

THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

**UNC-CH BINGHAM FACILITY
WASTEWATER SYSTEM IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT AMENDMENT**

September 4, 2012



Prepared By:

McKim & Creed, Inc.
1730 Varsity Drive, Suite 500
Raleigh, NC 27606
919-233-8091



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

ANNA A. WU, FAIA, LEED AP
UNIVERSITY ARCHITECT AND ASSISTANT
VICE CHANCELLOR FACILITIES
OPERATIONS, PLANNING AND DESIGN

103 AIRPORT DRIVE
CAMPUS BOX 1800
CHAPEL HILL, NC 27599-1800

TEL: 919-962-0761
FAX: 919-843-4567
www.fpc.unc.edu
annaw@fac.unc.edu

September 4, 2012

State Environmental Review Clearinghouse
1301 Mail Service Center
Raleigh, NC 27699-1301

Re: Bingham Facility Wastewater Treatment Facility Upgrade
The University of North Carolina at Chapel Hill

Dear Sir or Madam:

The enclosed documents consist of the Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the construction of The University of North Carolina's (UNC-CH) Bingham Facility Waste Water Treatment Facility Upgrade in Orange County, North Carolina. UNC-CH and McKim & Creed have prepared this EA and FONSI and are submitting it to the State Environmental Review Clearinghouse. Sixteen copies are included for your review. The responsible state agency is UNC-CH.

Agency Contact: Masaya Konishi, Assistant Director
UNC-CH Facilities Planning
103 Airport Dr., CB# 1090
Chapel Hill, NC 27599-1090
(919) 843-5103 (phone)
(919) 962-9103 (fax)
MKonishi@fac.unc.edu

Preparer of EA: McKim & Creed
1730 Varsity Drive, Suite 500
Raleigh, NC 27606
(919) 233-5261 (phone)
(919) 233-8031 (fax)
CRiley@mckimcreed.com

We appreciate your review of this submittal. Please contact us if you require additional information for clarification.

Sincerely,

Anna Wu, FAIA, LEED™ AP
Assistant Vice Chancellor
Facilities Operations, Planning & Design

Mary Beth Koza
Director
Environment, Health and Safety

Enclosures

cc: Masaya Konishi w/attachments

Table of Contents

1.0	Executive Summary.....	1
2.0	Proposed Project Description.....	3
3.0	Purpose and Need for the Project.....	4
4.0	Alternative Analysis.....	4
5.0	Existing Environmental Characteristics of the Study Area.....	5
5.1	Topography.....	5
5.2	Soils.....	6
5.3	Land Use.....	7
5.4	Wetlands.....	8
5.5	Prime or Unique Agricultural Lands.....	8
5.6	Public Lands and scenic, Recreational and State Natural Areas.....	8
5.7	Areas of Archaeological of Historical Value.....	8
5.8	Air Quality.....	9
5.9	Noise Levels.....	9
5.10	Water Resources (Surface Waters and Groundwater).....	9
5.11	Forest Resources.....	10
5.12	Shellfish and Fish and Their Habitats.....	11
5.13	Wildlife and Natural Vegetation.....	11
6.0	Predicted Environmental Effects of the Project.....	19
6.1	Topography.....	19
6.2	Soils.....	19
6.3	Land Use.....	19
6.4	Wetlands.....	20
6.5	Prime or Unique Agricultural Lands.....	20
6.6	Public Lands and scenic, Recreational and State Natural Areas.....	20
6.7	Areas of Archaeological of Historical Value.....	20
6.8	Air Quality.....	20
6.9	Noise Levels.....	21
6.10	Water Resources (Surface Waters and Groundwater).....	21
6.11	Forest Resources.....	21
6.12	Shellfish and Fish and Their Habitats.....	22
6.13	Wildlife and Natural Vegetation.....	22
6.14	Introduction of Toxic Substances.....	22
7.0	Mitigative Measures.....	22
8.0	References.....	23
9.0	Conclusion Statement.....	24
10.0	Exhibits.....	25
11.0	State and Federal Permits Required.....	25

1.0 Executive Summary

In 2006, an Environmental Assessment (EA) was prepared by S&ME, Inc. on behalf of The University of North Carolina at Chapel Hill (UNC-CH) for the Research Resources Facility (RRF) Expansion project located in Orange County, North Carolina. The EA was submitted to the State Environmental Review Clearinghouse on March 21, 2006 in connection with proposed development at the RRF that was to have included nine animal enclosure buildings, two office buildings, one research building, a storage building, a new potable water well and treatment system with a new pump house and an animal wastewater treatment building.

The 2006 EA was reviewed through the State Environmental Review Clearinghouse under the provisions of the North Carolina Environmental Policy Act and a Finding of No Significant Impact (FONSI) was issued on May 9, 2006.

Since the submittal of the 2006 EA, the RRF has been renamed the UNC-CH Bingham Facility.

After completion of the 2006 EA and issuance of the FONSI, the scope of the previously proposed project changed due to economic considerations and the changing needs of UNC-CH. The number of proposed buildings was reduced from the original scope to include two additional buildings (a total of three buildings at the UNC-CH Bingham Facility) for housing and care of research animals. The existing wastewater treatment system was upgraded in 2007 to include a new septic tank, effluent pump station, AdvanTex® textile media packed tertiary filter system, ultraviolet disinfection system, flow monitoring equipment, 75, 800-gallon lined effluent storage basin with spray irrigation pump station and a 2.12-acre spray irrigation system for land application of 3,556 gallons per day (GPD) of the tertiary treated wastewater. The wastewater treatment system was constructed in the southeastern section of the site and the 2.12-acre spray irrigation area was constructed in the central part of the site.

An animal wastewater treatment system was also constructed consisting of a biological nutrient removal wastewater treatment system with tertiary media filters, ultraviolet disinfection, effluent pump station, 1.58-million gallon plastic lined wet weather storage basin, irrigation pump station and a 3.33-acre spray irrigation system for land application of approximately 8,000 GPD of the treated effluent. Construction of the wet weather storage basin and the spray irrigation system was along the northern property boundary of the site as shown in the attached existing facility site map, Exhibit 1.

The proposed project area that was described in the 2006 EA included only the southern portion of the UNC-CH Bingham Facility. Possible impacts to the central and northern portions of the UNC-CH Bingham Facility property were not described in the 2006 EA.

After investigating the energy needs of the Bingham Facility, UNC-CH constructed a bulk propane storage and supply system in 2011 consisting of two (2) 18,000 gallon bulk propane

tanks. The existing propane tank farm with smaller propane tanks was insufficient to meet the heating needs of all three buildings on the campus. This system was designed and constructed in accordance requirements of the NC Department of Agriculture and NFPA 58 code requirements.

With the continuing economic down-turn, a series of technical issues with the operation of the animal wastewater treatment system and changing research needs, UNC-CH made the decision to repurpose the Bingham Facility as a dry-bedding animal holding facility. In addition, the decision was made to decommission the existing animal wastewater treatment and spray irrigation system. Also, the decision was made to refurbish the existing AdvanTex® domestic wastewater treatment system, rebuild the existing wet weather storage basin at the northern property line with structurally stable berms and a clay liner and construct a new spray irrigation system. Plans and specifications for the proposed improvements were completed by McKim & Creed in August 2011 and submitted to the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality (DWQ), Aquifer Protection Section, for permitting. The draft permit has been issued for review. A site map of the proposed facilities is included in this report, Exhibit 2.

The scope of this project is within the approximately 57-acre study area of the project considered in the original (2006) EA. The study area is located in southwestern Orange County and is generally bounded by Orange Chapel Clover Garden Road to the west and adjacent to the intersection with Millikan Road. The total project area including existing development and proposed facilities is limited to approximately 22 acres of the study area. Existing buildings are one story structures: Building 1 is approximately 9,400 square feet (sf), Building 2 is approximately 5,400 sf and Building 3, the newest building, is approximately 10,800 sf. Other structures include several storage structures, a small farmhouse, a trailer, and a well house. The facility is fenced for security, served by a gravel entrance road, and includes gravel parking areas. The scope of the proposed project will reduce the overall project footprint by approximately 3 acres by eliminating the animal wastewater treatment system and spray irrigation area.

The previous project resulted in impacts to some wetlands and a stream that were not previously identified in the 2006 EA. UNC-CH has since delineated the wetland areas and streams at the facility and as required by DWQ, has successfully implemented mitigation measures to one of these impacted wetland areas.

This EA is being submitted to the State Environmental Review Clearinghouse to update and correct inaccuracies in the 2006 EA and to include portions of the site that were not included in the 2006 EA. A copy of the 2006 EA is attached for reference.

With the reduced overall project scope, reduced wastewater treatment capacity, demolition of the existing animal wastewater treatment and spray irrigation system and updated information

on existing environmental characteristics, it is unlikely that the proposed project will have any significant impacts to the environmental resources at the site.

2.0 Proposed Project Description

The proposed project at UNC-CH Bingham Facility consists of the following wastewater treatment system improvements:

- Gravity sewer collection system improvements to deliver raw wastewater generated from all three existing buildings to the existing 8,000-gallon domestic wastewater septic tank. The effluent from the septic tank will be pumped via the existing septic tank effluent pump station to the 3,556-GPD AdvanTex® domestic wastewater treatment system.
- Refurbish the existing AdvanTex® domestic wastewater treatment system to provide secondary treatment in accordance with NCDENR 15A NCAC 02T .0500 rules and regulations for wastewater irrigation systems. The existing ultraviolet disinfection system will be removed and replaced with a chlorine contact tank and chlorine chemical feed system to meet disinfection requirements.
- A new secondary effluent pump station will be constructed to pump effluent from the AdvanTex® treatment system to the wet weather storage basin via the existing 3-inch PVC force main.
- The existing “animal” wastewater treatment system effluent upset storage basin, located adjacent to the AdvanTex® system, will be refurbished as an emergency 125,000-gallon effluent storage basin. The effluent storage basin will be interconnected with the proposed secondary effluent pump station to pump effluent from the basin to the wet weather storage basin.
- The 1.58-million gallon (MG) wet weather storage basin for the existing animal wastewater treatment system will be reconstructed to repair the structurally unstable earthen embankments and reconfigured for a wet weather storage capacity of 936,000 gallons. The basin will be constructed with a cement stabilized compacted clay liner to replace the existing damaged synthetic liner.
- The existing irrigation pump station will be refurbished with new irrigation pumps, piping, valves, and electrical equipment to pump to the new spray irrigation system.
- Construct a new low-rate secondary effluent spray irrigation system consisting of four (4) separate spray irrigation zones with a total of approximately 5.7 acres of irrigation area. The spray irrigation system will be designed for dispersal of an average of 3,556 GPD of secondary effluent.
- Decommission the existing animal wastewater treatment system and spray irrigation system.

With repurposing of the facility to a dry-bedding animal holding operation, the primary sources of wastewater generated at the facility will be from the personnel working at the facility and the cage and rack washer for cleaning of cages, racks, debris pans, and miscellaneous items used in

the care of laboratory animals; therefore, the wastewater will be typical domestic strength wastewater. Wastewater sources include toilets, dishwasher, laundry washers and showers. Other sources include an animal cage washer, holding room wash-down, wet lab sinks, spent brine from softener systems and small amounts of boiler blow-down water. Design influent wastewater characteristics are as follows: 250 milligrams/liter (mg/L), Carbonaceous Biochemical Oxygen Demand (CBOD), 200 mg/L total suspended solids (TSS), 40 mg/L Total Kjeldahl Nitrogen (TKN). The AdvanTex® wastewater treatment system is designed to provide effluent quality meeting the limits established by 15A NCAC 02T .0500 rules: 30 mg/L CBOD, 30 mg/L TSS, 15 mg/L ammonia, and 200 Fecal Coliform per 100 ml sample with chlorine disinfection of the effluent.

3.0 Purpose and Need for the Project

The UNC-CH Bingham Facility provides the needed space and facilities for housing and caring for animals used in medical research at UNC-CH. This research is critical, involving significant external funding. Space is limited on the main campus, and the Bingham Facility provides a necessary and convenient off-site location to Chapel Hill (approximately 15 miles from Chapel Hill) in a rural agricultural setting. The UNC-CH Bingham Facility also provides additional space for staff including researchers, students and animal care personnel.

4.0 Alternatives Analysis

With the repurposing initiative at the UNC-CH Bingham Facility to dry-bedding approaches to minimize or eliminate animal wastewater, the proposed project reduces wastewater treatment capacity and disposal requirements, potable water consumption and potential environmental impacts. Decommissioning the existing animal wastewater treatment and spray irrigation system reduces the footprint of the facility on the site providing approximately 3.0 acres of additional land area that can be restored to natural conditions. With the decommissioning and removal of the existing animal wastewater treatment system, the existing land area will be restored by backfilling, grading, and reseeded with a native seed mix. In addition, it does not reduce the existing capacity of the facility for housing and care of research animals.

Closing the Facility Alternative

UNC-CH has made a significant investment in the Bingham Facility and the alternative of closing the facility leaves the University with the problem of locating and developing other sites to provide needed animal housing and care facilities. If the proposed alternative is not implemented, then the UNC-CH Bingham Facility will need to be closed. This is not a viable alternative.

No Action Alternative

The take no action alternative is not a viable alternative. It does not allow for combining the wastewater streams from the existing buildings to be treated in the existing AdvanTex® wastewater treatment system, and it does not allow for refurbishing the wastewater treatment system including the AdvanTex® system, the failing wet weather storage basin, and the provision of adequate spray irrigation facilities. This alternative leaves in place the existing animal wastewater treatment system which provides no benefit for site restoration and creates problems with safety at the site as well as aesthetic issues.

Based on this brief alternatives analysis the proposed project offers the best alternative to serve the needs of UNC-CH as well as to reduce potential environment impacts. Redesigning and upgrading the existing wastewater treatment system is the least environmentally damaging practicable alternative for the site.

5.0 Existing Environmental Characteristics of the Study Area

5.1 Topography

The subject site is located in the southwestern portion of Orange County, within the North Central Piedmont physiographic region and is comprised primarily of broad, gently rolling hills. Elevation within the county ranges from 230 feet on the floodplains of Morgan Creek in the southeastern portion of the county, to undulating terrain at 700 to 800 feet above mean sea level in the northern part of the county. At 860 feet, Occoneeche Mountain in Hillsborough is the highest point in the county. Within the subject site, the topographic high point of approximately 520 feet is located at the western edge of the property, along Orange Chapel Clover Garden Road. The on-site topographic low of approximately 470 feet is located at the southeastern edge of the property, in the vicinity of the confluence of the two on-site natural drainage channels.

Within the project area footprint, elevations range from approximately 520 feet at the western edge, to approximately 490 feet at the northern edge. Overall, the surface slope of the project area dips to the east toward Collins Creek. The project area is depicted on the White Cross, NC USGS Topographic Map, Exhibit 3.

A review of the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Map (FIRM) panel number 9728 K and the adjacent panel 9738 J, revised February 2, 2007, indicates that no portion of the study area is within the 100-year floodplain. The nearest downstream floodplain has a reported base flood elevation of 468 feet nearest the study area, Exhibit 4.

5.2 Soils

Based on review of the USDA publication Soil Survey of Orange County (1977), the project area is located within the Georgeville-Herndon-Tatum general soil association map unit, Exhibit 5. This map unit consists of gently sloping to moderately steep, well-drained soils that have a surface layer of silt loam and a subsoil of clay loam, silty clay, and clay. The soils located within the project area are mapped as Georgeville silt loam, 2 to 6 percent slopes; Georgeville silt loam, 6 to 10 percent slopes; Chewacla loam; Herndon silt loam, 2 to 6 percent slopes; Herndon silt loam, 6 to 10 percent slopes; and Tatum silt loam, 8 to 15 percent slopes. These soil map units are further described as follows:

- Georgeville silt loam, 2 to 6 percent slopes (Gem) and 6 to 10 percent slopes (GeC):
Clayey, kaolinitic, thermic Typic Hapludults
Georgeville silt loam is generally found on broad sloping ridges in the Piedmont. The soil is well-drained, with moderate permeability, and is generally acidic. Cleared areas mapped as Georgeville soil are used primarily for growing corn, soybeans, tobacco, and small grains. On the subject property, Georgeville soils are the predominant soil type. This soil map unit is found on upland areas in the central, western, and northern portions of the subject property, including the area occupied by the existing facilities.
- Chewacla loam (Ch):
Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Chewacla soils are typically found in floodplains along streams and are poorly drained. These soils, although not typically hydric, may have hydric inclusions in depressional areas. On the subject property, these soils are found as narrow strips bordering the two drainage features located on the subject property.
- Herndon silt loam, 2 to 6 percent slopes (HrB) and 6 to 10 percent slopes (HrC):
Clayey kaolinitic, thermic Typic Hapludults
Herndon silt loam is a well-drained, moderately permeable, soil typically found on broad upland ridges. This soil is acidic, and cleared areas throughout its range are primarily used to cultivate agricultural crops including corn, soybeans, tobacco, and small grains. On the subject property, this soil type is found along a narrow strip in the eastern portion of the property.
- Tatum silt loam, 8 to 15 percent slopes (TaD):
Clayey, mixed, thermic Typic Hapludults
Tatum silt loam is typically found on long, narrow, upland side slopes. This soil is characterized as well-drained, and moderately permeable, and is generally acidic. Land mapped as TaD is primarily occupied by pasture or woodland throughout its range. On the subject property, this soil type is restricted to a narrow strip along the western property boundary, paralleling Orange Chapel Clover Garden Road.

Additional soils and site investigations completed by Soil, Water & Environment Group (SWE), Exhibit 5, generally support the soil information presented in the 2006 EA. SWE identified Georgeville and Herndon soils in the proposed spray irrigation areas.

5.3 Land Use

Orange County is located in north-central North Carolina, and has a total area of 400 square miles. The population of Orange County is approximately 117,515. The closest towns to the project site are Carrboro to the east and Chapel Hill to the northeast. The population of Carrboro is approximately 16,782, and the town occupies an area of 4.5 square miles. The population of Chapel Hill is 49,301, and the area of the town is 20 square miles. UNC-CH, the first state university in the United States, is located there and was established in 1789. More than 27,000 students attend UNC-CH, and university faculty number more than 3,100.

The study area consists of approximately 57 acres owned by UNC-CH. The majority of the site, encompassing approximately 42 acres, is wooded with mature pine and hardwood species. An interface of younger tree species borders the mature woodland and maintained areas.

Approximately seven acres of the overall site are currently occupied by existing facilities, and consist of pastureland or maintained lawn area. Only one research building was present on site when the 2006 EA was written. At this time there are three existing one-story research buildings that are approximately 10,800 sf, 5,400sf and 9,400 sf. Two 18,000 gallon bulk propane storage tanks have been added to the site. The incinerator located adjacent to Building 1 has been decommissioned and removed from the site.

The area along Orange Chapel Clover Garden Road is no longer used for agricultural purposes. A portion of the project area is fenced as pasture, and contains three heated shelters. Several storage buildings, an unoccupied farmhouse and a trailer once used as a residence by an employee of the facility, but are no longer used for this purpose, are also located on site. The proposed project area encompasses approximately ten acres of the overall site, consisting primarily of maintained lawn, and also including less than three acres of the adjacent woods to the north of the existing facilities. The remaining eight acres, along Orange Chapel Clover Garden Road, are cleared. Land use in the vicinity of the subject property consists primarily of woodland, pastureland and widely scattered residential development. The subject property is bounded on all sides by woodland or farm field.

The study area is located in the Bingham township but is not within a municipality and is zoned AR (agricultural residential). The purpose of the agricultural residential designation is to preserve land suitable for agricultural, silvicultural or horticultural uses.

5.4 Wetlands

An onsite wetlands assessment completed by Biohabitats, Inc. in 2010, indicated the presence of wetlands near streams within the study area, Exhibit 7. Past construction activities resulted in wetland impacts within the study area. These impacts were mitigated under the guidance of Biohabitats, Inc. and are described in detail, Exhibit 8. UNC-CH received “After the Fact” approval for wetland impacts on June 25, 2010 (DWQ Project # 10-0451) and authorization from the US Army Corps of Engineers (Action ID SAW-2010-00812) May 28, 2010.

5.5 Prime or Unique Agricultural Lands

According to the list of Important Farmlands of North Carolina (1998), the following soils are classified as Prime Farmland or Farmlands of Statewide Importance:

- Georgeville silt loam: 2 to 6 percent slopes = Prime Farmland soil
6 to 10 percent slopes = Farmland of Statewide Importance
- Chewacla loam: Prime farm land soil
- Herndon silt loam: 2 to 6 percent slopes = Prime Farmland Soil
6 to 10 percent slopes = Farmland of Statewide Importance
- Tatum silt loam: 8 to 15 percent slopes = Farmland of Statewide Importance

The proposed project area is located within the Georgeville silt loam and Herndon soil mapping units. The majority of soil impacts will occur on Georgeville silt loam. The area to be impacted is previously developed with the existing facilities and is not currently used for agricultural purposes. The Herndon soil will be impacted in a small area as part of the upgrade. This use will not change as part of the *Proposed Action*, and no land will be taken out of production as a result of the proposed project.

5.6 Public Lands and Scenic, Recreational and State Natural Areas

The proposed project will occur on land owned by UNC-CH. No part of the project is on or adjacent to formally designated parkland, scenic or recreational areas or state natural areas.

The closest property to the project that may be considered scenic or natural is the Kuenzler Wildlife Habitat Preserve (Orange County Tax PIN 9738341332), which is located approximately 2,500 linear feet east of the Bingham Facility. The proposed project will have no impact on the Kuenzler Wildlife Habitat Preserve.

5.7 Areas of Archaeological or Historical Value

Review of the North Carolina State Historic Preservation Office’s GIS web service indicates that there are no sites of historical value within the study area, Exhibit 9. The web service does not

include archaeological data at this time. The State Historic Preservation Office (SHPO) was contacted in 2006 as part of the Clearinghouse review for comments on the proposed project. The SHPO review of the proposed project resulted in no comments on impacts to sites of archaeological or historical value, Exhibit 10.

5.8 Air Quality

Air quality in Orange County is subject to the federal National Ambient Air Quality Standards (NAAQS), which are enforced by the North Carolina Division of Air Quality (NCDAQ) through an agreement with the Environmental Protection Agency (EPA). The NCDAQ is responsible for conducting inspections and investigating air pollution complaints. Orange County is in EPA Region IV, and is classified as a "Non-Attainment Area" for the 8-Hour ozone level based on the NAAQS, indicating that the county is in non-compliance. Orange County is grouped with seven other North Carolina counties in the Triangle region. This area must submit a State Implementation Plan (SIP) by June 2007. The SIP must outline how the Triangle region will achieve attainment status for NAAQS by June 2009.

The air permit at the time the 2006 EA was written listed the regulated emissions source for the facility as an incinerator, which has since been decommissioned and removed from the site. The current air permit (Air Permit Number 03036R14) includes four diesel-fired emergency generators. Three of the emergency generators are listed as insignificant/exempt activities. There are eight boilers at the site which are also listed as insignificant/exempt activities. No previous odor problems or complaints related to emissions from existing facilities on the site were identified. No open burning is expected to take place during the proposed construction or during normal operation after construction.

5.9 Noise Levels

The primary source of noise in the vicinity of the study area is expected to result from traffic on nearby roads including Old Greensboro Road (to the south), Millikan Road (to the west) and along Orange Chapel Clover Garden Road (also to the west). The noise levels at the site are typical for a largely undeveloped rural area, and the proposed project will not cause the noise levels at the site to rise. Animals on site are housed indoors to reduce negative noise impacts to neighboring properties, but some dogs are allowed to exercise in outdoor runs, their barking does not exceed noise levels allowed under Orange County rules.

5.10 Water Resources (Surface Waters and Groundwater)

The portion of Orange County in which the project area is located lies within the Cape Fear River Basin. The basin discharges southeast from the north central piedmont region near Greensboro to the Atlantic Ocean near Wilmington. The Cape Fear River is formed at the confluence of the Haw and Deep Rivers on the border of Chatham and Lee counties.

The project site is located in the Cape Fear River Subbasin 03-06-04. This sub-basin contains the lower reaches of the Haw River, and is located within the Carolina Slate Belt. Tributaries within the sub-basin are characterized by large boulder and/or rime areas, which are prone to low flow conditions during drier months. Land use within the sub-basin is largely forested or agricultural pasture, cultivated crops and urban land uses. Large numbers of registered livestock and animal operations are also present within the sub-basin. Land use within the sub-basin is increasingly urban.

The site is drained by two unnamed tributaries that eventually flow south towards Collins Creek. DWQ's Classification Index No. for the portion of Collins Creek nearest the subject property is 16-30-(0.5). The portion of Collins Creek nearest the study area is classified as WS-V, NSW. The WS-V classification provides the lowest level of protection for water supply watersheds. The NSW supplemental classification is added for areas where additional nutrient management is needed to discourage excessive growth of microscopic or macroscopic vegetation. Nearest the study area, Collins Creek is listed as Not Rated because of significant violations at a community wastewater treatment plant that may have adversely affected aquatic sampling results. Downstream of the study area, Collins Creek is designated on the state's 303(d) list of impaired waters for nutrient sensitivity.

The area of Orange County where the study area is located is subject to the Jordan Lake Nutrient Management Strategy (Jordan Rules) which "aims to restore and maintain water quality, protects the lake's classified used and maintain or enhance protections currently implemented by local governments in existing water supply watersheds." The Jordan Rules regulate wastewater discharge, agriculture, fertilizer management, stormwater (for new and existing development) and riparian buffers within the Jordan watershed. Per the Jordan Rules, a 50-foot riparian buffer is required on all surface waters.

Climate in Orange County and the surrounding area is generally temperate. Average yearly rainfall in Orange County is 41 inches. The daily temperature has average minima and maxima ranging from 29 to 88 degrees Fahrenheit.

5.11 Forest Resources

Approximately 42 acres of the 57-acre study area are wooded. The adjacent wooded areas are comprised of mature and mid-stage hardwood and pine species ranging from 12 to 15 inches in diameter at breast height (dbh). A portion of this wooded area will be cleared to accommodate the proposed facility expansion. Canopy species in the upland portions of the wooded area included tulip tree (*Liriodendron Tulipifera*), loblolly pine (*Pinus taeda*), and white oak (*Quercus alba*) in the canopy, with a subcanopy of Eastern red cedar (*Juniperus virginiana*) and sourwood (*Oxydendrum arboreum*). Canopy vegetation in areas of lower topographic position in the study area consisted of sycamore (*Platanus occidentalis*), hackberry (*Celtis laevigata*), sweetgum

(*Liquidambar styraciflua*), and red maple (*Acer rubrum*). The subcanopy in these areas was dominated by American holly (*Ilex opaca*).

5.12 Shellfish and Fish and Their Habitats

There are two streams located in the study area. One, an unnamed tributary of Collins Creek, is located in the wooded portion of the site east of the project area. A second stream, a first-order channel draining to the unnamed tributary or Collins Creek, is located in the wooded area north of the project site.

Fish species common to creeks and streams in Orange County include rosyside dace (*Clinostomus funduloides*), white shiner (*Luxilus albeolus*), blue head chub (*Gila coerulea*), White mouth shiner (*Notropis alborus*), highfin shiner (*N. altipinnis*), creek chub (*Semotilus atromaculatus*), silver redhorse (*Moxostoma anisurum*), smallfin redhorse (*M. robustum*), margined madtom (*Noturus insignis*), pirate perch (*Aphredoderus sayanus*), redbreast sunfish (*Lepomis auritus*), pumpkinseed (*L. gibbosus*), bluegill (*L. macrochirus*), largemouth bass (*Micropeterus salmoides*), and tessellated darter (*Etheostoma olmstedii*).

5.13 Wildlife and Natural Vegetation

Currently, the 57-acre study area consists of approximately seven acres of previously developed area occupied by the existing facility, eight acres of agricultural fields, and approximately 42 acres of wooded area. The project area is adjacent to and includes approximately three acres of wooded area, comprised of mature and mid-stage hardwood and pine species ranging from 12 to 20 inches in diameter at breast height (dbh). As described in Section 5.11, above, canopy species in the upland portions of the wooded area included tulip tree, loblolly pine, and white oak in the canopy, with a subcanopy of Eastern red cedar and sourwood. Canopy vegetation in areas of lower topographic position in the study area consisted of sycamore, hackberry, sweetgum, and red maple. The subcanopy in these areas was dominated by American holly with a shrub layer of coralberry (*Symphoricarpos orbiculatus*). Herbaceous species observed on the date of the field investigation included wild ginger (*Hexastylis arifolia*), running pine (*Lycopodium flabelliforme*), Japanese honeysuckle (*Lonicera japonica*), Japanese bamboo grass (*Microstegium vimineum*), crane fly orchid (*Tipularia discolor*), ebony spleenwort (*Asplenium platyneuron*), chickweed (*Stellaria media*) and Christmas fern (*Polystichum acrostichiodes*). Presented below is a list of species observed within the study area, categorized with respect to habitat.

Table 1: Summary of Observed Vegetation

Common Name	Scientific Name
Wooded Area	
American beech	<i>Fagus grandifolia</i>
American holly	<i>Ilex opaca</i>
Bamboo grass	<i>Microstegium vimineum</i>
Carolina jessamine	<i>Gelsemium sempervirens</i>
Chickweed	<i>Stellaria media</i>
Christmas fern	<i>Polystichum acrostichoides</i>
Coralberry	<i>Symphoricarpos orbiculara</i>
Cranefly orchid	<i>Tipularia discolor</i>
Eastern red cedar	<i>Juniperus virginiana</i>
Ebony spleenwort	<i>Asplenium platyneuron</i>
Greenbrier	<i>Smilax rotundifolia</i>
Hackberry	<i>Celtis laevigata</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Loblolly pine	<i>Pinus laeda</i>
Northern red oak	<i>Quercus rubra</i>
Poison ivy	<i>Toxicodendron radicans</i>
Red maple	<i>Acer rubrum</i>
Running pine	<i>Lycopodium flabelliforme</i>
Scrub pine	<i>Pinus virginiana</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Sourwood	<i>Oxydendrum arboreum</i>
Sycamore	<i>Platanus occidentalis</i>
Tulip-tree	<i>Liriodendron tulipifera</i>
White oak	<i>Quercus alba</i>
Wild ginger	<i>Hexastylis arifolia</i>
Willow oak	<i>Quercus phellos</i>
Maintained Areas	
Bermuda grass	<i>Cynodon dactylon</i>
Bittercress	<i>Cardamine hirsuta</i>
Chickweed	<i>Stellaria media</i>
Crabgrass	<i>Digitaria sanguinalis</i>
Five-fingers	<i>Potentilla quinquefolia</i>
Rabbit tobacco	<i>Gnaphalium obtusifolium</i>

Wildlife observed during the field review included white-tail deer (*Odocoileus virginianus*), downy woodpecker (*Picoides pubescens*), Northern cardinal (*Cardinalis cardinalis*), and Carolina chickadee (*Poecile carolinensis*). Other wildlife likely to be found living in the study area or using

the site and surrounding areas for food procurement or as a travel corridor may include: gray squirrel (*Sciurus carolinensis*), raccoon (*Procyon lotor*) and opossum (*Didelphis virginiana*).

Amphibian species that might be expected to be found within the impact area include American toad (*Bufo americanus*), Fowler's toad (*B. woodhousei*) and green frog (*Rana clamitans*). Reptilian species common to the area include the copperhead (*Agkistrodon contortrix*), black rat snake (*Elaphe obsoleta*), Eastern garter snake (*Thamnophis sirtalis*), five-lined skink (*Eumeces fasciatus*) and Eastern box turtle (*Terrapene carolina*).

The (NCDENR Natural Heritage Program (NCNHP) database website and the U.S. Fish & Wildlife Service (USFWS) Endangered Species website were consulted regarding current Federally listed Threatened and Endangered Species within Orange County. These two sources identified records of two birds, nine mollusks, and three vascular plants documented within Orange County. Of these 14 species, five are federally listed. These federally listed species include two bird species, the bald eagle (*Haliaeetus leucocephalus*) and the red-cockaded woodpecker (*Picoides borealis*); one species of freshwater mussel, the dwarf wedgemussel (*Alasmidonta heterodon*); and two species of vascular plants, smooth coneflower (*Echinacea laevigata*) and Michaux's sumac (*Rhus michauxii*).

In addition to the five federally-listed species referenced above, additional species protected by the State of North Carolina were further identified through the NCNHP database search. The state-listed species include an additional eight species of mollusks: the Triangle floater (*Alasmidonta undulata*), the brook floater (*Alasmidonta varicosa*), the Atlantic pigtoe (*Fusconaia masoni*), the yellow lampmussel (*Lampsilis cariosa*), the Carolina fatmucket (*Lampsilis radiata conspicua*), the green floater (*Lasmigona subviridis*), the creeper (*Strophitus undulatus*) and the Savannah lilliput (*Taxolasma pullus*) and one species of vascular plant, prairie blue wild indigo (*Baptisia minor*). The listed species along with the respective protected status of each are summarized in Table 2 below. Explanations of federal and state rankings are provided at the end of the table.

Table 2: Protected Species Summary

Species	State Status	Federal Status	White Cross Quad Status
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	T	T,PD	No Record
Red-cockaded Woodpecker (<i>Picoides borealis</i>)	E	E	No Record
Dwarf Wedgemussel (<i>Alasmidonta heterodon</i>)	E	E	No Record
Triangle Floater (<i>Alasmidonta undulata</i>)	T	-	-
Brook Floater (<i>Alasmidonta varicosa</i>)	E	FSC	-
Atlantic Pigtoe (<i>Fusconaia masoni</i>)	E	FSC	-
Yellow Lampmussel (<i>Lampsilis cariosa</i>)	E	FSC	-
Carolina fatmucket (<i>Lampsilis radiata conspicua</i>)	T	-	-
Green Floater (<i>Lasmigona subviridis</i>)	E	FSC	-
Creeper (<i>Strophitus undulatus</i>)	T	-	-
Savannah Lilliput (<i>Toxolasma pullus</i>)	E	FSC	-
Prairie Blue Wild Indigo (<i>Baptisia minor var. aberrans</i>)	T	-	Obscure
Smooth Coneflower (<i>Echinacea laevigata</i>)	E-SC	E	No Record
Michaux's Sumac (<i>Rhus michauxii</i>)	E-SC	E	No Record
T - Threatened, E -Endangered, SC -Species of Concern, PD -Proposed De-listed			

A pedestrian survey was initially performed in March 2003 for federally listed species and suitable habitats within the study area with a follow-up field review performed during the month of February 2006. Following are brief descriptions of the species listed above, and the results of the pedestrian field reviews.

Bald eagle (*Haliaeetus leucocephalus*) - Federally Listed Threatened, State Listed Threatened

The bald eagle is a large raptor with a wingspan of approximately seven feet. Adult individuals of this species have a mainly dark brown plumage with a solid white head and tail. The bald eagle develops adult plumage in the fifth or sixth year. Juveniles of the species exhibit a chocolate brown to blackish plumage with occasional occurrences of white mottling on the tail, belly, and underwings. The bald eagle's primary diet consists of fish. However, it will feed on birds, mammals, and turtles when fish are not available.

The bald eagle's primary habitat is undisturbed riparian zones including coastal, river, and lakeshore areas. Bald eagle nest sites within the southeast are usually located in living pine or cypress trees along large bodies of water. Nest sites are often located in the largest living trees within the area commanding an open view of the surrounding terrain. Nest sites are generally located within one-half mile of open water with a clear flight path leading to the water. There

are no known nesting locations of the bald eagle in the study area, or in the area encompassed by the White Cross USGS Quadrangle.

The proposed project is not located near, nor will it impact large bodies of water. Additionally, the proposed project will be largely located in a disturbed maintained lawn and will not involve the removal of large trees that may be considered nesting sites for the bald eagle. The proposed project is not anticipated to result in adverse impacts to the bald eagle or its preferred habitat.

Red-cockaded woodpecker (*Picoides borealis*) - Federally Listed Endangered, State Listed Endangered

The red-cockaded woodpecker is a black and white bird measuring approximately seven inches long. The bird displays black and white horizontal stripes on its back. The cheeks and underparts are white and the sides are streaked in black. The cap and stripe on the throat and neck of the bird are black. Male individuals of the species have a small red spot on each side of the black cap and display a red crown patch after the first post-fledgling molt. The woodpecker's diet consists primarily of insects and seasonal wild fruit.

The red-cockaded woodpecker's range is closely linked to the distribution of southern pines. Loblolly and longleaf pines that are 60 years old or older are generally selected for nesting sites. However, other species of southern pines may also be used for nesting. Preferred nesting sites generally include relatively open, mature pine stands with an undeveloped or low understory layer. Foraging habitat is frequently limited to pine or pine-hardwood stands that are 30 years or older, with a preference for pine trees with a diameter of 10 inches or larger. The USFWS indicates that the maximum foraging range for the red-cockaded woodpecker is approximately one-half mile.

The site does not contain suitable nesting and foraging habitat for the red-cockaded woodpecker. There are no relatively open pine stands with an undeveloped or low understory located within the project site. Red-cockaded woodpecker is listed as an historic record for Orange County, indicating that it has not been observed here in at least 20 years. Accordingly, the proposed project is not anticipated to adversely impact this species or its preferred habitat.

Dwarf Wedgemussel (*Alasmodonta undulata*) - Federally Listed Endangered, State Listed Endangered

The Dwarf Wedgemussel is a small, freshwater mussel, rarely exceeding 45 mm in length. Young shells are usually greenish-brown. As the animal ages, the shell color becomes obscured by mineral deposits and appears black or brown. The shell is generally thin, but thickens slightly with age. The lateral teeth are the most distinctive shell characteristic of the dwarf wedgemussel. There are two lateral teeth in the right valve and one in the left valve, as opposed to the typical arrangement for most freshwater mussel species, which generally display two lateral teeth in the left valve and one in the right valve. The species has a white foot. Dwarf wedgemussels are found in large rivers and small streams. They are often burrowed into

clay banks among the root systems of trees. Landscape in areas occupied by the mussel is largely wooded, with trees near the stream being relatively mature and tending to form a shaded area over smaller streams, creeks, and headwater river habitats. Additionally, water quality must be good to excellent to support the dwarf wedgemussel. The maximum age for the dwarf wedgemussel is around 12 years.

Triangle Floater (*Alasmidonta undulata*) - State Listed Threatened

The outer surface of the shell of this freshwater mussel is yellow to golden brown with dark rays. The inner surface of the shell is bluish white. This species exhibits no particular habitat preference and has been collected from a variety of stream substrates. Known locations of this species occur within the Eno River sub-basin in Orange County.

Brook Floater (*Alasmidonta varicosa*) - State Listed Endangered

This mussel has a small, thin, rhomboidal shaped shell that rarely exceeds 70 mm in length, 40 mm in height and 30 mm in width. The outside of the shell is yellowish or brownish with numerous dark green or black rays. The inside of the shell is glossy, bluish white. This species has a bright orange foot, and inhabits medium size streams and rivers. It prefers clean, swift flowing waters with stable gravel, or sand and gravel substrates.

Atlantic Pigtoe (*Fusconaia masoni*) - State Listed Endangered

The Atlantic pigtoe is a freshwater mussel displaying a medium, sub-rhomboid shaped shell that rarely exceeds 60 mm in length. The exterior of the shell is generally a yellowish brown or greenish brown with a parchment-like texture. The interior of the shell is somewhat shiny and can be white, salmon, orange or iridescent blue. As with the brook floater, the Atlantic pigtoe usually inhabits medium to large streams, preferring clean, swift waters with stable gravel or sand. In general, the mussels are found at the downstream edge of riffle areas.

Yellow Lampmussel (*Lampsilis cariosa*) - State Listed Endangered

The yellow lampmussel has a smooth, shiny exterior that is usually yellow with some brownish freckling or patches. Over half of the shell is rayed. Females display a short, high shape while males are longer and elliptical. Shells of adults may reach 130 mm in length. The interior of the shell is usually white to bluish white. The yellow lampmussel can be found in a variety of habitats. Studies appear to indicate that the mussel prefers the sands downstream of large boulders in fast flowing, medium sized rivers and medium to large creeks.

Carolina fatmucket (*Lampsilis radiata conspicua*) - State Listed Threatened

The outer surface of the shell of this mussel is reddish-brown with dark greenish-black rays. The inner surface of the shell is an iridescent salmon color. There are two lateral teeth on the left valve and one on the right. Additionally, there are two pseudocardinal teeth on each valve. The Carolina fatmucket is most often found in gravel, cobble or boulder substrates, and also in impounded habitats. In Orange County, this mussel is known from the Eno River sub-basin.

Green Floater (*Lasmigona subviridis*) - State Listed Endangered

The green floater is a small mussel, with the adults usually less than 55 mm in length. Shells are thin and trapezoidal in shape. The exterior of the shell varies from dull yellow to brownish green. Numerous dark green rays may be visible on the shell, especially in young specimens. The interior of the shell is white with some blue. In many specimens, yellow or salmon blotches occur in the inside of the shell, both centrally and near the beak cavity. Hinge teeth are moderately developed but very delicate, and the lateral teeth may be incomplete or indistinct. The left valve has two long, straight, thin, lateral teeth. The right valve has one lateral tooth. The green floater is most often found in small to medium size streams in quiet pools and eddies with gravel and sand substrate because it is intolerant of strong currents. The green floater is associated with good to excellent water quality. This species is documented in the Eno River subbasin in Orange County.

Creepers (*Strophitus undulatus*) - State Listed Threatened

The creeper, also called the squawfoot, is a thin, fragile freshwater mussel that may reach over 100 mm in length. It is generally smooth and shiny. The color may range from yellowish to dark brown. Green rays may extend over the entire surface of the shell, and the interior of the shell may be extensively salmon-colored. This species prefers silt, sand, gravel and mixed substrates. It has been found in small streams and large rivers and lakes to a depth of four meters.

Savannah Lilliput (*Toxolasma pullus*) - State Listed Endangered

This mussel has a small oval or elliptical shell. A large specimen would measure 35 mm in length, 20 mm in height and 16 mm wide. The exterior has a coarse, satiny texture because of the numerous, closely spaced growth lines. The exterior of the shell is generally blackish in color but can be brownish, greenish, or olive with obscure, very fine green rays. The interior of the shell is bluish white with a pink to purplish iridescence at the posterior end. This species is found in creeks, rivers, and impounded habitats. It is typically found in sand, silty-sand or mud substrate. It prefers to be near the shore in still, shallow water.

Smooth coneflower (*Echinacea laevigata*) - Federally Listed Endangered, State Listed Endangered

Smooth coneflower is a perennial herb that generally grows up to 1.5 meters in height. The stems are smooth and the leaves are sparse. The flowers are light pink to purplish, usually drooping, and five to eight centimeters long, and the flower heads are usually solitary. The plant flowers from May through July. The habitat of smooth coneflower is open woods, cedar barrens, roadsides, clear-cuts, dry limestone bluffs and power line R/W, usually on magnesium- and calcium-rich soils. The preferred sites are characterized by abundant sunlight and little competition in the herbaceous layer. This plant is listed as a historic record for Orange County, indicating that it has not been observed here in at least the past 20 years.

The edge habitat around the wooded area was reviewed for the presence of this plant. The frequent maintenance and densely grassed area of the immediate proposed project site do not provide suitable habitat for the smooth coneflower. No individuals of smooth coneflower were

observed during field review, and it is unlikely that this plant occurs within the study area. Accordingly, the proposed project is not anticipated to adversely impact this species.

Michaux's sumac (*Rhus michauxii*) - Federally Listed Endangered, State Listed Endangered

Michaux's sumac is a densely hairy shrub with erect stems ranging from one to three feet in height. The shrub's compound leaves are narrowly winged at their base, dull on their tops, veiny and slightly hairy on their bottoms. Each leaf is finely toothed on its edges. Flowers are greenish-yellow to white and are four to five parted. Each plant is unisexual. The plant flowers from April to June; its fruit, a dull red drupe, is produced in October and November.

The plant grows in sandy or rocky open woods in association with basic soils. This plant survives best in areas where some form of disturbance has provided an open area. This plant is listed as a historic record for Orange County, indicating that it has not been observed here in at least the past 20 years.

No individuals of this species were observed during the field review. Additionally, Michaux's sumac has not been documented in the area encompassed by the White Cross, NC USGS Quadrangle. The immediate project area, which is disturbed and frequently maintained, does not provide suitable habitat for this species and it is not anticipated that the proposed project will adversely impact Michaux's sumac or its preferred habitat.

Prairie Blue Wild indigo (*Baptisia minor*) - State Listed Threatened

Prairie wild blue indigo is a rhizomatous, perennial herb with glabrous, and often glaucous stems. The leaves are generally three-foliate. The plant produces deep blue to violet flowers in April to May, and paper-like legumes from June through August. Prairie blue wild indigo is often found along woodland borders and open areas, frequently over mafic soils.

Although the project site borders a wooded area, the project area is maintained by frequent mowing up to the edge of the wooded area, leaving little potential habitat for this species in the study area. The immediate project area is frequently maintained and does not provide suitable habitat for this species.

Based on literature review, our habitat assessment, and a pedestrian field review, it is our opinion that the study area does not provide suitable habitat for federally or state protected species known to occur within Orange County. Pedestrian field review of the site did not reveal the presence of federal or state listed terrestrial species in the study area. In addition to the literature and field review, the NCNHP and USFWS were contacted regarding comments that each agency may have in response to the proposed project. In a letter dated March 13, 2006, the NCNHP responded that " ... there are no records of significant natural communities or significant natural heritage areas at the site nor within a mile of the project area." The letter additionally noted that there is a current record of the State Endangered Brook floater from

Collins Creek. NCNHP encouraged the use of proper sedimentation controls to minimize potential impacts from sediment entering Collins Creek.

6.0 Predicted Environmental Effects of the Project

6.1 Topography

The proposed project will not result in significant changes to the existing topography of the site. It is proposed to reconstruct portions of the existing berm around the wet weather storage basin by using suitable fill material and compaction of the fill material in lifts to insure the structural integrity of the embankments. The side slopes of the basins will be changed to 3:1 slopes to minimize erosion, and a suitable clay liner will be provided to prevent erosion of the side slopes and to provide a barrier to infiltration and seepage. Reconstruction of the proposed wet weather storage basin and the supplemental effluent storage basin will not impact delineated wetlands or streams or encroach on flood plains. Utilization of proper erosion and sediment control measures will prevent impacts to delineated wetlands and surface waters during construction activities.

6.2 Soils

Refer to Section 5.2 above for descriptions and locations of various soil types on the site. The proposed project will not likely result in the removal of soil from the property. In the event that unsuitable material is encountered during construction, the material will be removed from the property and properly disposed of at an off-site location. Stabilization and runoff control mechanisms that adequately account for increased erosion during construction and in periods immediately following will be employed. With the decommissioning of the existing animal wastewater treatment system, some of the unsuitable construction soils found on site can be utilized as backfill material in the holes from removal of this equipment. It may be necessary for the contractor to haul in additional fill material for this purpose and to restore the natural grades of the site. Areas disturbed during construction will be properly protected and stabilized to prevent sediment from impacting wetlands and surface waters. The proposed project will not result in impacts to on-site soils.

6.3 Land Use

The proposed project will not significantly alter existing land use in the project area or require changes to existing land use plans. The proposed project will increase the area of restored natural land at the site by about 0.2 acres due to demolition of the existing animal wastewater treatment system. After demolition of the animal wastewater treatment system, the site will be backfilled, graded and seeded with a native seed mix. The proposed new spray irrigation system will utilize an additional 5 acres of land, but this land is not reserved for any specific land use.

6.4 Wetlands

The existing wetlands in the project area have been delineated and will be flagged and protected to prevent any direct or indirect impacts during the construction project. It may be necessary to provide some groundwater dewatering during reconstruction of the wet weather storage basin, but this will not be done in the vicinity of the delineated wetlands. The spray irrigation system is designed at application rates that will infiltrate the soils and not cause runoff to any wetland areas or surface waters. The wet weather storage basin provides adequate storage of treated effluent during periods when the soil is saturated from rainfall or frozen in the winter, conditions not suited for spray irrigation.

6.5 Prime or Unique Agricultural Lands

A portion of the land area on the site adjacent to Orange Chapel Clover Garden Road has been used for agricultural purposes in the past, but this is not current practice at the site. It is not the intent or desire of UNC-CH to utilize this small amount of land for agricultural purposes. It is primarily used as a buffer for the privacy and security of the UNC-CH Bingham Facility. Some of this land area along the road provides the best soils on the site for spray irrigation of the treated wastewater. A portion of this land, within the required legal setbacks, will be utilized for spray irrigation zones due to the favorable soil conditions.

6.6 Public Lands, Scenic and Recreational Lands

No public lands, scenic or recreational areas will be impacted by the construction of the proposed project.

6.7 Areas of Archaeological or Historic Value

The proposed project does not involve the demolition or renovation of existing buildings. The project will be restricted to areas already disturbed in previous construction activities and with no known archaeological or historic value.

6.8 Air Quality

The proposed project may have minor and temporary impacts to air quality during construction. Specific impacts may include dust emissions and emissions from construction equipment. To minimize air quality impacts, dust control measures will be implemented during construction and construction equipment will be properly maintained.

No open burning will be permitted and use of chemical substances that could result in odorous emissions are not anticipated.

6.9 Noise Levels

The proposed project will result in temporary increases in noise levels from construction activities. Construction activities will be restricted to normal working hours Monday through Friday. No blasting will be conducted during this project.

6.10 Water Resources

The proposed project is not expected to have any direct impacts to surface waters. It is proposed to utilize an existing 3-inch PVC forcemain at the existing stream crossing to the wet weather storage basin to avoid any construction impacts on the stream. This section of piping will be pressure tested for integrity before use. If it becomes necessary to replace the 10 foot section of pipe through the stream crossing, UNC-CH will obtain the necessary permits from USACE and DWQ to install a new section of pipe. The construction alternative is to directional drill to install this section of pipe, but this might not be feasible due to the bedrock in this section of the stream.

An approved erosion and sediment control plan has been developed and will be in effect during the construction activities. All construction activities will be restricted to areas outside the legally required setbacks and buffers from wetlands and surface waters. Moisture sensors will be provided in the spray irrigation zones to restrict the operation of the spray irrigation system during wet weather to prevent runoff to wetlands and surface waters.

Also, construction activities should have no direct impacts on groundwater quality. There could be minimal dewatering required in the reconstruction of the wet weather storage basin, but the existing groundwater quality should be acceptable for discharge to the surface water and the discharge of groundwater will be temporary.

Construction of monitoring wells is required up-gradient and down-gradient from the proposed spray irrigation zones, and groundwater sampling and testing will be required as a condition of the non-discharge permit to insure that groundwater quality standards are not impacted by site operations. Groundwater testing from the existing spray irrigation system monitoring wells shows that the operation of the spray irrigation system has not impacted groundwater quality.

6.11 Forest Resources

Construction of the spray irrigation zone piping system will involve clearing and some grubbing of tree roots in a 10-foot wide corridor along the piping routes. Clearing of these corridors allows for installation of the piping as well as continued maintenance activities of the system. Approximately 0.6 acres of forest land will be cleared to construct the spray zones.

Clearing will be minimized since the existing vegetation in the spray zones is needed for uptake of water and residual nutrients.

6.12 Shellfish and Fish and Their Habitats

Some fish and freshwater shellfish habitats are known to exist downstream in Collins Creek, but controls will be in place during the construction of the project and during operation of the proposed system to prevent impacts to surface water quality.

6.13 Wildlife and Natural Vegetation

Approximately 0.6 acres of forest land will be cleared to construct the proposed spray irrigation system. Construction activities in other areas of the site will not impact forestland or natural vegetation.

6.14 Introduction of Toxic Substances

The proposed project will not introduce any toxic substance to the environment during construction or continued operation of the system.

7.0 Mitigative Measures

The proposed project will not result in significant impacts to the environmental resource categories described above. Implementation of the proposed project is designed to provide for the treatment and disposal of wastewater generated on site in a DWQ approved and environmentally protective manner. To eliminate or minimize environmental effects resulting from the proposed project, the following mitigative measures are included:

- An NCDENR, Division of Land Quality (DLQ) erosion and sedimentation control permit will be obtained for the site prior to the start of construction activities. The DLQ approved erosion and sedimentation control plan is provided in the construction contract documents, and the contractor is required to regularly inspect and maintain erosion and sedimentation control measures to insure compliance with the DLQ permit for the site.
- The proposed project is designed and permitted in accordance with NCDENR, DWQ rules and regulations.
- Activities of the contractor such working hours, control of construction waste materials, no burning or use of explosives, etc. are included in the contract documents.
- Contractor oversight and observation will be provided by a qualified construction administrator.

8.0 References

North Carolina Department of Cultural Resources - North Carolina State Historic Preservation Office. HPOWEB GIS Service [web application]. 2012. Raleigh, North Carolina, USA. Available at: <http://gis.ncdcr.gov/hpoweb/> (Accessed August 28, 2012).

North Carolina Floodplain Mapping Program. Floodplain Mapping Information System [web application]. 2007. Raleigh, North Carolina, USA. Available at: <http://floodmaps.nc.gov/FMIS/Map.aspx?FIPS=135> (Accessed August 28, 2012).

North Carolina Department of Environment and Natural Resources – North Carolina Division of Water Quality. Jordan Lake Rules. 2012. Raleigh, North Carolina, USA. Available at: <http://portal.ncdenr.org/web/jordanlake> (Accessed August 28, 2012).

Orange County Planning Department. Orange County, N.C. Code of Ordinances, Appendix A: Unified Development Ordinance. April 5, 2011. Hillsborough, North Carolina, USA. Available at: <http://www.co.orange.nc.us/planning/documents/UDOFINALcorrected061912MOSTCURRENT.pdf> (Accessed August 28, 2012).

North Carolina Department of Environment and Natural Resources – North Carolina Division of Water Quality. Classification & Standards Unit. 2012. Raleigh, North Carolina, USA. Available at: <http://portal.ncdenr.org/web/wq/ps/csu> (Accessed August 28, 2012).

9.0 CONCLUSION STATEMENT

 X **Finding of No Significant Impact (FONSI).** After preparation/review of this EA, the University of North Carolina at Chapel Hill has concluded there is a *Finding of No Significant Impact (FONSI)* and will not be preparing an *Environmental Impact Statement (EIS)*.

The University of North Carolina at Chapel Hill

Agency

Signed Mary Beth Koza

Mary Beth Koza
Director
UNC-CH Environment, Health and Safety

10.0 Exhibits

- Exhibit 1: UNC-CH Bingham Facility Existing Facilities**
- Exhibit 2: UNC-CH Bingham Facility Proposed Facilities**
- Exhibit 3: USGS Topographic Map**
- Exhibit 4: UNC-CH Bingham Facility Floodplain Map**
- Exhibit 5: USDA Soil Survey**
- Exhibit 6: Soil Scientist Evaluation**
- Exhibit 7: UNC-CH Bingham Facility Wetlands and Streams**
- Exhibit 8: Biohabitats Memorandum (Wetland Delineation and Mitigation)**
- Exhibit 9: UNC-CH Bingham Facility Sites of Historical Value**
- Exhibit 10: Department of Cultural Resources Response Letter**

11.0 State and Federal Permits Required

Permits obtained for construction of the proposed project include the following:

- **Erosion & Sediment Control, DLQ No. ORANG-2011-010**
- **Stormwater Management Plan, DWQ No. SW5110901**
- **Wastewater Irrigation System, DWQ WQ0023896**