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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