buildings and protectiveness of the entombment, and the facility would remain vacant due to the presence of industrial hazards and investments needed for occupancy to bring infrastructure to code.

3.2 Geology and Soil

The site is within the Till Plains broad physiographic region, which is characterized by gently rolling hills, most of which are a series of moraines, or mounds of rock and soil created by glaciers. Moraines in the Till Plains region of Ohio are up to 100 feet high and 6 miles wide. Glaciers created valleys, terraces, and new drainage patterns, including the Great Miami River. More specifically, the site is within the Southern Ohio Loamy Till Plain physiographic subunit (Brockman 1998). Morainal features in this subunit are cut by steep-valleyed large streams, with alternating broad and narrow floodplains. The Great Miami River Valley, in which the site lies, is filled with coarse-grained outwash stratified sediment. The glacial deposits at the site are underlain by Silurian Age bedrock (OKI 2011). A physiographic map of Ohio is provided in Appendix C.

According to the Natural Resources Conservation Service soil survey map (Appendix C), the site is underlain entirely by the Udorthents, which is a highly disturbed urban soil complex. Given the adjacent quarry and the heavy land modification at and in the area of the site, soil on the site is likely composed of construction fill and is not indicative of historic geologic and physiographic events. Udorthents are not prime and unique farmland and are not hydric.

There is no evidence of radiological contamination of the soil at the site. The 2020 annual inspection and radiological survey conducted by LM showed no evidence of radioactivity contamination at the site above applicable standards except for the radioactivity contained within the entombment (LM 2020). Additionally, a radiological survey conducted in accordance with NUREG-1575 Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) was

performed in 2020, which confirmed no evidence of radiological contamination at the site with the exception of the entombment. These reports can be found in Appendix G.

Preferred Alternative – The Preferred Alternative would have no effect on geology or soil. The proposed demolition would not impact bedrock and would have no negative effects on the already highly disturbed soils. Stormwater runoff and erosion control measures would be implemented when and where appropriate to minimize soil loss from erosion during demolition activities.

Protectiveness of the entombment would be ensured during demolition and fill would be placed between the concrete entombment and the surrounding structure. The entombment would be further protected by encasement in additional waterproofed concrete to prevent migration of any contaminants into the surrounding environment. No potential contaminated soil would be left at the site and it would be graded to elevations similar to those existing at predemolition.

No Action Alternative – The No Action Alternative could have long-term moderate effects to soil. Soil surrounding the site could become contaminated with hazardous materials found at the site such as LBP and polychlorinated biphenyl (PCB).

3.3 Vegetation

There are patches of woody vegetation, each less than 0.2 acre in size, that border the auxiliary building (Figure 6 and Figure 7). The patches consist primarily of bush honeysuckle (*Lonicera maackii)*, an invasive, nonnative species. Other native species, such as American ash (*Fraxinus americana),* American sycamore (*Platanus occidentalis*) and staghorn sumac (*Rhus typhina*) also occur. The vegetation is low-quality scrub; however some of the trees that grow in this area have a diameter at breast height (DBH) greater than 3 inches. Other vegetated areas at the site are highly disturbed and dominated by ruderal species that are typically found in lawns and wastelands. Figure 7 shows a vegetation map of the site.

Preferred Alternative – There would be short-term minor impacts to the site vegetation from the Preferred Alternative. Approximately 0.1 acre of low-quality scrub, including nine trees with a DBH greater than 3 inches, would be removed between October 1 and March 31 to allow heavy equipment to access the buildings to be demolished (Figure 6). Vegetation that grows within the area of disturbance would be removed during the demolition. However, it would be replanted with a native prairie seed mix (grasses and a variety of appropriate native pollinator species that typically grow with grasses) after demolition. Once established, this would result in a long-term minor positive impact to the vegetation communities of the area, as nonnative species would be replaced with higher quality native species. Impacts would be minor because of the small size of disturbance and revegetation. However, this small area, when established, could serve as a seed source for native prairie species to spread to other areas of the site.

There would be no effect to the vegetation that occurs outside of the area of disturbance.

No Action Alternative – The No Action Alternative would have no effect on vegetation. There would be no change from the current conditions, and tree removal would not occur.

Figure 6. Area East of the Piqua Decommissioned Reactor Site Auxiliary Building Showing Patches of Woody Vegetation

Figure 7. Piqua Decommissioned Reactor Site Vegetation Map

3.4 Terrestrial and Aquatic Organisms

Wildlife species inhabiting the project area would be characteristic of the species found in suburban areas and along riparian corridors in west-central Ohio. These can include snakes, mice, rats, songbirds, raccoons, turtles, and so on. Much of the wildlife present would likely be transient, but patches of vegetation could support small numbers of migratory birds or other wildlife species.

The Great Miami River is considered a warm water fishery that contains popular sportfish including smallmouth, largemouth and spotted bass (*Micropterus dolomieu*, *M. salmoides*, and *M. punctulatus*, respectively), white and rock bass (*Morone chrysops* and *Ambloplites rupestris*, respectively), sunfish (Family *Centrarchidae*), channel catfish (*Ictalurus punctatus*), and flathead catfish (*Pylodictis olivaris*). The aquatic invertebrate community of the river is made up mostly of pollutant tolerant species due to water quality conditions (Section 3.6.2).

Preferred Alternative – There would be short- and long-term minor impacts to wildlife and habitat associated with implementation of the Preferred Alternative. Demolition would be contained within the limits of disturbance (Figure 4). Approximately 0.1 acre of woody vegetation would be removed and replaced with prairie species, altering a minor amount of habitat at the site. Because the patches of vegetation to be replaced are surrounded by impermeable ground and human activity, and suitable wildlife habitat exists in surrounding areas, fauna populations at the site would likely not be significantly affected.

Migratory birds may be affected by the proposed action. Nesting habitat may be present on or in buildings (e.g., barn swallow [*Hirundo rustica*]), in shrub or tree habitat (e.g., field sparrow [*Spizella pusilla*]), or on the ground (e.g., killdeer [*Charadrius vociferus*]). Effects to nesting migratory birds would be avoided by scheduling the demolition activities outside the birds' nesting seasons.

There would be no effect to aquatic species from the Preferred Alternative. There are no bodies of water onsite. Impacts to streams, wetlands, and other resources would be avoided to the greatest extent possible and minimized through the use of best management practices. If limits of disturbance from construction activities exceed 1 acre (estimated at approximately 1 acre), then a National Pollutant Discharge Elimination System (NPDES) permit would be obtained to prevent movement of disturbed soils and any demolition related pollutants to offsite locations, including the Great Miami River.

Information on potential effects to threatened and endangered species can be found in Section 3.5.

No Action Alternative – The No Action Alternative could have long-term minor effects to aquatic organisms. Soil surrounding the site could become contaminated with hazardous materials such as LBP and PCBs degrading on the outside of the building, which could run off into the Great Miami River, further degrading water quality. The No Action Alternative would have no effect on terrestrial organisms.

3.5 Threatened and Endangered Species

Table 3 displays federally listed species that have ranges that overlap with the project site area, according to the USFWS Information for Planning and Consultation website. There are no federally designated critical habitats within the area of the proposed project site or within the county. Although they do not appear on the USFWS website for the project area, the state of Ohio has stated that the site is within range of two additional federally listed species—the club shell and snuffbox—which are also included in Table 3.

The state of Ohio lists threatened or endangered plants and animals and several species of concern that are found within 1 mile of the project area, are in Miami County, or have statewide ranges. These are also included in Table 3.

Table 3. Federal Threatened, and Endangered Species and State Threatened or Endangered, and State Species of Concern with Ranges that Overlap at the Piqua Decommissioned Reactor Site

Common Name	Scientific Name	Status
Rayed bean	*Villosa fabalis*	Federal and state endangered
Northern long-eared bat	*Myotis septentrionalis*	Federal threatened and state endangered
Indiana bat	*Myotis sodalis*	Federal and state endangered
Club shell	*Pleurobema clava*	Federal endangered
Snuffbox	*Epioblasma triquetra*	Federal endangered
Blue corporal	*Ladona deplanata*	State endangered
Iowa darter	*Etheostoma exile*	State endangered
Little brown bat	*Myotis lucifugus*	State endangered
Tricolored bat	*Perimyotis subflavus*	State endangered
Rock serviceberry	*Amelanchier sanguinea*	State threatened
Harebell	*Campanula rotundifolia*	State threatened
Sprengel's sedge	*Carex sprengelii*	State threatened
Timid sedge	*Carex timida*	State threatened
Ashy sunflower	*Helianthus mollis*	State threatened
Wood's hellebore	*Veratrum (syn. Melanthium) woodii*	State threatened
Seaside arrowgrass	*Triglochin maritimum*	State threatened
Flatleaved bladderwort	*Utricularia intermedia*	State threatened
Elktoe	*Alasmidonta marginate*	State Species of Concern
Western creek chubsucker	*Erimyzon claviformis*	State Species of Concern

Of the species shown in Table 3, the rayed bean, club shell, snuffbox, blue corporal, Iowa darter, seaside arrowgrass, flatleaved bladderwort, elktoe, and western creek chubsucker are associated with waterbodies or wetlands. Thus, there is no suitable habitat in the project area, but these species could be potentially affected by water quality changes. However, water quality will be protected through the use of best management practices that minimize erosion and sedimentation, so no adverse effects to aquatic or wetland species would occur.

There is also no suitable habitat on or near the project area for harebell, which in Ohio is associated with limestone cliffs. Sprengel's sedge and timid sedge are found in undisturbed, native riparian areas. Ashy sunflower is found in native prairies and rock serviceberry and

Wood's hellebore prefer native woodlands. There are no state listed species known to live in the project area, and they are unlikely to be present because there is no suitable habitat.

Indiana bat: This species hibernates in cool, humid caves and spends summers in river or stream corridors with well developed riparian or upland woods. Here, they roost under loose bark on dead or dying trees with a DBH greater than 5 inches. They have been known to roost in buildings. Human disturbance during hibernation, loss and fragmentation of forested habitats, environmental contamination, and white-nose syndrome are major reasons for declines in numbers of Indiana bats (USFWS 2019).

Northern long-eared bat: This species hibernates in caves or mines in the winter. It spends summers in upland forests, roosting in tree species with loose bark with a DBH greater than 3 inches. It has been known to roost in buildings. White-nose syndrome is the main threat to this species.

Little brown bat: This species hibernates in caves or mines in the winter. In summer, it lives in forests, normally along streams and rivers. White-nose syndrome is a threat to this species. Pesticides, deforestation, and mining are also threats.

Tricolored bat: This species hibernates in caves or mines in the winter. In summer, it lives in a variety of habitats including forests. It is threatened by white-nose syndrome.

There are nine trees within the project area with a DBH greater than 3 inches that could provide marginal summer habitat for the northern long-eared bat, Indiana bat, little brown bat, or tricolored bat. There are also patches of potentially suitable forest habitat nearby. A band of low-quality forest about 50 feet (ft) wide is west of the site between the Great Miami River and Bridge Street (Figure 7). It runs north to south along the river and contains native species like American sycamore, eastern cottonwood (*Populus deltoides*), staghorn sumac, Virginia creeper (*Parthenocissus quinquefolia*), various oaks (*Quercus* spp.) and maples (*Acer* spp.), and nonnative species like wild muscadine (*Vitis rotundifolia*) and bush honeysuckle.

Two areas of higher quality, remnant hardwood forest are also found near the project area. About 750 ft to the south, a band of forest about 300 ft wide extends to the south along the river for some distance. To the east are approximately 18 acres of forest, surrounded by industrial and agricultural areas. These small forests may provide summer habitat for bat species. It is unlikely that the northern long-eared bat or Indiana bat is in the project area at any time because it is not within any known capture buffers (USACE 2021).

A desktop assessment was performed in accordance with the *Range-Wide Indiana Bat Survey Guidelines* (USFWS 2020), and no potential hibernacula are present in or within 0.25 mile of the project area. Although some bats can roost or hibernate in buildings, surveys found no evidence of bat use of the Piqua facility (USACE 2021).

Preferred Alternative – The Preferred Alternative would have no effect on any species associated with waterbodies or wetlands. There would be no work occurring in streams or wetlands. Additionally, best management practices and adherence to an NPDES permit, if obtained, would ensure that stormwater would not impact water quality in the Great Miami River or associated wetlands. The project area contains no habitat for harebell, Sprengel's sedge, timid sedge, ashy

sunflower, rock serviceberry, or Wood's hellebore, so the Preferred Alternative would have no effect on these species.

Because marginal summer habitat may be present at the site, USFWS was contacted to help DOE assess potential effects of the Preferred Alternative on listed species. It is possible, but unlikely, that the northern long-eared bat or Indiana bat could roost at the site during the summer because marginal habitat may be present in nine trees within the project area, and several small areas of potential forested habitat are nearby. However, the trees within the project area would be removed between October 1 and March 31, when bats could not be present. There is no evidence that bats use the building at any time (USACE 2021). Therefore, the project would not affect northern long-eared bats or Indiana bats, and no further consultation with the USFWS is required. However, if the schedule were to change and the patch of wooded vegetation were to be removed between April 1 and September 30, consultation with the USFWS would be required.

In accordance with guidelines provided by the Ohio Department of Natural Resources, the Preferred Alternative is not likely to affect little brown bats or tricolored bats because trees would be removed between October 1 and March 31, and potential hibernacula are not present within 0.25 mile of the project area. However, if the schedule were to change and the patch of wooded vegetation were to be removed between April 1 and September 30, mist net and acoustic surveys would be required along with consultation with the Ohio Division of Wildlife.

No Action Alternative – The No Action Alternative would not affect federally or state listed species, as vegetation would not be removed and ground disturbance would not occur.

3.6 Water Resources

3.6.1 Groundwater and Potable Water

The Ohio Department Natural Resources Groundwater Resources of Miami County map (Appendix C) indicates that the site lies within an area where wells would likely yield 3 to 10 gallons of water per minute. Groundwater in the area of the site occurs mostly in the blue weathered shale which underlies unconsolidated deposits of widely varying thickness. The direction of groundwater movement is generally in the direction of the Great Miami River. The concrete bioshield comprising the entombment sits partially below the water table, although groundwater level at the site is variable and dependent upon water levels in the Great Miami River (DOE 1993).

To protect drinking water supplies the Ohio Environmental Protection Agency (Ohio EPA) designates drinking water source protection areas around land that supplies groundwater wells or is used for surface water intake. There are no protection areas within the project area. The nearest protection area is approximately 1.5 miles northeast of the site.

Preferred Alternative – The Preferred Alternative would have long-term beneficial effects to groundwater. Although the site is not currently impacting groundwater quantity or quality, this alternative would include further encasement of the entombment in a crystalline waterproofed concrete that has the ability to heal itself via adhesives that are activated when cracks are formed, which would inhibit leaching of the entombed materials to the groundwater. After demolition, appropriate testing would be completed to verify that the proposed action did not result in the

release of hazardous constituents to the surrounding environment. All hazardous materials would be transported offsite to approved disposal facilities (see Section 3.15 for details).

The Preferred Alternative would have no effect on potable water. There are no source water protection areas near the site.

No Action Alternative – The No Action Alternative could have long-term moderate effects to groundwater. Soil surrounding the site could become contaminated with hazardous materials such as LBP and PCBs degrading on the inside and outside of the building, which could infiltrate into groundwater.

3.6.2 Surface Waters and Waters of the U.S.

No bodies of water exist on the site. However, the Great Miami River, a 165-mile long tributary of the Ohio River, is approximately 100 feet west of the site, and two constructed freshwater ponds are within 0.2 mile of the site (Figure 8).

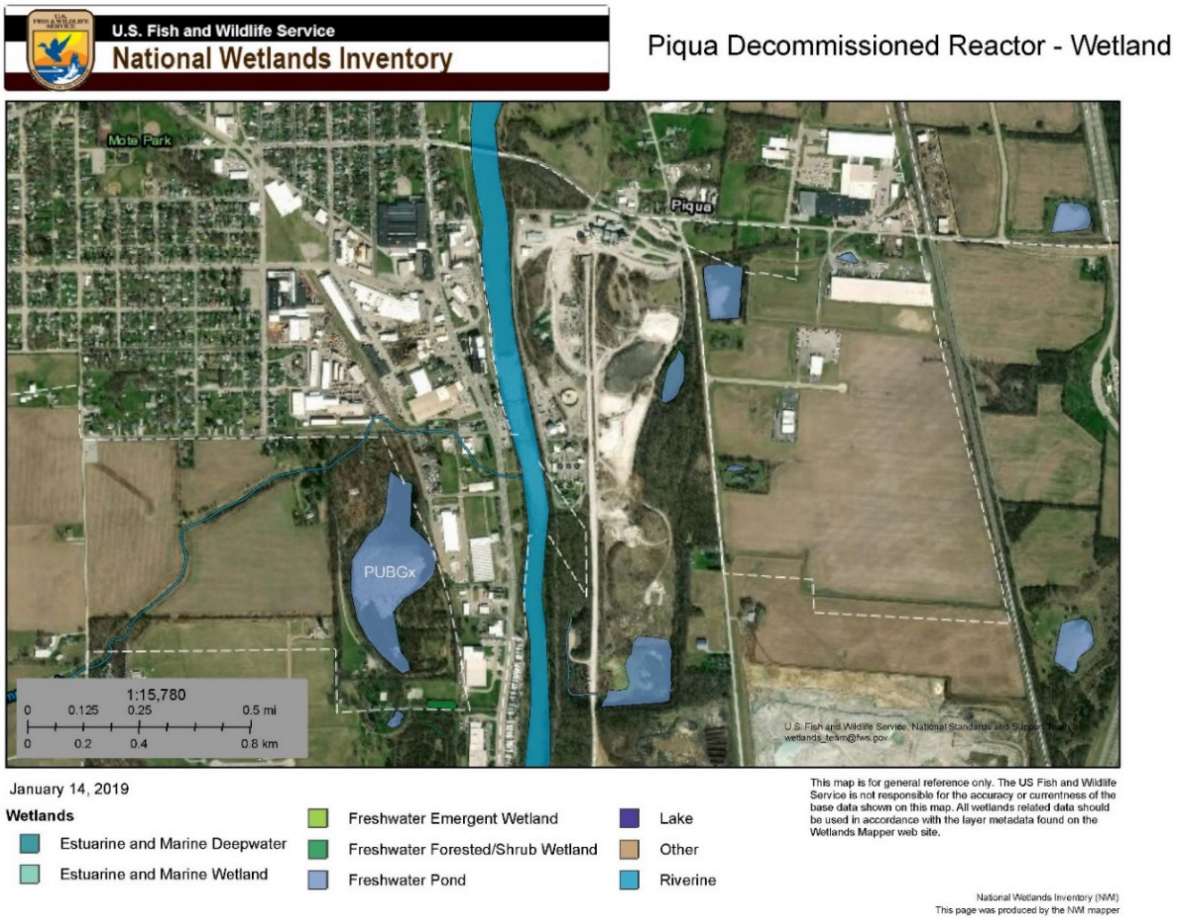

Figure 8. National Wetlands Inventory Map for the Piqua Decommissioned Reactor Site

According to the Ohio EPA Division of Surface Water, the Great Miami River is impaired with respect to recreation and fish tissue. Bacteria levels in the river are too high for safe contact and fish tissues contain PCBs at a rate too high for safe consumption. Additionally, two data points,

approximately 0.7 mile and 0.25 mile upstream of the site, have "low/fair" scores for the Invertebrate Community Index, an indicator that the river only partially supports aquatic life.

Preferred Alternative – There could be negligible short-term effects to surface waters and Waters of the U.S. from the Preferred Alternative.

There are no waterbodies within the limits of disturbance; however, surface water runoff could temporarily increase turbidity and pollutant levels in surrounding surface waters. These impacts would be negligible because LM would implement stormwater runoff and erosion control best management practices where applicable and obtain a NPDES permit, including development of a Storm Water Pollution Prevention Plan (SWPPP), if construction activities exceed 1 acre. All appropriate best management practices regarding sediment control would be applied. The SWPPP, if needed, would include the identification of stormwater discharge points, nearby permit outfalls that receive stormwater from the project site, and conveyances that serve these outfalls; the SWPPP would also include specific control measures to mitigate stormwater contamination.

No Action Alternative – The No Action Alternative could have long-term minor effects to surface waters and Waters of the U.S. Soil surrounding the site could become contaminated with hazardous materials such as LBP and PCBs degrading on the inside and outside of the building, which could run off into the Great Miami River, further contributing to the already high levels of PCBs in the water.

3.7 Air Quality

The U.S. Environmental Protection Agency (EPA) sets air quality standards for pollutants considered harmful to public health and welfare through the Clean Air Act. The National Ambient Air Quality Standards (NAAQS) has two sets of standards. Primary standards exist to protect public health, including the health of sensitive populations such as people with asthma, children, and the elderly. These standards have been established for six criteria air pollutants, which are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter less than 10 micrometers (PM_{10})and particulate matter less than 2.5 micrometers ($PM_{2.5}$), and sulfur dioxide, and each state is required to develop implementation plans for each pollutant. PM_{10} and $PM_{2.5}$ are particulate matter 10 and 2.5 micrometers or smaller in diameter, respectively.

The secondary standards protect public welfare (nonphysical effects, such as visibility impairment and damage to food sources) are codified in Title 40 *Code of Federal Regulations* Section 50 (40 CFR 50). The NAAQS are expressed as concentration of a pollutant in air and the duration of exposure. Exposure duration can be further defined as either short-term (e.g., 1-hour, 8-hour, 24-hour) or long-term (e.g., annual average). The Ohio EPA is responsible for ensuring compliance with the NAAQS through its state implementation plan. Geographical areas are generally defined as being in either "attainment" or "nonattainment" of the standards for the pollutants listed above. Miami County is in attainment of all EPA standards for air quality, meaning the air is cleaner than the national standard (EPA 2021).

Additionally, the *Ohio Administrative Code* 3745-17-08 (OAC 3745-17-08) "Restriction of Emission of Fugitive Dust," provides guidelines on restrictions for emitting fugitive dust in the state and requires that the use of water or other suitable dust suppression chemicals be used

during the demolition of a building. Besides utilizing water spray during debris removal, the following recommendations in the OAC for limiting fugitive dust include, watering haul roads, posting and enforcing a site speed limit (15 mph), controlling vehicle access, minimizing truck loading drop heights, covering or wetting storage piles, wind fencing if appropriate, and providing periodic street sweeping of the haul road.

Locations of hazardous and residually radioactive surfaces or materials within the site, which could potentially become airborne, are specifically described in Section 3.14.

Preferred Alternative – The Preferred Alternative could have short-term minor impacts to air quality. The Preferred Alternative would remove structures documented through a comprehensive 2020 characterization radiological survey report (Appendix G; LM 2020) that are suitable for removal of radiological controls as there is no evidence of radiological materials or radiological contamination in those portions of the site. Based on the characterization survey and historic annual facility surveys, LLRW and airborne radioactivity are not expected to be generated. The following steps would be taken to ensure compliance with "as low as reasonably achievable" principles, and to lessen effects from a potential reduction in air quality resulting from the Preferred Alternative:

- A written respirable crystalline silica exposure control plan would be developed and implemented by a competent person, workers would be trained and offered medical exams, and records of workers' silica exposure and medical exams would be kept (OSHA 2017a). Operator isolation, wet methods, or respiratory protection would ensure workers are properly protected from respirable crystalline silica (OSHA 2017b).
- If necessary, personal protective equipment such as respirators and disposable coveralls would be worn by workers to reduce their exposure to silica, LBP and related hazards.
- Limited areas of the site were inaccessible during the 2020 characterization survey (Appendix E) and would be surveyed for radiological contamination as they became accessible.
- Monitoring would be performed at the building location and site boundaries as appropriate to verify that no threat to the public was present and that cumulative emissions of concern (e.g. respirable dust, silica, lead, asbestos), during the proposed demolition activities would not result in workers or members of the public receiving greater than the applicable regulatory limits.

Demolition activities are typically more limited in scale and duration than construction activities. Operations typically involved in demolishing and removing structures include mechanical dismemberment, drilling and breakup of foundations, debris loading, dozing operations, and truck traffic. During demolition, dust particulates would be produced. The potential exists for dust to contain lead and PCBs from paint, asbestos from sealant in the roofs, and silica from concrete. Additionally, diesel particulate matter from engine exhaust would be produced by heavy machinery used during the proposed demolition. However, because of the isolated nature of the site, air quality effects from demolition would be generally limited to short-term minor impacts to workers, with effects to the public expected to short-term and negligible. LM would implement source control emission best management practices to the extent practicable.

Airborne contamination controls would be implemented to ensure that workers would not receive a total effective radiation dose, or any other emission dose, in excess of the DOE federal limit.

These controls may include, but would not be limited to, barriers, high-efficiency particulate air (HEPA) filters, containment structures, dust suppression techniques (such as misting), and differential pressures between adjacent areas/rooms, as appropriate.

Applicable federal limits for public exposure to radiation are set at 100 millirem (mrem) per year by DOE Order 458.1 Chg 4, *Radiation Protection of the Public and the Environment*, for the sum of all exposure pathways. Annual inspections, the postclosure report, and the 2020 radiological characterization report (Appendix G; LM 2020) all indicate that the buildings (excluding the entombment, which will be left in place) do not contain residual radioactive activity that would be expected to result in an exposure greater than 100 mrem per year during demolition. Care would be taken during demolition activities to ensure protection of the entombment. Additionally, the entombment would be fully protected and capped off with an impermeable layer, which would substantially reduce the potential that radiological emissions would impact human health or the environment in the long term.

Due to the previously mentioned controls and that demolition would only be conducted during daylight hours and work would be temporary, significant impacts to air quality are not anticipated to occur from the Preferred Alternative.

At least 10 working days before demolition activities would begin, a Notification of Demolition and Renovation Form would be submitted to the Ohio EPA, Division of Air Pollution Control, District Office. This office would ensure that applicable standards regarding air quality are attained throughout the duration of the proposed demolition.

No Action Alternative – The No Action Alternative would have no effect on air quality.

3.8 Noise

Noise is measured as a day-night average sound level (DNL) in decibels A-weighted (dBA), of which the human ear is most sensitive. The DNL are an average exposure to sound over a 24-hour period, and sound generated between 10 p.m. and 7 a.m. have 10 dBA added artificially before averaging. The EPA identifies a long-term DNL exposure of 70 dBA or less as the level of environmental noise that will prevent any measurable effect to hearing loss over a lifetime.

Additionally, Occupational Safety and Health Administration (OSHA) provides criteria for short-term permissible noise exposure levels for consideration of hearing protection or the need to administer sound reduction controls (Table 4).

Table 4. OSHA Noise Exposure Standards for Consideration of Hearing Protection or Sound Reduction Controls

Duration/day (hours)	Noise level (dBA)
8	85
4	88
2	91
1	94
0.5	97
0.25	100

Noise in the vicinity of the site is characterized by traffic along Piqua-Troy Road, U.S. Highway 36, East Main Street, North County Road 25A, and Interstate 75 (I-75). Additionally, the site is surrounded by industry. The background noise level of the area is likely similar to commercial areas, which are approximately 60 dBA (FAA 2020). The nearest residential building is approximately 0.1 mile west of the site across the Great Miami River, with most residential buildings approximately 0.45 mile or further from the site.

Preferred Alternative – The Preferred Alternative would have short-term minor impacts with regard to noise. Noise would result from the operation of machinery and equipment during daylight hours, with DNL calculations summarized in Table 5. Sound levels would be in compliance with safety and health standards set forth by the EPA. The nearest residential building is approximately 680 feet from the site (Figure 9). Therefore, the nearest residence would not be expected to experience DNL above 70 dBA for the duration of the demolition and would likely only experience noise levels slightly above normal for the area (Table 5). This does not factor in obstructions like buildings and vegetation which would further reduce sound levels.

Additionally, increased traffic from trucks hauling demolition waste is not expected to increase noise levels in the already industrialized area, where truck traffic is already common. Workers would need to wear hearing protection while onsite to prevent possible hearing loss. Noise levels would be monitored weekly to ensure compliance.

Table 5. Maximum Possible Sound Generated by Demolition of Piqua Decommissioned Reactor Site

Distance from the Site (feet)	Day-Night Average Sound Levels (dBA)*
Onsite	100
50	90
100	84
200	78
400	72
800	66

Note:
* Sound levels adapted from the Federal Highway Administration's Construction Noise Handbook (2017). This is the loudest possible day-night average sound level and assumes constant sound at the highest level for the loudest construction and demolition equipment (excluding explosives). Additionally, obstructions like hills, buildings, and vegetation, which reduce noise, are not factored into sound levels.

Demolition activities can result in varying degrees of ground vibration, depending on the equipment, methods employed, and soil compactness. Activities that typically generate the most severe vibrations are high-explosive detonation and impact pile driving, which would not be utilized for demolition. All demolition equipment causes ground vibration to some degree, but the vibrations diminish in strength with distance. During design, acceptable ground vibration levels for protection of the entombment and WWTP infrastructure would be calculated, and these levels would not be exceeded during demolition. Therefore, there would be no adverse vibration impacts from the proposed activity on the entombment or the WWTP.

No Action Alternative – The No Action Alternative would have no effect on noise levels, and no ground vibrations would be produced.

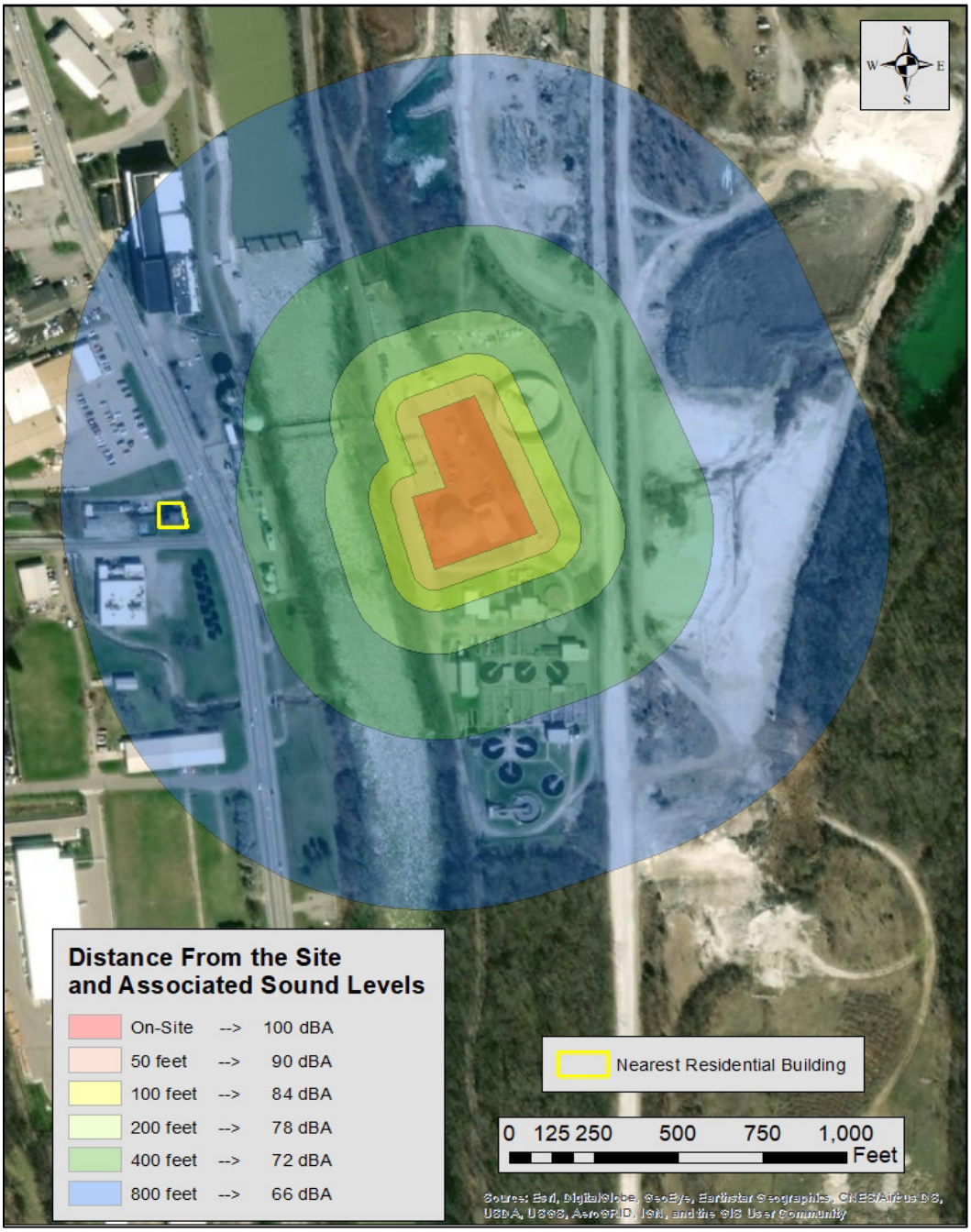

Figure 9. Distance from Piqua Decommissioned Reactor Site and Associated Day-Night Average Sound Levels Caused by the Proposed Demolition

3.9 Cultural Resources

An archaeological survey was completed for the project to fulfill the requirements under Sections 106 and 110 of NHPA (as amended). The final draft of the phase I archaeological survey for the site is included in Appendix D of this EA. The archaeological area of potential effect (APE) for the demolition of the aboveground structures at the site consists of the limits of disturbance shown in Figure 4.

The primary objective of this survey was to identify any prehistoric and historic archaeological sites that could be eligible for the National Register of Historic Places (NRHP). This objective was met through a literature review and records search to identify any known archaeological resources and a field survey to locate any unknown archaeological sites in the APE.

Fieldwork was conducted on September 20, 2018, by a USACE archaeologist. Results of the archaeological survey revealed no evidence of intact soils at the site and did not identify any significant prehistoric or historic archaeological resources within the APE. LM communicated this finding to the SHPO on April 5, 2019. The Ohio SHPO concurred with this finding on May 29, 2019 (Appendix D). Because there were additions to the project, USACE was required to conduct a subsequent archaeological survey of the revised APE, which occurred on December 3, 2020. No significant cultural resources were identified during the subsequent survey and LM communicated the findings to the Ohio SHPO on January 12, 2021 (Appendix D).

LM also communicated these findings to the Miami Tribe of Oklahoma, the Seneca-Cayuga Nation, the Delaware Nation, and the Eastern Shawnee Tribe of Oklahoma on April 5, 2019. The Miami Tribe of Oklahoma concurred with this finding on May 6, 2019 (Appendix D). LM also communicated the finding of the subsequent archaeological survey completed in December 2020 to the Miami Tribe of Oklahoma, the Seneca-Cayuga Nation, the Delaware Nation, and the Eastern Shawnee Tribe of Oklahoma (Appendix D).

A historic building survey was conducted on the site in Piqua, Ohio (Appendix D). Onsite surveys and local archival research were conducted January 23–27, 2017. The purpose of this study was to develop a determination of eligibility for inclusion in the NRHP for this potentially historic building. The historic building survey and background research resulted in the determination that the site is eligible for inclusion in the NRHP under Criterion A for its association with important aspects of American history and under Criterion C for its architectural and engineering qualities; a historic district is not present at this location.

LM communicated this finding to the Ohio SHPO on November 30, 2017. The Ohio SHPO concurred with this finding on January 30, 2018 (Appendix D). LM also communicated this finding to the Advisory Council on Historic Preservation (ACHP) on October 21, 2020. ACHP replied on November 13, 2020, that it will not participate in the development of a Memorandum of Agreement (MOA) to address adverse effects to the reactor dome and auxiliary building.

3.9.1 Archaeological

Preferred Alternative – Because no archaeological resources are known to exist within the APE and the site is previously disturbed, the demolition of the aboveground structures at the site (and associated incidental ground disturbance) is not anticipated to impact any archaeological resources.

No Action Alternative – The No Action Alternative would not affect archaeological resources at the site.

3.9.2 Structural or Architectural

Preferred Alternative – LM has determined that the proposed demolition of the site would have an adverse effect on the reactor dome and auxiliary building, which are eligible for listing in the NRHP. Under NHPA, agencies are required to identify historic properties, assess effects to historic properties, and consider alternatives to avoid, minimize, or mitigate any adverse effects, and document their resolution. In accordance with 36 CFR 800, "Protection of Historic Properties," LM complied with the obligations required under Section 106 of NHPA, as amended.

LM initiated consultation with the Ohio SHPO, the Delaware Nation, the Eastern Shawnee Tribe of Oklahoma, the Miami Tribe of Oklahoma, and the Seneca-Cayuga Nation, the City of Piqua, the Piqua Library, Heritage Ohio, and Preservation Ohio. The Ohio Historic Preservation Office, City of Piqua, the Miami Tribe of Oklahoma, Heritage Ohio, and the Library of Piqua have acted as consulting parties for the MOA. Documentation of this consultation process are provided in Appendix D.

Under NHPA, LM is required to notify ACHP regarding the adverse effects of the project on the reactor dome and the auxiliary building since a determination was made that they are eligible for listing in the NRHP. LM contacted ACHP on October 21, 2020, about the adverse effects to the reactor dome and auxiliary building and the development of a MOA to mitigate those effects (Appendix D). LM also invited ACHP to participate in the consultation for the MOA. ACHP responded in a letter dated November 13, 2020, that it will not participate in the MOA for the project (Appendix D).

To address the adverse effects of this undertaking to the reactor dome and auxiliary building, the following is a summary of mitigation activities that have been proposed in an MOA between LM and the Ohio SHPO (Details are provided in Appendix D):

- Recordation: LM shall complete a Historic American Building Survey (HABS) recordation of the Piqua Nuclear Power Plant in accordance with National Park Service guidelines and specifications, prior to any irreversible physical alteration of the historic property.
- Diorama: LM shall collaborate with the Ohio SHPO and the city to design and construct a diorama exhibits that documents the history of the Piqua Nuclear Reactor Facility. The diorama shall be given to the city of Piqua for housing at the Piqua Public Library.
- Historical artifacts: LM shall collaborate with the city of Piqua and Ohio SHPO to identify a list of site historical artifacts that will be retained as historical memorabilia.
- Interpretive signage: LM shall collaborate with the city of Piqua and the Ohio SHPO to design and construct an interpretive free-standing sign that will be displayed near the site in a publicly accessible location.

No Action Alternative – The No Action Alternative would not affect architectural resources at the site, as LM would continue facility maintenance and would ensure compliance with NHPA.

3.10 Aesthetic and Visual Resources

The site does not offer aesthetic and visual resources, and mostly contains aging industrial buildings and paved surfaces. There are two small strips of woody vegetation that surround the

buildings on the south and east side; however, they are dominated by invasive species, primarily bush honeysuckle (*Lonicera maackii*), which do not increase the aesthetic value of the site or surrounding area. Additionally, the land use of the surrounding area is an industrial surface mine and a WWTP, which are detrimental to the aesthetic value of the area.

Preferred Alternative – The Preferred Alternative would have no effect on aesthetic and visual resources. There would be temporary ground disturbance caused by the demolition; however, this would blend into the surrounding land use. The potential removal of the two patches of woody vegetation adjacent to the site would be replanted in native prairie vegetation, which would modestly increase the visual appeal of the site. Additionally, the adjacent forest along the river would buffer any view of the demolition from the nearest residence located approximately 700 ft to the west of the site.

No Action Alternative – The No Action Alternative would have no effect on aesthetic and visual resources.

3.11 Human Health Effects

The region of interest for human health effects is the site and adjacent or nearby areas that could be subject to contaminant exposure via one or more environmental pathways (i.e., air, water, or land).

The principal potential human health effect from exposure to low doses of radiation is cancer. Human health effects from exposure to chemicals may be both toxic effects (such as nervous system disorders) and cancer. Exposure and dose are neither health effects nor environmental impacts. Rather, they cause the health effects.

LM is committed to creating a safe working environment to ensure that potential risks to the health and safety of the public and workers are eliminated or minimized to the greatest extent practicable throughout the duration of the Preferred Alternative. A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. In support of the project, the LMS contractor would implement a Radiation Safety Program, an Environmental Monitoring and Control Program, and a Waste Management Program to ensure the safe removal of activated or contaminated components in an effort to reduce the risk of a potential release to the environment.

These programs impose regulatory requirements for the benefit of employees and the public, including implementation of engineering and administrative practices that aim to reduce risks of illness, injury, death, and property damage. The requirements of these programs would include routine measurement of the quantity of direct radiation and radioactive material releases.

Control of airborne and respirable silica during demolition and deconstruction in compliance with *OSHA's Respirable Crystalline Silica Standard for Construction* (OSHA 2017b) will simultaneously mitigate unexpected airborne radioactive contamination that was not identified by characterization and remedial action support surveys. Respirable silica exposure and respirable particulate matter are far more credible exposure scenarios than extensive airborne radioactive contamination. Before executing the Preferred Alternative, coordination is required

with Ohio EPA's Division of Air Pollution Control and the Regional Air Pollution Control Agency as an air permit, or compliance with air permit conditions, may be required.

Materials hazardous to human health encompass items identified through air quality, waste, transportation, workplace safety and radioactive materials control regulations. Work would be completed in accordance with all applicable federal, state, and local laws and regulations, including DOE Orders (see Section 6.0).

Preferred Alternative – Under the Preferred Alternative, the existing protection of entombed radioactive materials would be enhanced without disturbing the containment. The entombment is also protected by agreements with the city, and the Preferred Alternative would enhance protection of the entombment. The Preferred Alternative is designed to prevent damage to the entombment during execution. LM would work with the city to modify the current contract and lease, if necessary, to include restrictions (e.g., no digging) and clarify permitted land uses that would ensure protectiveness of the entombment.

Structural elements (e.g., decontamination and decommissioning materials) removed with the Preferred Alternative are not expected to be radiologically contaminated or impacted. Quantitative risks to human health from radionuclides are not assessed as the characterization data indicate the wastes generated during the preferred alternative contain radioactivity at levels significantly below the established release levels and the entombment would remain protected.

There are long-term, beneficial impacts of moving of hazardous materials to permitted treatment and disposal facilities.

No Action Alternative – The No Action Alternative could have long-term moderate effects to human health. Soil surrounding the site could become contaminated with hazardous materials such as LBP and PCBs degrading on the inside and outside of the building, which could infiltrate into groundwater and surface water, or suspend into air.

3.12 Waste Management and Waste Disposal

Comprehensive radiological surveys of the site have indicated that waste generated from the site can be disposed of as nonradioactive waste. However, three areas of the site were inaccessible and have not been radiologically surveyed as a part of the characterization effort: (1) Room B-7 in the auxiliary building; (2) vaults, tanks, and piping; (3) and the below grade entombment. These areas would require radiological surveying before or as a part of demolition.

Radiological surveys of the entombment would be specifically related to the anchoring process for encasement of the entombment in waterproofing concrete. Neither LLRW or mixed low-level radioactive waste (MLLRW) generation is anticipated based on radiological surveys of the facility, and therefore would not be evaluated in detail. If the remaining radiological surveys identify that LLRW or MLLRW would be generated, it would likely be a small quantity that would be managed and disposed of in accordance in with applicable waste acceptance criteria and all relevant federal and state waste management regulations and requirements. If LLRW is generated and disposed of offsite, it would likely be packaged into one shipment.

Potential disposal locations include licensed and permitted radioactive waste disposal facilities in Texas and Utah. No additional radiological decontamination activities are anticipated for the Preferred Alternative. All materials and waste from the structure of the site (concrete, metal, fixtures, LBP, lamps, fluids, and so on) must complete a documented radiological clearance process to ensure contamination was not released from the property for unrestricted use or disposal.

Release and clearance of property with the potential to contain residual radioactive material must be conducted in concert with the requirements of the Ohio Department of Health, American National Standards Institute/HPS N13.12-2013 *Surface and Volume Radioactivity Standards for Clearance* (ANSI/HPS 2013) and DOE Orders.

All recyclables and nonradiological wastes would be disposed of at approved offsite commercial facilities in accordance with applicable waste acceptance criteria and all relevant federal, and state waste management regulations and requirements. Hazardous materials reports were prepared following surveys were performed during 2020 addressing asbestos and hazardous materials (Auxano 2020) and painted surfaces with PCBs and LBP (Auxano 2021). Those findings are included in Table 6.

Work would be completed in accordance with all applicable federal, state, and local laws and regulations, including DOE Orders (see Section 6.0).

Table 6. Waste Summary for the Proposed Demolition of the Buildings at the Piqua, Ohio, Decommissioned Reactor Site

Type	Waste Description	In Place Quantity	Estimated Shipment Quantity	Estimated Truckloads
Recyclable/ Landfill Diverted Deconstruction Debris	Concrete paving	4546 SF	255 LCY	8
	Asphalt/paving	2196 SY	952 LCY	26
	Soil/gravel outside building footprint	146 SY	31 LCY	7
	Steel from concrete paving	N/A	60 Tons	6
	Miscellaneous steel	N/A	50 Tons	6
Non-Recyclable/ Disposed Deconstruction Debris	Steel from paint contaminated concrete demolition	N/A	469 Tons	47
	Paint contaminated concrete	2209 CY	2871 LCY	221
	Site clearing debris	227 SY	114 CY	6
	Underground piping	384 LF	14 CY	1
	Masonry debris	N/A	6.6 CY	0
TSCA Wastes	PCB capacitors	7 each	< 1 CY	1
	PCB light ballasts	41 each	< 1 CY	

Table 6. Waste Summary for the Proposed Demolition of the Buildings at the Piqua, Ohio, Decommissioned Reactor Site (continued)

Type	Waste Description	In Place Quantity	Estimated Shipment Quantity	Estimated Truckloads
Hazardous and Regulated Wastes	LBP with or without regulated PCBs	74,000 SF	6.5 CY	6
	Non-PCB light ballast	63 each	< 1 CY	
	Non-PCB hydraulic fluid associated with the overhead crane	35 gallons	< 1 CY	
	Non-PCB hydraulic fluid associated with other equipment	5 gallons	< 1 CY	
	Ozone-depleting refrigerant in one air conditioning unit	N/A	< 1 CY	
	Diphenyl benzenes (residual reactor coolant)	Residue in two large tanks	< 1 CY	
	Incandescent light bulbs	98 each	< 1 CY	
	Halogen light bulbs	12 each	< 1 CY	
	High-pressure sodium halide bulbs	26 each	< 1 CY	
	High-intensity light bulbs	1 each	< 1 CY	
	Mercury thermostats	1 each	< 1 CY	
	Mercury pressure gauge – 3 pounds	2 each	< 1 CY	
	Mercury ampules	2 each	< 1 CY	
	Battery backup	13 each	< 1 CY	
Asbestos	Admin Bldg Room 202 electrical panels	30 SF	2	2
	Admin Bldg Room B-8 yellow expansion joint compound in concrete wall seam	35 SF	< 1	
	Connector roof black roof mastic	300 SF	< 1	
	HVAC equipment gray/olive mastic in seams	165 SF	< 1	
	Room B-7 black gaskets on man doors of tank and lights	45 SF	< 1	
	Pipes on exterior of south side of dome tan pipe insulation	332 LF and 15 CY soil	30 CY	
Total				**338**

Notes:
The total truckloads estimate assumes that none of the concrete debris would be used as backfill after demolition is complete.

Abbreviations:
CF = cubic feet
CY = cubic yard
HVAC = heating, ventilation, and air conditioning
LCY = loose cubic yards
LF = linear feet
N/A = not applicable
SF = square feet
TSCA = Toxic Substances Control Act

Preferred Alternative – Building materials removed would be characterized for proper management and disposal following demolition. Based on the comprehensive radiological survey results previously conducted, no materials removed during the Preferred Alternative are expected to be characterized as radioactive wastes.

If radiologically impacted areas are identified, radiological contamination control practices would be instituted, and radiation survey meters, and other radiation detection instrumentation would be used, as appropriate, to ensure that radioactive material and radiologically impacted areas are appropriately controlled. Workers would be made aware of any abnormal radiological conditions in a timely manner.

Because two areas of the site were inaccessible and have not been radiologically surveyed, these areas would be radiological surveyed before or as a part of demolition. If the remaining radiological surveys identify that LLRW or MLLRW would be generated, it would likely be a small quantity that would be managed and disposed of in accordance with applicable waste acceptance criteria and all relevant federal and state waste management regulations and requirements. If LLRW is generated and disposed of offsite, it would likely be packaged into one shipment and disposed of at a licensed radioactive waste disposal facility in Texas or Utah in accordance in with applicable waste acceptance criteria and all relevant federal and state waste management regulations and requirements as described in Section 3.12.8.

As all waste would be managed by appropriately trained personnel and transported and disposed in accordance with applicable regulations, the health risk to workers and the public from the proposed demolition and subsequent waste disposal is anticipated to be negligible. Disposal options are identified in Table 7.

Table 7. Disposal Options for Waste Generated for the Proposed Demolition of the Buildings at the Piqua, Ohio, Decommissioned Reactor Site

Facility Type	Name	Location
Debris Recyclers	Franklin Iron and Metal Corp	Dayton, OH
	Ohio Concrete Recycling	Akron, OH
	OmniSource Corporation	Toledo, OH
	River Rock Recycling	Dayton, OH
	Valley Metal Recycling	Dayton, OH
Subtitle D (Solid Waste Landfill)	Miami County Transfer Station (MCTS)	Troy, OH
	Rumpke Transfer Facility	Dayton, OH
	Cherokee Run Landfill	Bellfontaine, OH
	Preble County Landfill	Eaton, OH
	Waste Management Stony Hollow Landfill	Dayton, OH
Subtitle C (Hazardous Waste Landfill)	Envirosafe Services of Ohio	Oregon, OH
	US Ecology, LLC	Belleview, MI
Recyclers of Lamps, Batteries, and so on.	Veolia Environmental Services	West Carrollton, OH
	Waste Management Lamp Tracker	Blaine, MN
	USA Lamp & Ballast	Cincinnati, OH

No Action Alternative – The No Action Alternative would have no effect on waste disposal, as demolition would not be pursued. Therefore, there would be no health or safety risks to workers or to members of the public from waste removal, packaging, or disposal; yet, hazardous materials would remain with the potential for long-term effects.

3.12.1 Recyclable Materials

Recycling diversion of waste from above grade portions of the reactor and administration buildings, along with recyclable manufactured articles throughout the buildings, should be accomplished at the maximum rate possible. LM has a waste recycling diversion goal of 50% by weight through recycle, reuse, or composting. Recycling is not disposal and is a legitimate disposition path for above grade materials generated by the Preferred Alternative. Multiple recycling or reclamation services are anticipated to achieve the 50% landfill diversion goal by weight of above grade materials. The following items, at a minimum, are candidates for recycle:

- Above grade metal with or without LBP, with written concurrence of compliance with, or waiver of, the DOE memoranda referencing the "Moratorium and Suspension of the Release of Metals from DOE Sites" (DOE 2000–2011)
- Above grade concrete
- Asphalt
- Equipment and vehicle fluids
- Ozone-depleting refrigerant
- Universal wastes (UWs) with recycling options, including batteries, lamps, and mercury
- Hazardous and regulated wastes with recycling options, including aerosol cans and non-PCB light ballasts

Waste diversion should be tracked by waste type, method of diversion, weight (actual or estimated), and name of destination facility. Below-grade metal and concrete from within the footprint of the reactor and administration buildings are not acceptable for recycling.

3.12.2 Federal and Ohio-Specific UWs

UW regulations simplify the management of specific, frequently generated non-radioactive wastes from a wide variety of operations. Advantages of UW rules include exclusion from hazardous waste generator status, more lenient transportation requirements and a 1 year accumulation period. UW is an option to the Resource Conservation and Recovery Act (RCRA) hazardous waste disposal rules and is recorded in 40 CFR 273. The five federal categories and two specific to Ohio are:

- Batteries
  - Battery backups were identified during the hazardous materials surveys.
- Pesticides
  - Pesticides were not identified during the hazardous materials surveys.
- Mercury-containing equipment
  - Hazardous materials surveys identified thermostats, pressure gauges, ampules, and electronic radio tubes.
- Lamps (light bulbs)
  - Hazardous materials surveys identified fluorescent, incandescent, halogen, high-pressure sodium halide, and high intensity discharge lamps.

- Aerosol Containers
  - Aerosol containers were not identified during the hazardous materials surveys.
- Paint and Paint-Related Waste (specific to Ohio)
  - The definition of "paint-related waste" includes material contaminated with paint resulting from paint removal activities, including wastes that contain heavy metals, such as lead, regulated by RCRA. This does not include paint containing lead with regulated levels of PCBs, or paint containing regulated levels of heavy metals and PCBs, as PCBs are regulated through the Toxic Substances Control Act (TSCA). See Section 3.12.7 for an explanation of paint waste that includes PCBs and heavy metals.
  - Ohio includes two (2) specific wastes (paint and paint-related wastes, antifreeze,) under UW rules in Ohio regulations (OAC 3745-51-09). These waste streams may be managed as a UW within the state of Ohio. However, other states may not have designated these wastes as a UW. If an Ohio-specific UW to or through another state, the shipment must comply with that state's requirements for the transportation and management of the UW.
- Antifreeze (specific to Ohio)
  - Antifreeze was not identified during the hazardous materials surveys.

Preferred Alternative – There would be no effect to human health or the environment with the implementation of the preferred alternative. UW would be removed and disposed of by trained workers during decontamination and demolition activities and disposed of in accordance with all applicable federal, state, and local laws and regulations (including DOE Orders) at state-approved facilities.

No Action Alternative – Under the No Action Alternative, the industrial hazards would remain and may cause health and safety risks to occupants or visitors of the site. There is also the potential for contaminants to migrate and be transported to surrounding environmental media (air, soil, water) through deterioration of coatings and containments. LM would be responsible for maintaining the site in an appropriate condition to prevent deterioration.

3.12.3 Polychlorinated Biphenyls

PCBs are primarily regulated through TSCA. The cleanup and disposal requirements for PCB remediation waste and bulk product waste are different.

PCB remediation waste is waste containing PCBs as a result of a spill or release (date and concentration limits apply), (e.g., PCB-contaminated soil, sediments, and concrete).

PCB bulk product waste is waste derived from products manufactured to contain PCBs in a non-liquid state at 50 parts per million (ppm) or greater. Typical examples are caulk, paint, and sealants. Caulk and other PCB containing products like paint and sealants were used in many buildings in the 1950s through the 1970s.

Fluorescent light ballasts are regulated for disposal when they contain PCBs that are regulated for disposal. Disposal options depend on whether the PCBs are found in an intact and non-leaking PCB small capacitor, a nonintact or leaking PCB small capacitor, or in the potting material (40 CFR 761.50[b][2]). The PCB regulations do not create any assumptions about the

PCB concentrations in fluorescent light ballasts. Hazardous materials surveys identified PCB light ballasts and PCB capacitors. Hazardous materials surveys identified PCB light ballasts and PCB capacitors.

Paint was tested for PCB concentration in the administration building, reactor dome, and exterior concrete pad indicated PCBs were below regulatory limits. See Section 3.12.7 for a detailed explanation on paint contamination and disposal.

Preferred Alternative – There would be no effect to human health or the environment with the implementation of the preferred alternative. PCB wastes would be removed and managed by trained workers during decontamination and demolition activities and disposed of in accordance with all applicable federal, state, and local laws and regulations (including DOE Orders) at approved facilities.

No Action Alternative – Under the No Action Alternative, the PCB hazards would remain and may cause health and safety risks to occupants or visitors of the site. There is also the potential for contaminants to migrate and be transported to surrounding environmental media (air, soil, water) through deterioration of PCB containments. LM would be responsible for maintaining the site in an appropriate condition to prevent deterioration.

3.12.4 Asbestos

Most of the asbestos-containing material (ACM) was removed and disposed of by a certified asbestos abatement contractor during an abatement project occurred from April 15, 2019, to August 22, 2019. The entombment remained in a protective state and the exterior façade was left intact in compliance with NHPA. Selective demolition of interior walls was performed to access interior abatement areas. As a result of abatement, 12.73 tons of solid waste debris and 30.26 tons of ACM, was transported and disposed at a licensed landfill.

Certain areas with ACM were considered inaccessible and were left in place (refer to asbestos abatement report and maps in Appendix F). Additionally, possible sources of ACM may still be present in caulk or epoxy used to seal cracks in concrete on the exterior of the administration building, and the sealant utilized under the original roofs. Known sources of asbestos include insulation, gaskets, mastic in heating, ventilation, and air conditioning units, wall caulk sealant, roof mastic and transite panels.

Preferred Alternative – There would be no effect to human health or the environment with the implementation of the preferred alternative. The remaining residual amounts of ACM (approximately 36 cubic yards) would be removed and managed by trained workers during demolition. Disposal of ACM would be in accordance with all applicable federal, state, and local laws and regulations (including DOE Orders) at approved facilities.

No Action Alternative – Under the No Action Alternative, some ACM would remain and may cause health and safety risks to occupants or visitors of the site if the ACM were to be disturbed. LM would be responsible for maintaining the site in an appropriate condition to prevent deterioration.

3.12.5 Ozone-Depleting Substances

One air conditioning unit was identified with ozone-depleting refrigerant during a hazardous materials survey.

Preferred Alternative – There would be no effect to human health or the environment with the implementation of the preferred alternative. Ozone-depleting substances would be recovered by trained and certified technicians using EPA-certified equipment during decontamination and demolition activities in accordance with applicable regulations. The appliance would be separately recycled or disposed separately at an appropriate facility.

No Action Alternative – Under the No Action Alternative, the ozone-depleting substances would remain. Theft of refrigerant and copper are potential activities. LM would be responsible for maintaining the site in an appropriate condition to prevent atmospheric venting of ozone-depleting substances.

3.12.6 Construction, Demolition, and Industrial Wastes

Industrial wastes and exempt waste (construction and demolition debris) can be accepted at Ohio's industrial solid waste landfills and at most hazardous waste landfills. This includes the Preferred Alternative's nonrecyclable deconstruction debris and metal. This would include an estimated 3005 cubic yards of debris and 469 tons of steel (Table 6). See Section 3.12.7 for a discussion of disposal of material bonded with LBP and PCB contaminated paint.

Industrial waste liquids are generally not acceptable for direct disposal and require pretreatment of the physical state of the waste. Hazardous materials surveys estimated non-PCB hydraulic fluid in the amount of 40 gallons (Table 6).

Virgin compounds commonly used in non-PCB light ballasts are listed hazardous waste, and spent ballasts are either recycled or handled as industrial wastes, frequently by hazardous waste landfills as they are often declined by Subtitle D facilities. Hazardous materials surveys identified 63 non-PCB light ballasts (Table 6).

Residual used reactor coolant, a terphenyl mix available either under the trade name Dowtherm (from Dow Chemical) or Santowax (from Monsanto), was identified in:

- Room B-5 High Boiler
- Room B-7 Drain Tank

The room B-5 High Boiler and Room B-7 Drain Tank contained residual amounts of chrysene and phenanthrene. Chrysene was detected at 32,1000 micrograms per kilogram and phenanthrene was detected at 59,2000 micrograms per kilogram, and they were the only polyaromatic hydrocarbons detected. The coolant wastes are not RCRA listed waste (chrysene U050) as the wastes are not in a pure, unused form.

Preferred Alternative – There would be no effect to human health or the environment with the implementation of the preferred alternative. Construction, demolition, and industrial wastes would be removed and managed by trained workers during decontamination and demolition

activities and disposed of in accordance with applicable Ohio regulations and at approved facilities.

Most materials are anticipated to meet the standards of construction and demolition or industrial waste.

No Action Alternative – Under the No Action Alternative, the hazardous materials would remain and may cause health and safety risks to occupants or visitors of the site. There is also the potential for contaminants to migrate and be transported to surrounding environmental media (air, soil, water) through deterioration of coatings and surfaces. LM would be responsible for maintaining the site in an appropriate condition to prevent deterioration.

3.12.7 Hazardous Waste Including Lead and PCB Contaminated Paint

RCRA establishes "cradle-to-grave" requirements for hazardous waste from generation through transportation, treatment, storage and disposal. Land disposal occurs in Subtitle C permitted facilities. Wastes are identified by the characteristics of ignitability, corrosivity, reactivity, and toxicity, or from listings of specific compounds, combinations of compounds and generation processes. At this time, listed (F, K, U, P codes) wastes are not anticipated. Wastes within the hazardous waste envelope that are not handled as UW or recycled will be addressed as hazardous wastes.

All potentially hazardous waste (tank residues, tank system rinseates, LBP abatement residues, spent lamps/bulbs, batteries, mercury gauges, oils, etc.) may be evaluated by further sampling and analysis to characterize it as either non-hazardous, UW, or hazardous waste for proper storage, transport, and disposal.

The presence and extent of LBP and PCB contaminated paint has been confirmed and documented through a hazardous materials survey that was completed in 2017 and updated in 2020 by Auxano (Appendix E). Extensive flaking LBP and PCB contaminated paint exists throughout the administration building and reactor dome interior. However, paint at the site contains both lead and PCBs concentrations above the regulatory criteria of 5 micrograms per liter and 50 ppm, respectively.

Preferred Alternative – The preferred alternative is expected to have no effect on human health related to hazardous waste, and no hazardous waste would be left at the site. Hazardous wastes would be removed and managed by trained workers during decontamination and demolition activities and treated and disposed of in accordance with applicable Ohio hazardous waste regulations.

Based on the lead and PCB concentrations found in paint at the site, paint-contaminated material can be disposed of at an approved PCB disposal facility; or when disposed pursuant to 40 CFR 761.61(a) or (c), a permitted municipal solid waste or non-municipal non-hazardous waste facility; or a RCRA Sec. 3004 or Sec. 3006 permitted hazardous waste landfill.

This includes the disposal of debris that has LBP and PCB contaminated paint bonded to it, including an estimated 3005.6 cubic yards of debris and 469 tons of steel (Table 6). This would also include approximately 75,000 square feet of paint that would be removed from the reactor

dome stairwell and lower levels of the reactor dome. This is to ensure that no LBP or PCB contaminated paint would be left belowground after the area is backfilled. This equates to approximately 6.5 cubic yards of LBP waste, with approximately 55 square ft of paint removal resulting in 0.13 cubic feet of waste.

As previously noted in Section 3.12.1, below grade metal from within the footprint of the reactor and administration buildings are not acceptable for recycling. Below grade concrete could be used as fill provided the paint is removed from its surface.

No Action Alternative – Under the No Action Alternative, the hazardous materials would remain and may cause a health and safety risk to occupants or visitors of the site. There is also the potential for contaminants to migrate and be transported to surrounding environmental media (air, soil, water) through deterioration of coatings and containments. LM would be responsible for maintaining the site in an appropriate condition to prevent deterioration.

3.12.8 Radiological Wastes

The radioactive nuclear fuel was removed from the site during initial deactivation activities conducted prior to entombment of remaining radioactive components. Radioactive contamination has not been identified in the materials scheduled for removal during the Preferred Alternative, nor is the generation of radioactive wastes expected.

The results of multiple annual radiological inspections performed from 1992 to 2019, consisting of greater than 100 radiological survey locations for each survey, and the recent radiological characterization survey performed and completed in 2020, reveal that no removable or fixed radioactive surface contamination exists on the material and structural surfaces that would be removed with the Preferred Alternative (LM 2020). The results of both the direct and smear contamination surveys were nearly indistinguishable from background measurements and significantly below the regulatory release limits for surface contamination throughout the facility, including structures that would be removed during the Preferred Alternative.

Only one location (floor drain location No. 16 on the 56 foot level) that would not be disturbed by the Preferred Alternative had a direct surface contamination reading of any significance in 2018; it was 35 disintegrations per minute (dpm)/100 square centimeters (cm^2) alpha and 700 dpm/100 cm^2 beta. In 2019, floor drain location No. 16 was below the surface contamination limit (and near the detection limit of the nuclear counting instrument) for alpha and was 655 dpm/100 cm^2 beta. Both are well below the 10 CFR 835, Appendix D surface contamination release limits of 500 dpm/100 cm^2 and 5000 dpm/100 cm^2, respectively. Floor drain location No. 16 data have consistently decreased over nearly 30 years of surveys.

The smear from floor drain location No. 16 indicated that no removable surface contamination was present. Additionally, the highest gamma radiation exposure rate measured in the facility for the 2018 annual inspection and 2019 annual inspection was only slightly higher than the background radiation dose rate measurement. Specific results of the 2018 and 2019 radiological surveys are available online through LM (2020).

To determine the remaining isotopic inventory within the building portions slated for demolition and removal during the Preferred Alternative, a characterization survey was completed in

August 2020 (NV5 2020). All required surveys were performed; however Room B-7 (see Appendix G for characterization survey maps) in the basement on the south side of the auxiliary building was inaccessible during the survey due to obstruction by a tank that encompasses the entire B-7 room. All radiological measurement results were indistinguishable from background radioactivity or radiation dose rate levels and significantly below the regulatory release limits for surface contamination. The full characterization summary report can be found in Appendix G.

Preferred Alternative – There would be no effect to human health or the environment with the implementation of the preferred alternative. Neither LLRW nor MLLRW is anticipated based on surveys of the facility. No additional radiological decontamination activities are planned for the Preferred Alternative. All demolition and transportation activities would be performed in accordance with approved work plans and programs.

Materials and wastes removed from site for disposition other than at a facility approved by DOE for radioactive waste disposal requires documentation of unrestricted release by an appropriate combination of nondestructive assay, laboratory analysis, removable and total contamination surveys, and techniques acceptable and in compliance with DOE standards.

However, if LLRW or MLLRW is generated, the waste would be classified based on available data, process knowledge, disposal facility acceptance criteria and any applicable federal and state regulatory requirements.

Offsite disposal options include:

- EnergySolutions, LLC (Clive, Utah)
- Waste Control Specialists LLC (Andrews, Texas)

No Action Alternative – Under the No Action Alternative, there would be limited risk of radiological exposure to workers since LM would continue to manage the site in accordance with DOE policies and procedures.

3.13 Transportation, Roadways, and Traffic

The city is served by I-75 with access to the interstate to the north and south of the site. The city has outlined preferred routes for trucks entering and leaving the site to reach I-75 (Figure 10 and Figure 11), to avoid the downtown area. Rail transportation for disposition within a six-hour radius is unlikely to be cost- or time-efficient.

Preferred Alternative – The preferred alternative would have a negligible effect on transportation, roadways or traffic. It is anticipated that most personnel would travel to and from the site by privately operated vehicles. Therefore, no measurable impacts on the Miami County Transit Service or pedestrian and bicycle infrastructure would be anticipated to occur. Due to limited parking at the site, personnel may be shuttled to and from the site in vans or small buses.

Approximately 340 truckloads of materials and waste would be generated during the proposed demolition, which is expected to take 418 days. This would equate to an average of less than one truckload of waste being transported from the site each day. Although, actual numbers of trucks

entering and leaving the site each day would be variable depending on the stage of demolition. The waste is anticipated to be disposed of at applicable disposal sites listed in Table 7. All trucks entering and leaving the site would utilize I-75 to access the listed facilities and would use the routes specified by the city to access I-75 (Figure 10 and Figure 11).

Road infrastructure and traffic volume capacity within Piqua are expected to be sufficient to accommodate the additional truck traffic required to transport the waste generated from demolition. Regional and city road upgrades, new roads, and new access gates are not expected to be required for the Preferred Alternative. Slight modification to a local roadway providing access to the site may occur to address a sharp turn restricting vehicle length and over-width transportation of construction equipment. Any such modification and any secondary haul routes leaving the site would be coordinated with the appropriate property owner and authorities.

Transportation corridors are disturbed areas, no construction is planned, and transportation would be conducted in accordance with DOE, U.S. Department of Transportation, EPA regulations, and all applicable state requirements, including OAC 3745-53, "Transporter Standards."

No Action Alternative – The No Action Alternative would not require transport of demolished materials and therefore would have no impacts on transportation capacity.

Figure 10. City's Preferred Route to Northern I-75 Access (Provided by the City of Piqua)

Figure 11. City's Preferred Route to Southern I-75 Access (Provided by the City of Piqua)

3.14 Accidents/Hazards and Sabotage

3.14.1 Emergency Information

The closest emergency room to the site is the Upper Valley Medical Center at 3130 N County Rd 25A, Troy, Ohio. The Miami Valley Hospital is a large urban hospital and is a member of the Premier Health Partners network. The medical center is approximately 5 miles (10 minutes via car) from the site. The Outpatient Care Center North of the Upper Valley Medical Center is approximately 2.3 miles (6 minutes via car) from the site at 280 Looney Road in Piqua, Ohio. Additionally, Kettering Hospital in Troy, Ohio, is approximately 7.8 miles (13 minutes via car) from the site.

Local law enforcement is provided by the Piqua Police Department (PPD) and the Miami County Sheriff's Office, in Piqua and Troy, respectively. The PPD has three full-time deputies as well as a full-time chief. The Miami County Sheriff's Office provides law enforcement throughout the county, including aiding municipal police departments.

There are 20 municipal and volunteer fire departments in Miami County, including the Piqua Fire Department (PFD), which has three 24-hour duty shifts with 10 members each, consisting of an assistant chief, captain, and eight firefighters. Responsibilities of the PFD include providing fire and emergency medical services, technical rescue operations, fire prevention inspections, and fire safety education as well as additional duties including the maintenance of the city's disaster plan and early weather warning sirens. The PFD has mutual aid agreements with all area departments and is a member of the Greater Dayton Area mutual aid agreement group. All members are trained in both firefighting and emergency medical skills but receive additional training and certification in confined space, rope rescue, hazardous materials, and active shooter tactical training. In addition, the PFD also operates two specialized rescue teams: a dive rescue and recovery team and a technical rescue team.

3.14.2 Highway Radiation Dose and Latent Cancer Risk

Hazardous materials shippers are obligated to have a training plan for hazardous materials employees. The scope of the Preferred Alternative does not trigger the security plan requirements of 49 CFR 172 for the shippers.

Preferred Alternative – No LLRW or MLLRW are anticipated to be generated during the Preferred Alternative. Two areas of the site were not able to be radiologically surveyed prior to demolition and will be surveyed as a part of demolition activities. As a conservative measure for analytical purposes, it is assumed that these areas may be above radiological limits and require management as LLRW. If this occurs, the amount of waste generated is anticipated to be low and could be managed in one load of radioactive waste that would be transported by highway to EnergySolutions or Waste Control Specialists for disposal.

EnergySolutions' Clive, Utah facility is the furthest facility from the site at approximately 1720 miles and is used as a conservative approach to analyze potential impacts from LLRW shipments. DOE radioactive waste shipments are sole-use vehicles, and there is no extended storage in transit or transfers between trucks. After delivery, the truck would be dispatched elsewhere and not return to Piqua; to be conservative, a roundtrip of 3440 miles is assumed. While there is no anticipated extended storage of wastes during transit, normal stops at roadside facilities are included in the analysis.

No Action Alternative – The No Action Alternative would not require transport of demolished materials and therefore would have no impacts on highway radiation doses.

3.14.3 Highway Accident Risk

Transportation-related incidents are credible accident scenarios. Hazardous materials shippers are obliged to prepare for accidents or upset conditions in several ways. Waste manifests and bills of lading require shippers to provide a 24/7 phone number for emergency response, and for hazardous materials shipments, the number must be answered by a person familiar with the

shipment and not go to voicemail. Shippers often provide transporters with an approved route to the destination.

Transporters have emergency response plans and security plans based upon the freight they transport. Their plans may include satellite tracking, computer uplinks, cab video, periodic dispatch contacts, and the use of distress code words.

Preferred Alternative – It is anticipated most wastes would be dispositioned within 50 miles of the Site. Due to the abundance of recycling, Subtitle C, D, and demolition disposal facilities within 100 miles of the site, rail transportation accident risks were not considered.

The National Highway Traffic Safety Administration reported that in 2016, 4251 large trucks were involved in accidents that resulted in 4369 fatalities in the U.S., which is a rate of 1.0278 fatalities per accident. During 2016, large trucks traveled 287,895 million miles on U.S. highways (NHTSA 2019). The overall fatality rate was 1.52×10^{-8} fatalities per mile driven.

As a conservative measure, the assumption is a trip of 100 miles from the site to a facility, and the trucks return empty to the site for the next trucking cycle for a 200-mile round trip. There is expected to be 268 shipments of waste during the implementation of the preferred alternative, however as a conservative measure 1000 shipments is used to calculate potential vehicle deaths and injury.

$$1000 \text{ loads} \times 200 \text{ miles/shipment} \times 1.52 \times 10^{-8} \text{ fatalities/miles} = 3.04 \times 10^{-3} \text{ deaths}$$

Data that details the number of injuries related to large trucks was published last in 2015. This data reported that 116,000 injuries were related to 279,844 million miles driven by drivers of large trucks. The overall injury rate was 4.15×10^{-7} injuries per mile driven. The estimated number of injuries resulting from traffic accidents during the 500-day period would be as follows:

$$1000 \text{ loads} \times 200 \text{ miles/shipment} \times 4.15 \times 10^{-7} \text{ injuries/miles} = 8.30 \times 10^{-2} \text{ injuries}$$

As a result, the total highway safety impact of the Preferred Alternative using highly conservative estimates for number of shipments and total miles per shipment would be less than one (8.30×10^{-2}) injuries and less than one (3.04×10^{-3}) highway deaths during the proposed action. As such, the highway accident risk for this project is expected to be negligible.

No Action Alternative – The No Action Alternative would not require transport of demolished materials and would have no impacts on highway accident risk.

3.14.4 Natural Disaster Risk

Accidents could also occur due to natural phenomena (e.g., earthquakes, tornadoes, floods), equipment failure, or human error. These types of accidents are generally categorized according to their expected frequency of occurrence and the severity (i.e., the level of consequence). The types of accidents analyzed range from those that are high probability/low consequence to those that are low probability/high consequence. A sliding scale approach is generally employed with greater depth in analysis provided for higher-consequence accidents. The Miami County

Emergency Management Agency's (MCEMA) *2017 Draft Hazard Mitigation Plan* identifies 10 natural hazards that threaten Miami County, Ohio (MCEMA 2017).

The maximum, reasonably foreseeable accident is the dispersal of contaminated dust and debris initiated by a tornado or windstorm, although other events capable of causing similar dispersion (e.g., fires) are also possible. The probabilities of future tornadoes/windstorms within Miami County, Ohio is based on storm magnitude on the Fujita Scale (the Fujita Scale is used to categorize a tornado retrospectively depending on the level of damage, although each damage level is associated with a wind speed), and damages one might expect from storms varying in intensity. Probabilities are listed below in Table 8 (adapted from the MCEMA's *2017 Draft Hazard Mitigation Plan*).

Table 8. Probabilities of Storms of Varying Intensities Occurring Anywhere in Miami County, Ohio, in Any Given Year

F Number	Fastest ¼-mile (mph)	Second Gust (mph)	Typical Damages	Annual Probability
0	40–72	45–78	Light damage to trees and buildings	42%
1	73–112	79–117	Moderate damage to trees and buildings, roofs peeled off, mobile homes disturbed	47%
2	113–157	118–161	Considerable damage to trees and buildings, roofs torn off frame houses, mobile homes destroyed, large trees down	11%
3	158–207	162–209	Severe damage to trees and buildings, roofs and walls torn off well-constructed buildings, trees uprooted, trains overturned	0
4	208–260	210–261	Devastating damage, well-constructed houses leveled, large missiles generated	0

Table 8 presents probabilities of storms occurring anywhere in Miami County, an area of 410 square miles. The annual probability of an F-0 storm occurring in any particular square mile in Miami County is 1 in 976. The annual probability of an F-1 and an F-2 storm occurring in any particular square mile in Miami County is 1 in 872 and 1 in 3727, respectively (The scale has five categories, F-0 through F-5, with F-5 being the most damaging storm. F-0 is a tornado that has winds around 40-72 mph and causes slight damage to properties).

According to the National Oceanic and Atmospheric Association's National Climatic Data Center (MCEMA 2017), the average occurrence of significant winter storm events in Miami County per year is 3.5. The entire site is within the FEMA 1% annual chance flood hazard zone, meaning that, in any given year, there is a 1% chance that the site will be flooded.

Preferred Alternative – The risk of accidents causing harm to workers or the environment is short-term and negligible.

Due to the low probabilities of tornadoes or windstorms and flooding impacting the site, natural hazards are unlikely to affect human or environmental health by disturbing demolition materials. Consequently, the risks associated with such accidents have been determined to be negligible. In addition, the waterproofing concrete is designed to prevent water intrusion to reduce the impact if flood events were to occur.

No Action Alternative – Under the No Action Alternative, environmental and human health would still be at risk from tornadoes or windstorms.

3.14.5 Sabotage

A probability of occurrence for intentional acts of sabotage cannot be estimated. Even though access to the site is secure and controlled, risk of such acts can't be eliminated completely. The impacts of such an unlikely event would be similar to those associated with natural hazards, such as tornadoes, or the impacts of an accident involving a truck carrying waste from the site.

The city reports that it has recently experienced some trespassing issues at its WWTP, which is adjacent to the site. These issues contributed to the city taking action to temporarily relocate a public bike trail to the other side of the Great Miami River from its current location in front of the site and WWTP during the city's WWTP upgrade project. The bike trail is back to its original configuration, but the city plans to relocate this trail as soon as construction of the Piqua Power Plant pedestrian bridge is complete. This is one of nine high-priority infrastructure projects outlined in the *City of Piqua 2017–2021 Strategic Plan* (Piqua 2017).

Preferred Alternative – During the implementation of the preferred alternative there would be a negligible risk of malicious acts as crew members would be onsite much of the time, and the area is secured.

After completion of the preferred alternative there would be negligible risk of sabotage. The site would appear to simply be a parking lot that would be gated with barbed wire fencing to prevent access with appropriate signage. The land surface above the entombment would be protected by heavy concrete bollards with a mounded, large-diameter stone riprap cap to deter foot traffic.

The new bike trail is expected to cross the river several hundred yards downstream of where the current trail crosses near the site, and vegetation along the river bank is expected to minimize and most likely preclude visibility of the site from the new bike trail. Once the bike trail relocation is finished, virtually no dedicated public access to the site would exist, and exterior visibility of the site by the public is expected to be extremely reduced and potentially nonexistent.

No Action Alternative – Under the No Action Alternative, the site would be a more visible target for malicious acts or acts of terrorism, as the aboveground facilities would still be within the public eye, thus, creating a long-term risk for malicious acts.

3.14.6 Accidental Breach of the Entombment

An accidental release of radiological material that impacts public health (i.e., one that exceeds applicable regulatory thresholds) is highly unlikely to occur at the site. Nuclear reactor operations ceased at the site in 1969 and the reactor cavity was successfully entombed, with all fuel removed. No leakage from the entombment has been identified in the 52 years the site has been inactive. Unlike many other nuclear reactor sites, the radiologically contaminated waste in the entombment is within solid materials (metal and concrete) that cannot easily migrate offsite. Therefore, many accidental release scenarios for the loss or containment of highly radioactive liquids, gases, and hot particles are not applicable to this site.

Preferred Alternative – The reactor dome and other interior structures would be systematically dismantled and removed in a controlled fashion to ensure protectiveness of the entombment. Additionally, a detailed demolition plan has been developed to ensure stability of the existing structure as the reactor dome is disassembled. The existing entombment would be cleared of all perturbances and a new crystalline waterproofed self-healing concrete shell would be cast around the existing entombment for further protection. The shell would ensure that no water would infiltrate through the entombment and would provide additional physical protection for the entombment from accidental breach. The site demolition plan includes measures to prevent water infiltration of the entombment as well as manage drainage surrounding the entombment.

No Action Alternative – Under the No Action Alternative there would be no risk of breaching the entombment.

3.15 Socioeconomics, Environmental Justice, and Protection of Children

Federal agencies are required to identify any disproportionately high and adverse human health or environmental effects of their actions on minority or low-income populations and children. In accordance with Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, EPA recommends the lead agency and project proponent pay particular attention to worksite proximity in places where children live, learn, and play, such as homes, schools, and playgrounds. Construction emission reduction measures should be strictly implemented near these locations to be protective of children's health. To identify such impacts, it is first necessary to identify the minority or low-income populations that could be affected by the Preferred Alternative or No Action Alternative.

According to the 2010 U.S. Census, approximately 1.8 million people live within a 50-mile radius of the site, and approximately 26,000 people live within 5 miles of the site. On the basis of the 2010 census data, 15 percent of the population within 50 miles and 8 percent of the population within 5 miles of the site are minorities, as compared with the state average of 20 percent for Ohio and a national average of 38 percent.

With respect to low-income populations, the 2010 census data reveal that 34 percent of the population within 50 miles and 10 percent of the population within 5 miles of the site are composed of low-income populations, as compared with the state average of 33 percent for Ohio and a national average of 34 percent. EPA Environmental Justice (EJScreen) Reports are provided within Appendix C of this EA.

According to the 2010 U.S. Census, approximately 30 percent of the population within 50 miles and 31 percent of the population within 5 miles of the site consists of children (age 0 to 17). More specifically, the data show that 6% of the population within both 50 and 5 miles of the site is composed of children under the age of 5, as compared with the state and national averages of 6% (EPA 2010). The nearest school is Jerome Horwitz Elementary and is approximately 1 mile northwest of the site.

Preferred Alternative – The Preferred Alternative would have no effect on low-income populations, minority populations, or children.

As previously indicated, offsite impacts of the Preferred Alternative would be negligible due to the remote nature of the site. The nearest residence is approximately 0.1 mile west of the site. Further, the site is fenced and has gated access. Construction signage, access controls, and no trespassing signs would be used during project phases.

An adverse impact would mean that residents would need to be relocated, their lifestyles and living conditions would need to change, or their health and safety would be at risk from the Preferred Alternative. Since the "adverse" condition is not met, there is no reason to determine and quantify the "disproportionately high" condition. "Disproportionately high" would indicate that impacts to minority and low-income populations from the Preferred Alternative are anticipated to be higher than impacts to nonminority and mid- to high-income populations. There would not be any environmental justice concerns associated with the Preferred Alternative due to the lack of adverse impacts to any population.

No Action Alternative – The No Action Alternative would have no effect on socioeconomics, environmental justice, or children.

4.0 Reasonably Foreseeable Impacts

According to the Council on Environmental Quality regulations, effects or impacts mean "changes to the human environment from the Preferred Alternative or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the Preferred Alternative or alternatives, including those effects that occur at the same time and place as the Preferred Alternative or alternatives and may include effects that are later in time or farther removed in distance from the Preferred Alternative or alternatives."

The site is adjacent to the WWTP, and these facilities are within abandoned operations areas of the Piqua Materials gravel pit. The city began using a newly constructed WWTP in 2017 which involved expansion to the east of the current plant and utilized retired gravel operation areas; this project has since been completed. The city has no planned industrial or commercial projects in the project area. The city of Piqua Planning and Zoning department was contacted to request information regarding past, present, or foreseeable future projects being planned for construction surrounding the demolition site. The city reported that it is not considering any future needs in the area, and no other past projects were identified.

The city is planning to relocate a nearby bike trail to avoid the site and reduce the risk of trespassers. If the bike trail is not relocated prior to commencement of the Preferred Alternative, then there may be coordination with the city to temporarily relocate the bike trail. The city's environmental documentation regarding the bike trail (Appendix A) would only have negligible effects on the environment and would not be expected to result in any additional impacts to any of the resources discussed in this EA.

The Preferred Alternative involves the demolition of the aboveground structures at the site and the restoration of disturbed lands where the buildings occur to a paved parking lot of approximately 0.5 acre. The waste generated during the project would not result in any significant impact to the resources discussed in this EA and is not expected to have any additive impacts when considering the other past and future known projects in the area.

5.0 Mitigation

This section describes the proposed mitigation activities that would be implemented to compensate for the adverse effect of the loss of resources.

There would be mitigation strategies implemented for the protection of environmental resources. These mitigations include:

- Best management practices for stormwater control will be implemented and a NPDES permit will be obtained if the limits of disturbance from construction activities exceed 1 acre.
- Trees with a DBH greater than 3 inches will only be cut between October 1 and March 31.
- Airborne contamination controls will be implemented to ensure that workers would not receive a total effective radiation dose, or any other emission dose, in excess of the DOE federal limit. These controls may include, but are not be limited to, barriers, HEPA filters, containment structures, dust suppression techniques (such as misting), and differential pressures between adjacent areas/rooms, as appropriate.
- Dust controls will be implemented to reduce fugitive dust, including:
  - Posting and enforcing a site speed limit
  - Watering roadways
  - Control vehicle access
  - Limit loading drop heights
  - Utilize water during demolition as appropriate
  - Contract with city of Piqua (or subcontractor) to periodically sweep paved roads

Mitigation will need to be completed for the loss of the historic property (the reactor dome and auxiliary building) and will occur in accordance with the MOA between the Ohio SHPO and LM (Appendix D). In a letter dated November 13, 2020, ACHP declined to participate in the MOA (Appendix D).

There are four mitigation measures that will take place to account for the loss of the historic property (the reactor dome and auxiliary building):

- Recordation: LM shall retain a qualified historic preservation consultant (i.e., preservation professional) meeting the Secretary of the Interior's Professional Qualifications in History and/or Architectural History in accordance with 36 CFR 61 to complete a HABS recordation of the PNPF in accordance with National Park Service (NPS) guidelines and specifications. The historic preservation consultant shall obtain all necessary information to complete the HABS recording prior to any irreversible physical alteration of the historic property. LM shall coordinate with the preservation professional, the NPS, and the SHPO as needed to ensure that the HABS recordation package meets the regulations described in Volume 68 *Federal Register* pages 43159–43162 (68 FR 43159–43162) in the NPS's, "Guidelines for Architectural and Engineering Documentation." NPS HABS staff have primary review and approval authority for the recordation package.

After resolving all comments and receiving approval from NPS HABS staff, the preservation professional shall submit the final HABS recordation package within 2 years of the execution of this MOA to LM for formal submittal to the NPS.

- Diorama: LM shall collaborate with the SHPO and city of Piqua to design and construct an exhibit that documents the history of the site. The exhibit shall include a museum diorama of the combined reactor and administration building. The diorama shall be no larger than 5 feet × 5 feet and portable, with a case, that is professionally prepared to provide an accurate three- dimensional (3D) rendering of the historic property to approximate scale. This diorama would be an aerial view of the exterior of the site when it was operational.

  The diorama shall take advantage of traditional model-making as well as 3D printing, as appropriate, in order to create a realistic replication of the reactor and administration building. The diorama will be designed and prepared by a professional firm using the existing building drawings and photographs. The display is expected to also include an audio and visual component that will describe the operations of the facility. The diorama exhibit is also expected to provide display space that would allow Piqua Public Library staff to be able to display and interchange site artifacts at their discretion. The cost for the diorama exhibit is expected not to exceed $100,000. A conceptual and final design will be shared with the city of Piqua and SHPO for review and comment within 6 months and 1 year, respectively, of the execution of this MOA. The city of Piqua shall concur on the final exhibit design before construction can begin. The exhibit shall be constructed and given to the city of Piqua for their use, for example, in the Piqua Public Library, within 2 years of the execution of this MOA.
- Architectural salvage: Prior to demolition, LM shall collaborate with the city of Piqua and the SHPO to identify historical artifacts from the site that will be retained from the site. Such material may include, framed and unframed photographs and drawings, signs, artwork painted on the walls, or other unique historic objects or pieces of equipment (e.g., the control room operating panel). LM shall remove these objects prior to demolition of the site, determine that they are free of contamination and pursue disposition in accordance with DOE policies and procedures. Dispositioned salvaged artifacts shall be given to the city of Piqua for use as historical memorabilia within 2 years of the execution of this MOA.
- Interpretative signage: LM shall collaborate with the city of Piqua and SHPO to design and construct an interpretive sign that is anticipated to cost approximately $25,000. The sign will tell the history of the site using a combination of photographs, drawings, and narrative. The free-standing sign shall be approximately 4-foot-wide by 3-foot-high, full color, and made of weatherproof construction suitable for erection outdoors. A draft design of the interpretative sign shall be shared with the city and SHPO for review and comment within 1 year of the execution of this MOA. Upon resolution of comments, this interpretive sign shall be designed, fabricated, and given to the city of Piqua within 2 years of the execution of this MOA. LM is advised that the city of Piqua intends to install the sign adjacent to the city-owned public bicycle/pedestrian trail on the west side of the Great Miami River across from the Piqua WTTP.

  LM also shall collaborate with the city of Piqua on the application process and design for the city to obtain an Ohio Historical Marker at a publicly accessible location proximate to the location of the decommissioned Piqua reactor building. The city, as the local sponsor would submit an application for a marker to Ohio History's Local History Services with LM support as needed. LM will reimburse the city for the cost of marker production and marker

installation. The Ohio Historical Marker program runs on an annual July–June cycle; applications are due in the Local History Services office every year by July 1. Once an application has been accepted into the program, Local History Services confirms the historical significance of the subject, ensures the marker text is historically accurate, and collaborates with the local sponsor to finalize the text as it will appear on the marker. The anticipated cost is estimated to be less than $25,000.

6.0 Compliance with Laws, Regulations, Permits, and Orders

The Preferred Alternative would comply with applicable federal, state, and local laws and regulations as well as current permits, including DOE Orders. In accordance with the Atomic Energy Act of 1954, as amended, DOE has self-regulating authority for radioactive materials at the Piqua site. The applicable and potentially applicable environmental laws, regulations, DOE Orders, and relevant permits are summarized below:

- 10 CFR 835, "Occupational Radiation Protection Program"
- 10 CFR 1021, "DOE National Environmental Policy Act Implementing Procedures"
- 29 CFR, "Labor"
- 29 CFR 1910.134, "Respiratory Protection"
- 29 CFR 1929 et seq. "Occupational Safety and Health Administration"
- 36 CFR 61, "Procedures for State, Tribal, and Local Government Historic Preservation Programs"
- 36 CFR Subpart B 1220–1238, "Records Management"
- 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants"
- 40 CFR 122, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System"
- 40 CFR 239-282, "Resource Conservation and Recovery Act"
- 40 CFR 258.2, "Criteria for Municipal Solid Waste Landfills"
- 40 CFR 261.3, "Definition of Hazardous Waste"
- 40 CFR 702-799, "Toxic Substances Control Act"
- 40 CFR 761 et seq. "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions"
- 49 CFR, "Transportation"
- 16 USC Sec. 668-668c, "Bald and Golden Eagle Protection Act"
- 16 USC 703-712, "Migratory Bird Treaty Act of 1918"
- 16 USC 1531, et seq. "Endangered Species Act" as amended
- 33 USC 1251, et seq. "Clean Water Act," as amended
- 42 USC 1857h-7, et seq. "Clean Air Act," as amended
- 42 USC Part 2011, et seq. "Atomic Energy Act of 1954," as amended

- 42 USC 4321, et seq. "National Environmental Policy Act," as amended
- 42 USC Sec. 4901–4918, "Noise Control Act of 1972"
- 42 USC 9601, et seq. "Comprehensive Environmental Response, Compensation, and Liability Act"
- 54 USC 300101, et seq. "National Historic Preservation Act," as amended
- DOE Order 435.1, *Radioactive Waste Management*
- DOE Order 458.1 Chg 4, *Radiation Protection of the Public and Environment*
- DOE Order 460.2A, *Departmental Materials Transportation and Packaging Management*
- EO 11988, *Floodplain Management*
- EO 11990, *Protection of Wetlands*
- EO 12898, *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*
- EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*
- EO 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*
- *Ohio Administrative Code* (OAC) 3701 "Radiation Control"
- OAC 3745 "Ohio Environmental Protection Agency"
- OAC 3745-22 "Asbestos Hazard Abatement"
- OAC 3745-27 "Solid Waste and Infectious Waste Regulations"
- OAC 3745-50–53 "Hazardous Waste Management, Identification, Generator, and Transporter Standards"
- OAC 3745-273 "Management Standards for Universal Waste"
- Ohio Revised Code Chapter 3714.04, *Granting of exemption where disposal of debris is unlikely to have adverse effects - exception*
- Public Law (PL) 94-496, "Toxic Substances Control Act"
- PL 94-5800, as amended by PL 100-582, "Resource Conservation and Recovery Act (RCRA) of 1976"

7.0 Public Involvement and Coordination

This EA was made available for a 30-day public review. All concerned agencies, organizations, people, and tribes listed in Table 9 were contacted by mail announcing the availability of the EA. Additionally, a notice of the availability to review this EA was published in the following local newspapers: *Columbus Dispatch*, *Dayton Daily News*, and *Miami Valley Today*.

All comments received during this review period were evaluated and necessary changes were incorporated into the final EA. All received comments, along with a comment response matrix documenting LM responses to comments received,are provided in Appendix H of this final EA.

The coordination necessary for full compliance with the Endangered Species Act and NHPA is discussed in Sections 3.5 and 3.9, respectively.

Table 9. Agencies, Organizations, People, and Tribes Contacted for Public Review of this Environmental Assessment

Stakeholder Type	Agency/Organization/Person/Tribe
Local Agencies	Piqua City Manager's Office
	Piqua Public Library
State Agencies	Ohio Environmental Protection Agency
	Ohio Ecological Services Field Office
	Ohio Department of Natural Resources
	Ohio State Historic Preservation Officer
	Ohio Department of Health
State Elected Officials	Governor Mike DeWine
	Representative Jena Powell
	Senator Steve Huffman
Tribes	The Miami Tribe of Oklahoma
	Seneca-Cayuga Nation
	Delaware Nation, Oklahoma
	Eastern Shawnee Tribe of Oklahoma
Federal Agencies	U.S. Environmental Protection Agency, Region 5 Office
	Nuclear Regulatory Commission
	DOE, Office of Sustainable Environmental Stewardship
	U.S. Fish and Wildlife Service
	Advisory Council on Historic Preservation
Federal Elected Officials	Senator Sherrod Brown
	Senator Rob Portman
	Representative Warren Davidson
NGOs	Heritage Ohio, Inc.
	Preservation Ohio

Abbreviation:
NGO = non-government organization

8.0 Conclusion

The Preferred Alternative, which includes full demolition of the aboveground structures at the site and placement of fill between the concrete entombment and the exterior reactor dome shell, would have no significant environmental impacts on the existing environment. The purpose and need for this action is to identify a long-term path forward for the site that is protective of human health and the environment from risks associated with unoccupied buildings and vacant property that no longer contribute to the active DOE mission.

The Preferred Alternative was chosen over the No Action Alternative because it would ensure the lowest probability that health and safety of the public and the environment would be impacted by residual radioactivity and industrial hazards by eliminating future occupancy and ensuring protectiveness of the entombment. Appropriate mitigation actions will be undertaken, in coordination with the Ohio SHPO, to ensure that the loss of historic structures is compensated for. The implementation of the Preferred Alternative would not have a significant adverse impact on the quality of the environment and an Environmental Impact Statement is not required. A FONSI has been prepared as no significant changes are determined to be necessary.

9.0 References

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36 CFR 800, "Protection of Historic Properties," *Code of Federal Regulations*.

40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards," *Code of Federal Regulations.*

40 CFR 273, "Standards for Universal Waste Management," *Code of Federal Regulations*.

40 CFR 761 et seq. "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," *Code of Federal Regulations.*

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