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Environmental Impact Assessment for the Westfall Site

Fearrington, Chatham County, North Carolina

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S&EC Project No. 8126.E4

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1.0 Proposed Project Description and Need

The Project, initially called "Booth Mountain," was approved in January of 2005. As required by Chatham County, the name has since been changed to "Westfall." The originally approved Project consisted of approximately 294-acres located between Jack Bennett Road (SR 1717) and Lystra Church Road (SR 1721) within the Williams Township. The Project was approved for 180 lots. After the project received zoning approval from the County, the developer submitted for and received approval of a Preliminary Plat for the first phase of construction. Project construction for the first phase began in 2006-2007. This first phase of construction was partially completed. All roadways and utility mains within the first phase of development were constructed. However, work on the Project stopped during the economic crisis and the project was conveyed by the original developer to the lending institution funding the construction loan(s).

Applicant recently purchased the Project in the winter of 2011. Since its purchase of the property, Applicant has been diligently moving forward with completion of the existing utilities so that they can be certified for operation and has finalized agreements with Aqua of North Carolina, Inc. ("Aqua") for the completion and operation of the wastewater treatment facility. The wastewater treatment facility has been conveyed to Aqua. In addition, off-site roadway improvements for the Phase C area along Jack Bennett Road have been completed per the North Carolina Department of Transportation's requirements. Home construction on lots within the Phase C area has begun.

There are currently 92 existing lots for which a final plat has been recorded with the Chatham County Register of Deeds. Please refer the attached Existing Conditions Exhibit map for the current existing condition.

The original project was divided into three different sections – A, B, & C. Section A area, north of Herndon Creek to Lystra Road, contained larger estate lots. The Section B area is located south of Herndon Creek to Jack Bennett Road along the western most portion of the site. Section C area is located east of Section B along Jack Bennett Road and is separated from Section B by property owned by the Chatham County Board of Education.

The purpose of this modification is to add additional property and increase the overall residential density of the project while implementing new environmental requirements per current County regulations. Approximately, 14.071 acres of land are being added to the existing 294.316 acres such that the new overall project area will consist of 308.387 acres. The revised land plan increases the total number of lots from 180 to 242, or an additional 62 lots but decreases the overall development footprint by reducing the size of the lots. The original plan was approved for 0.61 units per acre while the proposed plan is 0.78 units per acre which is well under the allowable 1.09 units per acre. The existing platted lots within Section A will remain intact, other than a few modifications to locate the new Amenity area at the end of Westfall Way and modification of lots at the end of Raven Ridge Court to accommodate a water quality BMP. Section B will be re-platted in it's entirety to accommodate revised lot widths throughout this section. Section C will remain intact and no changes to the existing platted lots will occur. Refer to Table 1 (original approval) and 1A (modified for approval) for the Net Land Area Computations.

The revised plan has increased the residential density by increasing the land area and by utilizing the existing infrastructure (roads and utilities) and reducing the size of the proposed residential lots. In reducing the size of the proposed lots we have also increased the amount of overall open space within the development. The original approved plan had approximately 99.9 acres of planned open space, however minor changes were made during the preliminary plat phase which increased the total area of open space to 108.81 acres. The revised plan increases this open space by 34.66 acres for a total of 140.20 acres.

In addition to increasing the open space the revised plan will also reduce the total amount of impervious surface. The approved plan proposed an impervious surface of approximately 18.5% of the total land area. The revised plan only proposes 17.8% of the total land area. The main reduction in impervious surface was relative to the reduction of asphalt paving for roadways. There was also a decrease in sidewalks and reductions to the proposed wastewater treatment and maintenance areas impervious areas.

Please refer to the attached Vicinity Map relative to the project location and surrounding areas.

Refer to the Existing Conditions Exhibit attached relative to the existing roadway network and refer to the Overall Modified Master Plan relative to the proposed facilities.

The proposed plan and modification, as previously mentioned, has an existing approval in place as a Planned Residential Development. However, the project does fit in within the surrounding land uses of residential development, forested areas, and light commercial uses within a 1-mile radius of the site. Within a 5-mile radius of the site, there are several other similar Planned Residential Developments such as The Preserve at Jordan Lake, The Legacy, and Windfall. Other mixed use developments within this area are Governors Club, Briar Chapel and Fearrington Village, not to mention several existing or planned commercial centers.

Roadways will be designed to the appropriate NCDOT design standard such that land disturbance for each phase of construction will be minimized to the degree possible. Overall disturbed areas will be in accordance and as allowed per the Chatham County Soil Erosion and Sedimentation Control Ordinance.

The proposed amenity area swim facility will have an approximate 1,500 s.f. structure which will house bathrooms, pool pumps, and storage area. This structure will be single story and approximately 20-feet in height. Residential homes will range in square footage from approximately 1,800-5,000 s.f.

Since this is a residential community the majority of all buildings will be residential in nature. The amenity facility located within Section A will provide a swimming pool and small building structure which will house bathrooms, pumps/pool equipment, and storage areas for furniture. There will also be several smaller picnic structures provided in various locations within the amenity areas located in Sections A, B, and C. The wastewater treatment facility will also have a few small structures which will house components for the treatment devices.

The proposed development will only have parking spaces provided at the two amenity areas. The number of these spaces in each area will be small. Approximately 28 spaces will be provided at the Pool Amenity and approximately 17 spaces along the play field amenity area.

Definitive construction plans depicting actual cleared areas have not been prepared at this stage of the approval process, however all roadway corridors shown on the Overall Modified Master Plan Exhibit will be graded and roadways paved. It is also anticipated the amenity areas for the pool, play field, and tot lots will also require some level of grading and pavement. Landscaping will also be provided in these areas, but definitive plans have not been completed at this time. The attached Overall Master Plan provides an approximate idea of areas which would be cleared for roadways, ponds, and homes. The extent of clearing on each home lot will vary. All areas requiring grading will be done so in accordance with the Chatham County Soil Erosion and Sedimentation Control Ordinance.

Refer to the Existing Utilities Exhibit, Proposed Water Mains Exhibit, and the Proposed Sanitary Sewer Mains Exhibit for the existing and proposed utilities locations and connections.

Refer to the Existing Utilities Exhibit and the Proposed Sanitary Sewer Mains Exhibit for wastewater management system.

Refer to the Overall Modified Master Plan Exhibit, individual Amenity Plan Exhibits, and the Typical Roadway Sections Exhibit for reference of impervious surface locations. See Table 2 and 2A for comparison of the differences in overall impervious surface calculations between the original approval and modified plan. Impervious surface percentage for the site overall has been reduced from the original proposal.

Refer to the Stormwater Management Plan Exhibit for layout of proposed stormwater control devices. The current existing approval was approved prior to the new stormwater regulations and this approval only required dry detention basins for treatment of the first ½-inch of runoff volume. There are three existing dry detention structures within the existing constructed and platted areas which will remain as-is. All other areas will be changed to include the design and installation of Water Quality structures which will treat the 1-inch one hour storm volume in addition to detaining the 10-year storm event to pre-developed peak discharge rate per the Chatham County Stormwater Ordinance amended August 20, 2012. These devices will be wet detention ponds per NCDENR Best Management Practices and will provide for removal of 85% Total Suspended Solids which will provide a much higher level of treatment relative to the existing approved plan.

2.0 Alternatives Analysis

Since this is a modification to an existing approved Planned Residential Development the alternative is to move forward with the current approved plan. However, we feel the modification submitted, although increasing density provides for a better alternative as it relates to stormwater management, open space preservation and environmental stewardship.

The modified plan increases the amount of open space, incorporates new buffer requirements along ephemeral streams, a reduction in impervious surfaces, and the incorporation of a better overall stormwater management strategy relative to water quality.

3.0 Existing Environment and Project Impacts

The following sections (3.1 – 3.13) describe conditions as observed during several visits to the project site between 2007 and 2012, and as collected from other sources including GIS data resources and publicly available records.

3.1 Geography

The Westfall site is located in the Piedmont physiographic province in the Cape Fear River Basin. Figures 1A and 1B depict the site as shown on the Fearrington USGS topographic quadrangle.

3.1.1 Geographic Setting and Geology

The Westfall site is situated at the western edge of the Carolina Slate Belt, where this belt meets an area of intrusive metamorphosed granitic rock. No impacts to the geographic setting or geology are anticipated.

3.1.2 Topography

Existing topography on the site ranges from steep slopes to relatively flat areas. Drainage is generally southeastern. Elevation above sea level ranges from 246 feet at the southeastern floodplain of Herndon Creek to 600 feet at the summit of Boothe Hill, in the northwestern portion of the site. For reference, USGS and Chatham County 2-foot Lidar based topographic maps of the site are included as Figures 1A, 1B, and 2.

Anticipated impacts to topography include site grading, excavation, and filling for lot development, roadway construction, erosion and sediment control devices, and utility installation. All roadway corridors shown on the Overall Modified Master Plan exhibit will require grading. It is also anticipated the amenity areas for the pool, play field, and tot lots will also require some level of mass grading in order to develop the site plans as depicted. Some areas of mass grading may be required for home construction however; in general most lots will only require the area immediately surrounding the footprint of proposed houses to be graded.

Definitive construction plans depicting actual planned grading have not been prepared at this stage of the approval process, however all efforts will be made to ensure that earthwork is balanced on-site and no overburden is required to be hauled off-site.

3.1.3 FEMA Floodplains

Figure 3 depicts the studied extent of FEMA flood hazard areas, as per the NC Flood Mapping Program data, on and adjacent to the Westfall site. The project site is located on FEMA FIRM panel 9784J, effective February 2, 2007. Herndon Creek is studied by limited detailed methods upstream to cross section 059, which is located in the southeastern portion of the Westfall site. Special flood hazard areas on the site include Zone AE within the 100-year floodplain and Zone X outside of the 100-year floodplain. Upstream of cross section 059, Herndon Creek is not studied and no floodplains or special flood hazard areas are shown.

No impacts to the 100-year floodplain are anticipated.

There are no known contaminated areas located within the site which will require mitigation.

During construction and grading there may be areas which require soil to be relocated from one area to another in order to accomplish a balance earthwork. Proper erosion control devices will be provided in these areas.

Erosion control plans for the site development will be prepared according the latest County requirements. The overall strategy will be to utilize the proposed stormwater management structures as temporary erosion control devices since these are located in draws and tributaries of larger drainage areas. This will minimize the number of overall structures required which will also help minimize the amount of clearing required for erosion control structures. It is anticipated additional measures such as temporary skimmer basins, inlet protection, silt fencing, etc will also be utilized to minimize sediment laden runoff.

3.2 Soils and Prime Farmlands

Figure 4 depicts the soil series located on the Westfall site as shown on the Chatham County Soil Survey. Descriptions of select characteristics of these soil series follow. For additional information, the interested reader is referred to the Soil Survey of Chatham County, North Carolina (NRCS 2006).

ChA - Chewacla and Wehadkee Soils, 0 to 2 % slopes, frequently flooded: Poorly to somewhat poorly drained, unsuited for urban development and septic fields. This is a hydric soil series, and is considered to be prime farmland if drained and protected from flooding.

CrB – Creedmoor-Green Level complex, 2 to 6 % slopes: Somewhat poorly to moderately well drained, poorly suited for urban development and septic tanks due to high shrink-swell potential, wetness, and restricted permeability. This series is considered to be prime farmland.

CrC – Creedmoor-Green Level complex, 6 to 10 % slopes; Somewhat poorly to moderately well drained, poorly suited for urban development and septic tanks due to high shrink-swell potential, wetness, and restricted permeability. This series is considered to be farmland of statewide importance.

WdE – Wedowee Sandy Loam, 15 to 35 % slopes, bouldery: Well drained, moderately permeable, low shrink-swell potential poorly suited for urban development due to steep slopes and boulders. This series is not considered to be important farmland.

WeB – Wedowee Sandy Loam, 2 to 6 % slopes: Well drained, moderately permeable, low shrink-swell potential, well suited for urban development, moderately suited for septic fields due to restricted permeability. This series is considered to be prime farmland.

WeC – Wedowee Sandy Loam, 6 to 10 % slopes: Well drained, moderately permeable, low shrink-swell potential, moderately suited for urban development due to steep slopes, moderately suited for septic fields due to restricted permeability and steep slopes. This series is considered to be farmland of statewide importance.

WeD – Wedowee Sandy Loam, 10 to 15 % slopes: Well drained, moderately permeable, low shrink-swell potential, moderately suited for urban development due to steep slopes, moderately suited for septic fields due to restricted permeability and steep slopes. This series is considered to be farmland of statewide importance.

WeE – Wedowee Sandy Loam, 15 to 25 % slopes: Well drained, moderately permeable, low shrink-swell potential, poorly suited for urban development and septic fields due to steep slopes. This series is not considered to be important farmland.

Anticipated impacts to soils during development include grading, excavation and filling during construction. These activities will modify the composition of the soils within the Westfall site. Existing soils are suitable for residential development, however if soils are not suitable a determination by an appropriate consultant will determine what modifications to soil composition are required. In order to minimize impacts to soils, development on many lots will be limited to the areas immediately surrounding the footprint of proposed houses. Portions of the site have previously been cleared and graded, and disturbance to the soil has already occurred. It is not anticipated that contaminated soils will be encountered on the site. The following table lists approximate estimates of anticipated existing and future disturbance to soils, including farmland soils.

Soil Series	Farmland Classification	Approximate Total Acreage On-Site	Existing Disturbed Acreage *	Proposed Total Disturbed Acreage	Proposed Undisturbed Acreage
ChA	Prime if Drained	4.39	0.12	0.12	4.27
CrC	Statewide Importance	36.28	6.00	13.44	22.84
CrB	Prime	33.38	0.92	26.70	6.68
WdE	Not Important	12.41	0.61	3.37	9.04
WeB	Prime	4.48	1.00	3.98	0.5
WeC	Statewide Importance	39.96	26.46	23.13	16.83
WeD	Statewide Importance	7.63	1.86	4.37	3.26
WeE	Not Important	169.01	28.57	90.11	78.9

*Existing disturbed acreage calculated based on previously cleared areas shown on 2010 aerial

3.3 Land Use

The Existing land use within and adjacent to the site is primarily a mix of forested areas and residential development, with few light industrial areas. A portion of the site has previously been cleared and infrastructure (roads, wastewater plant, stormwater devices, and some utilities) installed. The remainder of the site is forested. The Westfall site and the majority of the surrounding area are currently zoned as R-1 for residential development. Other zoning designations within a 1-mile radius of the site include Unzoned, MH-NC, B-1, CU-IND-L, O&I, and R-5. Zoning and land use is shown in Figure 5.

The proposed change in land use of forested portions of the Westfall site to residential development is consistent with the surrounding land use. Portions of the site have been designated as open space, and many of these areas will remain in a forested or mostly forested condition after development. Additionally, many lots will be cleared and graded in accordance with siting a residential dwelling thereon. The balance of the lot area is intended to remain in a wooded condition, subject to approved landscaping therein in accordance with applicable CUP conditions and setback regulations.

The modified site plan calls for 242 lots, with approximately 143.95 acres set aside as open space (approximately 47% of the site).

3.4 Wetlands

A detailed wetland delineation and Cape Fear stream buffer evaluation of the Westfall site was conducted in July of 2004. Streams and wetlands were reviewed and confirmed by the US Army Corps of Engineers (USACE). These streams and wetlands were surveyed and a final survey map was submitted to the USACE and a Signed Jurisdictional Determination was received from the USACE in August of 2007 that was good for 5 years. USACE Nationwide Permits 12 & 39 and North Carolina Division of Water Quality (DWQ) 401 approval were issued for wetland and stream impacts to the Westfall site in October of 2007. Approval was provided for 0.025 acres of permanent wetland impacts, 0.224 acres of temporary wetland impact, 94 linear feet of permanent perennial stream impact, 33 linear feet temporary perennial stream impacts, 206 linear feet of temporary intermittent stream impacts, and 10 linear feet of temporary intermittent stream impacts. Compensatory mitigation was not required for the impacts. The construction of the approved activities within these areas was completed in 2007. No additional wetland or stream impacts are proposed for the Westfall site; therefore no further permits will be requested from the USACE or DWQ.

Violations NOV-2008-PC-0176, NOV-2008-PC-0643and NOV-2008-PC-0833 were issued in March of 2009 based upon a General Site Permit Inspection performed by DWQ in February of 2009. A final Repair and Stabilization Plan was submitted and approved by the DWQ and USACE in September of 2009. Repair and Stabilization was performed in December of 2009. Three year monitoring of the repair and stabilization began in January of 2010. Year Three Monitoring was conducted in July of 2012. Close out of the monitoring based upon the success of the repair and stabilization was approved by Monte Mathews of the USACE during a site visit in August of 2012. A site visit was conducted with Lauren Witherspoon of the DWQ to review the success of the repair and stabilization in October of 2012. Two of the three areas repaired and stabilized no longer require any monitoring. The crossing at Lystra Road may require additional monitoring until construction activities in this area are complete.

A re-verification of the streams and wetlands was conducted by S&EC in July 2012. A site visit was conducted with Monte Mathews of the USACE in August of 2012 to confirm the stream and wetland delineation. The final survey map depicting the findings of the site meeting with the USACE was submitted to the USACE for a Jurisdictional Determination in October of 2012. Wetlands and streams on-site have been approximated on the attached Wetland Sketch Map, presented as Figure 6. The final survey maps submitted to the USACE for sign off are presented Appendix G. Based on survey map preparation, the total wetland acreage within the area evaluated for this Environmental Impact Assessment is approximately 9.2 acres. Chatham County buffers have been added to wetlands due to the modification of the Westfall site plan.

The detailed wetland delineation consisted of traversing the property to examine soils, vegetation, and hydrology across the site in search of areas that meet the criteria for jurisdictional wetlands as described by the procedures set forth in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0) (USACE April 2012). Areas on the site with positive indicators of hydric soils, evidence of wetland hydrology, and presence of hydrophytic vegetation were flagged with sequentially numbered, pink S&EC flagging. Proof of wetland hydrology would be the existence of hydric soils with oxidized root channels in the upper 12 inches of the soil profile, water borne deposits, drift lines, scour marks, drainage patterns, regional indicators of soil saturation, etc. Surface waters such as intermittent and perennial stream channels, ponds, and lakes, which are also subject to regulation by the US Army Corps of Engineers (USACE) as waters of the US, were also identified. These surface waters may also be referred to as jurisdictional waters to indicate that they are within the jurisdiction of the USACE. It is important to note that wetlands are also classified as waters of the US and regulated by the USACE under authority of the Clean Water Act (33 USC 1344).

Ephemeral channels are also regulated by Chatham County. Ephemeral channels were identified during the wetland delineation and stream evaluation conducted in July of 2012, and is also shown in Figure 6. The Ephemeral Review Packet was submitted to Dan LaMontagne of the Chatham County Land and Water Resources Division in August of 2012.

The wetlands onsite were identified as both Headwater and Bottomland Hardwood Forest wetland type as outlined in the publication A Field Guide to North Carolina Wetlands. These wetland types are common throughout the piedmont region of North Carolina and are found mainly along headwater streams and floodplains like the ones onsite. The primary functions of the wetlands on-site include flood attenuation, pollutant removal, and wildlife habitat.

3.5 Public Lands and Scenic, Recreational, and State Natural Areas

The Westfall site is adjacent to a public land owned by the US Army Corps of Engineers and managed by the NC Wildlife Resources Commission as part of the Jordan Game Lands. This public land is located generally southeast of the Westfall site and shares approximately 0.24 miles of border with the Westfall site in the vicinity of Herndon Creek.

The Game Lands area adjacent to the Westfall site is already designated as an Archery Only zone. As such, no additional impacts to recreational use by hunters using firearms are anticipated; however, the NCWRC may decide to change the area to be a designated Safety Zone following development of the Westfall site, which will disallow hunting in the area.

Two areas designated by the NC Natural Heritage Program as Significant Natural Heritage Areas (SNHA) overlap the Westfall site. These are Boothe Hill and the Herndon Creek Ravine. Boothe Hill overlaps approximately 47.58 acres of the northwestern portion of the project site. This area is currently forested and has not been disturbed by recent development. The Herndon Creek Ravine overlaps approximately 70.73 acres of the project site in the vicinity of Herndon Creek. Of this area, approximately 10.36 acres within the project site has been previously disturbed by existing development.

Anticipated impacts to Boothe Hill and the Herndon Creek Ravine include clearing and grading for residential development. While there are no building restrictions designated to SNHA's, the modified site plan minimizes impacts to these areas. Approximately 12.75 acres of the Boothe Hill SNHA and 50.55 acres of the Herndon Creek Ravine SNHA will be preserved within the proposed Open Space. This is an increase in open space within the SNHA's from the previously approved site plan.

3.6 Areas of Archaeological or Historical Value

A review of online records maintained by the North Carolina State Historic Preservation Office (SHPO) was conducted in September of 2012.

No historic structures are documented by SHPO within the proposed Westfall site. Three existing structures are documented by SHPO to exist within a 1-mile radius of the site. These structures have been surveyed and do not have a historic designation. One additional structure, also with no historic designation, has been removed or destroyed. Figure 8 depicts surveyed structures documented by SHPO in the vicinity of the Westfall site.

Surveyed structures within a 1-mile radius of the Westfall site include:

CH0230 – Pierson House
CH 0268 – Sidney Dean house
CH0369 – Isiah Cole House

Ch0512 – Pink & James Wesley Carson House (Gone)

The ruin of an old house with a standing stone chimney exists on the Westfall site. It is likely that this chimney is over 50 years old; however, it has not been documented by SHPO. This chimney was GPS-located by S&EC, and is also shown on Figure 8. Photographs of this chimney are included in Appendix C.

No impacts are anticipated to any historic structures documented by SHPO. The existing chimney, which is not documented by SHPO, is within an area proposed for development, and will be removed.

No areas of archaeological significance were noted during previous submittals of the Westfall site plan. In the event significant archaeological or historical resources are encountered during construction, Applicant will comply with all applicable laws with respect to the same.

Applicant has consulted with the Chatham County Historical Association regarding the chimney and any possible but unconfirmed cemetery locations. The exchange of correspondence is attached hereto. Applicant has invited the Association to the property to conduct an on-site review of the chimney and to search for any cemeteries. Applicant has not located any cemeteries on site. To the extent any cemeteries are found, Applicant will comply with all applicable laws with respect to the same.

3.7 Air Quality

The proposed development is a residential neighborhood and impacts on ambient air quality will be minimal if any.

Open burning during construction may take place, depending on conditions prevailing at time of need. There will be no open burning after development build out.

Since this is a residential project, there are only two areas where parking will be provided. There will be approximately 28 parking spaces provided at the amenity swimming pool and approximately 17 parking spaces will be provided close to the play field amenity area.

The two existing sanitary sewer pump stations on-site have odorphos odor control chemical feeds to aid in odor control. The existing wastewater treatment facility also will have operating provisions for odor control. The modification as submitted will not affect the operation of these existing facilities or have any additional negative impact on the surroundings.

3.8 Noise Levels

Currently noise levels on-site are relatively low and consist of typical construction projects. Construction is active in Section A and Section C.

It is anticipated that noise levels generated on-site will be the same as the previous approval.

3.9 Light Levels

The proposed plan modification will increase the residential density, so the only impact will be relative to the additional home lighting which will be minimal. All lighting will conform to the requirements of the Chatham County Zoning Ordinance.

3.10 Water Resources

The project is located within the Cape Fear River Basin. Please refer to Figure 9 for a detailed hydrologic map of the site and surrounding areas.

Drinking water source for the project will be provided by Chatham County. Source of water for Chatham County is the Jordan Lake Water Treatment Plant.

3.10.1 **Surface Waters**

Surface waters on the Westfall site flow into Herndon Creek in the Jordan Lake watershed, which has been classified in NC-DWQ's "Classification and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina" as WS-IV; NSW, CA. WS-IV is defined as waters used as sources of water supply for drinking, culinary, or food processing purposes where a WS-I, II or III classification is not feasible. These waters are also protected for Class C uses. WS-IV waters are generally in moderately to highly developed watersheds or Protected Areas. NSW is defined as a supplemental classification intended for waters needing additional nutrient management due to being subject to excessive growth of microscopic or macroscopic vegetation. CA is defined as the critical area within ½ mile draining to water supplies as measured from the normal pool elevation of reservoirs, or 1 mile and draining to a water supply intake. The Westfall site itself is not located within the Critical Area of Jordan Lake it is located within the Protected Area. Protected Area is defined as being land area that is within 10 miles and draining to a water intake and within 5 miles and draining to the normal pool elevation. A hydrologic map is provided as Figure 9. S&EC's stream buffer evaluation consisted of examining each feature on the site that is shown on the most recent version of the US Geological survey's 7.5 Minute Quadrangle or NRCS soil survey using NC-DWQ stream evaluation techniques. 10 jurisdictional streams and 6 Ephemeral drainages were identified during the site evaluation, the approximate locations of which are illustrated in Figure 6. An additional perennial stream was mapped during S&EC's stream evaluation on July of 2012. This stream was confirmed by the USACE during the August 2012 site visit. The site plan was adjusted based upon these findings to avoid any impacts to the additionally mapped stream. There are no additional impacts to any streams due to the modification of the Westfall site plan. Additional buffers have been added to the Westfall site due to the modification of the Westfall site plan.

Additional benefits to surface waters at the Westfall site due to the modification of the site plan include an overall reduction in impervious surface area which will decrease run off to surface waters on and off site. Also, more stringent storm water treatment is being implemented due to the Jordan Lake storm water regulations.

NOTE: Streams on-site have been identified in the field, confirmed by the USACE, and surveyed by a licensed professional surveyor. A final survey map has been submitted to the USACE for sign-off. Ephemeral drainages on-site are awaiting verification by Chatham County.

3.10.2 **Groundwater**

Drinking water for the Westfall site will be provided by Chatham County Public Works and no groundwater wells will be utilized at Westfall. The spray area to be used by the wastewater treatment facility has been reduced and with current regulations for treatment there are no impacts anticipated to groundwater.

3.11 Fish and Aquatic Habitats

Fish and aquatic habitat within the Westfall site consists of Herndon Creek and its tributaries and adjacent wetlands. Although no specific survey for fish or aquatic organisms was conducted, several species of freshwater fish were observed in Herndon Creek during the field reconnaissance. Piles of small rocks observed in the creek indicate chub nesting activity. These nests, or "beds", are often used as breeding and spawning areas by multiple fish species. In addition to fish, various other aquatic and semi-aquatic animals were observed on the site within Herndon Creek and its adjacent wetlands and tributaries. Tributaries and wetland seeps on the site support a healthy population of the NHP-designated Significantly Rare Carolina Ladle Crayfish (*Cambarus davidi*). Herndon Creek also contains large populations of the Rocky River Crayfish (*Cambarus hobbsorum*), and Two-lined Salamander (*Eurycea cirrigera*). Several Northern Dusky Salamanders (*Desmognathus fuscus*), Pickerel Frogs (*Rana (Lithobates) palustris*), and a single specimen of the Mud Salamander (*Pseudotriton montanus*) were also found in Herndon Creek or its tributaries. Temporary pools in the floodplain of Herndon Creek were observed to support breeding populations of American Toads (*Bufo (Anaxyrus) americanus*), Spotted Salamanders (*Ambystoma maculatum*), Spring Peepers (*Pseudacris crucifer*), Uplands Chorus Frogs (*Pseudacris feriarum*), and other amphibians. The portion of Herndon Creek impounded by beavers was observed to support a large population of the Paper Pondshell (*Utterbackia imbecilis*), in addition to Blue-spotted Sunfish (*Enneacanthus gloriosus*), Eastern Newts (*Notophthalmus viridescens*), and various freshwater turtle species. For a full list of aquatic species incidentally observed on the site during field work, please refer to Appendix B.

Anticipated impacts to aquatic habitat include road and sewer line crossings. Culverted road crossings with adequate aquatic life passageways have already been constructed across two streams, and a sewer line has been installed across Herndon Creek and its adjacent wetlands. Incidental observation of aquatic organisms in the vicinity of these impacts shows that many species, including the Carolina Ladle Crayfish, persist immediately upstream and downstream of the impacts.

3.12 Wildlife and Natural Vegetation

The wildlife and natural vegetation assessment of the Westfall site included both field reconnaissance and investigation of North Carolina Natural Heritage Program (NHP) records. The overall condition of the site with respect to its existing vegetation and wildlife species composition was observed.

3.12.1 Natural Communities

Natural Communities and habitat types on the Westfall site include dry oak-hickory, dry-mesic oak-hickory, mesic mixed hardwoods, pine dominant areas, bottomland hardwoods, semipermanent impoundments, and previously cleared and/or paved areas. Descriptions and locations of these areas follow.

Dry oak-hickory forest: This community type on the Westfall site is approximately 0.49 acres in size, and is restricted to the summit and a portion of the southern slope of Boothe Hill. Although the entirety of Boothe Hill is described by NHP as being dry-mesic oak-hickory forest, the summit and uppermost south facing slope contain a very high percentage of White Oaks (*Quercus alba*), indicating more dry conditions than the surrounding slope areas.

Species composition within the dry oak-hickory forest is as follows:
Canopy dominated by White Oak, with few Post Oaks (*Quercus stellata*). Understory less dense and composed of very few Dogwood (*Cornus florida*) and young Red Maple (*Acer rubrum*). Herb stratum is very sparse. Vine stratum at ground level composed of dense Muscadine (*Vitis rotundifolia*).

Dry-mesic oak-hickory forest: This community type is widespread and covers approximately 131.87 acres on the Westfall site.

Species composition within the dry-mesic oak-hickory forest is as follows: Canopy composed of Southern Red Oak (*Quercus falcata*), Northern Red Oak (*Quercus rubra*), Mockernut Hickory (*Carya tomentosa*), and Tulip Poplar (*Liriodendron tulipifera*). The dominant canopy species within this community type on certain north-facing slopes adjacent to Lystra Road changes to Chestnut Oak (*Quercus montana*) and these areas resemble more mesic Piedmont monadnock forests. Understory is moderately dense and varies across the site. Generally, the understory is composed of Dogwood, Redbud (*Cercis canadensis*), Red Maple, Persimmon (*Diospyros virginiana*), Maple-leafed Viburnum (*Viburnum acerifolium*), Winged Elm (*Ulmus alata*), Blackgum (*Nyssa sylvatica*) and Sourwood (*Oxydendrum arboreum*). Herb stratum is sparse, with Spotted Wintergreen (*Chimaphila maculata*), Wild Ginger (*Hexastylis sp.*), Cranefly Orchid (*Tipularia discolor*), Hoary Mountainmint (*Pycnanthemum incanum*), Puttyroot (*Aplectrum hyemale) and* Christmas Fern (*Polystichum acrostichoides*). Vine stratum composed primarily of Muscadine, with some Poison Ivy (*Toxicodendron radicans*) and Virginia Creeper (*Parthenocissus quinquefolia*).

Mesic mixed hardwood forest: This community type covers approximately 62.02 acres of the site. It is found on the lower portions of slopes and north-facing slopes on the Westfall site, and adjacent to streams.

Species composition within the mesic mixed hardwood forest is as follows: Canopy varies across the site, but is generally composed of Tulip Poplar, Sweet Gum (*Liquidambar styraciflua*), Umbrella Magnolia (*Magnolia tripetala*), Green Ash (*Fraxinus pennsylvanica*), Sycamore (*Platanus occidentalis*), Willow Oak (*Quercus phellos*), and Northern Red Oak, and Southern Red Oak. Understory includes Witch Hazel (*Hamamelis virginiana*), Serviceberry (*Amelanchier arborea*), and other sapling hardwood species. Throughout most of the site, the herbaceous stratum within this community type is generally either sparse or composed primarily of Christmas Fern. Sporadic other herbaceous species include Sedges (*Carex sp.*), Lady Fern (*Athyrium filix-femina*), Ebony Spleenwort (*Asplenium platyneuron*).

Species composition within this community type on certain north-facing slopes of Herndon Creek and one of its tributaries changes significantly. The canopy in these areas is dominated by mature Beech (*Fagus grandifolia*). These north-facing slopes have an apparently more diverse herbaceous species composition, including Black Cohosh (*Cimicifuga racemiflora*), Bloodroot (*Sanguinaria canadensis*), Windflower (*Thalictrum thalictroides*), Upland Dwarf Iris (*Iris verna*), Rattlesnake Orchid (*Goodyera pubescens*), Round-lobed Hepatica (*Anemone americana*), Trillium (*Trillium sp.*), and Wild Sarsaparilla (*Aralia nudicaulis*).

Pine dominant areas: Approximately 25.86 acres of the site in several small patches, which would likely otherwise be dry-mesic oak-hickory or mesic mixed hardwoods, were harvested within the last 20 years and planted in Loblolly Pine (*Pinus taeda*).

Species composition within pine dominant areas is generally as follows: Near monoculture of relatively densely planted Loblolly Pine (*Pinus taeda*). Few sapling hardwoods occur in the understory, and these areas generally have a very sparse herbaceous and vine stratum.

Bottomland hardwoods: This community type accounts for approximately 8.46 acres of the Westfall site, and is restricted to the less steep topography in the floodplain of Herndon Creek.

Species composition within the bottomland hardwoods is as follows: Canopy dominated by large Sycamore and Tulip Poplar, with many Umbrella Magnolia and River Birch. The understory is moderately dense, and includes Possumhaw (*Ilex decidua*), Ironwood (*Carpinus caroliniana*), and Tag Alder (*Alnus serrulata*) as well as the invasive Chinese Privet (*Ligustrum sinense*). The herb stratum is generally dense, and includes False Nettle and the invasive Japanese Stilt Grass (*Microstegium vimineum*). Vines are common, with Muscadine the dominant species. Other vines include Japanese Honeysuckle (*Lonicera japonica*), Roundleaf Greenbrier (*Smilax rotundifolia*), and Poison Ivy.

Semipermanent impoundment: This community type, located in the southeast portion of the Westfall site is the result of a beaver dam across Herndon Creek. The impounded area within the site boundaries is approximately 0.77 acres. Vegetation in and around the impoundment consists of a mix of emergent and wetland herbs, shrubs, and trees.

Species composition within the semi permanent impoundment is as follows:
The canopy is sparse, with very few large trees at the edges of the impoundment. Canopy species include River Birch (*Betula nigra*) and Black Willow (*Salix nigra*). Shrubs are sporadic and include Buttonbush (*Cephalanthus occidentalis*) and Persimmon. Herbs dominate this community type, and include Woolgrass (*Scirpus cyperinus*), Common Rush (*Juncus effusus*), Cattail (*Typha latifolia*), Wartremoving Herb (*Murdannia keisak*), and False Nettle (*Boehmeria cylindrica*).

Previously cleared: Areas that have been previously cleared or paved account for approximately 78.14 acres on the Westfall site. Portions of this area that have not been paved consist of a mix of primarily herbaceous grasses, with sporadic young woody trees and shrubs. Most of the invasive species located on the site are found in these areas.

Species composition within unpaved areas that have been previously cleared is as follows: There is no canopy stratum. The largest plants in this area are sporadic young Loblolly Pines and the fast-growing invasive species Tree of Heaven (*Ailanthus altissima*) and Princess Tree (*Paulownia tomentosa*). Other woody tree and shrub species include many seedlings and small saplings of species in the surrounding forested areas, as well as Winged Sumac (*Rhus copallinum*). Herbs dominate these areas, and include Sericea Lespedeza (*Lespedeza cuneata*), Broomsedge Bluestem (*Andropogon virginicus*), Dogfennel (*Eupatorium capillifolium*), Blackberry (*Rubus sp.*), Thistle (*Cirsium vulgare*), and Common Mullein (*Verbascum thapsus*).

3.12.2 Endangered Species

Endangered species research and site surveys were previously performed for the existing development. Endangered species research for the purposes of this report focused only on portions of the site added since the previous approvals. The scope of rare species investigated during the preparation of this Environmental Impact Assessment includes all federally protected Endangered and Threatened species documented by the NC Natural Heritage program as occurring in Chatham and nearby Orange Counties and all federally listed, state listed, and NHP listed species documented within a 2-mile radius of the boundaries of the recently added site areas. The tables below describe these species and their habitats, with an assessment of whether potentially suitable habitat for these species may exist on the recently added portions of the Westfall site.

Chatham and Orange County Federally Protected Endangered and Threatened Species

Scientific Name	Common Name	Fed. Status	State Status	Co. Status	Habitat Comments	Potentially Suitable Habitat On-

						site?
Alasmidonta heterodon	Dwarf Wedgemussel	E	E	Orange – Current	Tar and Neuse drainages; mainly near Fall Line	No
Echinacea laevigata	Smooth Coneflower	E	E	Orange – Historical	Glades, woodlands, and open areas over mafic rocks	No
Lindera melissifolia	Pondberry	E	E	Orange – Historical	Carolina bays and seasonally wet depressions	No
Notropis mekistocholas	Cape Fear Shiner	E	E	Chatham – Current	Cape Fear drainage	No
Picoides borealis	Red-cockaded Woodpecker	E	E	Chatham, Orange – Historical	Mature open pine forests, mainly longleaf	No
Ptilimnium nodosum	Harperella	E	E	Chatham – Current	Rocky riverbeds	No
Rhus michauxii	Michaux's Sumac	E	E	Orange – Historical	Sandhills, sandy forests, woodland, woodland edges	No

Federal, State, and NHP-listed Species documented within a 2-mile radius of the boundaries of recently added portions of the site (Chatham County)

Scientific Name	Common Name	Fed. Status	State Status	EO. Status	Habitat Comments (as per NHP)	Potentially Suitable Habitat On-site?
Cambarus davidi	Carolina Ladle Crayfish		SR	Current	Neuse and Cape Fear drainages	Yes – Found on-site
Haliaeetus leucocephalus	Bald Eagle	BGPA	T	Current	Mature forests near large bodies of water	No
Monotropsis odorata	Sweet Pinesap	FSC	SC-V	Historical	Dry forests and bluffs	Yes
Thermopsis mollis	Appalachian Golden-banner		SC-V	Historical	Dry ridges and open woodlands	Yes

3.12.3 Wildlife

The Westfall site supports many species of mammals, birds, reptiles, and amphibians, as well as several species of fish and aquatic and terrestrial invertebrates. During site visits, a large population of Wild Turkey (*Meleagris gallopavo*) and many White-tailed Deer (*Odocoileus virginianus*) were observed. Please refer to the species list provided as Appendix B for a list of wildlife observed on the Westfall site.

The Westfall site currently contains good quality habitat for many species of wildlife. Oaks, hickories, Persimmons, and other trees and shrubs provide food for mammals and birds. The predominantly deciduous overstory produces a thick layer of leaf litter which supports various detritivores, decomposers, insects, and arachnids. These, in turn, provide food for small insectivorous mammals, reptiles, and amphibians. The leaf layer also provides humidity for

woodland species of amphibians, and refuge for small reptile and mammal species. Larger debris, including fallen rotting logs and piles of large rocks relict from previous human activity on the site provide refuge for larger reptiles such as Black Rat Snakes (*Elaphe obsoleta*), Copperheads (*Agkistrodon contortrix*), and rodents. The mature forest trees and sporadically dense shrubs on the site support nests of both large raptors and Neotropical migrant songbirds. Edges between forest and previously cleared areas provide opportunities for reptiles such as Northern Fence Lizards (*Sceloporus hyacinthinus*) to thermoregulate. The semipermanent impoundment and floodplain area supports turtles, fish, amphibians, native mussel species and other aquatic invertebrates.

Anticipated impacts to wildlife habitat include the conversion of forest for residential development, and the fragmentation of forested areas by roads. Smaller species of wildlife and species such as terrestrial amphibians which require specific habitat parameters (i.e. moisture and temperature constraints) will be directly affected the most by this development. Larger species of wildlife and habitat generalists are expected to be less directly affected by the development. During construction, larger wildlife and more mobile wildlife (mammals, birds) will be displaced into the surrounding areas, which consist of a mixture of forest and residential areas. The only barriers to this displacement are Lystra road, north of the site and Jack Bennett road south of the site. However, the project is connected to the Jordan Lake Army Corps of Engineers property which allows passage. Furthermore, the expansion in width of wildlife corridor along Herndon Creek further enhances wildlife migration.

Following construction, portions of the developed area will remain available for use by larger species of wildlife (deer, coyotes, foxes, squirrels, birds, etc…) Additionally, approximately 140 acres of the site is set aside as Open Space, and will be available to wildlife, including wildlife migrating to and from adjacent forested areas. This is an increase in wildlife habitat from the previously approved site plan

3.12.4 Invasive Species

Invasive plant species on the Westfall site are primarily adventive within previously cleared areas, as noted above. Exceptions to this include the presence of several, but not many, specimens of Autumn-Olive (*Elaeagnus umbellata*) in forested portions of the site, several areas covered by Japanese Stilt Grass, and few areas where Japanese Honeysuckle is present. In addition to invasive plant species, the invasive Red Imported Fire Ant (*Solenopsis invicta*) has become established in previously cleared and disturbed areas of the site. Please refer to the species list provided as Appendix B for a list of invasive species documented on the Westfall site.

3.12.5 Forest Resources

Future phases of the proposed development will require additional clearing for road and home construction. Only roadway corridors will be cleared during road construction and clearing only as necessary for this construction.

3.13 Hazardous Materials

During construction gasoline and diesel will be utilized for mechanical equipment. Re-fueling for this equipment will be required to take place in upland areas away from surface waters.

The planned Amenity Pool area will have a locked storage facility for required pool chemicals. Construction plans have not been developed for this facility and the overall pool design has not been completed, therefore a complete list of hazardous materials has not been determined. Once these designs are finalized a complete list of chemicals and associated Material Data Safety Sheets will be provided as required by local emergency responders.

The additional lots will create no additional hazardous materials issues with regard to the previously approved amenity pool area, wastewater treatment and associated reuse spray areas.

4.0 State and Federal Permits Required

The following site-related permits will be obtained:

Stormwater: Chatham County

Grading/Erosion Control: Chatham County

Water Distribution: Chatham County

Sanitary Sewer: Permit required from the NCDENR Division of Water Quality, Non-Discharge Permitting Unit for proposed sanitary sewer extensions.

Chatham County Open Burning

5.0 References

Bogan, A.E. 2007. Workbook and Key to the Freshwater Bivalves or North Carolina (DRAFT). North Carolina Museum of Natural Sciences, Raleigh, NC 105 pp, 10 color plates.

Bull, J. and John Farrand Jr. 1977. National Audubon Society Field Guide to North American Birds, Eastern Region. Alfred A. Knopf, New York. 797 pp.

Menhinick, E.F. 1991. The Freshwater Fishes of North Carolina. North Carolina Wildlife Resources Commission, Raleigh, North Carolina. 227 pp.

North Carolina Natural Heritage Program [NHP]. 2012. N.C. NHP internet-based search. “http://www.nconemap.com/data.html” Accessed August 11, 2012.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions [Online]. Available URL: "http://soils.usda.gov/technical/classification/osd/index.html" Accessed August 11, 2012.

Chatham County Soil Erosion and Sedimentation Control Ordinance as adopted 12/2/2008.

Chatham County Stormwater Ordinance amended August 20, 2012.

NCDENR Best Management Practices Manual 2007 amended October 16, 2012.

2-foot LIDAR-based Contours from NCDOT GIS
"www.ncdot.gov/it/gis/DataDistribution/ContourElevation/Data.html"

FEMA Flood Hazard Map, NCFloodMaps.com GIS Chatham County PGDB

Soils Map information, NRCS Soil DataMart Farmland Classifications from NRCS Web Soil Survey

Zoning from Chatham County GIS Update May 2012, 2010

2010 Aerial Map from NCOneMap.com

Historic Structures based on SHPO HOPWEB GIS Data.

Hydrologic Unit Map from EEP BasinPro 3.1 from NC CGIA

Hydro Layers from Chatham County GIS