Final

Environmental Assessment
for
The Ohio State University, Ohio 4-H Center
with
Green Building Technologies

DOE/EA 1571

Franklin County, Ohio

December 2006

U.S. DEPARTMENT OF ENERGY
GOLDEN FIELD OFFICE
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S. SUMMARY

S.1 INTRODUCTION

In accordance with the Department of Energy (DOE) National Environmental Policy Act (NEPA) implementing regulations, DOE is required to evaluate the potential environmental impacts of DOE facilities, operations, and related funding decisions. Based on action by the U.S. Congress, DOE has funding available to support the proposed public sector project described in this Environmental Assessment (EA).

The decision to use federal funds in support of the Ohio State University (OSU) 4-H Center with Green Building Technologies (the Ohio 4-H Center) project requires that DOE address NEPA requirements and related environmental documentation and permitting requirements. In compliance with the NEPA (42 U.S.C. 4321) and DOE's NEPA implementing regulations (10 CFR section 1021.330) and procedures, this Environmental Assessment (EA) examines the potential environmental impacts of DOE's decision to support the project in Franklin County, Ohio, including construction of the facility, as well as a No Action Alternative as set forth in Chapter 2.

S.1.1 Purpose and Need

The purpose of the Proposed Action, federal funding provided by DOE for part of the construction of the proposed Ohio 4-H Center, is to support the construction phase of two features within the Ohio 4-H Center designed for energy efficiency: 1) A hybrid geothermal/cooling tower heating, ventilating, and cooling (HVAC) system and 2) the use of recycled structural steel members. The existing 4-H offices on the OSU campus are in a small space within the Agricultural Administration Building that does not provide the visibility needed for the integration of 4-H programs into the rapidly expanding university complex and does not allow for the implementation of green building technologies.

The U.S. Congress has acknowledged the merit of this project by providing specific funding through DOE. Based on Congressional action, DOE has $990,000 dollars in funding available to support OSU's participation in the proposed project.

S.1.2 Project Site, Proposed Action and Alternatives

The OSU intends to construct the Ohio 4-H Center on its Columbus, Ohio campus northwest of the intersection of Fred Taylor Drive and West Lane Avenue. The Ohio 4-H Center is planned to be the first "green" building on the OSU campus and would utilize a hybrid geothermal/cooling tower HVAC system. The hybrid HVAC system would provide heating and cooling through a vertical geothermal heat exchanger combined with a closed circuit cooling tower for additional heat rejection. The legal description of the project site is City of Columbus tax parcel identification number 010062731 (Personal communication with Ralph Recchie, OSU Office of Real Estate on August 23 2006). Regional access to the site is provided by State Route 315 located about 500 feet (0.15 kilometers) west of the site, U.S. Interstate 670 located about 2.0 miles (3.2 kilometers) south of the site, U.S. Interstate 70 located about 3.5 miles (5.6 kilometers) south of the site and U.S. Interstate 71 located approximately 2.0 miles (3.2 kilometers) west of the site. Local access to the project site is via Fred Taylor Drive just north of West Lane Avenue.

The project site is owned by OSU and includes approximately 5.6 acres (2.26 hectares) (of which 1.4 acres or 60,900 square feet are to be developed for the 4-H Center and associated facilities) of mostly vacant land situated in a campus area comprised mostly of educational and recreational uses. The project site is characterized by open ground with a maintained grass cover. Some mature trees are located around the perimeter of the proposed building footprint and generally outside the proposed building footprint. Nearby land uses include two abandoned poultry barns and State Route 315 to the west, Chadwick North grove of native trees and Chadwick Lake to the north, the Value City Arena/Jerome Schottenstein Center (Schottenstein Center) east of Fred Taylor Drive, and academic facilities principally for the College of Food, Agriculture, and Environmental Sciences south of West Lane Avenue. Landscaping and parking areas associated with the Ohio 4-H Center would be located within these boundaries. The OSU Facilities Planning and Development office recommended a 200 foot setback along West Lane Avenue to retain a site for a future OSU gateway building. The Ohio 4-H Center is planned to be located north of the future gateway building.

The Ohio 4-H Center is planned to include office facilities for 20-25 employees of the Ohio State Extension 4-H program. These employees currently occupy the existing 4-H offices on the OSU campus. In addition to the full-time employees, the Ohio 4-H Center is expected to have a large number of public users participating in in-service training. In addition to serving 4-H youth, volunteers, and youth professionals, the Ohio 4-H Center is planned to be a training resource for other youth organizations, as well as a location for OSU Extension programming. It is expected that 25-50 cars per day would access the site. The project site is planned to include approximately 60 parking spaces and overflow parking is available east of Fred Taylor Drive at the Schottenstein Center.

Potable water used for operation of the Ohio 4-H Center and wastewater sanitation would be provided by the City of Columbus Division of Public Utilities. However, the building's "green" features, such as geothermal mechanical system and "green housekeeping plan" is planned to reduce water and energy consumption for the project. The intended use of DOE funding for this project is to support the construction phase of two features of the Ohio 4-H Center designed for energy efficiency. These features are: 1) A hybrid geothermal/cooling tower HVAC system and 2) the incorporation of recycled structural steel members.

The geothermal heating and cooling system is a hybrid geothermal (water source) closed loop heat pump system. Heat is extracted from or rejected to the earth through a vertical geothermal heat exchanger that would be buried under the Ohio 4-H Center's parking lot. The geothermal heat exchanger is planned to consist of a series of 72 drilled holes, each measuring five inches in diameter by 280 feet deep. Additional heat rejection would be accomplished through a closed circuit cooling tower in the Ohio 4-H Center's 5-story tower at the building's north end. Circulating fluid would not come into contact with soil.

Recycled steel would be the main component in the Ohio 4-H Center structural system. The project would require 282 tons of structural steel that would be produced in domestic mills using the Electric Arc Furnace (EAF) process and would contain at least 90% total recycled content. The use of recycled structural steel allows energy that would be used to extract raw material from the ground to be conserved and diverts waste from old steel products away from landfills.

Given the intent of this EA, scoping input, and preliminary impact findings, the only alternative to the Proposed Action analyzed in this EA is the No Action Alternative. OSU's environmental management commitments are described in Section 2.4.1.

S.1.3 Organization and Content of the Environmental Assessment

This EA is organized in a manner consistent with NEPA and DOE's NEPA Implementing Regulations. The EA has six Chapters, a summary, and associated appendices.

- Summary
- Chapter 1 – Introduction
- Chapter 2 – Proposed Action and Alternatives
- Chapter 3 – Affected Environment
- Chapter 4 – Environmental Consequences and Mitigation Measures
- Chapter 5 – Bibliography and References
- Chapter 6 – List of Preparers
- Appendices

S.2 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND ALTERNATIVES

S.2.1 Summary of Consultation Process, Input, and Impact Issues

A scoping/consultation letter was prepared and distributed to county, state and federal agencies and organizations on July 31, 2006. The consultation letter distribution list included agencies and organizations that may have information regarding potential environmental issues in the vicinity of the project site. Appendix A presents the consultation letter, a complete list of the letter recipients, and response letters received during the comment period.

S.2.2 Environmental Issues

The scoping letter for the Proposed Action identified the following environmental topics to be addressed in the EA:

- Land Use and Transportation;
- Visual Quality/Aesthetics;
- Public Services and Utilities;
- Noise;
- Socioeconomics and Environmental Justice;
- Biological Resources;
- Cultural Resources;
- Air Quality;
- Water Resources;
- Geology and Soils;
- Hazardous Materials and Waste Management;
- Secondary and Cumulative Impacts.

At this time, the Proposed Action and the No Action Alternative are the only alternatives addressed in the EA. The applicant's Proposed Action involves construction of the Ohio 4-H Center with Green Building Technologies. DOE's Proposed Action is to provide partial funding in support of the Ohio 4-H Center construction. DOE's No Action Alternative would involve a DOE decision not to provide funding for the project. The applicant, OSU, has already commenced construction activities for this project, so for NEPA compliance purposes and to create a meaningful No Action scenario, potential impacts addressed in this EA are as

compared to pre-construction baseline conditions. A privately funded project scenario would be identical, or at least similar to, the Proposed Action, however in the absence of DOE or other federal funding, OSU is not required to comply with NEPA.

S.2.3 Description and Comparison of Environmental Consequences

The following discussion summarizes findings of this EA and compares the impacts of the Proposed Action with those of the No Action Alternative.

Implementation of the Proposed Action would not result in significant impacts to the environment because the project site and surrounding area generally lack sensitive resources (e.g., threatened or endangered species, cultural resources, low-income or minority groups, etc.) and because of the limited impacts from the construction of the proposed Ohio 4-H Center. Additionally, OSU proposes an extensive set of environmental management commitments intended to avoid, minimize, and mitigate potential impacts. OSU's environmental commitments are described in Chapter 2 and described, where applicable, in Chapters 3 and 4.

The direct, indirect, secondary, and cumulative impacts of the Proposed Action are discussed throughout Chapter 4. None of these impacts are considered significant; however, the applicant has committed to the following measures:

- Construction areas will be fenced to limit disturbance to adjacent habitat outside of the construction zone. Stormwater handling and soil erosion control measures are described in the Ohio 4-H Center construction document package.
- To ensure that trees indicated to remain on site are protected during construction and promptly and properly treated and repaired if damaged, a landscape architect and arborists from the Chadwick Arboretum and Learning Gardens will be available for consultation.
- To minimize impacts associated with particulates, best management practices (BMPs) such as covering of dirt stockpiles and application of water sprays will be implemented.
- To ensure that impacts to soil or groundwater from the heat exchanger would be minimal to non-existent the BMPs for geothermal heat pumps described in Section 4.9.1 would be employed.

S.2.4 Comparison of Proposed Action to No Action Alternative

The vast majority of impacts created by the Proposed Action would be avoided if the No Action Alternative were selected as the preferred alternative. However, none of the impacts of the Proposed Action is considered significant, and the No Action Alternative would eliminate the beneficial impacts that could be expected from completion of the Ohio 4-H Center with Green Building technologies.

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1.0 INTRODUCTION

1.1 NATIONAL ENVIRONMENTAL POLICY ACT AND RELATED PROCEDURES

In accordance with the Department of Energy (DOE) National Environmental Policy Act (NEPA) implementing regulations, DOE is required to evaluate the potential environmental impacts of DOE facilities, operations, and related funding decisions. Based on action by the U.S. Congress, DOE has funding available to support the proposed project described in the following discussions and Chapter 2 of this Environmental Assessment (EA).

The Ohio State University (OSU) is a not-for-profit educational institution that would administer the federal funds for the proposed Ohio 4-H Center with Green Building Technologies (the Ohio 4-H Center project). The decision to use federal funds in support of OSU's proposed project requires DOE to address NEPA requirements and related environmental documentation and permitting requirements. In compliance with the NEPA (42 U.S.C. 4321) and DOE's NEPA implementing regulations (10 CFR section 1021.330) and procedures, this EA examines the potential environmental impacts of DOE's decision to support the project in Franklin County, Ohio, including construction of the Ohio 4-H Center, as well as a No Action Alternative as set forth in Chapter 2.

1.2 BACKGROUND

The Ohio State 4-H Green Building Project, as designed by the OSU project team, is planned as a multi-disciplinary learning center, with classrooms and learning labs as well as state and administrative offices for the 4-H program. As the home of Ohio 4-H—and the first facility of its kind on a land-grant university campus in the country—the Ohio 4-H Center is planned to feature:

- Flexible multi-purpose space for hands-on program opportunities for youth, volunteers, professional leaders and supporters.
- Educational conference and classroom facilities.
- State-of-the-art technology linking the Ohio 4-H Center to Ohio's 88 counties, the nation, and the world.
- "Green" features such as a hybrid geothermal/cooling tower HVAC system; structural steel containing at least 90% recycled content; and a "green housekeeping plan" to reduce water and energy consumption.

The Ohio 4-H Center is planned to provide a site for program activities designed to involve and engage increased numbers of Ohio youth and volunteer leaders, and for OSU faculty and staff to enhance the field of positive youth development through teaching and research. The Ohio 4-H Center is planned to provide access to OSU research and resources through distance learning opportunities, as well as through on-site conferences, workshops, and seminars for youth and adults—all of which will serve to strengthen local 4-H programs.

The proposed use of DOE funding for this project is to support the construction phase of two features within the Ohio 4-H Center designed for energy efficiency: 1) A hybrid geothermal/cooling tower HVAC system for heating and cooling and 2) the incorporation of recycled structural steel members.

Green buildings are designed to meet certain objectives such as protecting occupant health; using energy, water, and other resources more efficiently; and reducing overall impacts to the

environment. The proposed Ohio 4-H Center would incorporate several green building principles, including site selection, use of recycled building materials, and energy efficient heating and cooling systems. The Ohio 4-H Center is proposed at a site that takes advantage of an existing mass transit system and the site development plan strives to protect and retain existing landscaping and natural features. The proposed geothermal/cooling tower HVAC system would allow the Ohio 4-H Center to achieve improved energy efficiency levels beyond those found in typical buildings. The Ohio 4-H Center achieves materials efficiency through the selection of recycled structural steel members and low volatile organic compound (VOC) emission paints, coatings and adhesives. Such products promote resource conservation and efficiency and occupant health. The Ohio 4-H Center achieves water efficiency by using ultra low-flush toilets, low-flow shower heads, and other water conserving fixtures and promotes occupant health by providing adequate ventilation and a high-efficiency, in-duct filtration system. Heating and cooling systems that ensure adequate ventilation and proper filtration can have a considerable positive impact on indoor air quality.

The project site is located northwest of the intersection of Lane Avenue and Fred Taylor Drive in Franklin County, Ohio (see Figures 1-1 and 1-2). The legal description of the project site is City of Columbus tax parcel identification number 010062731(Personal communication with Ralph Recchie, OSU Office of Real Estate on August 23 2006). Regional access to the site would be provided by State Route 315 located about 500 feet (0.15 kilometers) west of the site, U.S. Interstate 670 located about 2.0 miles (3.2 kilometers) south of the site, U.S. Interstate 70 located about 3.5 miles (5.6 kilometers) south of the site and U. S. Interstate 71 located approximately 2.0 miles (3.2 kilometers) west of the site. Local access to the project site is via Fred Taylor Drive just north of West Lane Avenue.

The project site is owned by OSU and includes approximately 5.6 acres (2.26 hectares) of mostly vacant land (of which 1.4 acres or 60,900 square feet are to be developed for the 4-H Center and associated facilities) situated in a campus setting comprised of educational and recreational uses (Figure 1-3). Site visits to the project site and its surroundings were conducted on July 11, July 19 and August 10, 2006. During site visits observations regarding the characteristics of the site and surrounding area were made. The project site is open ground with a maintained grass cover. Some mature trees are located around the perimeter of the building area, generally outside the proposed building footprint. Nearby land uses include Chadwick North grove of native trees and Chadwick Lake to the north, the Value City Arena/Jerome Schottenstein Center (Schottenstein Center) east of Fred Taylor Drive, academic facilities south of West Lane Avenue and two abandoned poultry barns and State Route 315 to the west. OSU archives indicate that the area of land that includes the project site was purchased between 1917 and 1925. The first tract was purchased in 1917 from Louisa Hess, and had apparently been leased prior to the purchase. The remainder was leased and then acquired from Mary Hess in 1925. University archives provide details of the boundaries (based on surveys dating as far back as 1859) and Civil Engineering Maps of the lands were completed in 1919 (#191-63; 191-73;191-75). These archives indicate such items as fences and stables present on the land (R. Goerling, OSU Office of Archives, e-mail received August 23, 2006). Figure 1-3 presents a series of photographs that characterize the project site and surrounding area.

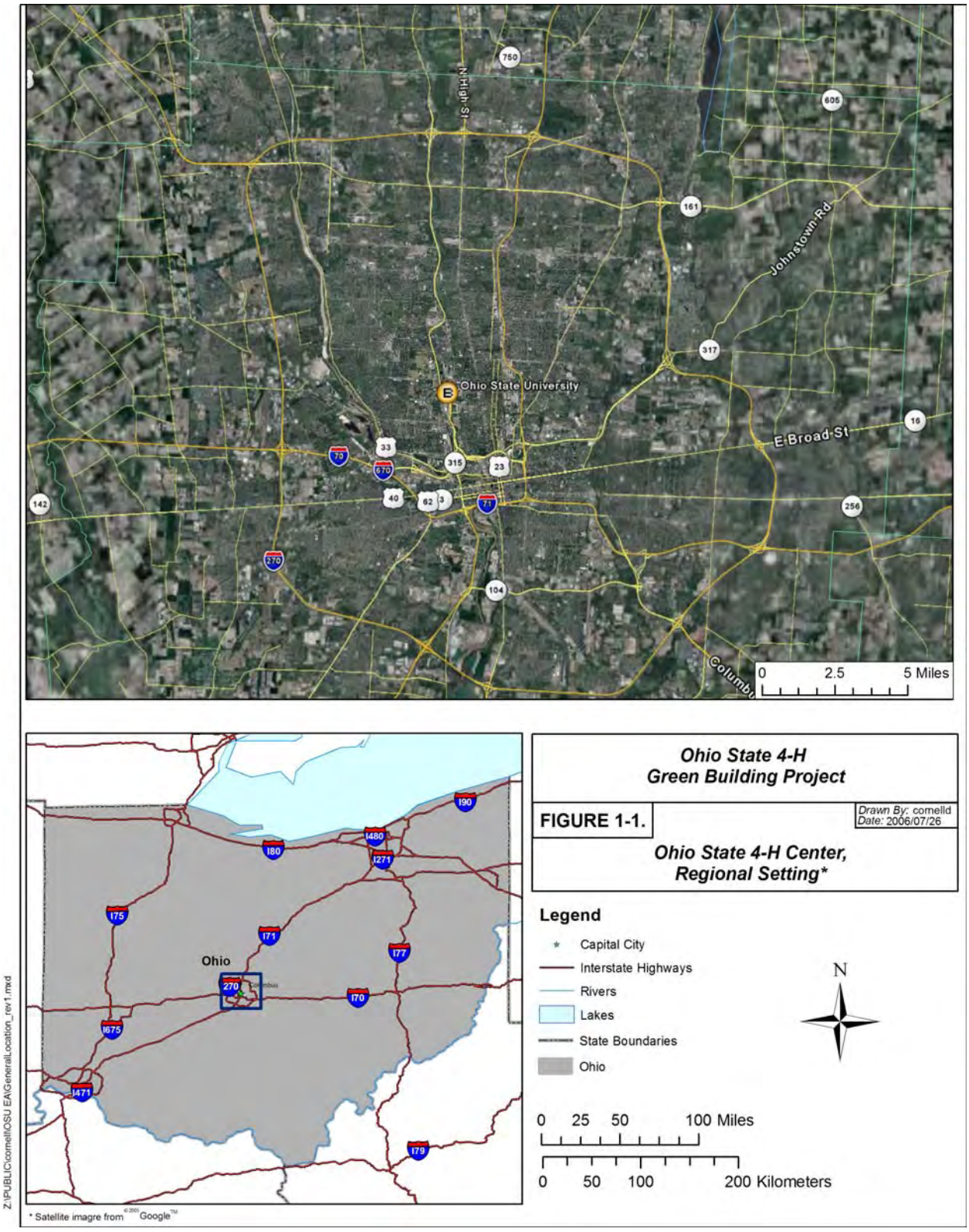
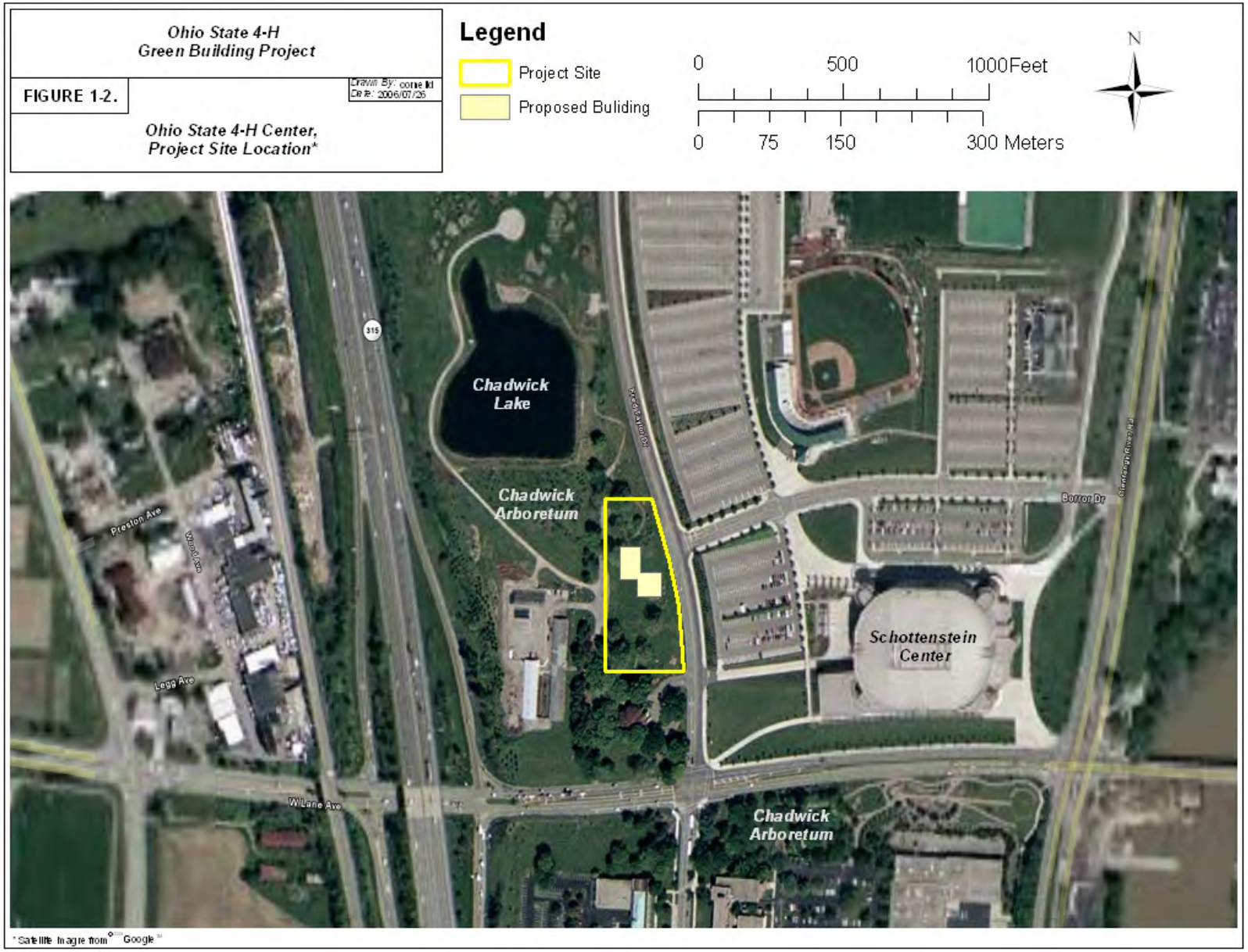


Figure 1-1: Regional Setting for the Ohio 4-H Center with Green Building technologies.


Ohio State 4-H
Green Building Project
FIGURE 1-2.
Drawn By: corne kl
Date: 2006/07/26
Ohio State 4-H Center,
Project Site Location*
Legend
Project Site
Proposed Buliding
0
500
1000Feet
0
75
150
300 Meters
N
Chadwick
Lake
Chadwick
Arboretum
Preston Ave
Legg Ave
W Lane Ave
Borror Dr
Schottenstein
Center
Chadwick
Arboretum
* Satellite Imagery from Google

Proposed project site looking north - Chadwick North grove of native trees and shrubs.

Proposed project site looking west - Existing poultry barns.

Figure 1-3 - Site Photographs

Proposed project site looking east - Schottenstein Center.

Proposed project site looking south - Lane Avenue setback.

Figure 1-3 -Site Photographs (Continued)

1.3 SCOPING: PROCESS AND RESULTS

A scoping/consultation letter was prepared and distributed to county, state and federal agencies and organizations on July 31, 2006. The consultation letter distribution list included agencies and organizations that may have information regarding potential environmental issues in the vicinity of the project site. Appendix A presents the consultation letter, a complete list of the letter recipients, and response letters received during the comment period.

1.3.1 Environmental Issues

The scoping/consultation letter for the Proposed Action identified the following environmental topics to be addressed in the EA:

- Land Use and Transportation;
- Visual Quality/Aesthetics;
- Public Services and Utilities;
- Noise;
- Socioeconomics and Environmental Justice;
- Biological Resources;
- Cultural Resources;
- Air Quality;
- Water Resources;
- Geology and Soils;
- Hazardous Materials and Waste Management; and
- Secondary and Cumulative Impacts.

1.3.2 Alternatives

The following alternatives were defined prior to the scoping period:

- Proposed Action and
- No Action Alternative.

At this time, the Proposed Action and the No Action Alternative are the only alternatives to be addressed in the EA. DOE's Proposed Action involves the provision of federal funds toward construction of the Ohio State 4-H Green Building Technologies project with green building technologies. The No Action Alternative would involve a DOE decision not to provide funding for the project. The applicant, OSU, has already commenced construction activities for this project, so for NEPA compliance purposes and to create a meaningful No Action scenario, potential impacts addressed in this EA are as compared to pre-construction baseline conditions. A privately funded project scenario would be identical, or at least similar to, the Proposed Action. If the applicant (OSU) proceeds without DOE or other federal funding, the project would not be subject to NEPA review.

Other alternatives raised prior to the scoping period were considered, but were eliminated from further analysis. These alternatives and the rationales for eliminating these alternatives are:

- **Locate the Ohio 4-H Center on property not owned by OSU:** Not considered feasible because of the added costs associated with the purchase of a suitable site, and because an off-campus location would not provide the visibility essential to promoting 4-H programs or foster integration of 4-H programs with other OSU disciplines such as the Colleges of Humanities, Human Ecology, Biological Sciences, Medicine, as well as the University Hospitals, OSU Cares, and the YMCA, among others; and
- **Locate the Ohio 4-H Center at some other location within the OSU campus:** This option was evaluated through a weighted-criteria site selection study that involved balancing the requirements of the building's occupants with the University Master Plan (OSU Master Planning Advisory Committee, 1995). This analysis provided quantifiable analysis of alternative on-campus locations, as well as a forum for input from a diverse group of stakeholders who would be affected by the location and use of the new facility. The recommendation of the siting study was to locate the Ohio 4-H Center on the proposed project site, also known as the Dakan Hall site, rather than in other potential locations at OSU.

The Ohio 4-H Center is planned to provide a permanent location for Ohio 4-H on the OSU campus and supply the visibility essential to promoting 4-H programs and to foster integration of 4-H's programs with other university disciplines.

1.4 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action, the decision to provide federal funding for the construction of the Ohio 4-H Center, is to support a hybrid geothermal/cooling tower HVAC system and the incorporation of recycled structural steel members. The existing 4-H offices on the OSU campus is a small space in the Agricultural Administration Building that does not provide the visibility needed for the integration of 4-H programs into the rapidly expanding university complex and does not allow for the implementation of green building technologies. The Ohio 4-H Center would serve 4-H youth, volunteers, and youth professionals from around the state of Ohio, the nation, and the world. It is planned to be a training resource for other youth organizations, as well as a location for OSU Extension programming reaching throughout Ohio.

The U.S. Congress has acknowledged the merit of this project by providing specific funding through DOE. Based on Congressional action, DOE has funding available to support OSU's participation in the proposed project.

1.5 ORGANIZATION, CONTENT, AND OBJECTIVES OF THIS ENVIRONMENTAL ASSESSMENT

This EA is organized in a manner consistent with NEPA and DOE's NEPA implementation guidelines. The EA has seven primary sections. The first section is a Summary. The organization, content, and objectives of the EA's remaining six chapters are as follows:

Chapter 1 – Introduction. Presents the regulatory context and rationale for preparing this EA, provides background about the project and proposed project site, summarizes the scoping process and results, defines the purpose and need for the project, and clarifies the organization, content, and objectives of this EA.

Chapter 2 - Proposed Action and Alternatives. Presents a detailed description of the project and the characteristics of the construction and operation of the proposed Ohio 4-H Center, along with a description of the No Action Alternative.

Chapter 3 - Affected Environment. Describes environmental baseline information about the project site and surrounding area.

Chapter 4 - Environmental Consequences and Mitigation Measures. Describes potential impacts of the Proposed Action and No Action alternatives, compares the impacts, presents required and recommended measures to reduce impacts, and makes "significance" findings.

Chapter 5 - Bibliography and References. Presents a listing of key documents used in the preparation of this EA and consultations that took place as part of the EA process.

Chapter 6 - List of Preparers. Identifies the individuals who prepared the EA and their roles.

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2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 DESCRIPTION OF THE PROPOSED ACTION

2.1.1 Project Applicants

The project applicant, OSU, has assembled a project team to develop a prototype commercial-scale project that is planned to utilize green building technologies in Franklin County, Ohio. The project team includes Lincoln Street Studio Ltd. (architects), Jezerinac, Geers & Associates Incorporated (structural engineers), W. E. Monks & Company (mechanical/electrical engineers), Jane Amidon (landscape architect consultant) and Sands Decker, Ltd. (civil engineers). As described in Chapter 1, DOE proposes to provide funding in support of this project. Details of the Ohio 4-H Center project are described in the Construction Document Package which is available for public review in the OSU Office of Facilities, Operations, and Development, which includes the Offices of the University Architect and Engineer.

2.1.2 Project Location

The project site is located on the OSU campus northwest of the intersection of Lane Avenue and Fred Taylor Drive in Franklin County, Ohio (see Figure 1-2). Regional access to the site is provided by State Route 315 located about 500 feet (0.15 kilometers) west of the site, U.S. Interstate 670 located about 2.0 miles (3.2 kilometers) south of the site, U.S. Interstate 70 located about 3.5 miles (5.6 kilometers) south of the site and Interstate 71 located approximately 2.0 miles (3.2 kilometers) west of the site (Figure 1-1). Local access to the project site is via Fred Taylor Drive just north of West Lane Avenue. The proposed project location is relatively flat to gently sloping down toward the wooded north of the proposed project site. Surface runoff is generally toward Fred Taylor Drive to the east and toward a drainage swale on the north site of the building location. Storm water on the project site is directed to Chadwick Lake via a 2-foot deep, grass-lined shallow swale that begins in the northwest corner of the project site.

2.1.3 Building Design, Construction, Operation and Maintenance

Building Design

The Ohio 4-H Center has been designed by the project team identified above with energy efficient technologies including a hybrid geothermal system for heating and cooling and a structural system incorporating a recycled steel manufacturing process to produce structural steel members. Figure 2-3 shows the project site plan. The footprint of the proposed Ohio 4-H Center building plus parking lot and roadways is 1.4 acres (0.6 hectares). The building alone would cover 0.6 acres (0.2 hectares).

If the Ohio 4-H Center is constructed as designed, the north end of the structure would have a 5-story office tower constructed over a full basement. The central and southern portions of the structure would generally be a single-story, slab-on-grade building. A small section of the building would have a second story to house mechanical equipment. The proposed project site area would encompass 5.6 acres (2.26 hectares). Some of this area is planned to be used for vehicle parking, geothermal wells, landscaping and other ancillary learning facilities. Three-

dimensional computer model images of the proposed building are provided in Figure 2-1. Photographs of the physical model of the proposed construction are shown in Figure 2-2.

If this facility is constructed as designed by the OSU project team, the Ohio 4-H Center is planned to utilize a heat pump system, with the earth serving as both the heat source and as a heat sink. The Ohio 4-H Center geothermal system would utilize the earth for heating and cooling because the earth remains at a relatively constant temperature of 55 degrees Fahrenheit (55˚F), particularly at depth. The vertical geothermal heat exchanger is planned to consist of a series of 72-80 boreholes, each 5 inches in diameter and approximately 280 feet deep. A plastic pipe would be inserted into each borehole with a "U" shaped bend at the bottom so that the pipe doubles back on itself (like a paper clip) and comes back to the top. These pipes would be collected into groups of eight, so that when a glycol solution is pumped through the pipe it actually goes down and up through eight boreholes to form a geothermal heat exchanger loop.

Regardless of what temperature the heat exchanger solution is when it leaves the building and enters the geothermal heat exchanger loop, it comes out of the heat exchanger and back to the building at 55˚F. Each group of eight boreholes would have its own pump, and the circulating solution from each group would be connected to a building loop so that the 55˚F solution from all the pipes would be circulated in loop fashion around the building. At various places in the building, heat pumps would exchange the temperature from the heat exchanger solution to air at a prescribed temperature. In winter, the system would take heat out (cool down) of the 55˚F glycol solution to warm the air that would blow into spaces for heating. In the summer, the heat pumps would heat up the 55˚F glycol solution by taking heat out of the air in spaces to be cooled. So, in the summer, the heat exchanger solution would go into the loop hot and the earth would absorb the heat, cooling the solution back down to 55˚F. In the winter, the heat exchanger solution would go into the loop cold and the earth would warm it back up to 55˚F (Lincoln Street Studios 2003).

Figure 2-4 shows the layout of the geothermal heat exchanger including borehole locations and supply and return headers. The vertical geothermal heat exchanger is planned to be covered by a research and display garden and surrounded by the Ohio 4-H Center parking lot. Additional heat rejection would be accomplished through a closed circuit cooling tower located in the building's north tower. The heat exchanger fluid contained in the closed loop piping would be a solution 20% Dowfrost HD® heat transfer fluid and 80% water, and, under normal operation, would not contact the soil or ground water. Dowfrost HD® with propylene glycol was selected as the fluid with the least environmental impact in the event of a pipe rupture. The heat exchanger fluid would vary in temperature between 90˚F and 30˚F and individual space heat pumps would extract heat from or reject heat to this loop. Space temperature would be controlled through heat pumps located in mechanical rooms and air distribution would be through a low pressure duct system.

Outside air supply and exhaust fan speed would operate at a minimum speed when the building is not occupied and fan speed would be increased based on a need for additional ventilation as established by space carbon dioxide (CO_2) sensors. An electric canister-type humidifier with distribution manifold mounted in the outside air supply duct would maintain building relative humidity above 30%.

Recycled steel would be the main component in the Ohio 4-H Center structural system. The project would require 282 tons of structural steel that would be produced in domestic mills using the Electric Arc Furnace (EAF) process and would contain at least 90% total recycled content.

The use of recycled structural steel allows energy that would be used to extract raw material from the ground to be conserved and diverts waste from old steel products away from landfills.

Construction Requirements

Site topography is relatively flat to gently sloping toward the wooded area to the north. The southern portion of the building footprint would be cut to a finished floor grade of 749 feet elevation. The central portion of the building footprint would receive up to 5 feet of fill to reach finished subgrade elevation and the northern end of the building would be constructed with a full basement that would extend approximately 10 feet below existing surface elevation and have a finished floor elevation of approximately 735.5 feet. To ensure that trees indicated to remain on site are protected during construction and promptly and properly treated and repaired if damaged, a landscape architect and arborists from the Chadwick Arboretum and Learning Gardens will be available for consultation. Temporary fence will be erected around the drip line of trees and vegetation selected to remain. The temporary fencing will ensure that construction materials are not stored within the drip line and that vehicles and foot traffic are not permitted within this area. The fence will be removed when construction is complete. Figure 2-5 shows the plan for tree removal, transplant, and preservation. The Ohio 4-H Center's construction document package includes provisions for the installation and maintenance of lawn, grasses and exterior plants after construction. A qualified landscape installer will be employed to ensure the successful establishment of exterior plants.

During construction, measures would be taken to prevent soil sedimentation into the stormwater system as permitted through the National Pollutant Discharge Elimination System (NPDES) general permit. To minimize impacts associated with particulates, best management practices (BMPs) such as covering of dirt stockpiles and application of water sprays would be implemented. During construction the site would employ surface stabilization after clearing, silt fences and inlet protection. A temporary on-site detention pond would be constructed to store all groundwater encountered during borehole drilling. If groundwater is turbid it would be stored in the detention pond until suitably clarified for disposal through area storm sewers. The heat exchanger boreholes would be installed using two diesel drill rigs equipped with standard steel drill rods using sonic drilling techniques (Jackson Geothermal, personal communication on October 6, 2006). Each borehole will have an external diameter of 4.5 inches. Potable water supplied by the Columbus Division of Water will be used to aid the drilling process. No soil will be removed during borehole installation.

East Exterior

Great Hall

Interior View

Reception Area

Sketch By Gary Bumpus

Ohio State 4-H
Green Building Project

FIGURE 2-1.

Drawn By: cornelkl
Date: 2006/07/26

Ohio State 4-H Center,
3-D Computer Model Images

South West View

West Main Entrance

South East View

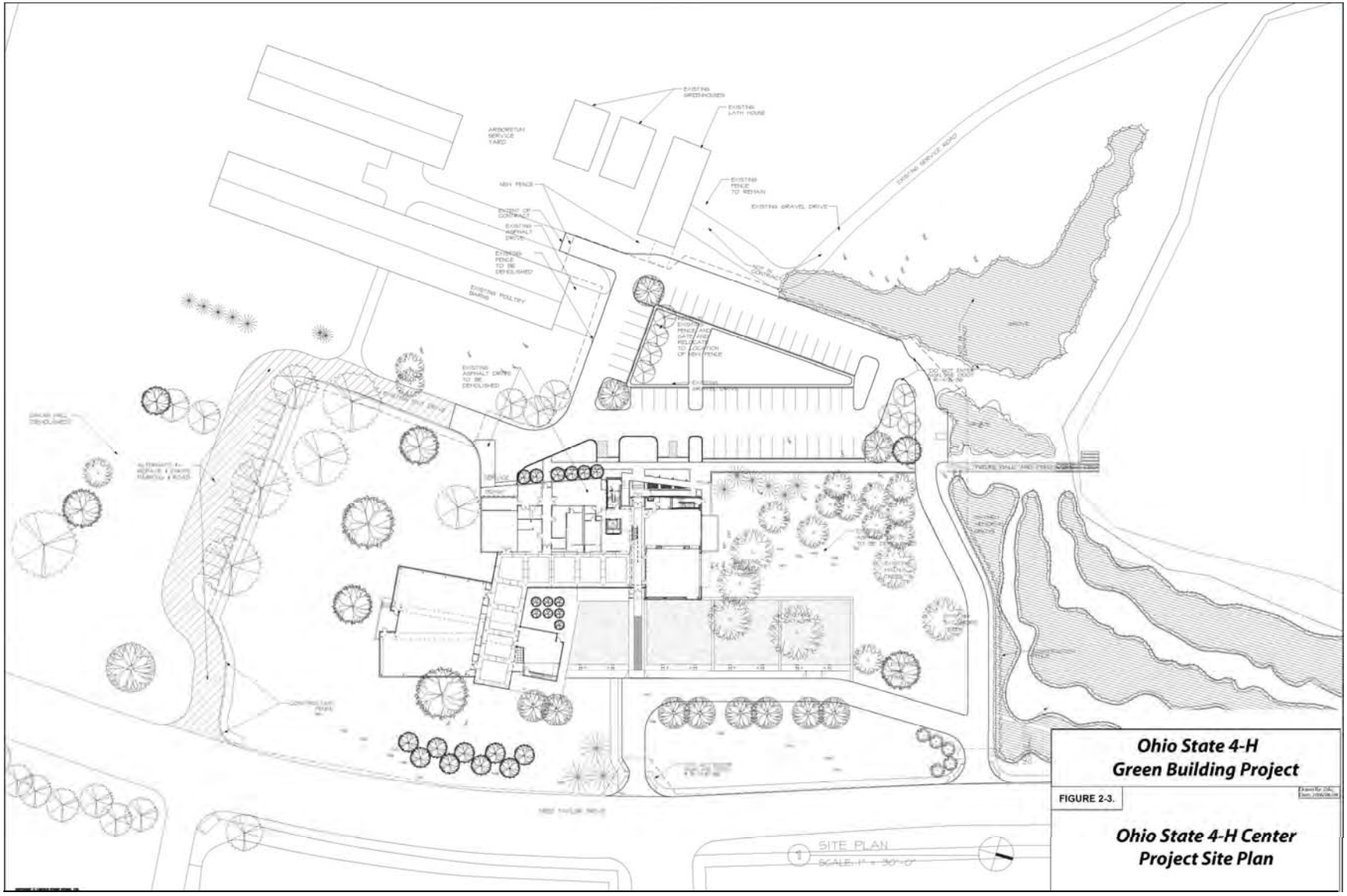
South East View

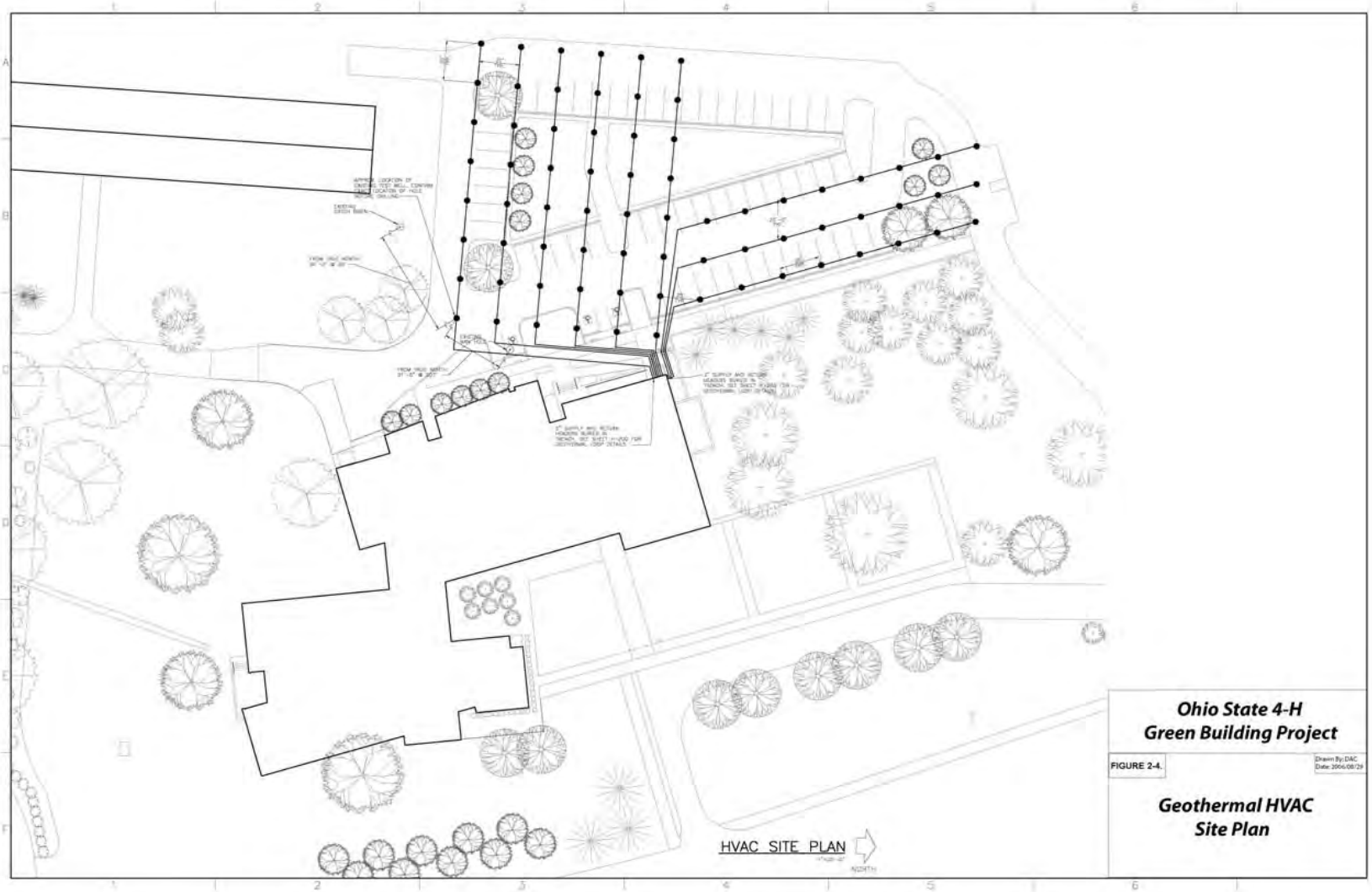
Ohio State 4-H
Green Building Project

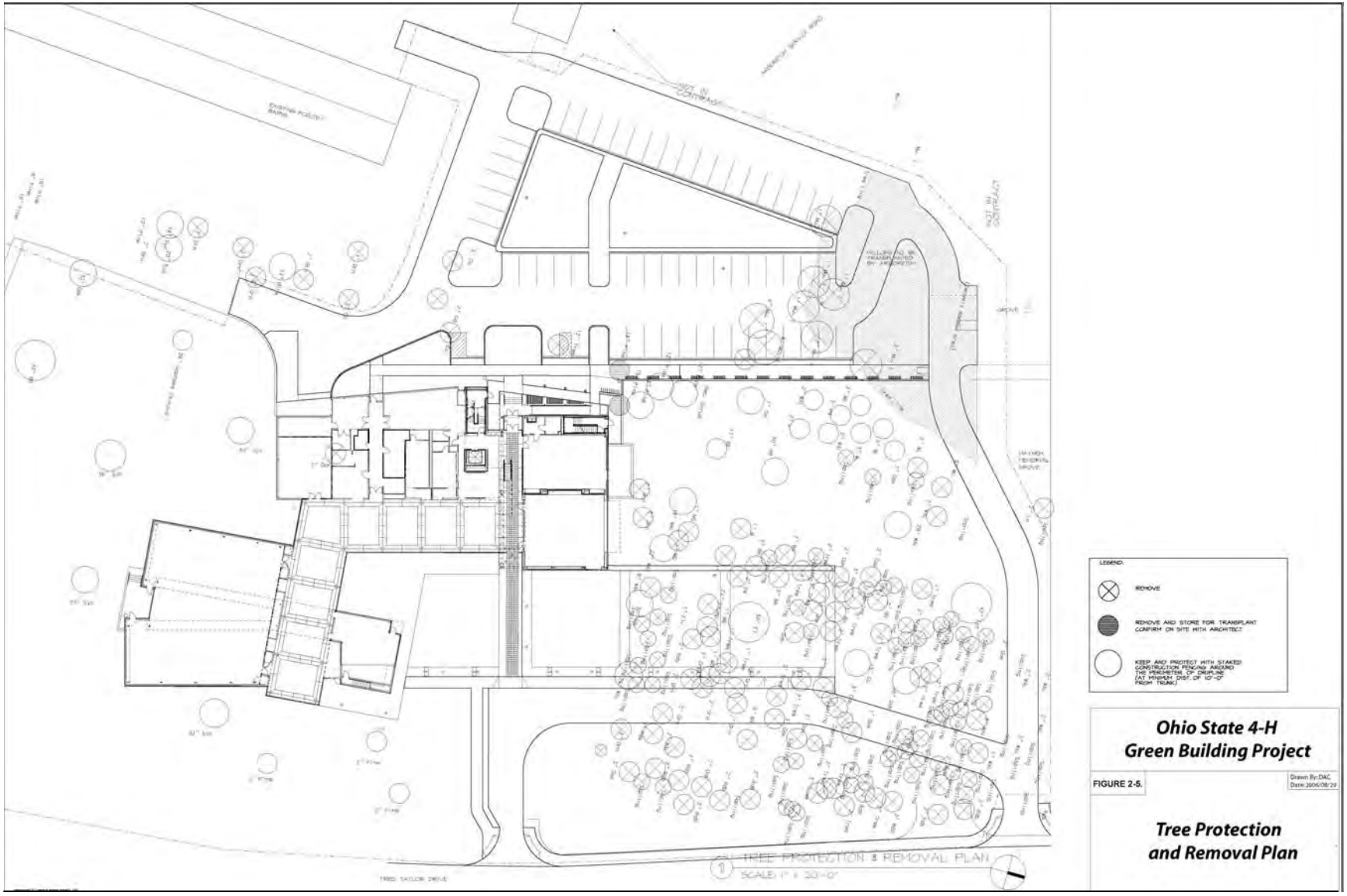
Drawn By: cornelkl
Date: 2006.07.26

FIGURE 2-2.

Ohio State 4-H Center,
Photographs of Physical Model


Ohio State 4-H
Green Building Project
FIGURE 2-3.
Ohio State 4-H Center
Project Site Plan
SITE PLAN


HVAC SITE PLAN
NORTH
Ohio State 4-H
Green Building Project
FIGURE 2-4.
Geothermal HVAC
Site Plan


LEGEND:
REMOVE
REMOVE AND STORE FOR TRANSPLANT CONFIRM ON SITE WITH ARCHITECT
KEEP AND PROTECT WITH STAKED CONSTRUCTION FENCING AROUND THE PERIMETER OF DRIPLINE (AT MINIMUM DIST. OF 10'-0" FROM TRUNK)
Ohio State 4-H
Green Building Project
FIGURE 2-5.
Tree Protection and Removal Plan
TREE PROTECTION & REMOVAL PLAN
SCALE: 1" = 30'-0"

Building Description

The Ohio 4-H Center has been registered with the U.S. Green Buildings Council (USGBC), and the design is currently undergoing review for Leadership in Energy and Environmental Design (LEED) certification. The LEED Green Building Rating System® is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. LEED was created to define "green building" by establishing a common standard of measurement, to promote integrated, whole-building design practices, to recognize environmental leadership in the building industry and to raise consumer awareness of green building benefits (USGBC 2006). No findings from the USGBC regarding the Ohio 4-H Center are available at this time.

The OSU Office of Facilities, Operations, and Development, which includes the Offices of the University Architect and Engineer, reviewed the Ohio 4-H Center plans for conformity with university regulations and standards. No report of deficiencies or lack of conformance with standards was made.

2.1.4 Environmental Management Commitments

During construction, the Ohio 4-H Center will implement the following environmental management commitments:

- The use of paints, coatings, sealants, adhesives and carpets that have a low VOC content to reduce the levels of ozone (O_3) that would be generated (VOCs and NO_x react in the atmosphere to generate O_3.).

- Construction would preferentially use regional materials and products that are extracted and manufactured within 500 miles of the site. Reducing the length of material transportation reduces the emission of criteria pollutants from motor vehicles.

- The project is planned to utilize 282 tons of structural steel produced in domestic mills containing at least 90% total recycled content.

- Water efficiency would be achieved by using water conserving plumbing fixtures (e.g. dual flush toilets, waterless urinals, and faucet sensors).

- At least 50% of the construction debris would be recycled.

- Highly reflective roof material and parking surfaces would be used.

- Monitoring systems would be incorporated into the building design to measure energy use and consumption, and carbon monoxide levels and ventilation.

Based on a preliminary energy analysis performed by W. E. Monks & Company that compared a budget building design representing minimum standards in terms of energy efficiency for a building built today with the proposed design for the Ohio 4-H Center, it is estimated that the proposed energy efficiency design of the Ohio 4-H Center is planned to result in yearly annual savings of 30% for heating, ventilating and cooling alone. (W. E. Monks & Co. 2004).

Permits and Coordination with Agencies

A NPDES general permit for the Ohio 4-H Center was issued by the Ohio Environmental Protection Agency (Ohio EPA) on September 7, 2006 (Trishman, M., OSU Project Manager, personal communication on October 9, 2006). This permit reviews the measures to prevent soil sedimentation in the stormwater system during construction. The Ohio Department of Commerce, Division of Industrial Compliance issued a Certification of Plan Approval for the Ohio 4-H Center Project in February 2005 and granted an extension to this permit in February 2006 (Personal communication with Jeff Snively, Lincoln Street Studio on September 21, 2006).

2.2 DESCRIPTION OF THE NO ACTION ALTERNATIVE

The No Action Alternative would involve a DOE decision to not provide funding for the Ohio 4-H Center. OSU has already started the construction phase of the 4-H Center project, so for NEPA compliance purposes and to create a meaningful No Action scenario, impacts addressed in this EA are as compared to pre-construction baseline conditions. DOE funding for this project is contingent upon finding that there are no significant environmental impacts associated with the construction of the proposed facility. Should DOE conclude that there are significant impacts associated with the project, no DOE funds will be committed to the construction effort.

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3.0 AFFECTED ENVIRONMENT

Site visits to the project site were conducted on July 11, July 19, and August 10, 2006. During these visits observations were made regarding vegetation and wildlife species and surface water drainage. All site visits and inter-agency consultations were complete prior to OSU beginning construction on the 4-H Center to establish the pre-construction baseline data.

3.1 LAND USE AND TRANSPORTATION

3.1.1 Project Site and Zoning

The project site is owned by OSU and includes approximately 5.6 acres (2.26 hectares) of mostly vacant land with a maintained grass cover surrounded by a campus area comprising educational (academic buildings) and recreational uses (sports arena, baseball stadium) (Figure 1-2). The project site is a portion of tax parcel identification number 010062731 and has been assigned a zoning designation "University, College, Research-Park District" by the City of Columbus (Personal communication with Ralph Recchie, OSU Office of Real Estate on August 23 2006). The proposed project is consistent with the current zoning designation. Some mature trees are located around the perimeter of the site and nearby buildings. Figure 1-2 presents a series of photographs that characterize the project site and surrounding area.

3.1.2 Surrounding Area

Land uses surrounding the project site include Chadwick North grove of native trees and shrubs and Chadwick Lake to the north, the Schottenstein Center east of Fred Taylor Drive, OSU academic facilities south of West Lane Avenue and two abandoned poultry barns and State Route 315 to the west. Chadwick North, located just north of the project site contains a collection of trees, shrubs, vines and woody ground covers native to Ohio. Chadwick North is part of Chadwick Arboretum and Learning Gardens, which is an outdoor laboratory whose primary role is to provide a landscape setting for teaching and research in a variety of disciplines (Chadwick Arboretum & Learning Gardens 2006). The mission of the Chadwick Arboretum and Learning Gardens is to provide an educational environment that advances knowledge of the relationship between people and their natural environment through multidisciplinary research, curriculum support, public education, plant preservation, and collections of plants within an aesthetically designed, constructed landscape. Chadwick Arboretum manages 60 acres with three main areas: Learning Gardens, Lane Avenue Gardens and Arboretum North (Chadwick Arboretum & Learning Gardens 2006). The Schottenstein Center is the primary indoor arena for OSU athletics and includes several large parking areas. The area south of the proposed building site contains academic facilities, principally for the College of Food, Agricultural, and Environmental Sciences. The poultry barns west of the project site are currently unoccupied and State Route 315 is a major transportation corridor for the City of Columbus.

OSU is a key component of the larger Columbus community, and the quality of the campus affects and is affected by the character of the surrounding neighborhoods. OSU's influence extends into the urban neighborhoods east, south and north of the campus, with many students residing in neighborhoods within 1 to 2 miles of the campus borders. A number of faculty and staff reside in adjacent neighborhoods, many within walking distance of the campus commercial districts that are present along High Street and to a lesser extent, sections of Neil Avenue and Lane Avenue.

The project site is located within OSU's Midwest Campus, which is the area between the Olentangy River and John Herrick Drive south of Lane Avenue that houses the instructional and support facilities of the College of Food, Agricultural, and Environmental Sciences, and the College of Veterinary Medicine. The Midwest Campus consists of several buildings of relatively low profile and density, interspersed with large areas of landscaped lawns and paved parking lots. State Route 315 is the western boundary of Midwest Campus. OSU-owned land west of State Route 315 includes businesses, warehouses and agricultural research space. Approximately 1.1 million gross square feet of building area are accommodated on the 91-acre site Midwest Campus (OSU Master Planning Advisory Committee, 1995).

The 1995 University Master Plan for OSU (OSU Master Planning Advisory Committee, 1995) is an ongoing process that began in 1993 and consists of a long range concept plan for the campus as a whole, augmented periodically by a series of more detailed district plans that will be prepared to address more immediate and specific area and project needs. According to the 1995 University Master Plan, the land along the Olentangy River corridor (within which the project site is located) is considered as an area for "significant future expansion" of academic and research facilities. The goal of this expansion is further integration of the Central and Midwest Campuses as a unified academic environment.

3.1.3 Transportation and Access

The project site is located near bus lines. Regional access to the site is provided by State Route 315 located about 500 feet (0.15 kilometers) west of the site, U.S. Interstate 670 located about 2.0 miles (3.2 kilometers) south of the site, U.S. Interstate 70 located about 3.5 miles (5.6 kilometers) south of the site and Interstate 71 located approximately 2.0 miles (3.2 kilometers) west of the site (Figure 2-1). Local access to the project site is via Fred Taylor Drive just north of West Lane Avenue.

As the only direct link with the regional network of limited-access freeways, State Route 315 is the preferred route for the majority of commuters and visitors approaching the OSU campus from beyond the surrounding neighborhoods. The OSU area is served directly by three interchanges with State Route 315 (Kinnear Road/Olentangy River Road, Lane Avenue, and Ackerman Road). Of the three, Lane Avenue is the primary approach to campus from State Route 315.

Lane Avenue also serves as a primary east-west cross town link and carries heavy traffic independent of OSU functions. While several local streets provide access to the campus from Lane Avenue, the principal public entry points are Fyffe Road/Fred Taylor Drive. Fyffe Road to the south and Fred Taylor Drive to the north provide entry into the Midwest Campus and the western end of the OSU loop road system. Fred Taylor Drive also provides access to the Schottenstein Arena and athletics facilities north of Lane Avenue. Midwest Campus is separated from the Central Campus by the river and open land adjacent to the river, and it is bracketed on all sides by arterial roads. Traffic near the project site is typically heavy.

The existing 4-H offices at OSU include 20-25 employees that commute to the site during the work week.

3.2 VISUAL QUALITY / AESTHETICS

Visual resources are the natural and manufactured features that define a particular environment's aesthetic qualities. In undeveloped areas, landforms, water features, and vegetation are the primary components that characterize the landscape. Manufactured elements such as buildings, fences, and streets are also considered.

3.2.1 Visual Characteristics of the Project Site

The visual character of the project site is predominantly undeveloped, although the Midwest Campus is one of the principal new development zones identified by the OSU Master Plan. The project site lies along the principal campus entrance corridor from the west and, as such, is considered an important visual corridor within the campus. The streets and pedestrian ways that cross the river to the Midwest Campus offer generally unobstructed views of the Olentangy River and the open spaces on either side. The OSU Master Plan recommends that the visual and functional importance of this corridor be emphasized by providing for pedestrian traffic and by broad lawns along the edge of the campus. The OSU Facilities Planning and Development office recommended that a 200-foot setback along West Lane Avenue be retained as the site for a future OSU welcome center. The 200-foot setback along Lane Avenue would be maintained by the proposed project.

The most prominent feature within the project site view shed is the Schottenstein Center directly east of the project site. The Schottenstein Center is a 770,000 square foot facility that can accommodate 21,000 people. A 100-foot setback along Fred Taylor Drive has been retained to match the Schottenstein Center setback and to preserve area aesthetics.

3.2.2 Public Vantage Points/Site Visibility

The project site is located adjacent to West Lane Avenue, the principal campus entrance corridor from the west, and would be visible to motorists traveling on this street. Additionally, the streets and pedestrian ways that cross the river to the Midwest Campus offer generally unobstructed views of the project site.

3.3 PUBLIC SERVICES AND UTILITIES

3.3.1 Storm Water Management

Surface runoff within the project site is generally toward Fred Taylor Drive to the east and toward a drainage swale on the north side of the building location. This surface runoff is directed to Chadwick Lake via a 2-foot deep, grass-lined shallow swale that begins in the northwest corner of the site.

3.3.2 Sanitary Sewer

Geothechnical Consultants, Inc (GCI) produced a *Subsurface Exploration and Foundation Engineering Report* for the project site in December 2003 (GCI 2003). This report states that existing sanitary sewer lines are present beneath the project site. Most subsurface sewer lines shown within the project site appear to have been shut-off and abandoned in place after the

structures previously located on the site were demolished. The exception is an active 8-inch sanitary line that extends across the building footprint in a general east-west direction. Connections to sanitary sewerage are subject to City of Columbus Construction and Material Specifications (Lincoln Street Studio, et al. 2006).

3.3.3 Domestic and Fire Water Supply

The City of Columbus water system provides domestic and fire water supplies within the project area. A 48-inch city water line on the west side of the Olentangy River near Olentangy River Road, which passes in close proximity to one of OSU's two 24-inch connections, is believed to be the nearest connection to the project site.

3.3.4 Electric Utilities

Electricity on campus is provided by the McCracken Power Plant and by the Columbus and Southern Electric Company via three transformers at the Buckeye Substation. Annual loads on campus are projected to increase by as much as 3.5 percent due to new construction and increased use of electronic equipment such as personal computers. Several initiatives currently are underway to extend the life of the existing capacity on-campus, including the use of more energy-efficient lights, fans, and other high-efficiency electrical appliances which have decreased the lighting load usage by 30 to 40 percent; and the installation of occupancy sensors, which have decreased the lighting load by 50 percent.

3.4 NOISE

Noise is defined as unwanted or annoying sound that is typically associated with human activities and that interferes with, or disrupts normal activities (DOE, 2003). Sound and noise are measured as sound pressure levels in units of decibels (dB). Response to noise varies according to its type, its perceived importance, its appropriateness in the setting and time of day, and the sensitivity of the individual receptor. Human hearing is simulated by measurements in the scale of A-weighting (dBA) network, which de-emphasizes lower frequency sounds to simulate the response of the human ear. Some typical sound levels from common noise sources are presented in Table 3.4-1.

3.4.1 Regulations and Guidelines

Environmental noise regulations and guidelines for outdoor, neighborhood and/or community noise levels have been promulgated by the EPA, the Federal Highways Administration (FHWA), the State of Ohio, and local governments such as Franklin County.

The EPA provides guideline noise levels for anticipated noise/human activity disturbance impacts in relation to industrial construction and operations. The levels are set to define a point at which these levels and lower levels would protect people from activity interference and annoyance. Outdoor locations “in which quiet is a basis for use” are assigned a maximum noise level of 55 dBA. Indoor locations are assigned a maximum noise level of 45 dBA (DOE, 2003).

The FHWA has created Noise Abatement Criteria for actions that involve federal roads. A noise level of 67 dBA is assigned to lands that include residences, schools, churches, hospitals, picnic areas, and recreation areas. A 24-hour average level, weighted to address the increased

significance of nighttime noise, of 67 dBA is a typical threshold for considering mitigation for residential sensitive receptor exposure.

Table 3.4-1. Sound Levels* of Typical Noise Sources and Noise Environments (A-Weighted Sound Levels).

Noise Source (at a given distance)	Scale of A-weighted Sound Level (dBA)	Noise Environment (equivalent)	Human Judgment of Noise Loudness (relative to a reference loudness of 70 dB*)
Commercial jet take-off (200 feet/60.6 meters)	120	--	Threshold of pain *32 times as loud
Motorcycle (25 feet/7.6 meters) Diesel truck, 40 mph (50 feet/15.2 meters)	90	Boiler room; Printing press plant	*4 times as loud
Garbage disposal (3 feet/1 meter)	80	Noisy urban daytime	*2 times as loud
Bus idling (50 feet/15.2 meters)	75	--	*1.5 times as loud
Passenger car, 65 mph (25 feet/7.6 meters) Vacuum cleaner (3 feet/1 meter)	70	--	Moderately loud *70 dB (Reference loudness)
Normal conversation (5 feet/1.5 meters)	60	Data processing center; Department store	*1/2 as loud
Light traffic (100 feet/30 meters)	50	Quiet urban daytime	*1/4 as loud
Bird calls (distant)	40	Quiet urban nighttime/rural	Quiet *1/8 as loud
Library	36	Quiet suburban nighttime	Quiet *3/32 as loud

*These values are logarithmic measurements (i.e., every 10-dBA increase is perceived by the human ear as approximately twice the previous noise level; therefore, the motorcycle is twice as loud as the garbage disposal). Source: FHWA and Salter, 2000.

The Ohio Bureau of Motor Vehicles stipulates that when operated at a speed of 35 miles per hour (mph) or less, the maximum noise limit is 82 decibels based on a distance of not less than 50 feet from the center of the line of travel. When operated at a speed of more than 35 mph, the maximum noise limit is 86 decibels.

Section 551.021, public nuisance regulations of the Franklin County Zoning Resolution stipulates that noise or vibration be controlled such that it will not be at a level above that normally perceptible from other development activities in the area or from the usual street traffic observed at the street right -of-way line of the lot (Franklin County, 2004).

3.4.2 Sensitive Receptors

Chadwick North is located approximately 50 feet north of the project site and is considered a sensitive receptor due to its role in providing outdoor education in a natural environment. No residences, academic facilities, or any other potential sensitive receptors are located within 500 feet of the project site.

3.4.3 Existing Noise Levels and Sources

Although noise measurements were not taken and noise modeling was not performed, site observations indicate the acoustic environment within the boundaries of the site can be considered similar to that of an urban location. The ambient noise level within the project site consists primarily of noise generated by vehicle traffic on adjacent roadways, primarily State Route 315. Actual noise levels in and around the site are affected by specific noise events, noise barriers such as vegetation or structures, and meteorological conditions, including wind speed and direction. Roadway noise levels depend upon vehicle type, speed, traffic volume, surface conditions, surface gradient, and distance to receptors.

3.5 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Executive Order 12898, enacted by President Clinton in 1993, requires that each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

3.5.1 Population

The project site is located in the central portion of Franklin County, in the city of Columbus, Ohio, on the campus of OSU. The population density of Franklin County is 2,020 per square mile. Based on 2005 Census data, Franklin County has a population of 1,090,771. This represents an increase of 2 percent over the County's 2000 population of 1,068,978. The City of Columbus is the largest city in the state of Ohio. Based on 2005 Census data, Columbus has a population of 730,657. This represents an increase of 2 percent over the city's 2000 population of 714,063. (http://www.census.gov/, 2006).

3.5.2 Employment

Table 3.5-1 provides data on the distribution of jobs in Franklin County by industry for 2002. The top three employment sectors in Franklin County in 2002 comprised health care, manufacturing and professional, scientific and technical services, respectively.

Table 3.5-1. Leading Jobs by Industry for Franklin County, Ohio (2002).

Industry	Jobs (2002)
Health care and social assistance	72,443
Manufacturing	45,727
Professional, scientific and technical services	40,919
Other services (except public administration)	18,237
Arts, entertainment and recreation	7,207
Food manufacturing	5,339
Plastics and rubber products manufacturing	3,984
Machinery manufacturing	3,281
Printing and related support activities	2,963
Other plastics products manufacturing	2,936

Source: U.S. Bureau of the Census, 2006 Economic census.

3.5.3 Housing

Based on 2000 Census data, Franklin County has 471,016 housing units, with a vacancy rate of 7 percent (32,238 units). The median house value in Franklin County is $116,200, while the median rent is $496 (U.S. Bureau of the Census, 2006).

3.5.4 Ethnicity

Table 3.5-2 provides a comparison of the ethnic composition of Franklin County, the State of Ohio, and the U.S. As shown on this table, the populations of Franklin County and the State of Ohio comprise a higher white population than that of the U.S. The Franklin County population has a considerably higher percentage of Black population compared to Ohio and the U.S. Franklin County and Ohio have a considerably lower proportion of Hispanics and Latinos than the U.S. Site visits to the project site and its surroundings were conducted on July 11, July 19 and August 10, 2006. Based on observations made during windshield tours of the project site and vicinity there do not appear to be any concentrations of minorities near the project site.

Table 3.5-2. Race Composition for Franklin County, State of Ohio, and the United States

Race	Franklin County	State of Ohio	U.S.
White	75.5%	85.0%	75.1%
Black	17.9%	11.5%	12.3%
American Indian	0.3%	0.2%	0.9%
Asian	3.1%	1.2%	3.6%
Pacific Islander	0.0%	0.0%	0.1%
Other Race	1.0%	0.8%	5.5%
Hispanic or Latino (of any race)	2.3%	1.9%	12.5%
Two or More Races	2.2%	1.4%	2.4%

Source: U.S. Bureau of the Census, Economic Census 2006.

3.5.5 Income and Poverty

Based on 2000 Census data, residents of Franklin County had a median household income of $42,734, as compared to $40,956 for the State of Ohio and $41,994 for the U.S. Additionally, 8.2 percent of Franklin County's population in 2000 was considered to be living below poverty level, a significantly lower percentage than that of the U.S. (12.4 percent) and 0.4 percent higher than that of the State of Ohio (7.8 percent). Based on a site visit conducted on July 18, 2006 and the Franklin County Profile (Ohio Department of Development 2006) there do not appear to be any concentrations of people living in poverty near the project site.

3.6 BIOLOGICAL RESOURCES

Biological resources include plants and animals within the region and the habitats in which they occur. All organisms and habitats occurring in one location comprise the ecosystem. Complex plant associations manifest as distinct vegetation communities and are driven by characteristics of precipitation, soil, hydrology, aspect, elevation, and climate, as well as competition among

plant species and herbivory. Wildlife associations are driven by plant species composition and structure of the vegetation community and abiotic factors such as soil structure, topographic relief, water availability, and temperature.

For purposes of this EA, biological resources are presented in four categories: vegetation, which includes noxious weeds; wetlands and other waters of the U.S.; wildlife; and species of concern. There are no aquatic resources within the project site because permanent water bodies are absent from the site.

A site visit to the 5.6 acre (2.26-hectare) project site was conducted on July 19, 2006 to identify vegetation and wildlife species and determine whether any sensitive species or habitats may be present on the site. The site visit entailed a general survey of the project site. A SAIC biologist walked throughout the project site and recorded all plant species observed. Wildlife species observed on site, including signs of wildlife, were also recorded. Photos were taken of the site showing general vegetation types that occurred. Possible occurrences of wildlife species not observed on site were determined based on vegetation types (habitat) observed on site. No formal surveys for migratory birds or threatened and endangered species were conducted. Details of the observations made during the site visit are provided below.

3.6.1 Vegetation

The project site occurs at an elevation of 750 feet above mean seal level (MSL) in the ecotone between the Eastern Broadleaf Forest (Oceanic) and Eastern Broadleaf Forest (Continental) Ecoregion Provinces (Bailey 1995). The project site is also located on the eastern edge of the Till Plains Physiographic Province, which is typified as fertile, and historically modified by glaciers (ODNR 2005). Although currently undeveloped, the project site, like most areas on the OSU campus, has been altered in the past and does not reflect a natural assemblage of plant species. The vast majority of the project site is covered by maintained lawn grass. However, mature trees are present on the northern and southern portions of the project site. Chadwick North to the north does contain many native tree and shrub species. Mature trees closest to the proposed building site include black walnut (*Juglans nigra*), hackberry (*Celtis occidentalis*), and American sycamore (*Platanus occidentalis*).

3.6.2 Wetlands and Other Waters of the U.S.

Based on a review of topographic maps, National Wetlands Inventory wetlands mapping, and the July 19 site visit, it was determined that wetlands and other waters of the U.S. do not occur on the project site. The nearest waters of the U.S. occur approximately 0.25 mile (0.4 kilometers) to the east (Olentangy River) and Chadwick Lake 0.1 mile (0.16 kilometers) to the north of the project site. Chadwick Lake is a man-made pond.

A shallow swale (2 feet deep) begins in the northwest corner of the project site and directs precipitation runoff to Chadwick Lake. The swale is grass-lined and does not contain an ordinary high water mark. No standing water has been observed in the swale during all visits to the project site conducted on July 11, July 19, and August 10, 2006. Several small clumps of willows occur along the length of the drainage swale outside the project site boundaries. The majority of the vegetation in the area are upland species. In summary, there is insufficient hydrology to support wetland communities within the project site boundaries.

3.6.3 Wildlife

Wildlife in the area is limited due to the surrounding developed areas and altered vegetation at the project site. Wildlife species observed during site visits are consistent with common species that inhabit urban and suburban environments in the region. Chadwick North provides a semi-natural environment and the majority of species were observed along the border between the grove and the lawn area. The following birds were observed: American robin (*Turdus migratorius*), blue jay (*Cyanocitta cristata*), European starling (*Sturnus vulgaris*), mourning dove (*Zenaida macroura*), gray catbird (*Dumetella caolinensis*), and northern cardinal (*Cardinalis cardinalis*). Red-tailed hawk (*Buteo jamaicensis*) and Cooper's hawk (*Accipter cooperii*) are relatively common within the general area, but none were observed at the project site during the site visits. The only mammal species observed during the site visit was the eastern gray squirrel (*Sciurus caroliensis*).

3.6.4 Species of Concern

The U.S. Fish and Wildlife Service (USFWS) and Ohio Department of Natural Resources (ODNR) were contacted concerning the presence of rare and/or protected species near the project site. According to these agencies, there are no known unique plant communities, Federal Wilderness areas, wildlife refuges, state nature preserves, scenic rivers, designated Critical Habitat, or threatened/endangered species known to occur on the project site, but the site does lie within the range of four federally listed endangered species (FWS 2006): Indiana bat (*Myotis sodalis*), clubshell (*Pleurobema clava*), northern riffleshell (*Epioblasma torulosa rangiana*), and Scioto madtom (*Noturus trautmani*). The latter three are aquatic species and no aquatic habitat occurs at the project site. USFWS also noted that the project site is within the range of the rayed bean (*Villosa fabalis*), a Federal Candidate mussel species. Although the project site is within the range of the Indiana bat, this bat requires cool, humid caves with stable temperatures for winter hibernation. During summer, the Indiana bats roosts under loose tree bark on dead or dying trees (USFWS 2006b). These habitat requirements are not met at the project site.

ODNR (2006a, b) had no records of any species of concern within 0.5 mile of the project site. ODNR did note that the clubshell mussel, northern riffleshell mussel, rayed bean mussle and Scioto madtom also are state-listed as endangered species. Additionally, ODNR indicated that the project site is within the historical range of the peregrine falcon (*Falco peregrinus*), a state endangered bird species, and the golden-winged warbler (*Vermivora chrysoptera*), both of which are state endangered bird species.

Based on observations made during the site visits, none of these species is present at the project site and they are not expected to be present due to a lack of appropriate habitat.

3.7 CULTURAL RESOURCES

Cultural resources are defined as any prehistoric or historic district, site, or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious or any other reason.

Only significant cultural resources warrant consideration with regard to adverse impacts resulting from a proposed action. To be considered significant, archaeological or architectural resources must meet one or more of the criteria (as defined in 36 CFR 60.4) for inclusion on the National Register of Historic Places (NRHP).

National Register-eligible resources are those that:

a) are associated with events or have made a significant contribution to the broad patterns of our history;
b) are associated with lives of persons significant in our past;
c) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d) have yielded, or may be likely to yield, information important in prehistory or history.

OSU archives indicate that the lands that include the project site were purchased between 1917 and 1925. The first tract was purchased in 1917 from Louisa Hess, and had been leased by OSU prior to the purchase. The remainder was leased and then acquired from Mary Hess in 1925. University archives provide details of the boundaries (based on surveys dating as far back as 1859) and Civil Engineering Maps of the lands done in 1919 (#191-63; 191-73;191-75). These archives indicate such items as fences and stables present on the land (R. Goerling, OSU Office of Archives e-mail received August 23 2006). OSU archives show previous land use adjacent to the project site to be poultry science and other animal husbandry. Poultry breeding houses formerly located north of the project site were all-wood construction and were built as part of a Works Progress Administration (WPA) project conducted in 1938 and 1939. Dakan Hall was also part of the WPA project and was located south of the project site but was demolished in 2004.

3.7.1 Historic Resources

Efforts to identify significant historic resources in the area of potential effect included an Environmental Data Resources, Inc. (EDR) records search and consultation with the Ohio Historical Society Office of Archaeology and Historic Preservation (OAHP) in Columbus, Ohio. Two historic buildings or structures listed on the national register of historic places were identified within a 1-mile radius of the project site: Ohio Stadium and the University, Hayes and Orton Halls located on the OSU “Oval” (the three “Halls” are considered a single structure). The Oval is the central open space of the OSU Columbus campus. Architect Howard Dwight Smith, drew the plans for the horseshoe-shaped, double deck stadium known as Ohio Stadium in 1907. His unique design earned him the gold medal of the American Institute of Architects for “excellence in public work” and Ohio Stadium was completed in time for the 1922 football season. University Hall was built around 1871 and was the first classroom building completed at OSU. Hayes and Orton Halls were completed in 1893.

3.7.2 Archaeological Resources

Efforts to identify significant archaeological resources in the project area included a records search at the Ohio Historical Preservation Office (OHPO). There are no properties included in the Ohio Historic Inventory, or Ohio Archeological Inventory in the immediate vicinity of the project site (OHPO, 2006). The Soil Survey of Franklin County, Ohio (USDA, 1980) defines the project site soils as “Udothents-Urban land complex, gently rolling” which generally consists of pavement, berm, median strip, ditches and interchanges of major highways and is indicative of excavated or disturbed soil. Based on the soil complex and close proximity of the project site to State Route 315, it is highly likely that the area has already been disturbed so the likelihood of

finding archeological resources is low. Additionally, soil borings advanced at the project site show a surface cover of fill material with depths varied from 1 to 9 feet across the building site. This is further evidence of disturbed soil. The project site does not appear to be located in an archaeologically sensitive area and there is a low probability that undisturbed deposits are present (OHPO 2006).

3.8 AIR QUALITY

This section discusses air quality considerations and conditions in Franklin County, Ohio. It addresses air quality standards and describes current air quality conditions in the region.

3.8.1 Definition of the Resource

Federal Air Quality Standards. Air quality is determined by the type and concentration of pollutants in the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The significance of a pollutant concentration in a region or geographical area is determined by comparing it to federal and/or state ambient air quality standards. Under the authority of the Clean Air Act (CAA), the United States Environmental Protection Agency (USEPA) has established nationwide air quality standards to protect public health and welfare, with an adequate margin of safety. These federal standards, known as the National Ambient Air Quality Standards (NAAQS), represent the maximum allowable atmospheric concentrations and were developed for six "criteria" pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), respirable particulate matter less than or equal to 10 micrometers in diameter (PM_{10}), particulate matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). The NAAQS are defined in terms of concentration (e.g., parts per million [ppm] or micrograms per cubic meter [$\mu g/m^3$]) determined over various periods of time (averaging periods). Short-term standards (1-hour, 8-hour, or 24-hour periods) were established for pollutants with acute health effects and may not be exceeded more than once a year. Long-term standards (annual periods) were established for pollutants with chronic health effects and may never be exceeded.

Based on measured ambient criteria pollutant data, the USEPA designates areas of the United States as having air quality equal to or better than the NAAQS (attainment) or worse than the NAAQS (nonattainment). Areas are designated as unclassifiable for a pollutant when there is insufficient ambient air quality data for the USEPA to form a basis of attainment status. These areas are treated similar to areas that are in attainment of the NAAQS.

State Air Quality Standards. Under the CAA, state and local agencies may establish ambient air quality standards (AAQS) and regulations of their own, provided that these are at least as stringent as the federal requirements. The State of Ohio's ambient air quality standards are virtually identical to the NAAQS. A summary of the NAAQS that apply to the project area is presented in Table 3.8-1.

State Implementation Plan. For non-attainment regions, the states are required to develop a State Implementation Plan (SIP) designed to eliminate or reduce the severity and number of NAAQS violations, with an underlying goal to bring state air quality conditions into (and maintain) compliance with the NAAQS by specific deadlines. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS in each state.

Table 3.8-1. National and Ohio Ambient Air Quality Standards (AAQS)

Air Pollutant	Averaging Time	NAAQS and Ohio AAQSs	
		Primary	Secondary
Carbon Monoxide (CO)	8-hour 1-hour	9 ppm (10 μg/m^3) 35 ppm (40 μg/m^3)	--- ---
Nitrogen Dioxide (NO_2)	AAM	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/m^3)
Sulfur Dioxide (SO_2)	AAM 24-hour 3-hour	0.03 ppm (80 μg/m^3) 0.14 ppm (365 μg/m^3) ---	--- --- 0.5 ppm (1,300 μg/m^3)
Particulate Matter (PM_{10})	AAM 24-hr	50 μg/m^3 150 μg/m^3	50 μg/m^3 150 μg/m^3
Particulate Matter ($PM_{2.5}$) [(a)]	AAM 24-hour	15 μg/m^3 65 μg/m^3	15 μg/m^3 65 μg/m^3
Ozone (O_3) [(b)]	8-hour	0.08 ppm	0.08 ppm
Lead (Pb) & Lead Compounds	3-month	1.5 μg/m^3	1.5 μg/m^3

Notes: AAM = Annual Arithmetic Mean; AGM = Annual Geometric Mean; ppm = parts per million; μg/m^3 = micrograms per cubic meter.

Sources: 40 Code of Federal Regulations 50; Ohio Administrative Code 3745.

Stationary Source Operating Permits. Title V of the CAAA of 1990 also requires states to issue Federal Operating Permits for major stationary sources. A major stationary source in an attainment or maintenance area is a facility (i.e., plant, base, or activity) that emits more than 100 tons annually of any one criteria air pollutant, 10 tons per year of a hazardous air pollutant or 25 tons per year of any combination of hazardous air pollutants. In Ohio, the Division of Air Pollution Control of the Ohio Environmental Protection Agency is responsible for enforcing both federal and state regulations for controlling air pollution. Ohio regulations are contained in rules 3745-14 to 3745-102 of the Ohio Administrative Code. The rules were adopted under Section 3704 of the Ohio Revised Code.

3.8.2 Existing Conditions

Regional Air Quality. Federal regulations at 40 CFR 81 delineate certain air quality control regions (AQCR), which were originally designated based on population and topographic criteria closely approximating each air basin. The potential influence of emissions on regional air quality would typically be confined to the air basin in which the emissions occur. Therefore, the ROI for the proposed action is the Metropolitan Columbus Intrastate Air Quality Control Region (AQCR 176), which includes Delaware, Fairfield, Franklin, Licking, Madison, Perry, Pickaway, and Union Counties in Ohio (40 CFR 81.200).

Attainment Status. A review of federally published attainment status for Ohio in 40 CFR 81.320 indicated that Franklin County is designated as attainment (i.e., meeting national standards) for

the following criteria pollutants: O_3 (the 1-hour standard), CO, NO_2, SO_2, PM_{10}, and Pb. The region was recently designated as basic nonattainment for the new 8-hour O_3 standard and nonattainment for the new $PM_{2.5}$ standard.

Climate. Columbus is located in central Ohio, which experiences a continental climate with hot summers and cold winters. Ohio's temperatures and precipitation are influenced by huge masses of air. Continental polar air from the Arctic brings colder temperatures and snow in winter. Maritime tropical air from the Gulf of Mexico brings hot and humid conditions.

Overall, January is the coldest and snowiest month in Columbus, with average temperatures ranging from 20-36ºF and an average of 9 inches of snow. July is the hottest month, with an average temperature range of 75-85ºF. Average annual precipitation in Columbus is about 40 inches per year, rainfall equivalent, with average snowfall of 25-30 inches per year. Columbus skies are sunny 60 percent of the time during summer months, and 30-40 percent during winter. Prevailing winds average 5-10 miles per hour from the south during spring, summer, and autumn months and from the west during winter. Wind speeds are generally higher (9-10 miles per hour) during the fall and winter.

Current Emissions. Aside from occasional exhaust emissions from grounds maintenance equipment for mowing the grass, trimming trees, etc., there are currently no air pollution emissions at the project site.

Regional Air Emissions. Table 3.8-2 lists county-wide emissions for Franklin County, Ohio, and for AQCR 176 (which includes Franklin County), as compiled by the USEPA in its National Emissions Inventory (NEI), which was last updated in 1999 (USEPA, 2003). The 1999 NEI contains estimates of annual emissions for stationary and mobile sources of air pollutants in each country, on an annual basis.

Table 3.8-2. Air Emissions Inventory Franklin County, Ohio, and Ambient Quality Control Regions (AQCR 176) Calendar Year 1999

	Pollutants (In Tons per Year)				
	CO	**SO_2**	**NO_x**	**PM_{10}**	**VOC**
Franklin County, OH					
Stationary Sources	19,075	4,297	7,221	24,136	22,122
Mobile Sources	366,681	1,872	35,071	1,441	27,794
AQCR 176					
Stationary Sources	30,958	16,348	14,251	69,732	34,866
Mobile Sources	532,325	3,058	58,179	2,506	40,517

Source: USEPA (2003).

3.9 WATER RESOURCES

3.9.1 Surface Water

Surface water resources comprise lakes, rivers, and streams. Surface water quantity and quality can influence the economy, ecology, recreation, and human health of an area.

There are no perennial creeks, streams, ponds, or floodplains on the project site. A shallow swale originates in the northwest corner of the project site and directs precipitation runoff to Chadwick Lake. Intermittent storms and other seasonal precipitation events may cause water to temporarily collect in topographic lows and drainages. This surface water, when present, is not utilized for any purpose.

3.9.2 Ground Water

Groundwater comprises the subsurface hydrological resources of the physical environment and is an essential resource. According to maps provided by the ODNR, the project site lies over an unconsolidated aquifer consisting of glacial deposits of sand and gravel over limestone-dolomite bedrock. Bedrock information obtained from ODNR groundwater maps of Franklin County indicate limestone and shale bedrock within the vicinity of the project site encountered at depths of 75 to 100 feet below natural ground surface.

In December, 2003 Geotechnical Consultants, Inc. (GCI) drilled 10 standard penetration borings to characterize subsurface conditions within the building footprint and across the project site and to investigate subsurface conditions for building engineering (GCI 2003). GCI noted water seepage in five of the ten borings during drilling operations. The observed water seepage in boring B-3 at approximately 12.5 feet below grade represents perched groundwater from thin, saturated sand and gravel layers encountered within the less pervious glacial till soils. Water seepage noted in borings B-7 through B-10 at depths of 17 to 22 feet below grade represents groundwater encountered within the less pervious sand and gravel deposits encountered below the upper level glacial till soils. The remaining borings (B-1, B-2, and B-4 through B-6) were dry during drilling and upon completion. The average water level between borings B-7 through B-10 was calculated at an elevation of 724.2 feet, which is slightly above the estimated water level of 720.0 feet within the nearby section of the Olentangy River, located approximately 0.25 mile east of the site. The regional groundwater flow direction of the aquifer in the vicinity of the project site appears to be east towards the Olentangy River.

According to data provided by Mid-Ohio Regional Planning (MORPC), there are no wellhead protection zones within 5 to 10 miles of the project site.

3.9.3 Floodplains

According to data provided by the Federal Emergency Management Agency (FEMA), the project site does not lie within a mapped floodplain (EDR 2006). The nearest 100-year floodplain lies approximately 0.25 mile to the east of the site and is associated with the Olentangy River.

3.10 GEOLOGY AND SOILS

3.10.1 Geology

The project site is located entirely within Franklin County, which is within the glaciated till plain of Central Ohio and has been glaciated during at least two distinct glacial periods. Evidence of both Illinoisan and Wisconsin age glacial till has been identified. The first glacial advance occurred about 50,000 years ago and left a layer of till as evidence when it melted. The second and last glacial advance occurred about 16,000 years ago and left another layer of till over the first (United States Department of Agriculture [USDA] Natural Resources Conservation Service

[NRCS] 1980). The ODNR, Division of Geological Survey reviewed maps and data concerning the geology beneath the Ohio 4-H Center project site and reported that the geology consists of Pleistocene glacial deposits over Devonian and Silurian limestone and dolomite (ODNR 2006b). The glacial deposits are approximately are 60 feet thick and dominantly clayey to silty till with interbeds of unconsolidated sand and gravel. The surficial deposits can be water bearing, particularly the sand and gravel deposits present at depth (See Appendix A).

The ODNR reports that a well drilled to 280 feet below surface at this site will penetrate the entire thickness of glacially derived surficial material and continue through an estimated 220 feet of bedrock to total depth. Maps on file at the Division of Geological Survey indicate that the Devonian-age Delaware Limestone will be the first unit encountered and only an estimated thickness of 10 feet of the unit will be present (total thickness of the Delaware Limestone is estimated at 30 feet). The Devonian-age Columbus Limestone will be the second bedrock unit encountered and will have a thickness of approximately 90 feet. Beneath the Columbus Limestone is the finely crystalline dolomite of the Silurian-age Salina Group. The Salina will not be entirely penetrated by the wells because it has a thickness of over 250 feet (ODNR 2006b).

The Columbus Limestone is water bearing. The Delaware Limestone and the Salina Group dolomite may also contain water particularly along fractures in the rock. A test well drilled 6,000 feet southwest of the project site encountered paleokarst (caverns and solution-widened fractures) during drilling and had to be abandoned because of loss circulation problems caused by the cavern (ODNR 2006b). A prior bore hole had been successfully drilled very close to the failed hole, demonstrating the erratic distribution of paleokarst features in the carbonate bedrock. Similar geologic settings may be found at the 4-H green building project site and some of the 72 holes to be drilled may encounter some paleokarst (ODNR 2006b).

Ohio cannot be classified as an area with unusually high amounts of seismic activity (Pawlowicz 1974). The seismic history of Ohio cataloged for the period 1900-1964 indicate distinct episodes of seismic activity near Anna, Ohio (Approximately 85 miles from the project site) but no similar pattern for the remainder of the state (Pawlowicz 1974). The Environmental Protection Agency (EPA) identifies Franklin County, Ohio as having a moderate potential for average indoor radon levels between 2 and 4 pCi/L (EPA 2006).

The sedimentary bedrock underlying these glacial deposits in Franklin County is exposed in some places as a result of erosion and/or construction activities. The bedrock ranges in age from the lower Devonian in the west to the lower Mississippian in the east. Lithologies consist of dolomitic limestone, shale, and sandstone. The Rasin River Formation is a dolomitic limestone that is exposed in places in the Big and Little Darby Creek valleys on the west side of the County. The Devonian formations in the eastern part of the County are younger and are situated above the Rasin River. These include the Columbus and Delaware Limestones and the Ohio and Olentangy Shales. The limestone is found along the Scioto River Valley and the shale is found along the northern Olentangy River Valley. The Mississippian System is exposed in the valleys of Big Walnut and Rocky Fork Creeks, and is composed of alternating beds of shale and sandstone (USDA NRCS 1980).

Geotechnical Consultants, Inc. was retained to investigate subsurface conditions for building engineering. Their report was made available to Lincoln Street Studio, Jezerinac Geers structural engineers and OSU. Their borings revealed a brown clay-silt under the natural topsoil with trace amounts of gravel. Fill material was found at several boring locations across the building site at depths of 1 to 9 feet below ground surface. This fill was likely the result of area regrading during the construction of State Route 315 west of the proposed project site. No

bedrock was encountered at the investigatory depth of 50 feet below ground surface. Groundwater seepage was noted from 12.5 to 22 feet below grade in some of the test borings.

In addition to GCI's *Subsurface Exploration and Foundation Engineering Report (2003*) Ewbank and Associates performed thermal conductivity tests at the project site on December 14, 2003. (Jackson Geothermal 2003). In situ thermal testing included the completion of a 305-foot deep test borehole. The purpose of this test was to determine the average thermal conductivity for the borehole. This value represents the rate at which the borehole and soil will transfer heat. It is an important variable in determining the amount of ground heat exchanger required for a specific system (Jackson Geothermal 2003). A well log for this boring is included with the thermal conductivity test results (Jackson Geothermal 2003).

3.10.2 Soils

The term "soils" refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Soil drainage, texture, strength, and erodibility all determine the suitability of ground to support structures and facilities.

Based on the Soil Survey of Franklin County (USDA 1980), soil at the project site is categorized regionally as "Udorthents-Urban land complex, gently rolling (Ut)". This soil complex consists of the pavement, berm, median strip and ditches, and usually occurs in long narrow strips located near the interchanges of major highway systems. This is consistent with the proximity of the project site to State Route 315 to the west and the Olentangy River transportation corridor to the east and is indicative of extensive excavations and fillings in the area.

The site-specific geology at the project site was investigated through the installation of 10 standard penetration soil borings in December 2003 (Lincoln Street Studios, et al 2006). The soil profile includes a surface cover of fill with depths varying from 1 to 9 feet across the building site. Fill consists of brown clay-silt soils with topsoil, cinders and varying amounts of sand and gravel. Below the fill and the natural topsoil cover are brown clay-silt and glacial till deposits. Below the brown glacial till and at depths of 9.5 to 16 feet below existing surface grades, brown to gray, fine to coarse sand and gravel were encountered. The amount of silt generally decreased with depth. Drillers noted occasional cobbles and/or boulders near the top of the sand and gravel deposit. Soil borings generally terminated within the sand and gravel deposit material at depths of 25 to 50 feet below existing ground surface.

3.11 HAZARDOUS MATERIALS AND WASTE MANAGEMENT

Hazardous materials are substances that pose a potential hazard to human health and/or the environment, if improperly managed. Hazardous wastes are hazardous materials that are no longer needed or usable and are defined as hazardous by the Resource Conservation and Recovery Act (RCRA).

3.11.1 Hazardous Materials

The proposed 5.6 acre (2.27-hectare) project site consists of vacant land. No hazardous materials are currently stored or used at the project site. Surrounding areas comprise primarily educational and recreational uses.

3.11.2 Hazardous and Non-Hazardous Wastes

Research for hazardous materials and wastes potentially associated with the project site included a review of university archives regarding land use at the project site. OSU archives indicate that the lands that include the project site land were purchased between 1917 and 1925. Past uses of the predominantly undeveloped project site included small-scale agriculture (poultry). University archives give no indications of past release or current storage of hazardous materials or wastes at the site. There are no records of industrial land use at the project site.

In addition to university archives a search of available environmental records was conducted by EDR. EDR reports are designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the American Society of Testing Materials (ASTM) Standard Practice for Environmental Site Assessments (E 1527-05) or requirements for the evaluation of environmental risk associated with a parcel of real estate. No mapped sites were found in EDR's search of available government records either on the property site or within a quarter mile radius around the property (EDR 2006b).

The project site has been owned by or been under the control of OSU since the early to mid-1900s. Based on best professional judgment and a critical review of available records there is no indication of hazardous or non-hazardous waste handling or pre-existing contamination at the project site.

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4.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

4.1 LAND USE AND TRANSPORTATION

This section discusses impacts on land use and transportation as a result of the Proposed Action and subsequent site operations. The purpose of this analysis is to provide an assessment of potential impacts resulting from the Proposed Action.

4.1.1 Proposed Action

Land Use

No significant land use impacts would occur under the Proposed Action. With regard to zoning, the proposed project would be consistent with the project site's "University, College, Research-Park District" zoning designation assigned by the City of Columbus. This zoning designation affords large educational complexes like OSU a great deal of flexibility with respect to future development. The Ohio Department of Commerce, Division of Industrial Compliance issued a Certification of Plan Approval for the Ohio 4-H Center Project in February 2005 and granted an extension to this permit in February 2006 (Personal communication with Jeff Snively, Lincoln Street Studio on September 21, 2006).

The Proposed Action would not result in significant impacts to on-site or nearby, off-site land uses. The nearest sensitive land use is Chadwick North, the grove of native trees and Chadwick Lake to the north. Short-term and temporary impacts to this land use would result from construction noise. See Section 4.4 for a detailed description of project-related noise impacts. Long-term impacts would generally be limited to an increase in the intensity of land uses adjacent to the arboretum and lake; however, this would have minimal effects on those land uses.

Transportation

The Ohio 4-H Center is planned to include offices for 20-25 employees of the Ohio State Extension 4-H program. On a typical day, it is expected that 25-50 cars per day would access the site, however, since the Ohio 4-H Center employees would be relocated from their current offices just south of West Lane Avenue, these workers do not represent new commuters to the area. In addition to the full-time employees, the Ohio 4-H Center is expected to host a large number of public users participating in workshops and in-service training. For employees and public users accessing the Ohio 4-H Center, the project site would include approximately 60 parking spaces. Overflow parking is available east of Fred Taylor Drive at the Schottenstein Center.

Traffic levels in the area would increase in the short-term due to construction (construction workers, equipment, and delivery of materials); however daily operation of the Ohio 4-H Center is not expected to have a noticeable impact on area traffic. Although existing traffic volumes on the roadways surrounding the project site are high, because the commuters accessing the project site do not represent additional commuters to the area and because construction traffic would be short term, it is anticipated that the Proposed Action would result in less than significant impacts to traffic and roadway safety.

4.1.2 No Action Alternative

Under the No-Action Alternative, land use and transportation conditions would remain unchanged and no impacts would occur.

4.1.3 Mitigation Measures

No significant impacts associated with land use and traffic would occur; therefore, no mitigation measures are required or recommended.

4.2 VISUAL QUALITY/AESTHETICS

This section discusses visual impacts resulting from the Proposed Action and subsequent site operations. The purpose of this analysis is to provide a qualitative assessment of impacts to visual quality and aesthetics that the Proposed Action may have on the project site and surrounding area.

4.2.1 Proposed Action

The Ohio 4-H Center exterior is planned to be constructed of metal, glass and brick (see Figure 2-1). The design of the building is intended to be aesthetically pleasing and compatible with surrounding development associated with a campus in an urban setting. The 200-foot setback along Lane Avenue would allow for the construction of a welcome center for visitors to the campus. A 100-foot setback along Fred Taylor Drive would be retained to match the Schottenstein Center setback and to preserve area aesthetics. In addition, as stated in Chapter 2, measures would be taken to preserve in place and/or relocate existing mature vegetation in order to maintain the natural features of the project site, to the extent possible.

The proposed construction is planned to have minor impacts on local view sheds. Although the Ohio 4-H Center would be visible from the Chadwick North Arboretum, the Ohio 4-H Center would not obstruct the view of the arboretum from the road and would not significantly alter the overall visual setting of the area given the existing intensity of development and the consistency of the Proposed Action with this development (i.e. campus setting). Proposed development plans include an outdoor education area and demonstration gardens that would be consistent with arboretum development. The most prominent feature within the project site view shed is the Schottenstein Center. Given the high visibility of the Schottenstein Center and other surrounding development, the overall visual impacts of the Ohio 4-H Center on the visual setting would be less than significant.

4.2.2 No Action Alternative

Under the No Action Alternative, no construction would occur and existing visual conditions would remain unchanged.

4.2.3 Mitigation Measures

No significant impacts associated with visual resources would occur; therefore, no mitigation measures are required or recommended.

4.3 PUBLIC SERVICES AND UTILITIES

This section discusses impacts resulting from increased demands for public services and utilities as a result of the Proposed Action and subsequent site operations. The purpose of this analysis is to provide a qualitative assessment of construction and operational impacts to public services and utilities resulting from the Proposed Action.

4.3.1 Proposed Action

Storm Water Management

Construction plans for the Ohio 4-H Center include measures to minimize erosion and subsequent sedimentation caused by construction activities. Construction guidelines include minimizing the area and time of excavation, saving existing vegetation, especially trees, and installation of temporary or permanent measures (e.g. storm sewers) to control runoff. These storm water retention features have been designed and incorporated into the development plan. The NPDES general permit was issued by Ohio EPA on September 7, 2006 (Trishman, M., OSU Project Manager, personal communication on October 9, 2006). A temporary on-site detention pond would be constructed to store all groundwater encountered during borehole drilling. If groundwater is turbid, it would be stored in the detention pond until suitably clarified for disposal through area storm sewers.

It has been estimated that the building would cover 0.6 acres, while the building plus parking lot would cover 1.4 acres with impervious surfaces. Detailed plans for final site grading and storm sewers are included in the Ohio 4-H Center Construction Document Package. These plans comply with the City of Columbus Construction and Material Specifications (2002).

Sanitary Sewer

According to the Subsurface Exploration and Foundation Engineering Report for the project site the existing sanitary sewer lines located in the vicinity of the project site are considered adequate to serve the Ohio 4-H Center. Schematics of the offsite water plan and storm sewer profile were submitted to the City of Columbus Department of Public Utilities, Division of Sewers and Drainage and were approved on September 9, 2004 (Lincoln Street Studio et al. 2004). The Construction Document Package for the Ohio 4-H Center is available for public viewing at the OSU Construction and Development Office.

Domestic and Fire Water Supply

Potable water used for operation of the Ohio 4-H Center would be provided by the City of Columbus Division of Public Utilities through a master meter agreement. The City of Columbus Division of Fire would provide fire protection to the project site.

Schematics of the Ohio 4-H Center storm sewers were submitted to the City of Columbus Department of Public Utilities, Division of Sewers and Drainage and were approved on September 9, 2004 (Lincoln Street Studio et al.2004). These connections are adequate to meet the Ohio 4-H Center's needs. The interior fire protection system would conform with Ohio Building Code, National Fire Protection Association Standards and Underwriter Laboratories, Incorporated specifications. Final approval of the fire protection system would be granted by the

Ohio Division of Industrial Compliance and the State Fire Marshall's Office (Lincoln Street Studio, et al. 2006).

The Ohio 4-H Center is planned to reduce potable water needs and achieve water efficiency by using water conserving plumbing fixtures (e.g. dual flush toilets, waterless urinals, and faucet sensors).

Heating and Cooling Utilities

A preliminary energy analysis of the Ohio 4-H Center was performed by W. E. Monks & Company. This analysis compared a budget building design representing minimum standards in terms of energy efficiency for a building built today with the proposed design for the Ohio 4-H Center. This analysis estimates that the proposed energy efficiency design of the Ohio 4-H Center is planned to result in yearly annual savings of 30% for heating, ventilating and cooling alone (W. E. Monks & Company 2004). The geothermal/cooling tower HVAC system works with only the electrical energy needed to power the pumps. There would be no need for coal, natural gas or petroleum based fuel sources.

Electrical

Existing electrical power supplies in the vicinity of the project site are adequate, and the project is planned to implement electricity efficient features to the extent possible. The Ohio 4-H Center design includes monitoring systems to measure energy use and consumption.

4.3.2 No Action Alternative

Under the No Action Alternative, additional public service and utilities needs under the Proposed Action would not be required. Therefore, no impacts would occur.

4.3.3 Mitigation Measures

No significant impacts associated with public services and utilities would occur; therefore, no mitigation measures are required or recommended.

4.4 NOISE

Impacts resulting from increased noise levels are indicated by changes in the ambient noise levels as a result of specified actions. This section discusses impacts to the sensitive receptors from site preparation and construction at the project site resulting from the Proposed Action and subsequent site operations. The purpose of this analysis is to provide a qualitative assessment of construction and operational impacts to ambient noise levels resulting from the Proposed Action rather than to define precise noise levels and corresponding mitigation measures. Consequently, modeling was not performed to estimate future noise levels.

4.4.1 Proposed Action

Construction Noise

Construction noise under the Proposed Action would be intermittent and would occur during normal working hours beginning in Fall 2006. Construction would cause temporary increases to the ambient noise level near the project site. The Proposed Action would result in construction noise from heavy equipment operation, building of foundations and structures, earthwork, trenching and utility installation and drilling of the geothermal boreholes. Noise levels associated with increased vehicle traffic resulting from construction activities would be temporary and limited to the times when construction actually takes place.

Construction operations could generate temporary noise levels up to 95 dBA measured at a reference level of 50 feet (15.5 meters) from the source (Salter, 2000). Table 4.4-1 displays the reduction in noise intensity associated with a 95-dB construction-related source over increasing distances. Table 4.4-1 does not consider additional factors that contribute to the reduction of noise intensity, such as topography, weather conditions, and noise sources external to the project site.

Table 4.4-1. Reduction of Sound Level Intensity of a 95-dBA (Construction-Related) Source and 75-dBA (Bus Idling) Source as a Function of Receptor Distance.

Distance in feet (meters)	Construction-Related dBA	Bus Idling dBA
50 (15.5)	95	75
100 (30.3)	89	69
200 (60.6)	83	63
250 (75.7)	81.5	61.5
300 (90.9)	80	60
400 (121.2)	77	--
500 (151.5)	75.5	--
800 (242.4)	71	--

The project site is located in an urban environment bordered by State Route 315 to the west and Schottenstein Center to the east. Sensitive receptors in the vicinity of the project site include people at the Chadwick Arboretum Grove 50 feet north of the project site. Based on the distance of the project site to the arboretum, it is anticipated that noise levels at the arboretum would be approximately 95 dBa during construction. However, this estimate can be considered conservative since it does not account for factors such as tree cover located between the arboretum and the construction site, which would serve to reduce noise levels. No residences, academic facilities, or any other potential sensitive receptors are located within 500 feet of the project site. Construction of the Ohio 4-H Center would be temporary and would not result in significant noise impacts. Continuous noise generated by State Route 315 and intermittent noise generated by activities at the Schottenstein Center could surpass noise generated at the project site.

Operational Noise

Noise from operation of the Ohio 4-H Center would come from air handling equipment associated with the HVAC system and vehicle traffic associated with workers and public users

of the facility. There will be no rooftop equipment at the Ohio 4-H Center. All HVAC pumps and air handling equipment would be located within the building and operational noise from this equipment would not be audible outside the building (Personal communication with Jeff Snively, Lincoln Street Studio on September 21, 2006). The 4-H Center will have the impact of operational noise generation at the project site is expected to be incidental and insignificant both within the Ohio 4-H Center and to off-site receptors. Most noise generating equipment would be confined to the interiors of buildings. Traffic generated by the Proposed Action would likely be dispersed throughout the day, and low vehicle speeds in the vicinity of the project site would reduce traffic-related noise levels. Given the distance to any sensitive receptors, it is not anticipated that operational noise would exceed any established thresholds and would not affect sensitive receptors, including the arboretum.

4.4.2 No Action Alternative

Under the No Action Alternative, noise characteristics of the project site would remain as described in Section 3.4 and no impacts would occur.

4.4.3 Mitigation Measures

There are no significant impacts associated with noise; therefore, no mitigation is necessary or recommended.

4.5 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

This section discusses socioeconomic and environmental justice impacts resulting from the Proposed Action and subsequent site operations. The purpose of this analysis is to provide a qualitative assessment of impacts to regional socioeconomics and environmental justice resulting from the Proposed Action.

4.5.1 Proposed Action

Socioeconomics

The Proposed Action would not result in significant local population or economic impacts. During construction of the Ohio 4-H Center there would be short-term construction jobs available. It is likely that these construction jobs would be filled by local construction workers. Because the 20-25 workers associated with the Ohio 4-H Center already work in the same area at OSU, the Proposed Action would not result in the creation of any new, long-term jobs.

Environmental Justice

Due to several factors, the Proposed Action would not result in negative impacts associated with environmental justice. First, it is not anticipated that the Proposed Action would result in any significant environmental or socioeconomic impacts. Second, the lack of development surrounding the project site would minimize or preclude the potential for any impacts on local residents or businesses. Although Franklin County features a high proportion of black residents relative to other geographic areas, the lack of any concentrated residential development in the vicinity of the project site, reduces the likelihood that any disproportionate environmental or human health impacts would occur to any minority community.

4.5.2 No Action Alternative

Under the No Action Alternative, socioeconomic conditions would remain unchanged and no impacts would occur.

4.5.3 Mitigation Measures

There are no significant impacts associated with economics or environmental justice; therefore, no mitigation measures are necessary or recommended.

4.6 BIOLOGICAL RESOURCES

This section discusses biological resource impacts resulting from the Proposed Action and subsequent Ohio 4-H Center operations. The purpose of this analysis is to provide a qualitative assessment of potential impacts to biological resources from the Proposed Action.

4.6.1 Proposed Action

Vegetation

The process of developing the project site would result in the direct loss of urban habitat. A total of approximately 4 acres of undeveloped vegetative land could be disturbed by the Proposed Action. However, mature trees within the 4 acres, selected to remain on site would be fenced at the drip line (See Figure 2-3). To protect the selected trees these areas would not be disturbed during construction activities. The project site has been altered in the past and does not reflect a natural assemblage of plant species. The vast majority of the project site is currently covered by maintained lawn grass. The Proposed Action calls for the use of native species plant material that may actually enhance the existing habitat. Land clearing activities, excavation and construction staging areas associated with the Proposed Action would disturb site vegetation, increasing the susceptibility of these areas to noxious weed invasion. This would be addressed by the establishment of native planting following building completion. The Ohio 4-H Center's construction document package includes provisions for the installation and maintenance of lawn, grasses and exterior plants. A qualified landscape installer will be employed to ensure the successful establishment of exterior plants. To ensure that trees indicated to remain on site are protected during construction and promptly and properly treated and repaired if damaged, a landscape architect and arborists from the Chadwick Arboretum and Learning Gardens will be available for consultation. Since the project site currently has a managed grass cover no change in site habitat or vegetative resources is anticipated. Overall impacts to vegetation would be less than significant.

Wetlands and Other Waters of the U.S.

Based on a review of topographic maps, National Wetlands Inventory wetlands mapping, and the site visits, it was determined that wetlands and other waters of the U.S. do not occur on the project site. Therefore, there would be no impacts to wetlands and other waters of the U.S. under the Proposed Action.

Wildlife

Wildlife in the area is limited due to the surrounding development and altered vegetation at the

project site. Wildlife species observed during site visits are consistent with common species that inhabit urban and suburban environments. See Section 3.6.3 for a more detailed discussion of wildlife observed at the project site. The vast majority of the project site is currently covered by maintained lawn grass. Impacts to wildlife from development under the Proposed Action would be considered less than significant because current conditions are not conducive to biological diversity or the presence of wildlife on the project site.

Species of Concern

The USFWS has concluded that the Proposed Action should not impact any rare and/or protected species or their habitat (USFWSa 2006). ODNR (2006a) had no records of any a species of concern within one-half mile of the project site. Therefore, no impacts to species of concern are anticipated.

4.6.2 No Action Alternative

Under the No Action Alternative, vegetation, wetlands, wildlife, and species of concern conditions would remain the same and no additional impacts to biological resources would be expected to occur.

4.6.3 Mitigation Measures

No significant impacts to biological resources have been identified; however, OSU has committed to implementing the following measures to reduce any less-than-significant, direct impacts to species and habitats on the project site:

- If construction is to occur during the nesting season, migratory bird surveys and nest searches should be conducted in the 30 days prior to starting construction. If nests are discovered, consultation with USFWS should be initiated to determine if disturbance to the species present must be avoided.

- Construction areas will be fenced to limit disturbance to the adjacent arboretum property outside of the construction zone.

4.7 CULTURAL RESOURCES

4.7.1 Proposed Action

Historic Resources

No historic resources were identified within the project site. Therefore, the Proposed Action would not result in significant impacts with regard to historic resources. Correspondence from the Ohio Historical Society (see Appendix B) indicates that they concur with these findings.

Archaeological Resources

No archaeological resources were identified within the project site. Large construction projects, including the adjacent Schottenstein Center and State Route 315, have drastically altered the setting of this area over the past several decades. As a result, the area retains little historic integrity. Therefore, the Proposed Action would not result in significant impacts with regard to archaeological resources. However, if during construction buried archaeological resources are

encountered, all construction should stop and a qualified archaeologist should be called in to assess the resource.

4.7.2 No Action Alternative

There are no known historic resources or archaeological resources within the project site. Therefore, no impacts are anticipated as a result of the No Action Alternative.

4.7.3 Mitigation Measures

No significant impacts to cultural resources would occur; therefore, no mitigation measures are required or recommended.

4.8 AIR QUALITY

Air emissions resulting from the Proposed Action were evaluated in accordance with federal, state, and local air pollution standards and regulations. Air quality impacts from a proposed activity or action would be significant if they:

- increase ambient air pollution concentrations above any NAAQS;
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS; or
- impair visibility within any federally mandated federal Class I area.

The approach to completing the air quality analysis was to estimate the increase in emission levels due to the Proposed Action.

According to USEPA's General Conformity Rule in 40 CFR Part 51, Subpart W, any proposed federal action that has the potential to cause violations in a NAAQS non-attainment or maintenance area must undergo a conformity analysis. A conformity analysis is not required if the Proposed Action or Alternative Action occurs within an attainment area. Since Franklin County is non-attainment for O_3 and $PM_{2.5}$, a conformity determination must be performed if project emissions exceed the *de minimis* thresholds of 100 tons per year for these pollutants or their precursors.

4.8.1 Environmental Consequences

The Proposed Action would involve construction and paving activities, plus commuting of worker personnel and transport of materials to and from the site during the construction period. Long-term emissions associated with the Ohio 4-H Center would include commuting of personnel to and from the building, and emissions from building operations.

Construction Emissions: Emissions during the construction period were quantified to determine the potential impacts on regional air quality. Calculations of VOC, NO_x, CO, SO_x, and PM_{10} emissions from construction, grading, and paving activities were performed using USEPA emission factors compiled in the California Environmental Quality Air Quality Handbook (South Coast Air Quality Management District 1993), Calculations Methods for Criteria Air Pollution Emission Inventories (Jagelski and O'Brien, 1994), and Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations (O'Brien and Wade, 2002). The emission factors for building construction include contributions from engine exhaust emissions (i.e.,

construction equipment, material handling, and workers' travel) and fugitive dust emissions (e.g., from grading activities). Trenching and grading emissions include fugitive dust from ground disturbance, plus combustive emissions from heavy equipment from trench work during the entire construction period. Paving emissions include combustive emissions from bulldozers, rollers, and paving equipment, plus emissions from a dump truck hauling pavement materials to the site. Estimated emissions that would occur from construction, grading, and paving activities under the Proposed Action are presented in Table 4.8-1. The emissions shown would occur over the duration of the construction period. The heat exchanger boreholes will be installed using two drill rigs equipped with standard steel drill rods using sonic drilling techniques. Although this source was not specifically included in the emission calculations, this source would be the equivalent of two diesel engines running for 72 days assuming 2-days drilling per well with a standard 8-hour workday.

Emissions generated by construction projects are temporary in nature and would end when construction is complete. The emissions from fugitive dust (PM_{10}) would be considerably less than those presented in Table 4.8-1 due to the implementation of control measures in accordance with standard construction practices. For instance, frequent spraying of water on exposed soil during construction, proper soil stockpiling methods, and prompt replacement of ground cover or pavement are standard landscaping procedures that could be used to minimize the amount of dust generated during construction. Using efficient practices and avoiding long periods where engines are running at idle may reduce combustion emissions from construction equipment.

Table 4.8-1. Construction Emissions – Proposed Action

Source	Emissions (In Tons)				
	CO	VOC	NO_x	SO_x	PM_{10}
Construction	0.4	0.1	1.8	0.0	0.1
Grading/Trenching	0.5	0.1	0.6	0.1	0.2
New Pavement	0.1	0.0	0.1	0.0	0.0
TOTAL	0.9	0.2	2.5	0.1	0.3

$PM_{2.5}$ emissions are expected to be less than or equal to PM_{10} emissions.

In general, combustive and fugitive dust emissions would produce localized, short-term elevated air pollutant concentrations, which would not result in any long-term impacts on the air quality in Franklin County or AQCR 176. The temporary construction-related emissions of PM_{10} and SO_x under the Proposed Action are not expected to adversely impact the air quality or visibility in the project area. The projected emissions for the entire Proposed Action are below the *de minimis* annual thresholds for conformity and less than 10 percent of the regional emissions shown in Table 3.8-3. A conformity determination, therefore, is not required for this action.

Operational Emissions: Air emissions at the Ohio 4-H Center after the Proposed Action is completed are expected to be minimal. The heating equipment in the new building is anticipated to be more efficient and have lower air pollutant emissions than typical boilers and heaters. Because the Ohio 4-H Center is a relatively small building, less than 5,000 square feet, it is expected that operational emissions would be insignificant.

Commuting: The Ohio 4-H Center would include office facilities for 20-25 employees of the Ohio State Extension 4-H program who would be relocated from their current offices just south of West Lane Avenue. These workers do not represent new commuters. It is expected that 25-50 cars per day would access the site, including vehicles that may be at the site during special events at the Ohio 4-H Center. Due to the relatively small number of cars accessing the site daily, emissions from commuting are expected to be insignificant.

4.8.2 No Action Alternative

Implementation of the No Action Alternative would not adversely impact the air quality or visibility in the vicinity of the project area. The projected emissions for the No Action Alternative are virtually identical from current emissions. A conformity determination, therefore, is not required for this action.

4.8.3 Mitigation Measures

OSU has committed to implementing the following measure to reduce any less-than-significant impacts associated with particulate emissions during construction:

- To minimize impacts associated with particulates, best management practices (BMPs), such as covering of dirt stockpiles and application of water sprays, would be implemented.

Additional detail on excavation support and earthwork are provided in the Construction Document Package (Lincoln Street Studio, et al 2006)

4.9 WATER RESOURCES

4.9.1 Proposed Action

The footprint of the Ohio 4-H Center alone is estimated to be 0.6 acres, the Ohio 4-H Center plus parking areas would cover approximately 1.4 acres. Given the small area affected, the loss of groundwater recharge due to the creation of impervious surfaces would be less than significant. During construction, the site would employ surface stabilization after clearing, as well as silt fences and inlet protection. An on-site detention pond is planned to be constructed to store all groundwater encountered during borehole drilling. Groundwater would be stored until suitably clarified for on disposal through storm water sewers.

As described in Section 2.1.3, the vertical geothermal heat exchanger is planned to consist of a series of 72-80 boreholes, 4.5 inches in diameter and approximately 280 feet deep. The vertical geothermal heat exchanger is planned to be covered by a research and display garden surrounded by the Ohio 4-H Center parking lot. The heat exchanger fluid contained in the closed loop piping would be a 20% inhibited propylene glycol solution and, under normal operation, would not contact the soil or ground water. Since the heat exchanger pipes would be configured as a closed loop, little to no impact to existing ground water resources is expected.

A potential negative effect of all closed loop geothermal heat pumps is the release of antifreeze solutions to the environment. Antifreeze solutions are required in colder climates to prevent the circulating solution from freezing (ISGS 2004). The potential environmental impact resulting from a leak in the geothermal heat exchanger is dependent on the toxicity and volume of antifreeze released to the environment. The Ohio 4-H Center heat exchanger would contain

approximately 1,800 gallons of diluted Dowfrost HD® in the vertical heat exchanger pipes, the same volume in horizontal pipes and 7,000 gallons in piping inside the building (Miller, Todd at W.E. Monks & Company, personal communication on Oct 3rd, 2006).

Best Management Practices (BMPs) would be employed to ensure that impacts to soil or groundwater would be minimal to non-existent. These BMPs include:

- The use of high-density polyethylene piping installed and hydrostatically tested by a loop contractor certified by the International Ground Source Heat Pump Association.

- Installer would supply notarized documentation confirming compliance with industry standards and a written warranty of fifty years or greater, specifying material replacement and labor allowance (Lincoln Street Studio et. al 2006).

- Following installation, the boreholes would be backfilled with thermally enhanced bentonite grout to protect the pipes and ensure good heat transfer. The use of thermally enhanced grout reduces the likelihood of surface water infiltration, inter-aquifer flow and antifreeze leakage by maintaining low hydraulic conductivity within the vertical boreholes (ISGS, 2004).

- The heat exchanger would utilize a solution 20% Dowfrost HD® heat transfer fluid and 80% water.

- A fluid make-up package consisting of a 100-gallon pressure tank and pump to maintain system fill pressure at 12 pounds per square in gauge (Lincoln Street Studio, et al 2006) would be used to maintain system pressure. The pressure tank would have a low level cutoff so if the level of heat exchanger solution were to drop below some preset level, a remote alarm would sound at the Building Automation System. If even a small amount of fluid leaked from the system the system would shut down.

- To minimize the loss of heat exchanger solution in the event of a pipeline rupture eight heat exchanger boreholes would be arraigned in parallel sequence along nine lateral supply and return headers (See Figure 2-4). A rupture in any one borehole would, at most, affect one ninth of the heat exchanger containing 400 gallons of diluted Dowfrost HD® heat transfer fluid.

Dowfrost HD® consists of 94% propylene glycol, less than 5% dipotassium phosphate added as a corrosion inhibitor, less than 5% deionized water and a bright yellow to aid in leak detection. Direct contact with Dowfrost HD® may cause slight transient eye irritation. Dowfrost HD® mist may cause irritation of the nose and throat but the single dose oral toxicity is considered to be extremely low and prolonged contact with the skin is essentially nonirritating (Dow 2004). Based on data for its major components Dowfrost HD® is practically non-toxic to aquatic organisms on an acute basis (Dow 2004). The potential for bioconcentration is low as polypropylene glycol and dipotassium phosphate are readily biodegradable and pass the (Dow 2004). Atmospheric degradation of polypropylene glycol is expected within minutes to hours (Dow 2004). The potential for movement of polypropylene glycol in soil is high (Dow 2004), however, the Ohio 4-H Center heat exchanger would contain a solution of 20% Dowfrost HD® and 80% water so movement and partitioning would be similar to that of water.

Common antifreeze compounds used in geothermal heat exchangers include calcium chloride, potassium acetate, potassium carbonate, sodium chloride, ethanol, methanol, ethylene glycol and propylene glycol. All of these compounds work but have varying degrees of toxicity, flammability or corrosivity. Dowfrost HD® with propylene glycol was selected as the fluid with the least environmental impact in the event of a pipe rupture. Propylene glycol is used commercially as antifreeze solution, as an anti-oxidant in soft drink syrups, as a coolant in refrigeration systems and as a deicer for airport runways (Verschueren 1983). Heinonen et al. (1996) recommended propylene glycol for geothermal heat pumps based on its low health, fire and environmental risks.

In *A Short Primer and Environmental Guidance for Geothermal Heat Pumps* EPA (1997) geothermal heat pumps were identified as one of the most energy efficient heat and cooling technology available and concluded that increased reliance geothermal heat pumps would reduce emissions of greenhouse gases, such as sulfur dioxide ($SO_{2)}$) and nitrogen oxides ($NO_{x),}$ precursors to acid rain, and achieve these benefits with very little risk to the environment.

Based on current drainage patterns the nearest surface water that could potentially be impacted by the Ohio 4-H Center would be the Olentangy River located approximately 1750 feet east of project site. It is unlikely that an antifreeze leak of the size needed to reach the Olentangy River would occur at the Ohio 4-H Center. Since there is no surface water of note present on or adjacent to the project site, no negative impacts to surface or groundwater are anticipated.

4.9.2 No Action Alternative

Under the No Action Alternative, no construction would occur and no impacts to water resources would occur. Conditions would remain as described in Section 3.9.

4.9.3 Mitigation Measures

No significant impacts to water resources are likely to occur; however OSU has committed to implement the following measures to reduce any less-than-significant impacts associated with impacts to water resources during construction and operation of the Ohio 4-H Center:

- During construction the site will employ surface stabilization after clearing, silt fences and inlet protection.
- An on-site detention pond will be constructed to store all groundwater encountered during borehole drilling. Groundwater would be stored until suitably clarified for on site disposal.
- Heat exchanger piping will be closed-loop piping that will be hydrostatically tested. The boreholes will be backfilled with thermally enhanced grout to protect the pipes and ensure good heat transfer.
- The heat exchanger installer will supply a notarized document confirming compliance with industry standards and supply a written warranty of fifty years or greater.
- The heat exchanger will be equipped with a fluid make-up package that would include a pressure tank with a low level cutoff and a remote alarm that would sound at the Building Automation System if a leak were to occur.

- The heat exchanger would utilize a solution 20% Dowfrost HD® heat transfer fluid and 80% water.

Additional detail on the construction and operation of the geothermal heat exchanger storm water protection measures are provided in the Construction Document Package (Lincoln Street Studio, et al 2006).

4.10 GEOLOGY AND SOILS

4.10.1 Proposed Action

Geology

Under the Proposed Action, the physiography, underlying geology, and topography of the area would not change. A limited amount of grading would likely be required for building foundations, but given the project site's limited topographic variation, the change is planned to be minimal. No geologic risks are known or anticipated.

ODNR indicated that paleokarst had been encountered during the installation of a test well installed near the project site (ODNR 2006b). ODNR also noted that a prior bore hole drilled very close to the failed hole was successfully completed, demonstrating the erratic distribution of paleokarst features in the carbonate bedrock (ODNR 2006b). During the installation of a test borehole drilled at the project site on December 2003 a fracture filled with easily shifting materials was encountered from 119 feet to 125 feet below ground surface (Lincoln Street Studio et. al, 2006). When the drill casing was withdrawn to insert the heat exchanger piping, the walls of the hole collapsed. To eliminate this problem the Ohio 4-H Center geothermal boreholes would be installed using standard steel drill rods advanced by sonic drilling techniques. The sonic drill rig vibrates the casing into place and no drill cuttings are removed. Material removed from the drill core would be incorporated into the site grading. The casing would be left in place while the piping is inserted. Once the heat exchanger piping is in place, the hole would be grouted with bentonite grout. The casing would be pulled out of the hole during the grouting process, so the surrounding materials collapse on the grout (Jackson Geothermal, personal communication on November 5, 2006).

A large void in the subsurface materials could result in poor heat transfer if the pipe did not have sufficient contact with the earth. The Ohio 4-H Center geothermal heat exchanger was designed to allow for the possibility for some voids in each hole. Small air pockets would be pumped full of grout and would not significantly impact efficiency of the geothermal heat exchanger. Only a very large underground cavern would impact the performance of the vertical boreholes, and no such caverns have been encountered in this area before. Although the geothermal heat exchanger would consist of 72 boreholes, a range of 72-80 boreholes has been included in the EA to account for the possibility of large void spaces or a broken drill stem. If a large underground cavern is detected at the project site, the placement of the heat exchanger boreholes may need to be adjusted (Jackson Geothermal, personal communication on November 5, 2006).

A building's performance during a seismic event depends not only on the severity of sub-surface rock motion, but also on the type of soil upon which a structure is founded (Ghosh 2000). A building's Seismic Design Criteria is assigned on the basis of location relative to historic seismic

activity, building occupancy, and soil type. These characteristics were considered for the Ohio 4-H Center project site and the building was designed for compliance with Seismic Design Category "B" (Miller, Todd, W.E. Monks & Company, personal communication on October 10, 2006).

Although the north end of the Ohio 4-H Center would be constructed over a full basement, increasing the risk for indoor radon, the basement would be used to house mechanical systems and would not include assignable office space. To further reduce risks due to radon the basement would be constructed with a perimeter floor drained tied to an interior sump pump system and would include a vapor barrier below the slab in areas where moisture could cause problems (Lincoln Street Studios et al. 2006). Occupational exposures to radon at the Ohio 4-H Center are expected to be well below the EPA action level of 4 pCi/L for indoor air in residential structures.

Soils

The footprint of the Ohio 4-H Center plus parking areas and roadways is estimated to cover 1.4 acres, however under the Proposed Action, it is conservatively estimated that a total of approximately 4 acres of land could be disturbed by the Proposed Action. Mature trees within the 4 acres, selected to remain on site would be fenced at the drip line (See Figure 2-3). To protect the selected trees these areas would not be disturbed during construction activities. This area includes the area needed for the vertical geothermal heat exchanger. Soils would be disturbed during installation of the heat exchanger boreholes, but when complete the top of the boreholes would be 5 feet below grade and are planned to be covered by a research and display garden surrounded by the Ohio 4-H Center parking lot. Based on the Soil Survey of Franklin County (USDA 1980) and soil borings advanced at the project site, area site soils appear to have undergone extensive excavations and fillings. Area soils were most probably disturbed during the construction of State Route 315 to the west and the Olentangy River transportation corridor east of the project site.

Given the relatively small areas potentially disturbed under the Proposed Action, if BMPs are employed during construction to minimize potential wind erosion, impacts to soil resources are expected to be minimal.

4.10.2 No Action Alternative

Under the No Action Alternative, no construction would occur, leaving conditions as described in Section 3.10. No impacts to geological resources would occur.

4.10.3 Mitigation Measures

OSU has committed to implement the following measure to reduce any less-than-significant impacts associated with wind erosion:

- To minimize impacts associated with particulates, BMPs such as covering of dirt stockpiles and application of water sprays would be implemented.

4.11 HAZARDOUS MATERIALS AND WASTE MANAGEMENT

4.11.1 Proposed Action

Construction Impacts

The construction phase of the Ohio 4-H Center would require the use of some hazardous materials such as paints coatings, sealant and adhesives. However, as part of the measures provided in the Construction Document Package only materials with a low VOC content would be employed (Lincoln Street Studios et al. 2006). The geothermal heat exchanger piping would be constructed on site. The propylene glycol solution used in the geothermal heat exchanger was selected as the fluid with the least environmental impact in the event of a pipe rupture. Standard procedures for the handling of hazardous materials, such as the use of secondary containment, would be used during construction phase. Additionally, during excavation the potential exists to encounter unknown, buried materials that could be considered hazardous. If this were to occur, measures would be taken to properly remove and dispose of these materials. The OSU Office of Environmental Affairs *Chemical Management Guidebook* is available on the OSU website to help hazardous waste generators comply with the various environmental regulations relating to infectious waste, defining a hazardous waste, spill cleanup procedures, waste minimization and chemical redistribution, collecting, packaging and manifesting waste, and dealing with waste requiring special handling or disposal procedures (OSU 2006) No impacts are anticipated during the construction phase.

Operational Impacts

Operations at the Ohio 4-H Center are likely to require only small, insignificant quantities of hazardous materials. The Ohio 4-H Center is planned to be constructed using low VOC content adhesives, coatings, and carpet, and 50% of all construction debris would be recycled. To minimize the need for pesticides the Ohio 4-H Center landscape plan specifies the use of native plant materials. Demonstration gardens would be located near the center to promote innovative and organic gardening techniques. The housekeeping plan for the Ohio 4-H Center calls for the use of soy-based cleaning products when possible. When hazardous materials are needed, they would be properly stored, handled, and disposed.

4.11.2 No Action Alternative

Under the No Action Alternative, conditions related to hazardous materials and wastes would remain as described in Section 3.11 and no impacts would occur.

4.11.3 Mitigation Measures

There are no significant impacts; therefore, no mitigation measures are required or proposed.

4.12 SUMMARY OF SECONDARY AND CUMULATIVE IMPACTS

Secondary impacts are those that are caused by a Proposed Action, but may occur later in time or farther removed in distance, relative to the primary impacts of the Proposed Action. “Cumulative impacts result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions" (40 CFR Section 1508.7).

This EA considers past, present, and reasonably foreseeable short-term and long-term future actions on the project site. In addition, it considers off-site factors and reasonably foreseeable off-site projects.

As discussed in Section 3.1, the project site is located within the campus of OSU. Past uses of the predominantly undeveloped project site included small-scale agriculture (poultry). The site has been owned by and been under the control of OSU since the early to mid-1900s. Zoning for the site and the surrounding lands owned by OSU is, zoning designated as "University, College, Research-Park District" as assigned by the City of Columbus. This zoning designation allows OSU flexibility with respect to future development. Development at OSU is generally not subject to NEPA review because it is state owned property and development is typically funded by state and private funding. However, to assess potential cumulative impacts in a more regional context, an inventory of recently completed projects and projects scheduled to be completed within approximately the next 5 to 6 years on the OSU campus were inventoried (Table 4.12-1).

Table 4.12-1. Cumulative Projects

Building Name	***Construction/ Renovation Year (FY)***	***Gross Square Feet***	***Description***
Recent Past Projects			
Blankenship Hall	*2000*	*58,108*	*Offices and meeting rooms*
Davis Heart and Lung Research Institute	*2000*	*133,856*	*Research labs and offices*
Parker Food Science & Technology Building	*2000*	*78,285*	*Labs, offices, and classrooms*
Poultry Brooding House 2	*2000*	*5,661*	*Agriculture (off campus)*
Stillman Hall	*2000*	*67,287*	*Offices and classrooms*
Younkin Success Center	*2000*	*68,705*	*Computer labs, classrooms, offices*
Hay Storage Building	*2001*	*6,000*	*Hay storage*
Jesse Owens Memorial Stadium	*2001*	*27,987*	*Track, field, and soccer stadium*
Meet Management Building	*2001*	*1,568*	*Offices, meeting and training rooms*

Table 4.12-1. Cumulative Projects (Continued)

Ohio Stadium	*2001*	*812,422*	*Renovation, code upgrades, expansion of box seating and press area*
Waterman Laboratory Headquarters	*2001*	*8,448*	*Offices*
Blackwell Inn	*2002*	*128,031*	*Hotel and conference center*
Retractable Shade Structure	*2002*	*6,566*	*Greenhouse*
Veterinary Medicine Academic Building	*2002*	*113,602*	*Classrooms, offices and library*
Aronoff Laboratory	*2003*	*107,593*	*Labs, offices and classrooms*
Heffner Wetland Research and Education Building	*2003*	*9,157*	*Offices and meeting rooms, wetland monitoring equipment*
Learning Gardens Storage Shed	*2003*	*210*	*Landscaping maintenance storage*
Neil Building	*2003*	*129,889*	*Student housing*
North and South Cannon Drive Parking Garages Renovation	*2003*	*445,943*	*Parking garage renovation for an additional 1,200 cars*
Scholars House East	*2003*	*19,377*	*Student housing*
Scholars House West	*2003*	*19,377*	*Student housing*
Worthington Building	*2003*	*50,023*	*Student housing*
Adventure Recreation Center	*2004*	*84,883*	*Recreation center*
Buckeye Village Community Center	*2004*	*27,086*	*Childcare and community meeting space*
Hagerty Hall Renovation	*2004*	*142,512*	*Offices, classrooms, computer labs, auditorium addition*

Table 4.12-1. Cumulative Projects (Continued)

Knowlton Hall	*2004*	*173,370*	*Offices, classrooms, studios, library, etc.*
Page Hall	*2004*	*64,578*	*Classrooms, offices, computer labs, meeting rooms*
Hospital Parking Garage	*2004*	*366,956*	*New parking garage for 1,000 cars*
Neil Avenue Parking Garage	*2004*	*318,475*	*New parking garage for 1,000 cars*
Ross Heart Hospital	*2004*	*227,123*	*Hospital*
Beef Barn Shop	*2005*	*2,750*	*Agriculture (not on campus)*
Biocontainment Laboratory	*2005*	*2,862*	*Laboratory*
Gateway Building A	*2005*	*130,000*	*Mixed use office, retail, housing*
Gateway Building B	*2005*	*111,000*	*Mixed use office, retail, housing*
Gateway Building C	*2005*	*200,000*	*Mixed use office, retail, housing*
Gateway Building D	*2005*	*74,000*	*Mixed use office, retail, housing*
Gateway Building E	*2005*	*390,000*	*Parking for 100 cars*
Gateway Building F North	*2005*	*18,500*	*Housing*
Gateway Building F South	*2005*	*18,500*	*Housing*
Golf Course Pesticide Building	*2005*	*1,518*	*Pesticide storage building (not on campus)*
McCorkle Aquatic Pavilion	*2005*	*128,894*	*Competition swimming facility, locker rooms, etc.*
Physics Research Building	*2005*	*238,108*	*Labs and offices*

Psychology Building	*2005*	*132,712*	*Labs, offices, and classroom*
Recreation and Physical Activities Center	*2005*	*283,806*	*Recreation center, gym, swimming pool, meeting space, offices, etc.*
Smith Electrical Substation	*2005*	*23,889*	*Electrical substation*
Scott Laboratory	*2006*	*262,805*	*Labs, offices, and classrooms*

Table 4.12-1. Foreseeable Future Projects

Main Library Renovation/Expansion	*2007-2010*	*N/A*	*Renovation and expansion of Main Library*
Brown Hall Renovation	*2007-2012*	*N/A*	*Renovation*
Hughes Hall Renovation	*2007-2012*	*N/A*	*Renovation*
Murray Hall Renovation	*2007-2010*	*N/A*	*Renovation*
Graves/Meiling Halls Renovation	*2007-2010*	*N/A*	*Renovation*
Human Ecology	*2007-2008*	*N/A*	*Construct early childhood development center at Weinland Park*
MBA Housing	*2009-2010*	*N/A*	*Housing*
Advanced Laser	*2007-2008*	*N/A*	*Research and development*
Koffolt Infill	*2007-2008*	*N/A*	
Electro Science	*2007-2008*	*N/A*	*Research and development*
Nanoscale Science	*2007-2008*	*N/A*	*Research facility*
Airport Improvements	*2009-2010*	*N/A*	*Airport facilities*
Ross Heart Hospital Expansion (Medical Center)	*2007-2010*	*N/A*	*Expansion of medical center*

Table 4.12-1. Foreseeable Future Projects (continued)

North Doan Building (Medical Center)	*2007-2008*	*N/A*	*Medical facilities*
Tower & Diagnostic Core (Medical Center)	*2007-2008*	*N/A*	*Medical center*
Parking Garage Replacement (Medical Center)	*2007-2008*	*N/A*	*Replace medical center parking garage*
Ambulatory Expansion (Medical Center)	*2007-2008*	*N/A*	*Medical center*
Cancer Tower, Diagnostic Core, and Infrastructure (Medical Center)	*2007-2012*	*N/A*	*Medical center*
Remediation on Rhodes/Doan (Medical Center)	*2007-2012*	*N/A*	*Medical center*
Other (Medical Center)	*2007-2010*	*N/A*	*Medical center*
Larkins Replacement	*2007-2008*	*N/A*	
Ohio Union Replacement	*2007-2010*	*N/A*	*Administrative building*
Wilce Student Health Center Renovation	*2007-2010*	*N/A*	*Renovation of health center*
Archer House Residence Hall Renovation	*2007-2008*	*N/A*	*Renovation of housing*
Fawcett Center Renovation	*2007-2008*	*N/A*	*Renovation*
Lincoln Tower Residence Hall Renovation	*2011-2012*	*N/A*	*Renovation*
Student Affairs Renovation and Renewal	*2007-2012*	*N/A*	*Renovation*
Food Service Master Plan Renovation	*2007-2012*	*N/A*	*Renovation*
Physical Facilities	*2007-2012*	*N/A*	*Electrical, heating/cooling, campus circulation, and storm water management improvements*

Table 4.12-1. Foreseeable Future Projects (continued)

Woody Hayes Athletic Center Phase I	*N/A*	*N/A*	*Renovation and expansion*
New Crew Team Boat House	*N/A*	*N/A*	*New facility*
Varsity Tennis Center	*N/A*	*N/A*	*Athletic facility*
Softball Field Upgrade	*N/A*	*N/A*	*Improve existing softball field*
French Field House	*N/A*	*N/A*	*Resurfacing and renovation*
Ice Rink	*N/A*	*N/A*	*Expansion and renovation*
Nicklaus Museum	*N/A*	*N/A*	*Construct new museum*

Past uses and development aggregated together have altered the native conditions of the project site and surrounding area. Various impacts such as degradation of habitat and habitat fragmentation, creation of impervious surfaces, air emissions, and traffic have occurred incrementally on the project site and the surrounding area over time. These developments and their impacts are the subject of individual reviews and approvals over time. Other processes are embodied in plans and policies adopted by local governments such as those associated with zoning designations, wetlands, and sensitive species and their habitat. These issues are discussed in previous sections of Chapter 4 of this document.

Potential impacts are discussed in Sections 4.1 through 4.12, as appropriate. As stated in other locations within Chapter 4, the Proposed Action's incremental contribution to these impacts would be insignificant and the No Action Alternative would not contribute to these impacts.

The most important examples of secondary and cumulative impacts associated with the Proposed Action are as follows:

- Temporary increased traffic (from construction) on area roads in the vicinity of the project site;
- Temporary regional and local air pollutant emissions;
- Short-term (construction) noise impacts;
- Development intensification; and
- Loss of urban habitat from vegetation removal.

Based on surrounding past, present, and future land uses in the project area, the additive impact of this project would not be significant.

4.13 IRREVERSIBLE/IRRETRIEVABLE COMMITMENT OF RESOURCES

An irreversible commitment of resources is defined as the loss of future options. The term applies primarily to the effects of use of nonrenewable resources such as minerals or cultural resources, or to those factors such as soil productivity that are renewable only over long periods. It could also apply to the loss of an experience as an indirect effect of a "permanent" change in the nature or character of the land. An irretrievable commitment of resources is defined as the loss of production, harvest, or use of natural resources. The amount of production foregone is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume production.

The Proposed Action would not have irreversible impacts because future options for using this site would remain possible. A future decommissioning process could restore the site for alternative uses, ranging from natural open space to industrial development. The location for the OSU 4-H Center is consistent with surrounding development and is planned to not significantly affect surrounding uses. No loss of future options would occur.

The primary irretrievable impacts of the Proposed Action would involve the use of energy, labor, materials and funds, and the conversion of some lands from an undeveloped condition through the construction of buildings and facilities. Irretrievable impacts would occur as a result of construction, facility operation, and maintenance activities. Direct losses of biological productivity and the use of natural resources from these impacts would be inconsequential, as discussed in Section 4.6.

4.14 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This section addresses the commitment of resources associated with the Proposed Action relative to the loss of long-term productivity associated with these commitments.

The Proposed Action would commit resources in the form of energy, labor, materials, and funds for the foreseeable future. The justification for these commitments at this time is described in Section 1.4, Purpose and Need for the Proposed Action. Long-term productivity associated with the site relates to demonstrating the efficiency of geothermal mechanical systems and the benefits of a “green housekeeping plan” in an educational environment. Additionally, the Ohio 4-H Center is planned to serve 4-H youth, volunteers, and youth professionals from around the state of Ohio, the nation, and the world. It would be a training resource for other youth organizations, as well as a location for OSU Extension programming reaching throughout Ohio.

The Proposed Action would create no long-term risks to public health and safety.

4.15 UNAVOIDABLE ADVERSE IMPACTS

There would be no significant unavoidable adverse impacts of the components of the Proposed Action. Where adverse impacts might be expected, OSU has committed to implementing measures identified to reduce or eliminate these impacts. These impacts and corresponding applicant committed measures are described throughout other sections of Chapter 4 and are listed in the Summary of this EA.

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5.0 REFERENCES AND PERSONS CONTACTED

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6.0 LIST OF PREPARERS

The following persons were primarily responsible for preparing this EA:

Steve Blazek, DOE NEPA Compliance Officer.
Kristin Kerwin, DOE NEPA Documents Manager.

SAIC CONTRIBUTORS		
Name	**Qualifications**	**Primary Responsibilities**
Carlos Jallo	B.A. Environment, Economics, Politics 10 years of related experience	Secondary and Cumulative Impacts, Irreversible / Irretrievable Commitment of Resources, Unavoidable Adverse Impacts
David Lingner, Air Quality Specialist	Ph.D., Chemistry, 1985 B.S., Chemistry and Mathematics, 1978 Years of Experience: 21	Air Quality
Hallie Serazin	M.S. Environmental Biology 22 years of related experience	Land Use and Transportation; Socioeconomics and Environmental Justice;; Noise; Public Services and Utilities Hazardous Materials and Waste Management
Paul Carter	B.S. Wildlife Biology, 15 years of related experience	Biological Resources

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APPENDIX A

SCOPING MATERIALS AND RESPONSES

- Scoping Letter
- Scoping Letter Attachment
- Figure 1 – Regional Setting
- Figure 2 – Project Site
- Scoping List
- United Stated Department of the Interior, Fish and Wildlife Service Letter
- Ohio Department of Natural Resources (ODNR), Division of Natural Areas and Preserves Letter
- Randall E. Sanders, ODNR Division of Real Estate and Land Management email

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

July 31, 2006

TO: DISTRIBUTION LIST ATTACHED

SUBJECT: Environmental Assessment for the Ohio State 4-H Green Building Project with Geothermal Mechanical Systems in Franklin County, Ohio

The U.S. Department of Energy (DOE), in compliance with the National Environmental Policy Act of 1969 (NEPA), will be preparing an environmental assessment (EA) for the Ohio State 4-H Green Building Project (the Center) with Geothermal Mechanical Systems (GMS) in Franklin County, Ohio. DOE is proposing to provide federal funding toward the construction of the Center, which constitutes a major federal action as defined by NEPA. A detailed description of the site and the proposed action is included in the attachment to this letter. DOE is the lead agency for this EA, and other federal, state, and local agencies are invited to participate in the environmental documentation process. DOE is requesting input on the NEPA process, proposed action and alternatives, and the environmental issues to be addressed in the EA.

The Draft EA is expected to be available for agency and public comment in September 2006. To facilitate preparation of the EA, DOE is requesting agency input on known resources that could be affected by construction of the 4-H center. **Please provide your input on or before August 11, 2006**. Any questions concerning the proposal should be directed to our consultant, Science Applications International Corporation (SAIC). The point of contact is Ms. Hallie Serazin. She can be reached at (614) 791-3342 if you have any questions or concerns. Please forward your written comments to Ms. Serazin, in care of SAIC, 4700 Lakehurst Court, Suite 110, Dublin, Ohio 43016 no later than August 11, 2006. Thank you for your assistance.

We look forward to hearing from you.

Sincerely,

Steve Blazek
NEPA Compliance Officer

Enclosure

Federal Recycling Program Printed on Recycled Paper

Attachment

ENVIRONMENTAL ASSESSMENT (EA) FOR THE OHIO STATE GREEN BUILDING PROJECT WITH GEOTHERMAL MECHANICAL SYSTEMS (GMS) IN FRANKLIN COUNTY, OHIO

PROPOSED ACTION

The Ohio State University (OSU) plans to construct the Ohio State 4-H Green Building on its Columbus, Ohio campus northwest of the intersection of Fred Taylor Drive and West Lane Avenue (see Figures 1, 2, and 3). The Center will be the first "green" building on OSU campus and will utilize a hybrid geothermal mechanical system. The U.S. Department of Energy (DOE) is proposing to provide federal funding toward the construction of the Center, which constitutes a major federal action as defined by the National Environmental Policy Act (NEPA).

SITE BACKGROUND AND DESCRIPTION

The Ohio State 4-H Green Building Project is planned as a multi-disciplinary learning center, with classrooms and learning labs as well as state and administrative offices for the 4-H program. As the home of Ohio 4-H—and the first facility of its kind on a land-grant university campus—the 4-H Center would feature:

- Flexible multi-purpose space for hands-on program opportunities for youth, volunteers, professional leaders and supporters.
- Educational conference and classroom facilities.
- State-of-the-art technology linking the center to Ohio's 88 counties, the nation, and the world.
- "Green" features such as a geo-thermal mechanical system; reduced water and energy consumption; "green housekeeping plan."

The Center would provide a state-of-the-art site for program activities designed to involve and engage increased numbers of Ohio youth, volunteer leaders, and for Ohio State faculty and staff to further develop the field of positive youth development through teaching and research. The Center would provide access to Ohio State research and resources through distance learning opportunities, as well as through on-site conferences, workshops, and seminars for youth and adults—all of which will serve to strengthen local 4-H programs. Having a physical building/structure on the Ohio State campus will help to ensure that 4-H will always be a part of the university.

The 4-H Center building would be approximately 50,000 gross square feet, and would have a number of outdoor activity areas associated with it. The building would be sited to preserve the park-like atmosphere of the project site, including the mature trees, extensive lawn and grade change. The project site would include parking for 58 vehicles.

The intended use of DOE funding for this project is to support the construction phase of two areas within the Ohio 4-H Center designed for energy efficiency. 1.) A hybrid geothermal

system for heating and cooling and 2) the structural system incorporating a recycled steel manufacturing process to produce structural steel members.

1) The geothermal heating and cooling system is a hybrid geothermal (water source) closed loop heat pump system. Heat is extracted from or rejected to the earth through a vertical geothermal heat exchanger buried under the Center's parking lot. The geothermal heat exchanger would consist of a series 72 drilled holes, five inches in diameter by 280 feet deep. Additional heat rejection would be accomplished through a closed circuit cooling tower. Circulating fluid would not come into contact with soil.
2) Structural steel wide flanges would be the main structural component in the 4-H Center structural system. The project would require 282 tons of structural steel that would be produced in domestic mills using the Electric Arc Furnace (EAF) process and would contain at least 90% total recycled content. The use of recycled structural steel allows energy that would be used to extract raw material from the ground to be conserved and diverts waste from old steel products away from landfills.

PURPOSE AND NEED

The purpose of the Proposed Action, the decision to provide federal funding for the construction of the planned Ohio State 4-H Green Building Project with hybrid GMS technology, is to support new technology with the potential to create broad public benefits. The Proposed Action would demonstrate the efficiency of geothermal mechanical systems and the benefits of a "green housekeeping plan" in an educational environment. The existing 4-H Center on the OSU campus is a small space in the Agricultural Administration Building that does not provide the visibility needed for the integration of 4-H programs into the rapidly expanding university complex and does not allow for the implementation of green building technologies. The Center would serve 4-H youth, volunteers, and youth professionals from around the state of Ohio, the nation, and the world. It would be a training resource for other youth organizations, as well as a location for OSU Extension programming reaching throughout Ohio.

The U.S. Congress has acknowledged the merit of this project by providing specific funding through DOE. Based on Congressional action, DOE has funding available to support OSU's participation in the proposed Ohio State 4-H Green Building project.

PROPOSED ACTION AND ALTERNATIVES

At this time, the Proposed Action and the No Action Alternative are the only alternatives to be addressed in the EA. The Proposed Action involves the provision of federal funds toward construction of the Ohio State 4-H Green Building Project with GMS. The No Action Alternative would involve a DOE decision not to provide funding for the project. For NEPA compliance purposes and to create a meaningful No Action scenario and baseline conditions, it has been assumed that the 4-H Center with GMS would not be constructed without DOE funding. However, it is possible that the applicant could proceed without DOE funding. A privately funded project scenario would be identical, or at least similar to, the Proposed Action. If the applicant (OSU) proceeds without DOE or other federal funding, the project would not be subject to NEPA review.

ENVIRONMENTAL TOPICS TO BE ADDRESSED

The proposed EA will address primary, direct, indirect, secondary and cumulative impacts of the Proposed Action and Alternatives. Beneficial and adverse, on-site and off-site, construction, demolition, and operation and maintenance impacts will be discussed, as appropriate. The environmental topics to be discussed in the EA include:

Land Use, Planning, Socioeconomics and Public Policy
Traffic and Circulation
Air Quality and Noise
Visual Quality/Aesthetics
Hazardous Wastes
Water Resources
Soils and Geology
Biological Resources
Cultural Resources
Waste Management
Public Facilities, Services and Utilities
Energy

SCHEDULE

The schedule for key milestones to complete the NEPA review process is:

Close of Scoping Period	August 11, 2006
Public Distribution of the Draft EA	September 2006

This letter and the draft EA, when it is available, will be posted on the DOE Golden Field Office electronic public reading room at http://www.eere.energy.gov/golden/.

Please direct written and oral comments to:

Hallie Serazin
NEPA Project Manager
Science Applications International Corporation
4700 Lakehurst Court
Dublin, OH 43016
(614) 791-3342
(fax) (614) 793-7620
serazinh@saic.com

FIGURES

Figure 1 – Ohio State 4-H Green Building Project, Regional Setting
Figure 2 – Ohio State 4-H Green Building Project, Project Site
Figure 3 – Ohio State 4-H Green Building Project, Project Site on U.S.G.S. Topographic Map

Ohio State 4-H Green Building Project with GMS EA Scoping List

Ohio Historic Preservation Office
Resource Protection and Review
Attn: Mr. Mark J. Epstein, Department Head
567 E. Hudson Street
Columbus, Ohio 43211-1030

Ohio Environmental Protection Agency
Lazarus Government Center
Attn: Mr. Randy Berneck
122 South Front Street
Columbus, Ohio 43215

Kent E. Kronnemeyer, Supervisor
U.S. Fish and Wildlife Services
6950 Americana Parkway, Suite H
Reynoldsburg, Ohio 43068-4132

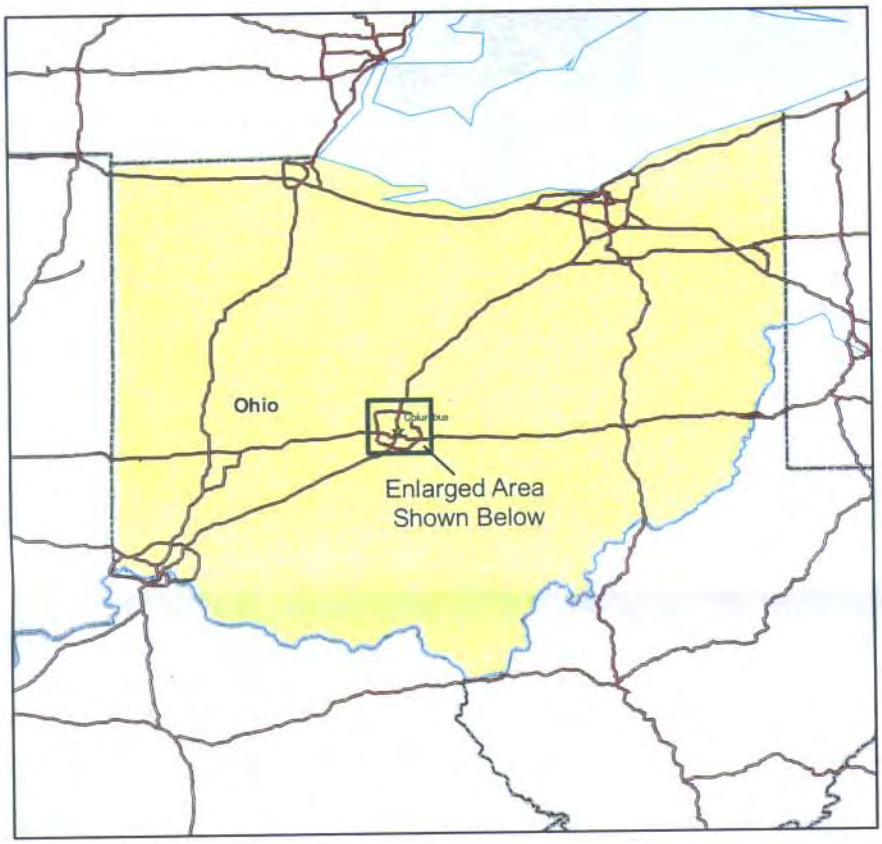
Franklin County Department of Development
Attn: Erin J. Prosser, Planner
280 East Broad Street, Suite 202
Columbus, Ohio 43215

Ohio Department of Natural Resources
Division of Geological Survey
2045 Morse Road, Building C1
Columbus, Ohio 43229-6693

Ohio Department of Natural Resources
Division of Soil and Water Conservation
2045 Morse Road, Building B3
Columbus, Ohio 43229-6693

Ohio Department of Natural Resources
Division of Natural Areas and Preserves
Ohio Natural Heritage Program
2045 Morse Road, Building F-1
Columbus, Ohio 43229

Ohio Department of Natural Resources
Division of Water
Attn: Mike Angle, Ground Water Mapping and Technical Services
2045 Morse Road, Building E3
Columbus, Ohio 43229-6693



Legend

- ★ Capital City
- Interstate Highways
- Rivers
- Lakes
- Land
- State Boundaries
- Ohio
- Canada

N

0 50 100 200 Miles

SAIC From Science to Solutions™

Ohio State 4-H Green Building Project

Drawn By: cornelld
Date: 2006/07/26

FIGURE 1.

Nationwide and Ohio Farm Bureau 4-H Center, Regional Setting*

* Satellite imagre from ©2005 Google™

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SAIC
From Science to Solutions™

Ohio State 4-H
Green Building Project

Drawn By: cornelld
Date: 2006/07/26

FIGURE 2.

Nationwide and Ohio Farm Bureau 4-H Center, Project Site*

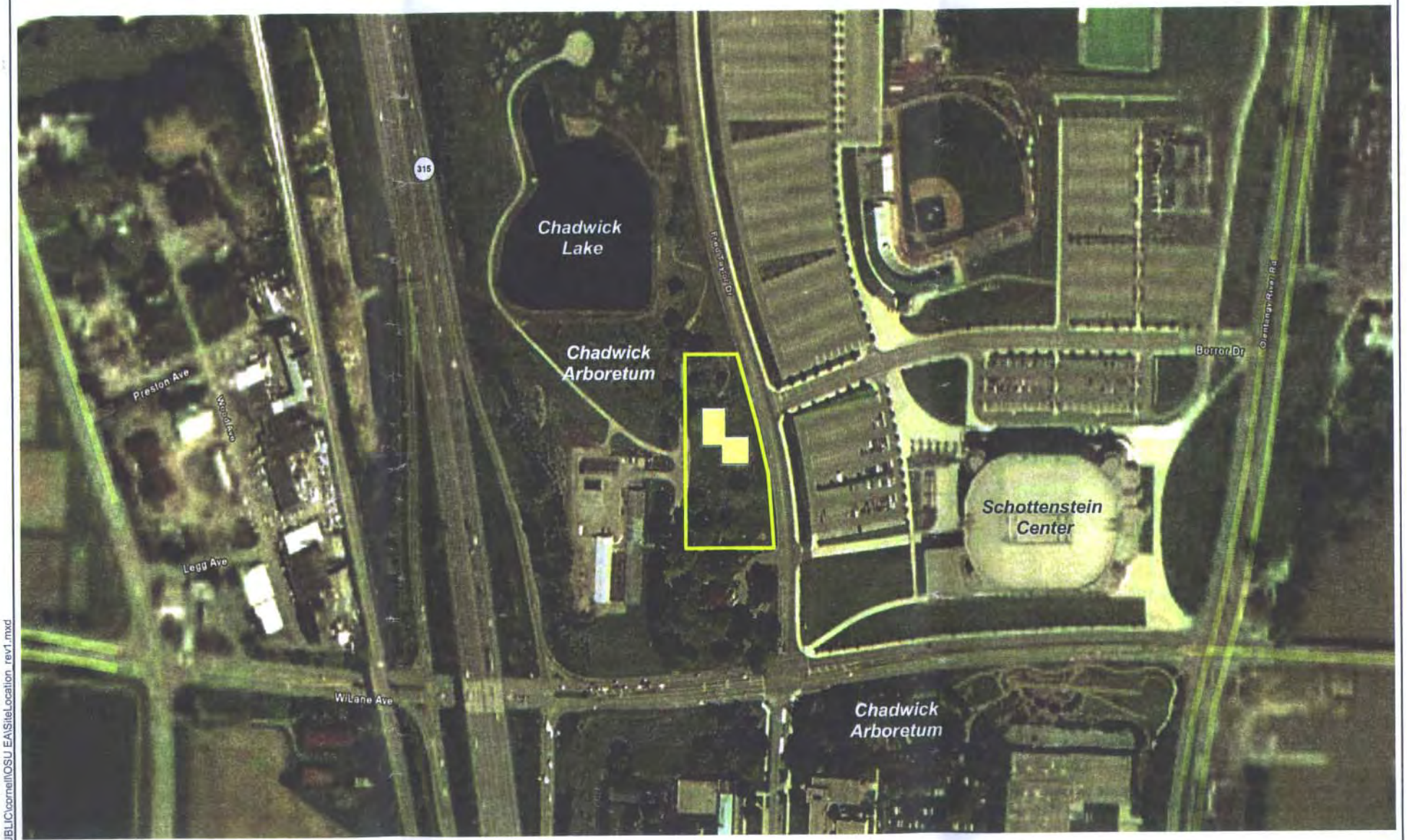
Legend

- Project Site
- Proposed Buliding

0 500 1000Feet

0 75 150 300 Meters

N



* Satellite imagre from © 2005 Google™

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SAIC
From Science to Solutions™

Ohio State 4-H
Green Building Project

Drawn By: cornelld
Date: 2006/07/26

FIGURE 3.

Nationwide and Ohio Farm Bureau 4-H Center, Project Site on U.S.G.S. Topographic Map

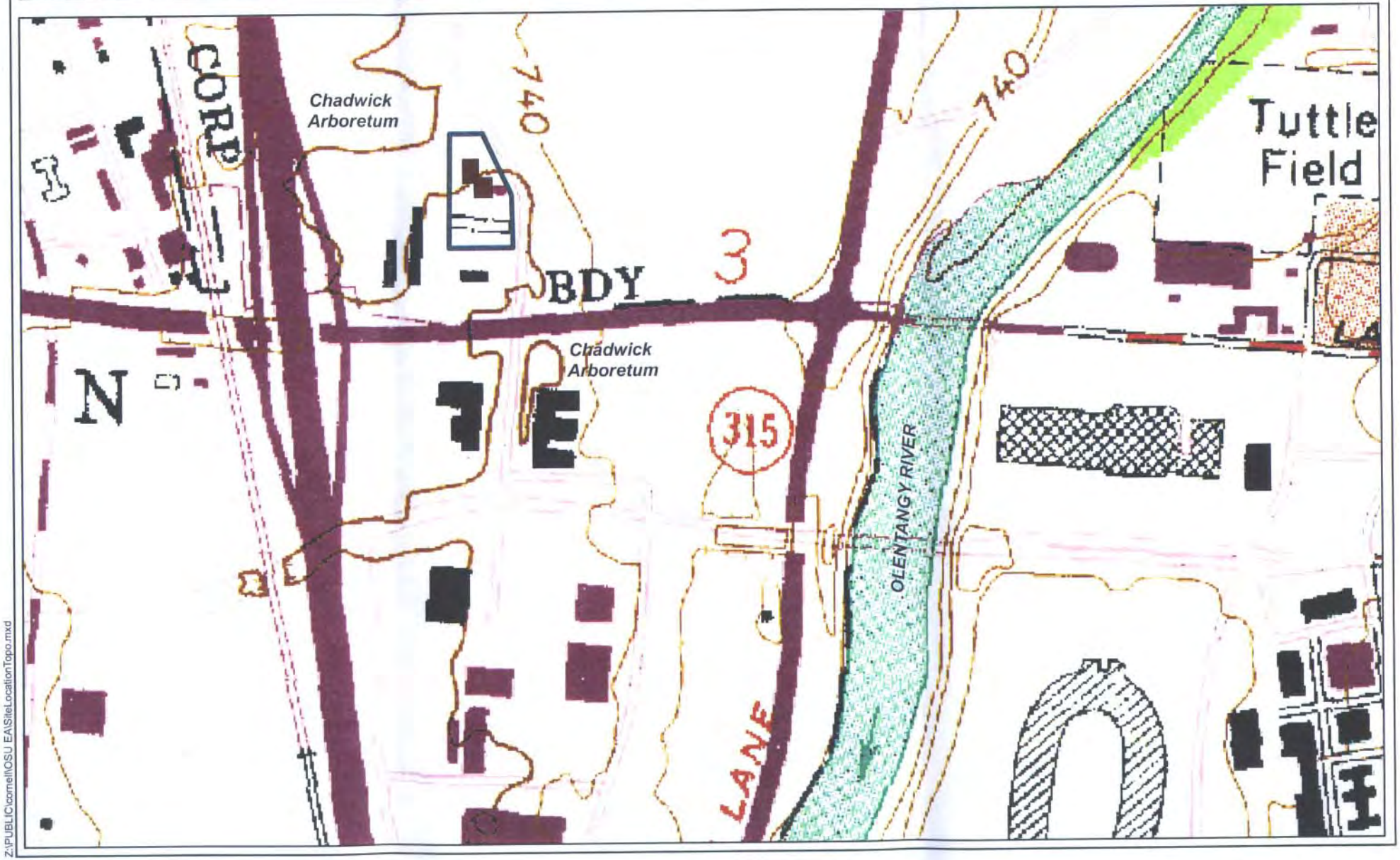
Legend

- Project Site
- Proposed Buliding
- Interstate/Highway
- Road

0 250 500 1,000 Feet

0 75 150 300 Meters

N



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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
6950 Americana Parkway, Suite H
Reynoldsburg, Ohio 43068-4127

(614) 469-6923 / FAX (614) 469-6919
August 10, 2006

Ms. Hallie Serazin
SAIC
4700 Lakehurst Court, Suite 110
Dublin, OH 43016

TAILS#: 31420-2006-FA-0295/TA-0831

Dear Ms. Serazin:

This is in response to the Department of Energy's July 31, 2006 letter, received on August 7, requesting U.S. Fish and Wildlife Service (Service) technical assistance regarding the Ohio State 4-H Green Building Project with Geothermal Mechanical Systems in Franklin County, Ohio.

There are no Federal wilderness areas, wildlife refuges, or designated Critical Habitat within the vicinity of the proposed site.

ENDANGERED SPECIES COMMENTS: The proposed project lies within the range of the Federally-listed endangered **Indiana bat** (*Myotis sodalis*), **clubshell** (*Pleurobema clava*), **northern riffleshell** (*Epioblasma torulosa rangiana*), and **Scioto madtom** (*Noturus trautmani*), and the **rayed bean** (*Villosa fabalis*), a Federal Candidate mussel species. Due to the project type, size, and location, the project, as proposed, should not impact these species or their habitat.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act of 1973 (ESA), as amended, and are consistent with the intent of the National Environmental Policy Act of 1969 and the U. S. Fish and Wildlife Service's Mitigation Policy. This letter provides technical assistance only and does not serve as a completed section 7 consultation document.

We appreciate this opportunity to provide the above comments. If you have questions, or if we may be of further assistance in this matter, please contact Angela Zimmerman at extension 22 in this office.

Sincerely,

for Mary Knapp, Ph.D.
Supervisor

cc: ODNR, DOW, SCEA Unit, Columbus, OH

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR — SAMUEL W. SPECK, DIRECTOR

Division of Natural Areas & Preserves
Tom Linkous, Chief
2045 Morse Rd., Bldg. F-1
Columbus, OH 43229-6693
Phone: (614) 265-6453 Fax: (614) 267-3096

August 9, 2006

Hallie Serazin
Science Applications International Corporation
4700 Lakehurst Ct., Suite 110
Dublin, OH 43016

Dear Ms. Serazin:

After reviewing our Natural Heritage maps and files, I find the Division of Natural Areas and Preserves has no records of rare or endangered species within one half mile of the Science Applications International Corporation Ohio State 4-H Center project. The site is located 0.2 mi. NE. of the junction of Lane Ave. and St.Rt. 315, Clinton Twp., Franklin Co., Northwest Columbus Quadrangle.

There are no existing or proposed state nature preserves at the project site. We are also unaware of any unique ecological sites, geologic features, breeding or non-breeding animal concentrations, state parks, scenic rivers, state nature preserves, state forests, or wildlife areas within the project area.

Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. Although we inventory all types of plant communities, we only maintain records on the highest quality areas. For National wetlands Inventory maps, please contact Madge Fitak in the Division of Geological Survey at (614) 265-6576. Aerial photos may be obtained from ODOT at (614) 275-1369. USGS maps can be requested directly from the U.S. Geological Survey at 1-888-275-8747.

Please contact me at (614) 265-6409 if I can be of further assistance.

Sincerely,

Butch Grieszmer, Data Specialist
Resource Services Group

Serazin, Hallie J.

From: Sanders, Randy [Randy.Sanders@dnr.state.oh.us]

Sent: Tuesday, August 22, 2006 11:12 AM

To: serazinh@saic.com

Subject: 06-0200; Ohio State 4-H Building Project with Geothermal Mechanical Systems

ODNR COMMENTS TO Steve Blazek, NEPA Compliance Officer, Department of Energy, Golden Field Office, 1617 Cole Boulevard, Golden, Colorado 80401-3393.

Location: The site is located 0.2 miles northeast of the junction of Lane Avenue and State Route 315, Clinton Township, Franklin County, Northwest Columbus Quadrangle.

Project: The Ohio State University plans to construct the Ohio State 4-H Green Building on its Columbus, Ohio Campus. The center will be the first "green" building on OSU campus and will utilize a hybrid geothermal mechanical system. The building would be approximately 50,000 gross square feet. The Department of Energy is requesting input on the NEPA process, proposed action and alternatives, and the environmental issues to be addressed in the EA.

The Ohio Department of Natural Resources (ODNR) has completed a review of the above referenced project. These comments were generated by an inter-disciplinary review within the Department. These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act, the Coastal Zone Management Act, Ohio Revised Code and other applicable laws and regulations. These comments are also based on ODNR's experience as the state natural resource management agency and do not supersede or replace the regulatory authority of any local, state or federal agency nor relieve the applicant of the obligation to comply with any local, state or federal laws or regulations.

Rare and Endangered Species: The ODNR, Division of Natural Areas and Preserve, Natural Heritage Database contains no records of rare species or unique natural features within the proposed project, and there are no state nature preserves or scenic rivers in the vicinity of the site.

Fish and Wildlife: The ODNR, Division of Wildlife (DOW) has the following comments.

This project is in the historical range of the Indiana bat (*Myotis sodalis),* a state and federally endangered species. If it is necessary to remove any trees to complete the project, it is recommended the applicant first contact the U.S. Fish and Wildlife Service for guidance.

The project is also in the historical range of the Clubshell mussel (*Pleurobema clava*), a state and federally endangered species, the Northern riffleshell mussel (*Epioblasma torulosa rangiana*), a state and federally endangered species, the Rayed bean mussel (*Villosa fabalis*), a state endangered and federal candidate species, and the Scioto madtom (*Noturus trautmani*), a state and federally endangered fish species. If it is necessary to do in-water work to complete the project, it is recommended the applicant first contact the U.S. Fish and Wildlife Service for guidance.

Additionally, the project is within the historical range of the Peregrine falcon (*Falco peregrinus*), a state endangered bird species, and the Golden-winged warbler (*Vermivora chrysoptera*), a state endangered bird species. If either of these species is encountered during construction of the project, work should immediately be stopped, and the DOW should be contacted.

Geological Survey: The ODNR, Division of Geological Survey has reviewed maps and data concerning the geology beneath The Ohio State University 4-H green building project. The geology consists of Pleistocene glacial deposits over Devonian and Silurian limestone and dolomite. The glacial deposits are dominantly clayey to silty till with interbeds of unconsolidated sand and gravel. Data indicate that these deposits are 60 feet thick. The surficial deposits can be water bearing, particularly the sand and gravel deposits present at depth.

A well drilled to 280 feet below surface at this site will penetrate the entire thickness of glacially derived surficial material and continue through an estimated 220 feet of bedrock to total depth. Maps on file at the Division of Geological Survey indicate that the Devonian-age Delaware Limestone will be the first unit encountered and only an estimated thickness of 10 feet of the unit will be present (total thickness of the Delaware Limestone is estimated at 30 feet). The Devonian-age Columbus Limestone will be the second bedrock unit encountered and will have a thickness of approximately 90 feet. Beneath the Columbus Limestone is the finely crystalline dolomite of the Silurian-age Salina Group. The Salina will not be entirely penetrated by the wells because it has a thickness of over 250 feet.

The Columbus Limestone is water bearing. The Delaware Limestone and the Salina Group dolomite may also contain water

particularly along fractures in the rock. A test well drilled 6,000 feet to the southwest of this site encountered paleokarst (caverns and solution-widened fractures) during drilling and had to be abandoned because of loss circulation problems caused by the cavern. A prior core hole had been successfully drilled very close to the failed hole, demonstrating the erratic distribution of paleokarst features in the carbonate bedrock. Similar geologic settings are found at the 4-H green building project site. This situation may prove to be troublesome for the drilling contractor and should be considered in the design and planning for a geothermal system. It would seem inevitable that some of the 72 holes to be drilled will encounter some paleokarst.

Soil and Water Conservation: The ODNR, Division of Soil & Water Conservation has no comments.

Special Flood Hazard Area: The proposed project may or may not be located in a Special Flood Hazard Area. To assist you in this determination, please contact the community's floodplain administrator. A list of community floodplain administrators can be found on the ODNR - Division of Water website at http://www.dnr.state.oh.us/water/floodpln/. To view a copy of a Flood Insurance Rate Map for your project area, you can either contact the community floodplain administrator, or obtain a copy online from the FEMA Flood Map Store at http://store.msc.fema.gov/.

ODNR appreciates the opportunity to provide these comments. Please contact Randy Sanders at 614.265.6344 if you have questions about these comments or need additional information.

Randall E. Sanders
Environmental Administrator
Division of Real Estate & Land Management
Ohio Department of Natural Resources
2045 Morse Rd, C4
Columbus, Ohio 43229-6693
614.265.6344
fax 614.267.4764
randy.sanders@dnr.state.oh.us

APPENDIX B

OHIO HISTORIC PRESERVATION OFFICE RESOURCE PROTECTION AND REVIEW LETTER

- State Historic Preservation Officer Concurrence Letter

OHIO HISTORY

October 6, 2006

Steve Blazek
NEPA Compliance Officer
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

Dear Mr. Blazek:

Re: Ohio State 4-H Green Building Project, West Lane Avenue and Fred Taylor Drive, Columbus, Ohio

This is in response to correspondence, received on August 7, 2006, regarding the above referenced project. My comments are made pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated regulations at 36 CFR Part 800.

The U.S. Department of Energy, in compliance with the National Environmental Policy Act (NEPA), will be preparing an Environmental Assessment (EA) for the Ohio State 4-H Green Building Project with Geothermal Mechanical Systems, a construction project at the corner of West Lane Avenue and Fred Taylor Drive in Columbus, Ohio. The agency seeks our comments regarding "known resources that could be affected by construction of the 4-H center" to assist in the preparation of the EA.

A check our records reveals that there are no properties included in the Ohio Historic Inventory, Ohio Archaeological Inventory, or National Register of Historic Places in the immediate vicinity of the project area. Large construction projects, including the adjacent Schottenstein Center and State Route 315, have drastically altered the setting of this area over the past several decades. As a result, the area retains very little historic integrity. Therefore, we feel that a finding of "no historic properties affected" is appropriate for this project.

If you have any questions regarding our review of this project, please contact me by phone at (614) 298-2000 or by e-mail at jcook@ohiohistory.org. Thank you for your cooperation.

Sincerely,

Justin M. Cook

Justin M. Cook, History Reviews Manager
Resource Protection and Review

Copy: Hallie J. Serazin, Senior Risk Assessment Scientist, Science Applications International Corporation, 4900 Blazer Parkway, Dublin, Ohio 43017

1007682

OHIO HISTORICAL SOCIETY
Ohio Historic Preservation Office
567 East Hudson Street, Columbus, Ohio 43211-1030 ph: 614.298.2000 fx: 614.298.2037