
Environmental Impact Assessment

**The Homestead
Chatham Co, NC**

Prepared for
Jordan Lake LLC
PO Box 204
Goldston, NC 27252

Prepared by

CH2MHILL

CH2M HILL Inc.
3125 Poplarwood Ct
Suite 304
Raleigh, NC 27604

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Executive Summary

The Homestead project (the Project) is a proposed 628-acre master planned community designed to meet the growing demand for residential housing in Chatham County. The Homestead project site (the Site) is located approximately 1.3 miles north of U.S. Highway 64, a dual lane major traffic carrier. The Site is bounded to the east by Big Woods Road and to the north by The Preserve, a similar community. The remaining area surrounding the Site is large lot parcels.

The purpose of this Environmental Impact Assessment (EIA) is to evaluate the potential direct, secondary and cumulative environmental impacts associated with The Homestead community project. This EIA was performed in general accordance with the standards for performance for an Environmental Assessment developed to meet the requirements of the North Carolina Environmental Policy Act. This assessment was completed based on review of public documents and documents developed for The Homestead. Although CH2MHill personnel did not perform field sampling, this report relies on and incorporates the findings of numerous other consultants who have evaluated various aspects of the Site and the proposed development and have performed field testing and analysis.

The EIA evaluated the potential impacts on topography; soils; land use; wetlands; important agricultural lands; scenic, recreational, and state natural areas; areas of archaeological or historical value; air quality; noise levels; water resources (surface and groundwater); forest resources; shellfish or fish and their habitats; wildlife and natural vegetation; and introduction of toxic substances. The EIA concludes that although there will be some environmental impacts associated with the Project, there are many practices and measures being undertaken to mitigate the impacts, and in our opinion, the impacts are not significant, particularly when compared with overall County resources.

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1 Introduction

The Homestead project (the Project) is a proposed 628-acre master planned community designed to meet the growing demand for residential housing in Chatham County. The Homestead project site (the Site) is located approximately 1.3 miles north of U.S. Highway 64, a dual lane major traffic carrier (Figure 1). The Site is bounded to the east by Big Woods Road (SR 1716) and to the north by The Preserve, a similar community. The remaining area surrounding the Site is large lot parcels. The Site was recently rezoned to RA-40 with lots of approximately 1 acre.

The purpose of this Environmental Impact Assessment (EIA) is to evaluate the potential direct, secondary and cumulative environmental impacts associated with The Homestead community project. This EIA was performed in general accordance with the standards for performance for an Environmental Assessment developed to meet the requirements of the North Carolina Environmental Policy Act. This assessment was completed based on review of public documents and documents developed for The Homestead. Although CH2MHill personnel did not perform field sampling, this report relies on and incorporates the findings of numerous other consultants who have evaluated various aspects of the Site and the proposed development and have performed field testing and analysis.

The remainder of this document describes The Homestead project site, the existing environmental conditions, the environmental impacts and the mitigative practices proposed to protect the environment.

1.1 Scope and Limitations

CH2M HILL developed this EIA based on documents developed for The Homestead and public documents obtained from Chatham County, and state and federal agencies. According to the Code of Federal Regulations regarding the National Environmental Policy Act of 1969, the purpose of environmental documents is to provide a description of potential environmental impacts and to discuss reasonable alternatives that will avoid or minimize impacts. CH2M HILL personnel visited the site, but did not conduct any studies or sampling on any portion of the Site. This document serves to identify the potential environmental impacts and outlines mitigation that has been proposed for the Site based on professional opinion. It was assumed that the development would proceed in accordance with all applicable local, state and federal regulations. No warranty is expressed or implied in this document.

2 Proposed Project Description

The Project is a 628-acre master planned community designed to meet the growing demand for residential housing in Chatham County. The Project consists of single family homesites, pool and tennis amenities, and large areas of open space.

The Site is depicted on the Farrington and Merry Oaks, NC USGS topographic quadrangle maps. The Site is located within the upper Cape Fear River Basin in DWQ's subbasin 030605 and in USGS Hydrologic Unit Code 03030002. Two named perennial streams, Beartree Creek and Parkers Creek, flow across portions of the Site. Each of these creeks drains to the New Hope Creek Arm of Jordan Lake.

Table 1: The Homestead Site Data

General	
Area	628 Acres
Total Units	463
ROW Area	47 Acres
Clubhouse	10,000 SF
Spa and Fitness Center	8,000 SF
Open Space, Club House, and Amenities Club House, Amenity Pool and Tennis (27 Acres) Meadows, Cleared and Part Wooded (136 Acres)	163 Acres
Stream Buffers	76 Acres in the form of 100 foot buffers around perennial and intermittent streams
Conservation/common area and water quality ponds	112 Acres

The Project is located within the Jordan Lake watershed. The majority of the Site is classified as WS-IV PA with the portions of the east side of the Site classified as WS-IV CA. The proposed impervious surface coverage for the Project is approximately 23.6 percent of the entire site. The current County and State standards allow for up to 24 percent impervious coverage for low density projects within WS-IV watersheds. Thus, the Homestead will qualify as a low density project.

Careful consideration has gone into the site plan in order to minimize impacts to surface waters and wetlands. Over half the Site will remain as open space. All of the intermittent and perennial blue line streams extending into the project have a minimum of 100 foot natural buffer along each side of the channel. Stormwater runoff will be treated through a series of structures; all outfall structures will drain to a bioretention pond and discharged through overland flow.

The County will provide water to the Project. A water reclamation facility which will treat to reuse standards will be incorporated into the design. Treated wastewater will then be discharged through a spray irrigation system to the open space areas on the Site. A certified operator will be on call 24 hours a day to ensure the system is properly operating. In addition, data will be collected and submitted to the Division of Water Quality as required in the Project's permit.

3 Purpose and Need

Chatham County's population growth rate is expected to be approximately 20% during the next decade increasing the population from 49,588 to 59,336 citizens. The County's ideal location for accessibility to the Research Triangle Region (Chapel Hill, Durham, Raleigh, Research Triangle Park) and the Piedmont Triad (High Point, Winston-Salem, Greensboro) is the primary factor for the County's healthy growth in population and economic status. Given the projected demographic growth of the County and the proximity to major business and research centers, the demand for quality community living is also expected to increase. The Homestead community will address this need for housing in the area while preserving the environmental and aesthetic health and integrity of the County's rural backdrop.

4 Alternatives Analysis

This section outlines alternatives to the proposed project.

4.1 No Action Alternative

Under the no action alternative, a new residential subdivision would not be built. Since Chatham County is growing and given the proximity of the proposed Site to the Research Triangle Area, it is likely that much of the Site would be developed with single family homes that would obtain water from wells and provide onsite wastewater treatment. Development on an individual lot basis is not subject to many of the rules and ordinances that a planned community must follow such as those pertaining to erosion and sediment control. Development in this manner will result in environmental impacts, although these impacts will be different from those under the proposed Project.

4.2 No Development Alternative

Under this alternative, the land at The Homestead site remains in its current use – largely forested, and the impacts discussed in Section 5 would not occur. Given the proximity of the land to the Research Triangle Area, to US-64 and the future I-540, it is unlikely that the land would remain undeveloped. Current zoning allows for 1-acre lots.

5 Current and Predicted Environmental Characteristics of Project Area

For this section it is assumed that the Project will be developed and maintained in accordance with all applicable local, state, and federal regulations. This section describes the existing and affected environment of the Site and the surrounding area in accordance with the North Carolina Environmental Policy Act.

5.1 Topography

5.1.1 Existing Conditions

The Project Site is located in the central piedmont physiographic region and has a consistently rolling terrain with moderately steep slopes. The topography of the Site varies from a high elevation of approximately 490 feet above mean sea level (MSL) to a low of approximately 250 feet. Figure 2 shows a map identifying the existing slopes on the Site. Approximately 43 percent of the Site has slopes less than 10 percent, 30 percent has slopes between 10 and 15 percent, and 26 percent of the Site has slopes that exceed 15 percent (Jordan Lake LLC, 2003 and 2005).

The confluence of Beartree Creek and one of the unnamed tributaries is designated as Zone A according to the Flood Insurance Rate Map found on the County's website (Figure 3). Zone A is the 100 year flood plain that is approximated; detailed hydraulic analyses are not performed in these zones, and thus base flood elevations do not exist.

5.1.2 Environmental Impacts

During and after construction the existing topography on site will be altered from land clearing and grading activities associated with development of the master planned community. At this time, a grading plan is not available, but the Project will involve some alteration of topography. Figure 2 illustrates that, with some limited exceptions, the proposed site plan avoids the steepest slopes. The steepest slopes lie within the riparian buffer area that is being protected and in open space. According to prior project documentation, of the areas set aside as open space meadow, approximately 60 percent will not be graded, and 20 percent will be cleared with minimal grading activity (Jordan Lake LLC, 2005). There are some lots located on either side of the tributary to Beartree Creek that have slopes of approximately 15 percent.

5.1.3 Conclusion

During and after construction the existing topography on site will be altered to some extent. Any development within the Piedmont of North Carolina would likely alter topography. The proposed site plan avoids the steepest slopes and the floodplain. The Project makes up approximately 0.16 percent of the County; when viewed on a Countywide basis, the Project will not significantly impact topography.

5.2 Soils

5.2.1 Existing Environment

Figure 4 shows a map identifying the different types of soils on the Site. Soils on the Site are complexes of several soil series: Herndon, Badin, Pittsboro, Georgeville, and Nanford. The relative amounts of the various soil amounts on the Project Site are summarized in Table 2.

Table 2: Relative Amount of Soil Types on Project Site

Soil	Acres	Percent	Prime farmland
Nanford-Badin Complex 2-6% slopes	115.2	18.3	
Nanford-Badin Complex 6-10% slopes	3.3	0.5	
Nanford-Badin Complex 10-15% slopes	14.3	2.3	
Badin-Nanford Complex 15-30% slopes	273.5	43.6	
Georgeville Silt Loam 2-6% slopes;	54.2	8.6	Yes
Pittsboro-Iredell Complex 2-8% slopes	119.2	19.0	
Herndon Silt Loam 2-6% slopes	3.3	0.5	Yes
Herndon Silt Loam 6-10% slopes	13.6	2.2	
Georgeville-Badin Complex 10-15% slopes	6.3	1.0	
Georgeville-Badin Complex 15-30% slopes	11.1	1.8	
Other	13.6	2.2	
Total	628	100	

5.2.2 Environmental Impacts

The clearing and grading for the proposed Site will result in soil disturbance. At this time, a grading plan is not available. During grading, soil will be moved; in some areas, it will be removed, while in other areas it will be replaced. Thus, the location of soil types may change. During clearing and grading, some soils will be eroded, but the impacts from this will be minimized by following an approved site plan that conforms to the requirements of the North Carolina Sedimentation Pollution Control Act of 1973. (More information is provided in the water resources section). Finally, by using heavy equipment on the Site, soils will be compacted. No contamination of soils is expected from the development.

5.2.3 Conclusion

The proposed land clearing and grading work on the Site will result in soil disturbance and compaction. Mass importing of offsite fill material should not be required due to the size of the Site. Measures that comply with the North Carolina Sedimentation Pollution Control Act of 1973 will be taken to minimize erosion. Mulching/seeding is planned directly after land is cleared on these sites. Based on our understanding of the proposed development plan, the proposed grading operations are not atypical for this geographic area. Environmental impacts should not be significant if grading and erosion control activities are performed in accordance with state regulations and good construction practices.

5.3 Land Use

5.3.1 Existing Environment

Table 3 and Figure 5 summarize the existing land use of the Site, and Figure 6 shows an aerial photograph illustrating the existing land use.

Table 3: Existing Land Use on The Homestead Site

DESCRIPTION	Acres	Percent of site
Southern Yellow Pine	181	28.8
Deciduous Shrubland	162	25.8
Bottomland Forest/Hardwood Swamps	110	17.5
Mixed Upland Hardwoods	57	9.1
Evergreen Shrubland	69	11.0
Mixed Hardwoods/Conifers	43	6.8
Unmanaged Herbaceous Upland	6	1.0
Total	628	100

The Site is largely forested, with some areas having been recently harvested. Evidence of past timber harvesting (i.e. stumps and lack of old-growth) can be seen throughout the Site as noted on the aerial photograph where recent logging roads are noted in the northwestern portion of the Site.

5.3.2 Environmental Impacts

Existing land use will be modified from predominantly silvicultural land to a residential community. The change in land use from current conditions on the Site will be fairly substantial; approximately 224 acres of the Site will be in the form of residential development. The riparian buffer areas will remain in natural forest, and these areas account for approximately 76 acres of the site. At least 20 percent of the 136 acres (27 acres) of meadow will be left with mature tree canopy. If only the riparian buffers and the 27 acres of meadow with mature tree canopy remain forested, approximately 16 percent of the site will still be forested. The Master Plan (Jordan Lake LLC, 2005) states that 25 percent of the project will be undisturbed; if this land is currently forested, that would equate to 157 acres of forested land. Other open space on the site will be in the form of conservation/ common areas, water quality ponds, and a small practice golf facility and putting green. It is anticipated that open space will account for over 50 percent of the site. These riparian corridors and meadows will serve to link the preserved forested area within the Site to forested areas outside the Site.

5.3.3 Conclusion

While the change in land use is significant for the Site, the change is not as dramatic if development occurred in a more traditional manner. In a traditional subdivision, each lot would be at least 40,000 square feet in size, and the footprint of the development would be more wide-spread. In contrast, the overall project density at the Homestead will not exceed that allowed by proposed zoning, but individual lots are smaller. Thus, by developing in a compact way, fewer trees are cut, and more open space is preserved. In addition, the Site comprises only

628 acres out of approximately 437,000 acres in Chatham County. The County is largely forested, and the impacts to land use on the Site are insignificant in the context of the County as a whole. Based on our review of the current land use plan, the Project will have no significant adverse impacts on future land use in the County.

5.4 Wetlands

5.4.1 Existing Environment

Section 404 of the Clean Water Act (CWA) requires the regulation of discharges into “waters of the United States.” Within North Carolina, the U.S. Army Corps of Engineers (COE) is responsible for the implementation, permitting, and enforcement of provisions of the CWA, although the U.S. Environmental Protection Agency is the principal administrative agency. The COE regulatory program is defined within 33 CFR 320-330.

Water bodies such as rivers, lakes and streams are subject to jurisdictional consideration under the Section 404 regulations. Wetlands have been defined as:

Those areas that are inundated or saturated by groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas [33 CFR 328.3(b) (1986)].

The three parameters that are indicative of a jurisdictional wetland include the presence of a hydric soil, hydrophytic vegetation, and wetland hydrology. Wetlands and vegetated riparian areas are valuable because they preserve biological diversity, protect wildlife, provide natural open spaces, protect water quality, stabilize stream banks, control erosion, and prevent flooding damage.

None of the soils located on the Site are hydric soils which indicates that existing wetlands should account for a very small portion of the site. Soil and Environmental Consultants (S&EC) personnel conducted a detailed wetland delineation of the Site. A total of 5.4 acres of wetlands and streams are located on the Site. Primarily the wetlands onsite consisted of emergent/seep wetlands (herbaceous vegetation) contained within bottomland hardwood communities. There were headwater wetlands on the property as well, which were primarily in herbaceous cover.

5.4.2 Environmental Impacts

Based on preliminary evaluation of the wetlands delineation and the site plan, no wetlands will be impacted by the development. There are five stream crossings by roads on the Site (Figure 7). Bottomless culverts or bridges will cross each stream to avoid any stream impacts. Utility lines may also cross streams. Mitigation of any wetlands and stream impacts will be carried out in accordance with North Carolina Division of Water Quality (DWQ) and COE rules. At this time, it is anticipated that only a 404 permit will be required, and no water quality certification (401 permit) will be needed.

5.4.3 Conclusion

The Project will have no significant adverse impacts on wetlands. The Project design avoids the wetlands on the Site. Potential stream impacts from roads are being avoided through the use of bottomless culverts and bridges. There may be utility crossings that require permits, however only 404 permits should be required and the impacts are considered temporary in most cases. The exact locations and impact amounts for these areas will be determined by the CE Group during the permitting process.

5.5 Important Agricultural Lands

5.5.1 Existing Environment

Important Farmlands within North Carolina are organized into three categories including Prime Farmland, Unique Farmland, and Farmland of Statewide Importance. Criteria established to determine these classifications were published January 31, 1978 in the Federal Register and amended on June 17, 1994. The North Carolina NRCS State Soils Staff developed the criteria for farmland of statewide importance in 1988.

Approximately 9 percent of the site contains soils listed as Federal prime farmlands as shown on Table 2. These soils currently are not used for farming, and instead function as part of forested riparian buffer zones along the stream channels.

5.5.2 Environmental Impacts

Once the Site is developed, it would not be used for agriculture, and this potential use on the prime farmlands would be lost. The Site has not been used for crop production. The Site is primarily wooded and would not likely be converted to agricultural uses in the future. Because the property is not currently being farmed and has not been farmed for many years, direct impacts to important Agricultural Lands are not significant.

5.5.3 Conclusion

The Project will have no significant impacts on important agricultural lands as the land is currently not being farmed, and it is unlikely that it would be converted to agricultural land given the growth in Chatham County.

5.6 Scenic, Recreational, and State Natural Areas

5.6.1 Existing Environment

The Big Woods Upland Forest is located on the Project Site. Its boundaries are roughly US 64 to the south, Big Woods Road to the east, Bush Creek on the north, and Mount Gilead Church Road on the west. The site is of County significance as it is a large block of rugged uplands, but is not a priority area for protection by the State. Information from the Natural Heritage Program indicates that many portions of the Site have been developed, and its boundaries need to be redrawn.

The Old Quarry Creek Significant Natural Heritage Area (SNHA) is located just north of the Big Woods Upland Forests and is just outside the Site. This area contains steep north-facing slopes which contain good examples of mesic mixed hardwood forest.

The Parkers Creek Ridges also lie within one mile of the Project. These ridges are of County significance but not a priority area for state protection. The ridges contain mature stands of hardwood trees.

There are not recreational lands on the Site, but the US Army Corps of Engineers owns the land across SR 1716 along Jordan Lake. The North Carolina Division of Parks and Recreation runs the Vista Point facility of the Jordan Lake State Recreation Area here. Vista Point provides hiking, fishing, boating, picnicking, and camping opportunities.

5.6.2 Environmental Impacts

The development will result in more development on the Big Woods Upland Forest area as this site lies within the Project area. However, this SNHA is not of state significance, and approximately 16 percent of the Site will remain in forested land in the form of riparian buffers and mature tree cover. Other forested land will remain in the form of Project boundary buffers and other forms of open space.

The Project will not impact the habitat at the Old Quarry Creek SNHA or the Parkers Creek ridges as they are located off the Project Site.

The development will not impact activities at Vista Point. Trees will remain at the front of the Project along SR 1716, and the development should not impact recreational opportunities at that site.

5.6.3 Conclusion

Based on our review of public documents, the Project will have no significant impacts on designated scenic, recreational, or natural areas.

5.7 Areas of Archaeological or Historical Value

5.7.1 Existing Environment

Cultural Resources are protected by law under the Indian Antiquities Articles of the North Carolina Administrative Code and Section 106 of the National Historic Preservation Act of 1966. Section 106 protects properties that possess significance but have not yet been listed or formally determined eligible for listing in the National Register. S&EC staff reviewed files at the State Historic Preservation Office (SHPO) and found no protected sites of archaeological or historical value located on the property. One prehistoric site located south of the Project was noted (Jordan Lake LLC, 2003). During site investigations, the consultant team found an old well.

5.7.2 Environmental Impacts

The well poses a safety hazard and will be filled in.

5.7.3 Conclusion

The only known site that will be eliminated is the well, and it is our opinion that the Project will have no impacts on areas of significant archaeological or historical value. The US Army Corps of Engineers has authority over wetland permitting; information regarding the wetland permit area will be submitted to the State Historic Preservation Office (SHPO) in Raleigh. SHPO will also be contacted if archaeological artifacts are uncovered during the construction.

5.8 Air Quality

5.8.1 Existing Environment

The main air quality issue in Chatham County is ozone pollution. Ozone is a highly reactive form of oxygen; high in the atmosphere, it protects the Earth from harmful solar radiation. When it is formed near the ground, ozone can damage trees and crops and is unhealthy to breathe. Ozone is not directly emitted, but is formed when sunlight reacts with volatile organic compounds (VOCs) and nitrogen oxides (NOx). According to the NC Air Awareness program, NOx is the limiting factor on the formation of ozone in North Carolina because of the abundance of naturally occurring VOCs from trees, which cannot be controlled. In North Carolina urban areas, more than 60% of NOx emissions are from automobiles.

Currently, the majority of Chatham County is in attainment status with respect to National Ambient Air Quality Standards. However, the northeastern portion of Chatham County, the site of the Project, is in non-attainment status with the 8-hour federal air quality standard for ozone (0.08 ppm) along with Wake County, Orange County, Durham County and the northwestern half of Johnston County (Division of Air Quality website). There is one ozone monitoring station in Chatham County at Pittsboro, and it recorded one exceedance of the 8-hour standard in 2003.

The Air Quality Index is a tool to evaluate levels of ozone, particles, and other pollutants in the air. The air quality index is used to assess potential impacts to human health. The 2003 AQI values for the Raleigh/Durham area were generally “Good” to “Moderate” with 7 days “Unhealthy for Sensitive Groups” and 1 day “Unhealthy.”

5.8.2 Environmental Impacts

Air quality may be impacted both during construction and after construction is completed. During the construction phase of the Project, machinery utilized will produce emissions resulting from the combustion of petroleum products, much like emissions from previous timber harvesting activities. Construction specifications for the Project will require mechanical equipment to meet emissions standards established by the State of North Carolina for the equipment utilized. Any burning will be conducted under controlled conditions with the appropriate permits from the local authorities if applicable.

Automobile activity will increase after construction as a result of development. However, North Carolina has taken very aggressive steps in regulating emissions from mobile sources in order to bring all of Chatham County and the rest of the Triangle area back into full attainment by 2009, notwithstanding projected increases in vehicle miles traveled. Full inspection and maintenance requirements on motor vehicles took effect in Chatham County on January 1, 2004

even though EPA does not require them. The expected reductions in mobile source emissions from these aggressive emissions requirements, not required under any federal law, may offset any automobile activity increase associated with the Project.

Odor is another potential air quality issue. In regard to air quality issues associated with the reclamation facility, there will be two possible primary sources of odor: influent and sludge. The incoming pipes will discharge the wastewater from the long force mains. These pipes may release odor due to the long length of retention of the wastewater. In this case, odor can be reduced by the injection or input of chemicals at the pump station. This injection has proven successful in the past in reducing odors from pipeline wastes. In regard to sludge, there is the potential for odor to be generated when the stored sludge is stabilized prior to removal by a sludge contractor. There are several operation conditions that might be incorporated to reduce or eliminate this odor generation.

5.8.3 Conclusion

Given the steps that are being taken to bring Chatham County into attainment of the ozone standard, the project is not expected to have a significant adverse impact on air quality.

5.9 Noise Levels

5.9.1 Existing Environment

This region of the county is predominantly rural and the majority of the noise producing activities are directly related to localized farming and logging operations; therefore the noise generated on site is primarily the result of the operation of heavy tillage equipment and automobiles. Other potential, temporary sources of noise include equipment associated with road maintenance efforts performed by the NC DOT or its associated sub-contractors.

Currently, noise levels are low on-site. In the past, noise levels were somewhat higher during timber harvesting.

5.9.2 Environmental Impacts

Noise levels are expected to increase during the construction phase of the project. Increased noise levels will be as a result of commonly used mechanical equipment that will be utilized to grade the site, road construction and building construction. Construction is normally limited to daylight hours when loud noises are more tolerable. Every reasonable effort will be made to minimize construction noise. Immediately following completion of the project, noise levels will be similar to other residential areas. The preserved open space on the property will help reduce this noise to surrounding areas.

5.9.3 Conclusion

The Project will result in increased noise around the Site as any new development on a forested site will. The Project has been designed with forested boundary buffers which will mitigate the noise from the development. It is our opinion that there will be no significant impacts on noise associated with this proposed project.

5.10 Water Resources (Surface and Groundwater)

5.10.1 Surface Water

5.10.1.1 Existing Environment

The Site is located in the upper Cape Fear River Basin in DWQ subbasin 030605 and in USGS Hydrologic Unit Code 03030002. The Site contains a number of unnamed tributaries that eventually flow either to Parkers Creek or to the New Hope Creek arm of Jordan Lake. All creeks on the Site are classified as WS-IV waters by DWQ. WS-IV classified waters are protected as water supplies which are generally in moderately to highly developed watersheds; point source discharges of treated wastewater are permitted pursuant to Rules .0104 and .0211, and local programs to control non-point source and stormwater discharge of pollution are required. In addition, all waters on the site are either in the critical area of Jordan Lake (within ½ mile of the normal pool elevation of the lake) or in the protected area (within 5 miles of the normal pool elevation).

DWQ collected benthic data from Beartree Creek at SR 1716 (just downstream of the Project) four times prior to 1993 as part of a pristine stream study done in cooperation with the U.S. Geological Survey. This site is atypical for triassic basin streams in that it has a higher gradient and a diverse substrate consisting of boulders and cobbles. DWQ does not assign water quality ratings to this site (DWQ, 1999).

The Haw River is impounded by B. Everett Jordan Dam. In 1983, the Jordan Lake watershed was classified as nutrient sensitive waters (NSW) based on the potential for nutrient overenrichment in the lake. A WASP model was recently developed to examine productivity in the lake. In addition, water quality sampling shows periodic excursions of the 40 ug/l criteria for chlorophyll *a*. Based on the modeling results and data, DWQ included the New Hope Creek arm of the lake upstream of the Project on the state's 303(d) list of impaired waters.

5.10.1.2 Environmental Impacts

Water quality could be impacted by the Project in three ways. First, during construction, sediment could enter the waterways. Secondly, after construction is completed, stormwater runoff may impact the streams. Finally, the land application system could impact downstream surface water quality. Each of these is discussed further below.

Grading and construction activities associated with the Project may temporarily increase siltation on and immediately downstream of the Site. During rain storms, erosion from a cleared site will be much higher than erosion from a forested site. The North Carolina Sedimentation Pollution Control Act of 1973 requires that a plan to control erosion and sedimentation be developed for any activity that disturbs one acre of land or more. This plan must include control measures that will prevent sediment impacts to water quality. Practices must be installed that will control sedimentation from the peak runoff generated by the 10-year storm.

One of the best methods to control sediment loading from construction sites is to minimize the time that land is exposed. Data collected by NCSU researchers at a site on the I-540 beltline indicate that mulching and seeding reduce erosion rates by approximately 95 percent. The State law requires that permanent ground cover be established within 15 working days from when

grading is completed. The Project will meet or exceed that requirement. Another effective method to minimize the time that bare soil is exposed is to develop the Site in phases. The Project will be completed in phases. In addition, to the extent practical, entire areas of home sites will not be cleared at a given time (exception to this is in Village lots near the amenity area which will be mass graded due to their smaller size); rather lots will be cleared individually as houses are built which will minimize the amount of land cleared and greatly reduce the amount of time that soil is bare. Finally, the riparian buffers that will be maintained on site will serve as a last line of defense in case one of the BMPs fails. By following the site plan and grading plan, implementing and maintaining BMPs to control sedimentation for the 10-year storm, completing the development in phases, and protecting the riparian buffers, the impacts to water quality during construction will be minimized and will not be significant.

Following construction, stormwater runoff from the development could impact water quality in two ways. First, stormwater runoff contains pollutants. For example, fertilizers and pesticides applied to the golf practice range, commercial and residential landscaping and oil that leaks from automobiles can run off into surface water during storms. This stormwater will be captured and treated through stormwater BMPs that include wet ponds, dry detention basins, and wetlands.

The second way that post-construction runoff can impact water quality is through changed hydrology. As land is developed, there is more area that is impervious. With increased imperviousness, less rainfall infiltrates the soil, which results in a greater amount of rainfall flowing directly to surface waters. This creates higher stormflows within the streams that causes higher instream erosion, which impairs aquatic habitat and reduces aquatic diversity. By clustering development in a smaller portion of the Site and preserving over 50 percent of the Site as open space, imperviousness will be minimized and the pre-development hydrology will be preserved to a greater extent.

Four of the five stormwater treatment facilities are being designed such that they control the peak flowrate for the one-year, 24-hour storm event. For the remainder of the Site, the first inch of stormwater runoff will be detained prior to entering the riparian buffers.

Finally wastewater will be treated through a water reclamation facility, and the wastewater will be land applied without discharge. The soil will serve to further filter any pollutants from the wastewater. DWQ prefers land application as a disposal method over discharge to surface waters.

The downstream waters of the Haw River and Jordan Lake should not be impacted by the development. Again, the project is being designed to minimize environmental impacts, and BMPs are being used to protect the water resources on site from the impacts of stormwater runoff (both in terms of quantity and quality).

The Homestead Community will be served by public water provided by Chatham County and will be designed in accordance with the Chatham County Public Works Water System Specifications and Details. The potable water use of the development will be minimized by including low water use fixtures in all buildings. In addition, the spray irrigation system described below will minimize the use of potable water for irrigation of public areas.

5.10.1.3 Conclusion

Any new development which increases imperviousness has the potential to impact surface water quality. This Project has been designed to minimize the impacts to water quality by preserving a large amount of open space, implementing erosion and sediment control practices, incorporating stormwater treatment facilities that will minimize and treat runoff, and managing the wastewater system. Based on our review of the Project documents, it is our opinion that the impacts to surface water will not be significant. The impacts to surface water quantity will also be insignificant.

5.10.2 Groundwater

5.10.2.1 Existing Environment

The Piedmont of North Carolina is underlain by crystalline-rock aquifers. These aquifers are lined by dense, almost impermeable bedrock that yields water from fractures and secondary porosity. Recharge predominantly occurs along the inter-stream areas through porous regolith and fractures in the bedrock. The majority of groundwater moves laterally and enters depressions in the landscape such as stream channels. According to USGS gathered data, well yields in crystalline-rock aquifers are very low, approximately 18 gallons per minute. Solum thickness has a direct correlation to groundwater storage, generally, the thicker the overlying regolith the greater the volume of water storage potential and subsequent well recharge/discharge capacity. Typically, groundwater recharge is greater in valleys and depressional areas due to the thicker regolith, and proximity to fracture zones in the bedrock. Groundwater quality is generally suitable for drinking and other uses, but iron, manganese, and sulfate can occur at undesirable levels (USGS, 2001).

Most observable changes in groundwater quality are related to land use and waste disposal patterns. Underground storage tanks, waste lagoons and disposal landfills are commonly responsible for point source contamination. However, more dispersed contamination by non-point sources is increasing and is manifested by petroleum, pesticide and biological contamination. No land uses commonly associated with groundwater contamination were encountered during the field inspections of this Site.

5.10.2.2 Environmental Impacts

The main potential source of impacts to groundwater quality is the land application of wastewater generated on the Site. The wastewater from The Homestead will be treated to State water reuse standards and used to irrigate sprayfields and greenways. The State of North Carolina Division of Water Quality (DWQ) does not require a treatment process for the removal of nutrients such as phosphorus or nitrogen in their operating limitations. Using land application of the treated wastewater as a disposal system will reduce nutrient loads. As the treated reuse water is irrigated, the trees and vegetation take up the available nutrients, specifically nitrogen and phosphorus, contained within the irrigated water. After the plants use the nutrients for growth, the soil filters the remaining nutrients while improving water quality going into the groundwater table.

The land application system is being designed to meet or exceed state requirements. With proper site management, and hydraulic and nutrient loading management, the site receiving reused water will work towards protecting groundwater and ultimately the surface waters

entering the Cape Fear River Basin. Planned monitoring of the reclaimed water and soil testing will help ensure that groundwater quality is protected.

5.10.2.3 Conclusion

Based on the wastewater treatment system and land application system design, there should be no significant impacts to groundwater.

5.11 Forest Resources

5.11.1 Existing Conditions

As shown in the Land Use Section, forestland occupies 62.2 percent of the Site with the remainder of the site in shrubland and herbaceous upland. The plant communities within the property are limited due to intense past silvicultural practices. Three main areas based on past silvicultural activities exist on the site as shown on Figure 6. In the northwest portion of the site, there is recently timbered land as noted by the appearance of the logging roads on the aerial photo. In the northeast portion of the Site, there is a mix of hardwoods and pine; the trees in this area are older, but no old growth trees were noted during the site visit. In the southern portion of the Site, there are pines that are approximately 15 years old. Figure 9 shows a map identifying the vegetation of the Site. Across SR 1716, the Army Corps of Engineers owns the land around Jordan Lake.

The Site consists mainly of two natural communities described in Schafale and Weakley: the Mesic mixed hardwood forest (piedmont subtype) and the Piedmont alluvial forest.

Mesic mixed hardwood forest (piedmont subtype)

The north-facing bluffs along the streams of the evaluated area are dominated by the mesic mixed hardwood forest community type (Schafale and Weakley 1990). The canopy is dominated by a mixture of hardwood species including; white oak, sweetgum, tulip poplar, American beech, northern red oak, mockernut hickory, and shagbark hickory. The subcanopy layer includes species such as sourwood, dogwood, eastern red cedar, American holly, and smaller individuals of canopy species. Herbaceous plant are quite diverse along the north-facing bluffs of the site and consisted of beechdrops, Christmas fern, wild ginger, and liverleaf. The most common vine was greenbriar.

Piedmont alluvial forest

This plant community is restricted to a small zone surrounding streams and wetlands. The canopy is consistent with the mesic mixed hardwood forest but included more bottomland (water tolerant) species such as sycamore, shagbark hickory, and sweet gum. Vines were quite prominent in this community with species such as Japanese honeysuckle and cross vine dominating. The most common herb found in this community was river oats. Other herbs present were also found in the mesic mixed hardwood forest.

5.11.2 Environmental Impacts

Existing land use will be modified from silvicultural land to a residential community. However, the Project has been designed with large amounts of open space in the form of recreational areas, riparian buffers, ponds, and wetlands. These riparian corridors will be:

- At least one hundred (100) feet along all perennial streams;
- At least one hundred (100) feet along all intermittent streams;

These riparian corridors will serve to link the preserved forested area within the Site to forested areas outside the Site. If only the riparian buffers and the 27 acres of meadow with mature tree canopy remain forested, approximately 16 percent of the site will still be forested. The Master Plan (Jordan Lake LLC, 2005) states that 25 percent of the project will be undisturbed; if this land is currently forested, that would equate to 157 acres of forested land. This number is likely conservative as other open space areas may contain a forested environment. Since lots will be cleared individually to the maximum extent practical, the change will not be as dramatic as it would if the entire development was mass graded as often occurs.

5.11.3 Conclusion

While the land use will change from a largely forested site, approximately 25 percent of the Site will be undisturbed. Since the Project has been designed with large amounts of open space, the impacts to forested land are reduced from those that would occur under a traditional 1-acre lot subdivision. Given that the Site comprises only approximately 0.16 percent of Chatham County's land area, the change in forested land will be insignificant in the context of the County as a whole.

5.12 Shellfish or Fish and Their Habitats

5.12.1 Existing Environment

Beartree and Parkers Creeks are the primary perennial streams on-site. Fish habitats are isolated to Beartree and Parkers Creeks and their associated tributaries. Fish species present within these water bodies are typical of the Piedmont region and likely include species such as sunfish, creek chub, and brim.

5.12.2 Environmental Impacts

During construction, erosion will occur at a higher rate than when the land is forested. An erosion and sediment control plan will be developed in accordance with the Sedimentation Pollution Control Act as described in the Soils Section. Practices will be implemented as part of this plan to minimize the time that soil is exposed by phasing the construction and expeditiously establishing ground cover when grading is completed. In addition, best management practices designed to protect against a 10-year storm event will be installed to capture any sediment that is eroded. The extensive riparian buffer system that is planned for the Site will serve as a last line of defense in case one of the erosion control devices fails. Finally, most of development avoids areas that have slopes that exceed 15 percent.

5.12.3 Conclusion

As described above and in the water resources section, appropriate action is being taken to minimize the impacts of sedimentation. Proper design, inspection and maintenance of the BMP structures will ensure failure does not occur and protect fisheries.

5.13 Wildlife and Natural Vegetation

5.13.1 Existing Environment

The Site exhibits a mix of forest types. These forest communities were manipulated by past and existing silvicultural practices and other land disturbance. Examples of manipulation include but are not limited to selective timber harvesting, utility easements, and road construction and maintenance. The Site and the immediate vicinity contain several dirt trails and roads, ditches, stream channels, gas rights-of-way, and forested riparian areas. This interspersed habitat types has a direct correlation to the wildlife population dynamics and the species diversity. Wildlife habitat located in the vicinity includes upland mixed pine/hardwood forest, mixed hardwood forest, forested wetlands and riparian areas, beaver impoundments, and stream channels.

Upland communities are home to Virginia opossum, raccoon, eastern cottontail, gray squirrel, red and gray foxes, and white-tailed deer, as well as the eastern mole and several species of shrews and mice. Bird life in the Project Area is likely typical of the Carolina Piedmont. Species likely using the area are: cardinals, American robins, Carolina chickadees, bluebirds, sparrows, warblers, rufous-sided towhees. These and other songbirds make their homes in the backyard habitats and forests of the area. Hawks, such as the red-tailed hawk, owls and vultures are predator and scavenger species known to inhabit the area.

S&EC personnel reviewed North Carolina Heritage Program (NHP) records and found no records of federal or state protected species within a two-mile radius of the project site. There are four federally listed endangered or threatened species within Chatham County: red-cockaded woodpecker (*Picoides borealis*), Cape Fear Shiner (*Notropis mekistocholas*), harperella (*Ptilimnium nodosum*), and the bald eagle (*Haliaeetus leucocephalus*). There are also several federal species of concern that have been known to occur within 5 miles of the project site (Table 4)

Table 4: Federally Listed Species within 5 Miles of Project Site

Vertebrates	Scientific name	Status
Bachman's Sparrow	<i>Aimophila aestivalis</i>	FSC
Bald Eagle	<i>Haliaeetus leucocephalus</i>	THR
Cape Fear Shiner	<i>Notropis mekistocholas</i>	END
Carolina Redhorse	<i>Moxostoma sp.</i>	FSC
Red-cockaded woodpecker	<i>Picoides borealis</i>	END
Carolina Darter	<i>Etheostoma collis</i>	FSC
Atlantic Pigtoe	<i>Fusconaia masoni</i>	FSC
Brook Floater	<i>Alasmodonta varicosa</i>	FSC
Septima's clubtail	<i>Gomphus septima</i>	FSC
Yellow lampmussel	<i>Lampsilis cariosa</i>	FSC
Carolina creekshell	<i>Villosa vauhaniana</i>	FSC
Harperella	<i>Ptilimnium nodsum</i>	END
Virginia quillwort	<i>Isoetes virginica</i>	FSC
Sweet pinesap	<i>Monotropsis odorata</i>	FSC
FSC = Federal species of concern THR = Federally threatened END = Federally endangered		

The red-cockaded woodpecker (RCW) nests in older-growth pine trees, and prefers longleaf pine, but will use other pines that are of sufficient size and age. The RCW will also nest in mixed stands as long as 50 percent of the stand is pine. No RCW habitat was noted on the project site during the site visit as most trees were not of sufficient size and age. The Natural Heritage Program website indicates that the RCW has not been found in Chatham County for twenty years. Based on no reports of the RCW at the Site, and the fact that RCW has not been found in Chatham County for twenty years, it likely does not exist in the vicinity of the Site.

The Cape Fear Shiner is generally found in streams with gravel, cobble, and boulder substrate with low sediment loads. The streams observed during the site visit did exhibit these substrates, but sediment was also observed in them. The Cape Fear Shiner has been found on the Haw River, but it is unlikely that the Haw populations would swim through Jordan Lake to inhabit the tributaries on the Site.

Harperella is a semi-aquatic annual plant that is found in rocky or gravel shoals and margins of clear, swift-flowing stream sections. The streams on site do move swiftly and could provide habitat, but the plants prefer granite substrates which are not on the property. S&EC performed a survey for harperella in November 2003, and did not find the plant. The survey was performed at a time when the species is not flowering which makes it more difficult to find. However, given the lack of granite on the property, it likely is not located there. In addition, the 100 foot riparian buffers planned in the community will protect any specimen that may be found on site.

The Bald eagle is considered threatened, but is proposed for delisting because of recent recovery of the species (USFWS, 2003). The bald eagle is a large raptor and is recognized by the characteristic white head of an adult. Nests are often constructed near water and can measure up to six feet across. Nests are reused by the same pair year after year. Bald eagles primarily

feed on fish, but can consume other small animals including frogs, smaller birds, and turtles. The recovery of this species is largely due to the banning of harmful pesticides including DDT. Bald eagles are found around Jordan Lake as the lake provides a source of food. Bald eagle nests are large and can measure up to 6 feet across. Large trees are needed to support them, and the trees on site are likely too young to support these nests. S&EC surveyed the Site for bald eagles, and did not observe any birds, nests, or suitable winter roosting sites. Thus, no bald eagles or habitat are present on the Site.

S&EC also surveyed the site for Virginia quillwort and sweet pinesap in November 2003. Virginia quillwort's habitat is in temporary ponds on granite, low wet fields, and edges of sluggish streams. No habitat or specimen were found during the survey. Sweet pinesap lives on roots of other plants. The plant is hard to detect, even when flowering; sweet pinesap was not found during the survey.

5.13.2 Environmental Impacts

Portions of the existing vegetation will be removed or modified during construction. The development will result in a reduction in the population levels of common bird and wildlife species. Species that require large forested tracts will be impacted the most. However, over 50 percent of the Site will remain in open space. After development, vegetative areas such as forested buffers, greenways, and public parks will be maintained throughout the life of the project. Riparian corridors and greenways will also connect forested areas.

While there is potential habitat for the Cape Fear shiner on the Site, it is unlikely that known populations would migrate through Jordan Lake to inhabit the streams on the Site. In addition, the use of erosion and sediment control practices, stormwater BMPs, and riparian buffers will minimize any impacts to water quality and aquatic habitat. There is also potential habitat for harperella, but no specimens were found during the survey. In addition, its habitat will be protected through the use of riparian buffers.

5.13.3 Conclusion

Developing the Site as a planned community results in the Site having over 50 percent open space which helps mitigate impacts to the flora and fauna of the community. Riparian buffers, proper erosion and sediment control techniques, and stormwater BMPs will help protect the habitat that is suitable for federally endangered species on the Site, if they do exist. S&EC concluded that, based on site observations, it is unlikely that development of this site will have negative impacts on threatened or endangered species known to occur in Chatham County. Thus, impacts to wildlife should not be significant.

5.14 Introduction of Toxic Substances

5.14.1 Existing Environment

The only potential toxic substances that may presently impact the Site are herbicides and pesticides that may be used on the silvicultural land.

5.14.2 Environmental Impacts

During construction, there is the potential for accidental spills of fuels such as gasoline or diesel from the mechanical equipment. All re-fueling will occur in designated upland areas, as far as feasible from surface waters. Spills that may occur will be contained immediately by certified personnel and disposed of appropriately. Any appropriate requirements (including the Material Safety Data Sheet) will be followed for storage and disposal of any substance that can be considered toxic. After development, automobiles and other mechanized equipment and chemicals used to maintain landscaping will be the major potential sources of toxic substances on the Site. Automobiles may leak oil and grease. Herbicides and pesticides may be used by homeowners to maintain their landscaping; they may also be applied to landscaping in the open space areas, particularly on the gold practice area. Any runoff associated with the Site will be treated in one of the stormwater BMPs. The land application system will use chlorine to disinfect the waste in order to protect human health from the land application and reuse system. However, the effluent will be dechlorinated to eliminate any potential for adverse effects from residual chlorine. In addition, the chlorine will be stored in tanks in a building, and secondary containment will be provided either through double wall tanks or by containment walls in the building.

5.14.3 Conclusions

Overall, the impacts from toxic substances should be minimal. Toxic impacts associated with residential development are normally insignificant. There are mitigative measures in place to treat the stormwater that runs off. Therefore, it is our opinion that no significant impacts from toxic substances will occur.

6 Secondary and Cumulative Impacts

Secondary Impacts are defined in 15A NCAC 1C.0101(d)(4) as “caused by and result from the proposed activity although they are later in time or further removed in distance, but they are still reasonably foreseeable.” The Project will not increase additional residential development. The Project may increase the likelihood of some additional commercial activity, but it cannot be attributed directly to the Project given the current growth trends in Chatham County. There are no significant secondary impacts associated with the proposed development.

Cumulative impacts are defined in 15A NCAC 1C .0101(d)(2) as “resulting from the incremental impact of the proposed activity when added to other past, present, and reasonably foreseeable future activities regardless of what entities undertake such other activities.” In order to estimate the cumulative impacts of the Project, data were obtained from Chatham County concerning the number of Planned Unit Developments that have been permitted within the County. In the past five years, four PUDs were permitted with a total acreage of 2270 acres and 1801 dwelling units and one compact community was permitted with a total acreage of 1589 acres and 2389 units. If one assumes that a similar number of residential developments will occur over the next five years, an additional 3800 acres of land will be developed as residential mixed-use communities. When compared to the land area of Chatham County as a whole (683 square miles, US Census Bureau website), this equates to 0.87 percent of the County land that will be transformed from rural land to residential/commercial. Even allowing for a greater level of growth results in one to two percent of the land changing. This is not a significant portion of the County.

A similar impact occurs when population projections are used. Over the next ten years, it is estimated that Chatham County will grow by 10,000 people or 20 percent. The current average household size is 2.47 persons in Chatham County. Assuming this percentage continues, this results in a need for approximately 4050 new residences in the next ten years or approximately 2000 residences in the next five years. This will not result in significant impacts to the County as a whole.

The cumulative impacts to the environment will also be lower from planned community site designs. These site designs maximize the amount of open space and reduce impervious surfaces. This results in greater levels of forestland and habitat being preserved. Lower impervious surfaces will also result in lower levels of stormwater runoff. Much of the open space that remains is in the form of wetlands and riparian buffers which serve to filter pollutants and provide habitat.

7 Mitigative Measures

Some impacts to environmental resources will occur at all development sites. As described above, there are several types of practices that will mitigate these environmental impacts at The Homestead. First, the Site is designed as a planned community that results in higher density development over a smaller footprint than would occur under a traditional site design. By concentrating the development, larger amounts of open space are preserved.

As part of this open space, the Project includes 100-foot riparian buffers along intermittent and perennial streams. Riparian buffers help protect water quality by filtering pollutants, stabilizing streambanks, and moderating stream temperature. They are effective in helping to control sediment loading as well as controlling stormwater runoff volume. In addition, buffers can provide ecological functions by protecting wetlands, providing food and habitat for aquatic and streamside organisms, and by providing wildlife corridors. Finally, riparian buffers can help protect floodplains and downstream property.

All of the existing wetlands are being preserved. Wetlands help preserve biological diversity, protect wildlife, protect water quality by filtering pollutants, and prevent flooding. There are several stream crossings on site, but these will be crossed through the use of bottomless culverts and bridges to avoid stream impacts. If utility lines impact wetlands or streams, they will be mitigated by restoration elsewhere or through mitigation payments in accordance with federal and state regulations.

Preserving larger amounts of open space helps maintain the overall level of imperviousness within a watershed. As imperviousness increases in a watershed, less water infiltrates the soil during storm events, and higher amounts of overland runoff occur. This results in higher stream flows during storms that can cause streambank erosion, habitat degradation, and lower biotic diversity in the aquatic ecosystem. By minimizing the amount of imperviousness, stormwater runoff volume decreases which helps protect water quality and the downstream water supply.

Four of the five stormwater treatment facilities are being designed such that they control the peak flowrate for the one-year, 24-hour storm event. For the remainder of the Site, the first inch of stormwater runoff will be detained prior to entering the riparian buffers.

During construction, erosion and sedimentation may occur during rain events. Soil erodes from all land types, including forested land. However, erosion rates are much higher from construction sites. A sediment and erosion control plan will be developed and implemented. This plan will indicate that the Project is being developed in phases. By developing the Project in phases, the time that land is cleared is minimized which reduces the erosion and sedimentation rates. In accordance with the Sedimentation Pollution Control Act, best management practices will be installed that capture any sediment that erodes from the site under the peak flow rate that will occur for all storms up to the 10-year event.

Finally, a state-of-the-art reclamation facility will be used to treat and dispose of wastewater generated on the Site through land application. After the wastewater is applied, the soil will

further filter pollutants including nutrients. Monitoring of the effluent and soil will occur at the land application sites.

8 State and Federal Permits

The following permits and approvals will be required for the project:

- Erosion and sediment control plan approval
- 404 permit
- Nondischarge permit
- Pump and haul permit

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Figures

Attachment 1

SHNA Area Descriptions