Supplement to Revision 1
of the
William States Lee III Nuclear Station
COL Application, Part 3
Applicant's Environmental Report

Construction and
Operation of Make-Up Pond C

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Preface

The scope of this effort is to supplement the existing Environmental Report (ER) (Rev 1) for the Lee Nuclear Site with information related to the construction and operation of Make-Up Pond C. This document (*Supplement to Revision 1 of the William States Lee III Nuclear Station COL Application, Part 3, Applicant's Environmental Report, Construction and Operation of Make-Up Pond C*; referred to as the "ER Supplement") supplements ER Rev 1. This approach was intended to allow the reader to focus quickly and easily on those items germane to the construction and operation of Make-Up Pond C.

It is highly recommended that the reader uses this document in conjunction with ER Rev 1 for cross-reference.

The format for the ER Supplement follows the format used to provide responses to Requests for Additional Information (RAIs) on the ER, and consists of two components: (1) text from ER Rev 1 that needs to be modified to include Make-Up Pond C; and (2) new text to be added to the ER relative to Make-Up Pond C:

(1) Text from ER Rev 1 to be modified:

As part of the section/subsection heading, the reader is instructed where the text to be modified is found in the source document (ER Rev 1). Modifications are then identified by underline (addition) and ~~strikethrough~~ (delete). Text from the ER Rev 1 is presented at the paragraph level (e.g., if last sentence in a paragraph needs to be revised, then the entire paragraph is provided, with the marked text revisions in the last sentence).

(2) New text relevant to Make-Up Pond C:

As part of the section/subsection heading, the reader is instructed where new text would be inserted into ER Rev 1.

1 INTRODUCTION TO THE ENVIRONMENTAL REPORT

1.0 INTRODUCTION

1.1 THE PROPOSED PROJECT

Section 1.1, The Proposed Project, page 1.1-2, last paragraph:

Ninety-Nine Islands Reservoir is the nearest major body of surface water to the Lee Nuclear Site. This reservoir is an impoundment of the Broad River. The Lee Nuclear Site is located adjacent to the reservoir, which bounds it to the north and east. Land along the south boundary of the site is private property (**Reference 1**). The proposed Make-Up Pond C is located northwest of the Lee Nuclear Site.

Section 1.1, The Proposed Project, page 1.1-3, 5th paragraph:

The proposed station ~~plant~~ uses two AP1000 reactors. Each reactor has a rated core thermal power of 3,400 Megawatts thermal (MWt) and a nuclear steam supply system (NSSS) thermal output of 3,415 MWt. The rated gross electrical power is 1,199.5 Megawatts electric (MWe). The rated net electrical power is at least 1,000 MWe (**Reference 5**). Waste heat is dissipated by mechanical draft cooling towers. Make-up water for the cooling towers is withdrawn from the Ninety-Nine Islands Reservoir (Broad River) through the river water intake structure. Make-Up Pond A serves as the central repository for raw water and contains an intake structure for providing make-up water to the station. For additional cooling water, an on-site reservoirs (Make-Up Pond B), and a proposed off-site reservoir (Make-Up Pond C) are available to provide cooling water needs to ensure that the existing limits for downstream flow from Ninety-Nine Islands Reservoir (Broad River) are maintained. Based on a review of historical data, use of these reservoirs is expected to be infrequent. Cooling tower blowdown is discharged to the Broad River, just above the Ninety-Nine Islands Dam. These facilities and the other facilities at the proposed ~~plant~~ station are shown in **Figures** 2.1-1 and 3.1-1 and are described in more detail in Chapter 3.

Section 1.1, The Proposed Project, page 1.1-4, 3rd paragraph:

During construction of the Cherokee Nuclear Station, a railroad spur was laid between East Gaffney and the site. When this earlier construction ended, the railroad spur was abandoned, and the rails were removed. Duke Energy plans to reconstruct this railroad spur to support construction and operations at the Lee Nuclear Site. With the exception of a short detour at an existing industrial facility (Reddy Ice Plant), and box culvert expansion at London Creek Crossing (more details are included in Subsection 2.2.2), current plans are to reconstruct the spur on the existing rail bed.

1.1.1 References

There are no revisions associated with Make-Up Pond C in this section.

1.2 STATUS OF REVIEWS, APPROVALS, AND CONSULTATIONS

The only revision associated with Make-Up Pond C in this section is revised Table 1.2-1.

TABLE 1.2-1 (Sheet 1 of 4)
FEDERAL, STATE, AND LOCAL AUTHORIZATIONS

Agency	Authority	Requirement	Date Filed	Date Received	License/ Permit No.	Expiration Date	Activity Covered	Status
AIR								
South Carolina Department of Health and Environmental Control (SCDHEC)	SC R. 61-62	Construction permit (emissions)	~~04/09/2008~~ 07/30/2010	~~07/29/2008~~ 07/30/2011			Permanent air-emitting equipment to be installed for station operations. Air emissions from diesel- and gas-powered generators that exceed 400 horsepower (construction) and all contractor construction sources.	Preparation of application not initiated.
SCDHEC	SC R. 61-62	Title V air operating permit or conditional major source permit	~~10/07/2014~~ 07/30/2016	~~1/05/2015~~ 07/30/2017			Air emissions operating permit for the purposes of Title V of the federal Clean Air Act. However, Lee Nuclear Station may be classifiable as a non-Title V conditional/synthetic minor facility. Under the new SC NSR rules, a regulatory analysis with appropriate calculations will be performed to determine whether NSR/PSD is applicable.	Preparation of application not initiated.
SCDHEC	SC R. 61-62	Concrete batch plant permit (Form IIF) (emissions)	~~06/09/2008~~ 07/30/2010	~~09/26/2008~~ 07/30/2011			Operation of a concrete batch plant on the site. This permit may be part of a SCDHEC Bureau of Air Quality construction permit (emissions)	Preparation of application not initiated.
Cherokee County	Fire Marshall	Approval	07/01/2007A	07/01/2007A	None	None	Open burning for vegetation/right-of-way clearing.	Permit has been received.
GROUNDWATER								
SCDHEC	SC R. 61-71	Well permits	02/17/2006A 06/27/2006A	02/21/2006A 07/03/2006A	2597 2736	None None	Installation and abandonment of wells.	Permits have been received.
HISTORIC PROPERTIES								
South Carolina Department of Archives and History	36 CFR 800	Consultation	04/03/2006A	06/08/2007			Identification and evaluation of historic properties.	The Phase I evaluation is complete and approved for the on-site ~~cooling water intake structure, road to the overlook, and meteorological tower~~ facilities. Surveys for Make-Up Pond C and Transmission lines complete and submitted to SCSHPO
RADIOACTIVE MATERIALS								
SCDHEC	SC R. 61-63	South Carolina radioactive material license	TBD	TBD			Bringing any radioactive source on the Lee Nuclear Site.	This license will be received by the contractors owning the radioactive material.

TABLE 1.2-1 (Sheet 2 of 4)
FEDERAL, STATE, AND LOCAL AUTHORIZATIONS

Agency	Authority	Requirement	Date Filed	Date Received	License/ Permit No.	Expiration Date	Activity Covered	Status
SURFACE WATER								
U.S. Army Corps of Engineers (USACE)	33 CFR 322, 323, 328, and 330	Section 404 dredge and fill permit	~~2008~~ 2010	~~2009~~ 2012			Construction of cooling water intake structure, dredging in pond/river, and construction in wetlands. ~~A USACE negative declaration on jurisdictional wetlands on the Lee Nuclear Site.~~ Construction of Make-Up Pond C and transmission line.	Preparation of application ~~not~~ initiated.
SCDHEC	SC R. 19-450	Permit	~~2008~~ 2010	~~2009~~ 2012			Construction in navigable waters for water intake and discharge structures and Make-Up pond C. Filed for in conjunction with USACE Section 404 permit.	~~Preparation of~~ Application not ~~initiated~~ required if NPDES permit is filed.
Federal Energy Regulatory Commission (Duke Energy Lake Management)		Water use permit	~~07/24/2008~~ 2011	~~09/17/2008~~ 2012			Water withdrawal from Ninety-Nine Islands Reservoir (Broad River).	Preparation of application not initiated.
SCDHEC	SC Code, Title 49, Chapter 4, Section 49-4-40	Water withdrawal registration	~~07/24/2008~~ 2012	~~09/17/2008~~ 2012			Water withdrawal from Ninety-Nine Islands Reservoir (Broad River).	Preparation of application not initiated.
SCDHEC	SC R. 61-9	NPDES discharge permit	~~05/29/2008~~ 10/29/2009	~~07/30/2008~~ 10/29/2010			Discharge of wastewater to surface waters (contractor concrete batch plant, cooling water blowdown, and process waste discharge).	Preparation of application ~~not~~ initiated.
SCDHEC	SC R. 61-9	NPDES storm water permit	~~05/29/2008~~ 07/01/2010	~~09/29/2008~~ 07/01/2011			Storm water to surface water discharges associated with land disturbance and industrial activity. Requires notice of intent, grading permit, erosion control plan prior to excavation, and SWPPP.	Preparation of application ~~not~~ initiated.
SCDHEC	SC R. 61-9	NPDES permit to construct	~~05/29/2008~~ 10/17/2011	~~07/30/2008~~ 04/09/2012			Construction of a wastewater treatment plant.	Preparation of application not initiated.
SCDHEC	Clean Water Act, Section 401, SC R. 61-101	Water quality certification	~~2008~~ 2010	~~2009~~ 2011			Federally licensed activities with discharges to navigable waters; state certifies water quality standards will not be violated.	Preparation of application not initiated.

TABLE 1.2-1 (Sheet 3 of 4)
FEDERAL, STATE, AND LOCAL AUTHORIZATIONS

Agency	Authority	Requirement	Date Filed	Date Received	License/ Permit No.	Expiration Date	Activity Covered	Status
SCDHEC	SC R. 61-58	Permit	06/27/2008 2011	08/28/2008 2012			Construction and operation of a public water distribution system.	Preparation of application not initiated.
SCDHEC	SC R. 72-1 to 72-9	Dam repair permit	11/21/2006A	01/15/2007A			Required before making repairs to an existing dam.	Permit has been approved.
SCDHEC	SC R. 72-1 to 72-9	Dam construction permit	2011	2012			Required to construct dam for Make-Up Pond C	Permit application not initiated
THREATENED AND ENDANGERED SPECIES								
U.S. Fish and Wildlife Service	Endangered Species Act/Migratory Bird Treaty Act (50 CFR 13, 17, 222,226, 227, 402, 424, 450-453)	Consultation	04/03/2006A				Consultation concerning potential impacts to federal threatened and endangered species and migratory birds.	Consultation process in progress. Consultations for the Lee Nuclear Site and railroad spur have been completed. Consultations will continue for Make-Up Pond C, the railroad spur, transmission corridors, and any necessary road work.
South Carolina Department of Natural Resources	Endangered Species Act (50 CFR 13, 17, 222,226, 227, 402, 424, 450-453)	Consultation	04/03/2006A				Consultation concerning potential impacts to state threatened and endangered species.	Consultation process in progress. Consultations for the Lee Nuclear Site and railroad spur have been completed. Consultations will continue for Make-Up Pond C, the railroad spur, transmission corridors, and any necessary road work.
TRANSPORTATION								
Federal Aviation Administration	Federal Aviation Act, 14 CFR 77	§ 77.15 Permit	04/14/2008 2011	07/23/2008 2011			Permit for structures over 200 ft. in height (construction cranes, reactor buildings).	Preparation of application not initiated.
South Carolina Department of Transportation	SC Code Annotated § 57-5-1080	Highway encroachment permit	2008 2010	2008 2012			Building an alternate construction entrance to the Lee Nuclear Site. Relocation of Hwy 329 for Make-Up Pond C.	Pre-application discussions held with DOT on the Hwy 329 reroute. Preparation of application not initiated.
WASTE MANAGEMENT								
SCDHEC	SC R. 61-79 and 61-104	RCRA ID number	07/02/2008 07/2007A	09/23/2008 08/14/2008A			90-day accumulation of hazardous waste.	Preparation of application not initiated. Permit has been received.

TABLE 1.2-1 (Sheet 4 of 4)
FEDERAL, STATE, AND LOCAL AUTHORIZATIONS

Agency	Authority	Requirement	Date Filed	Date Received	License/ Permit No.	Expiration Date	Activity Covered	Status
MISCELLANEOUS								
South Carolina Public Service Commission	SC Code Annotated § 58-33-110	Certificate of Environmental Compatibility and Public Convenience and Necessity	~~2008~~ 01/2010	~~2009~~ 07/2010			Construction and operation of a generating station of more than 75 megawatts.	Draft application preparation in progress.
South Carolina Public Service Commission	SC Code Annotated § 58-33-110	Certificate of Environmental Compatibility and Public Convenience and Necessity	~~2008~~ 01/2010	~~2009~~ 07/2010			Construction and operation of any transmission line with a designed voltage of 125 kV or more.	Draft application preparation in progress.
South Carolina Fire Marshall Office	Chapter 71, 1976 Code Section 23-36-80, as amended	Blasting permit	~~01/21/2008~~ 2011	~~02/01/2008~~ 2011			Magazine storage and use of high explosives on the Lee Nuclear Site and Make-Up Pond C.	Preparation of application not initiated.
SCDHEC	SC R. 61-107.11, Part III	Temporary C & D debris permit	07/03/2007A	07/03/2007A	None	None	Storing of engineered fill. Part III permit-by-rule through notification of SCDHEC.	Permit received as a result of notification to SCDHEC in Spartanburg, SC.
Cherokee County	Building Safety	Building permit	~~01/23/2008~~ 2011	~~02/01/2008~~ 2011			Construction of offices and warehouses only. Buildings subjected to inspection.	Preparation of application not initiated.

All dates are projected unless listed as actual (A).

TBD – to be determined.

2.0 ENVIRONMENTAL DESCRIPTION

Section 2.0, Environmental Description, page 2.0-1, 1st paragraph:

Chapter 2 describes the existing environmental conditions at the Lee Nuclear Site and the Make-Up Pond C study area, in the site vicinity, and in the region. The level of detail provided in the environmental descriptions is sufficient to adequately describe the potential environmental effects of construction (Chapter 4) and operation (Chapter 5) of two AP1000 reactors at the site. This chapter consists of eight sections:

2.1 STATION LOCATION

There are no revisions associated with Make-Up Pond C in this section.

2.2 LAND

2.2.1 The Site and Vicinity

Subsection 2.2.1.2, The Vicinity, page 2.2-1, last paragraph:

The vicinity is a 6-mi. band from the site boundary and is located in both Cherokee and York counties, South Carolina (Reference 1). Several transportation routes, including roads and rails, are located within the site vicinity. One major interstate, I-85, is located 6.6 mi. northwest of the center point between the two reactors and connects the Greenville-Spartanburg area to Gastonia, North Carolina (see **Figure 1.1-1**). The abandoned Lee Nuclear Station railroad spur connects to the Norfolk Southern rail system in East Gaffney (see **Figure 1.1-2**) (**Reference** 1). The proposed Make-Up Pond C is located northwest of the Lee Nuclear Site.

2.2.2 Transmission Corridors and Off-Site Areas

Subsection 2.2.2, Transmission Corridors and Off-Site Areas, page 2.2-5, INSERT NEW TEXT after 1st paragraph:

An additional pond, Make-Up Pond C, is proposed for the Lee Nuclear Station to allow continued operation during drought conditions. Make-Up Pond C will encompass approximately 620 acres (ac). Surrounding the pond is a 300-foot buffer, which encompasses 458 ac. The 300-ft buffer will remain in its natural vegetated state with the exception of a 50-ft wide strip along the shoreline, which is cleared, grubbed, and grassed to prevent debris from washing into the impoundment. Make-Up Pond C will require additional pipelines to transport water from the Broad River to Make-Up Pond C, transport water between Make-Up Pond B and Make-Up Pond C, and a 44-kilovolt (kV) transmission line to supply power to the pumps at Make-Up Pond C. The pipeline corridor is approximately 60 ac with an approximate 150-ft corridor. The impoundment of London Creek will result in the realignment of SC 329 (including a bridge over Make-Up Pond C), expansion of the box culvert at the railroad crossing of London Creek, and the re-routing of an existing transmission line. The re-routed transmission line corridor is estimated to be 24 ac.

As shown in **Figure** 2.2-6, according to U.S. Geological Survey (USGS) land use data, the land in the Make-Up Pond C study area is largely (65.0 percent) forested (deciduous, evergreen, and mixed forest). Other uses include pasture land (21.0 percent). Some low-intensity residential development (0.5 percent) also occurs in the Make-Up Pond C area. Remaining land uses include grassland (5.4 percent), open development (3.9 percent), shrub/scrub (2.5 percent), cropland (1.3 percent), water (0.3 percent), and woody wetlands (< 0.1 percent).

Residences are located east of SC 329/Victory Trail Road, off of Edward Road, Darby Road, Old Barn Road, Grace Road, Jimmy Road, and Whites Road. There is also some residential development north of Rolling Mill Road off of Deer Ridge Road, Fawn Trail, and Buck Trail. The Make-Up Pond C study area is covered entirely by Block Group (BG) 7 of Census Tract (CT) 9,705 for the 2000 U.S. Census. According to the U.S. Census Bureau, there are 1,044 total housing units within BG 7, all of which are occupied. Development within the Make-Up Pond C study area appears to be limited to residential development. Duke Energy is currently acquiring property within the Make-Up Pond C area.

Section 2.2.2, Transmission Corridors and Off-Site Areas, page 2.2-5, 3rd paragraph:

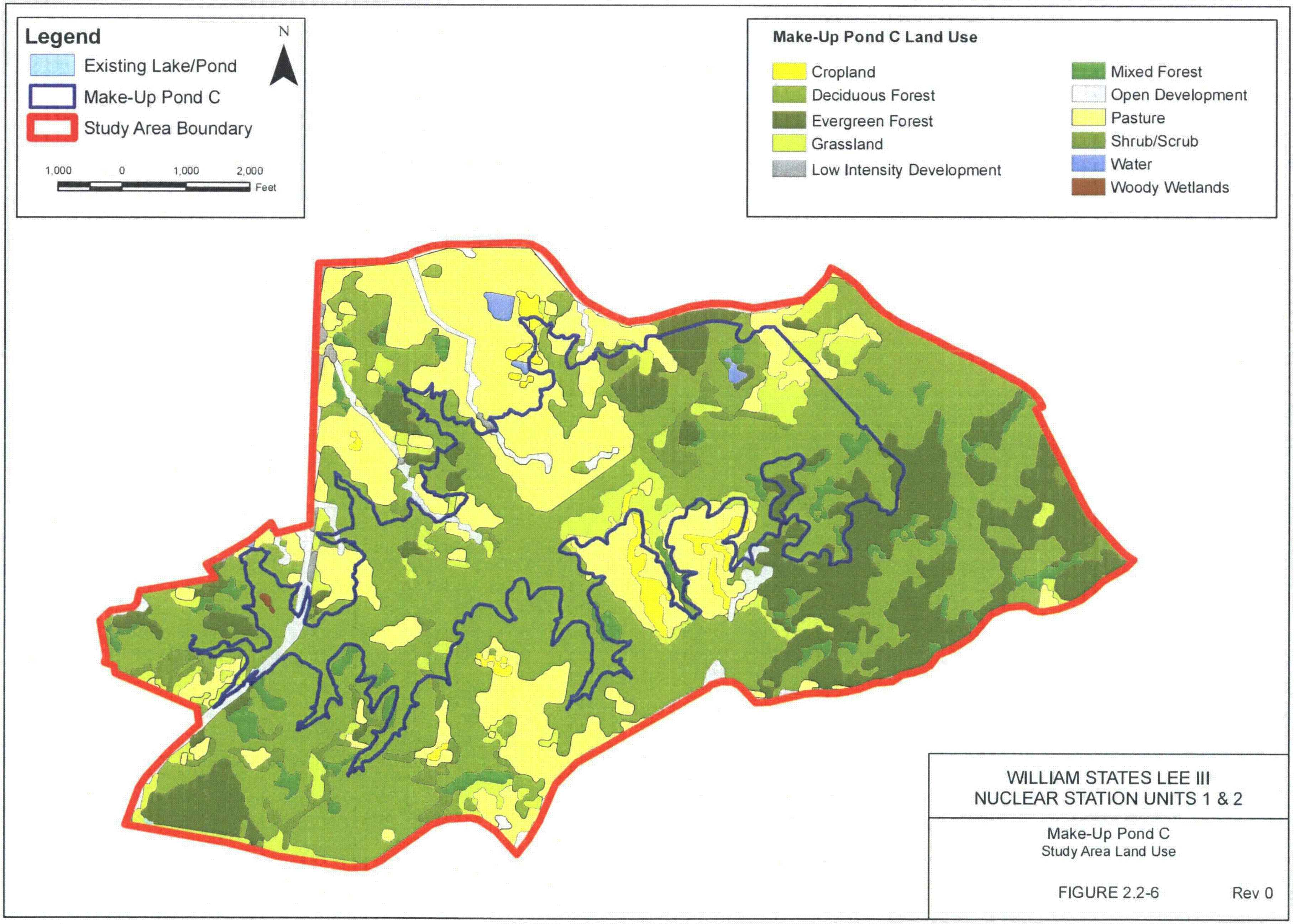
Duke Energy is reacquiring the right-of-way from current owners and plans to place new ballast and track to reactivate the rail line for construction of the Lee Nuclear Station. The original right-of-way remains intact. However, Duke Energy plans a short detour from this original route at the location of Reddy Ice Plant, which occupies part of the original rail bed. This detour involves approximately 1,300 ft. of track. Additionally, construction of the proposed Make-Up Pond C will necessitate improvement (via larger box culvert) to the existing culvert at the London Creek crossing downstream from the proposed Make-Up Pond C dam.

2.2.3 The Region

There are no revisions associated with Make-Up Pond C in this section.

2.2.4 References

There are no revisions associated with Make-Up Pond C in this section.


Legend
N
Existing Lake/Pond
Make-Up Pond C
Study Area Boundary
1,000 0 1,000 2,000
Feet
Make-Up Pond C Land Use
Cropland
Deciduous Forest
Evergreen Forest
Grassland
Low Intensity Development
Mixed Forest
Open Development
Pasture
Shrub/Scrub
Water
Woody Wetlands
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Make-Up Pond C
Study Area Land Use
FIGURE 2.2-6
Rev 0

2.3 WATER

Section 2.3, Water, page 2.3-1, 1st paragraph:

This section includes information that describes the physical, chemical, biological, and hydrological characteristics of the waters that may affect the Lee Nuclear Station effluents and water supply, or waters that may be assumed to be affected by the construction or operation of two new AP1000 units at the facility, including the proposed Make-Up Pond C.

2.3.1 Hydrology

Subsection 2.3.1.1.1.1, Upper Broad River Basin Watershed, page 2.3-2, INSERT NEW TEXT at end of section:

The proposed Make-Up Pond C will be an off-site man-made impoundment, formed by impounding London Creek, a tributary of the Broad River, northwest of Make-Up Pond B (**Figure** 2.3-30). Make-Up Pond C will be used to provide supplemental water during drought and/or low flow periods. Make-Up Pond C will be filled using water pumped through Make-Up Pond A and Make-Up Pond B, or directly from the Broad River. The Make-Up Pond C dam will be downstream of Lake Cherokee and upstream of the confluence of London and Little London creeks.

Subsection 2.3.1.2.1.3, Discharge Characteristics, page 2.3-5, 2nd and 3rd paragraph:

Low-flow conditions on the Broad River are a function of natural flow in the rivers and streams, available storage capacity of upstream reservoirs, and regulated discharge flow from upstream dams. Low-flow conditions are generally defined as the lowest consecutive 7-day stream flow that is likely to occur every 10 years (7Q10). Estimated long-term flows for the Broad River are based primarily on extrapolated USGS streamflow gauge data from the Gaffney Station (No. 02153500) due to its proximity to the Lee Nuclear Site and long record of data collection. Daily average flows were compiled for the periods 1938–1971 and 1986–1990. Data from two upstream gauges (No. 02153200 near Blacksburg and No. 02151500 near Boiling Springs) were used to fill the data gaps, calculating pro-rated flows based on their drainage areas relative to the Gaffney gauge. The resulting 83~~81~~-year period of record (1926–~~2006~~2008) for the Broad River at the Gaffney Station was used to determine an average annual flow of the Broad River. This flow was approximately 2,500~~2538~~ cfs. The 7Q10 was calculated with this same database to be 439~~479~~ cfs, using a Log-Pearson Type III distribution.

The South Carolina Water Use Report 2005 Summary (**Reference** 21) reported that the South Carolina climate is subject to periodic droughts. Since 1900, severe droughts have occurred statewide in 1925, 1933, 1954, 1956, 1977, 1983, 1986, 1990, 1993, ~~and~~ 1998, 2002, 2007, and 2008. The drought that officially began in June 1998 abated in the late summer of 2002 with the onset of the hurricane season. The effects of these droughts are reflected in the Broad River discharge characteristics.

Subsection 2.3.1.2.3, Local Tributaries, page 2.3-7, 2nd and 3rd paragraph:

~~The most significant of~~ Of these features, two of the more significant are ~~is~~ London Creek, which is discussed at the end of this subsection, and McKowns Creek, which is dammed at the Lee Nuclear Site to form the Make-Up Pond B (see **Subsection** 2.3.1.3). McKowns Creek's drainage area is estimated to be 1,633 ac~~.~~, including a small impoundment feeding the creek. This small impoundment has a drainage area of approximately 181 ac~~.~~ (**Reference** 8). The intermittent stream mentioned in the previous paragraph features a drainage area of approximately 385 ac.

There are a number of other creeks and impoundments within a ~~6 mi.~~ 6-mile radius of the Lee Nuclear Site; however, these features are hydraulically insignificant (i.e., small storage, low hazard structures, or outside drainage). ~~The largest of these features within this radius is the Wildlife Dam and reservoir located on London Creek. The reservoir has a maximum storage of 720 ac. ft.; is hydraulically insignificant.~~

NEW SUBSECTION Subsection 2.3.1.2.3.1, London Creek

The drainage area of Make-Up Pond C will be approximately 2,500 ac (about 3.9 square miles). Make-Up Pond C will be downstream of Lake Cherokee, an existing body of water impounded in 1971 by Wildlife Dam on upper London Creek. Lake Cherokee is the headwater of London Creek. The lake is owned by the South Carolina Department of Natural Resources (SCDNR) and is managed for sport fishing. The Lake Cherokee drainage area is estimated at 512 ac, of which approximately 53 ac are the water surface of Lake Cherokee itself. This 512-ac area is included in the approximately 2,500-ac drainage area upstream of the proposed Make-Up Pond C dam. The proposed Make-Up Pond C and drainage area are shown in **Figure** 2.3-31. Make-Up Pond C is in a non-gauged drainage area on London Creek. For the purposes of water balance modeling (see **Subsection** 5.2.1) and other analysis, a daily inflow data series for the proposed Make-Up Pond C location was developed from a gauged water basin in North Carolina with a suitable period of record for construction of an inflow series. The USGS Gauge 02149000 on Cove Creek near Lake Lure, North Carolina, was used (**Reference** 35). Flows were scaled by drainage areas to produce a synthetic inflow time series. The basin drainage area for Cove Creek of 79.0 square miles was taken directly from USGS records.

Synthetic daily inflows for the period of January 1, 1952, through December 31, 2007, were developed for the proposed Make-Up Pond C. Annual and monthly exceedances for the estimated synthetic daily inflows to proposed Make-Up Pond C are presented in **Table** 2.3-26. Cove Creek is not a perfect comparison since the watersheds are different (3.9 vs. 79 square miles) and London Creek is influenced by Lake Cherokee, which controls approximately 20 percent of the drainage basin and only provides through-flow in a natural way when the lake is full (i.e., outfall is through a drop inlet spillway with discharge pipe). The values in **Table** 2.3-26 suggest that the flow is perennial, although periods of zero flow were observed in London Creek during the 2008 investigation (**Subsection** 2.3.3.1.2.2).

Downstream of the proposed dam, Little London Creek joins London Creek and their combined flow enters the Broad River. Using a ratio of London Creek drainage area to that of USGS Gauge 02149000 (**Reference** 35), the average daily flow of London Creek at the proposed dam location is approximately 7 cubic feet per second (cfs) and the maximum daily flow is approximately 213 cfs. The minimum flow is near zero, observed during sampling in 2008 (**Subsection** 2.3.3.1.2.2).

Make-Up Pond C, a proposed off-site man-made impoundment, will be formed by constructing an earthen dam that impounds London Creek upstream of the confluence of Little London Creek. The Make-Up Pond C dam crest elevation will be 660 ft mean sea level (msl), and the spillway crest elevation will be 650 ft msl. See **Figure** 2.3-32 for a bathymetric map of the proposed Make-Up Pond C, which is based on current land contours. Make-Up Pond C will have a maximum depth of approximately 116 ft and a total storage volume of approximately 22,000 acre-feet (ac-ft) The surface area at the normal pond level of 650 ft msl is approximately 620 ac, which is approximately 25 percent of the total drainage area of London Creek upstream of the dam (see **Subsections** 2.3.2 and 2.3.3). The usable storage capacity is approximately 17,500 ac-ft.

Normal water surface elevation for the proposed Make-Up Pond C will be 650 ft. At times when natural stream flows to Make-Up Pond C (see **Subsection** 2.3.1.2.1.3) are inadequate to maintain a full pool condition, the pond will receive supplemental inflows from the Broad River. Based on conditions at the Lee Nuclear Site and using Soil Conservation Service runoff curve number methods, rainfall runoff, less infiltration losses and evaporation, is expected to contribute on average 236 gpm to the Make-Up Pond C impoundment.

Subsection 2.3.1.2.4, Wetlands, page 2.3-7, 1st paragraph:

Wetlands are areas that are inundated or saturated by surface water or 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. At the Lee Nuclear Site, wetlands occupy a total of 46.4 ac. or 2.4 percent of the site. They are currently represented by Alluvial Wetland, Non-alluvial Wetland, and Non-jurisdictional Wetland that total 3.2 ac. (0.2 percent), 10.8 ac. (0.6 percent), and 32.4 ac. (1.7 percent) of the total on-site area, respectively. No appreciable seasonal variations of wetland settings were documented during the year of assessment. Further discussion of wetlands is provided in Subsection 2.4.1.

Subsection 2.3.1.2.4, Wetlands, page 2.3-7, INSERT NEW TEXT at the end of section:

Wetlands in the Make-Up Pond C study area include small jurisdictional wetlands that are primarily associated with stream features along London Creek, Little London Creek, and various unnamed tributaries. These jurisdictional wetlands occupy an estimated 9.74 ac or 0.5 percent of the Make-Up Pond C study area. Further quantification and discussion of wetlands in the Make-Up Pond C study area are provided in **Subsection** 2.4.1.1.1.

Subsection 2.3.1.3.1.1, Reservoir Characteristics, page 2.3-8, 1st paragraph:

The Ninety-Nine Islands Dam impounds a 433-ac~~.~~ main stem "run-of-the-river" reservoir[1] with a normal water level at 511 ft~~.~~ above msl and a shoreline of approximately 14 mi~~.~~ (Reference 3). Flow through the Ninety-Nine Islands Reservoir is dominated by the flow of the river channel, which divides the reservoir into two backwater regions. The two backwater regions exhibit very little circulation during non-flood periods. Therefore, the average transit time through the reservoir is conservatively estimated from the volume of the reservoir along the main channel excluding the backwater areas. Based on a storage volume of 570 ac~~.~~-ft~~.~~ along the main channel to a point about 0.7 river mi~~.~~ upstream from the dam and an average annual flow of the Broad River of approximately 2,500~~2538~~ cfs, the average transit time for water flow through the reservoir is approximately 3 hours. During low-flow conditions, the transit time slows to around ~~14~~16 hours.

Subsection 2.3.1.3.3, Upstream Dams and Reservoirs, page 2.3-13, INSERT NEW TEXT after 1st paragraph:

Lake Cherokee is located just upstream of the proposed Make-Up Pond C, on a tributary of London Creek in Cherokee County, South Carolina. Based on the U.S. Army Corps of Engineers National Inventory of Dams (Reference 36) database, the lake was formed by Wildlife Dam (ID SC00269) then owned by SC Wildlife and Marine Resources. The dam, completed in 1971, is a compacted earth-fill structure approximately 940 ft long and 40 ft high. The reservoir has an estimated storage capacity of 720 ac-ft at crest elevation 675 ft. It is now owned and managed for sport fishing by the SCDNR (Reference 37).

Subsection 2.3.1.5, Groundwater, page 2.3-14, 1st paragraph:

This subsection discusses regional and local groundwater conditions and their influence on groundwater characteristics in the vicinity of the Lee Nuclear Site. ~~In order to~~To gather additional site-specific information, a detailed geohydrological investigation was conducted on the Lee Nuclear Site in 2006, and was supplemented in 2009 for the area of the proposed Make-Up Pond C. The objective of ~~this investigation~~ these investigations was to collect groundwater information, including the following:

Subsection 2.3.1.5.1, Physiographic Setting, page 2.3-14, 1st paragraph:

The Lee Nuclear Site and Make-Up Pond C study area are ~~is~~ located within the Piedmont physiographic province, a southwest-northeast-oriented province of the Appalachian Mountain system (**Figure 2.3-7**). The Piedmont province is 80–120 mi~~les (mi.)~~ wide and situated between the Blue Ridge province, a mountainous region to the northwest and the Atlantic Coastal Plain province to the southeast. The province is a seaward-sloping plateau, dominated by a monotonous topography of low rounded ridges with gentle slopes and ravines largely underlain by saprolite developed on crystalline rock. ~~The Piedmont province is the nonmountainous portion of the older Appalachians. Its surface is the result of degradation because the underlying rocks are deformed. The surface is rarely parallel to the beds of rocks, and the original surface is not preserved anywhere.~~

Subsection 2.3.1.5.1, Physiographic Setting, page 2.3-15, 2nd paragraph:

The Piedmont surface in the subregion ranges from 400 to 1,000 ft. above msl. The typical landscape of the Piedmont province is a rolling surface of gentle slopes with minimal relief (averaging about 50 ft.) cut or bounded by valleys of steeper slope and greater depth, often by several hundred feet. Near the larger streams, tributaries cut through deep and steep valleys that (when traced headward) become wide, shallow, and of gentle gradient. The deeper valleys are those of rejuvenated streams. The principal stream in the Kings Mountain Belt (Figure 2.3-8) is the Broad River. ~~The regional southeastward drainage of the Upper Broad River basin is reflected in the trend of the Broad River.~~ The Broad River is incised 200 to 250 ft. below the summit levels of the Piedmont. The Broad River valley is narrow with little or no floodplain development and its tributary streams cut downward to the level of the Broad River where they have caused locally rugged topography (Reference 13).

Subsection 2.3.1.5.1, Physiographic Setting, page 2.3-15, INSERT NEW TEXT at end of section:

The topography of the proposed Make-Up Pond C footprint ranges from approximately 535 ft msl along London Creek at the downstream limit of the dam site to 650 ft msl at the proposed waterline. Additional information on the physiographic features of the study area is included in **Subsection 2.6.1**.

Subsection 2.3.1.5.2, Regional and Local Geology, page 2.3-15, 1st and 2nd paragraphs:

A complex mosaic of igneous and metamorphic rocks underlies the vast majority of the Broad River basin. Most of the rocks in the Piedmont province are medium- to high-grade metamorphic rocks such as schist, gneiss, and amphibolites. These rocks are generally stratified and compositionally layered with distinct foliation. In addition, lineaments and fault systems are common in the region, and several major thrust sheets are present in the basin. Numerous granitic plutons and stocks have intruded older metamorphic rocks ~~and are often marked by areas of higher topography, because of the massive, resistant nature of these intrusive rocks~~. The Lee Nuclear Site and Make-Up Pond C study area are ~~is~~ located within the Charlotte Terrane of the Carolina Zone (the Kings Mountain Belt) of the Piedmont province (**Figures 2.3-7 and 2.3-8**), which contains a complex series of deformed rocks consisting of felsic and mafic schists, gneisses, quartzites, conglomerates, and marble, generally considered to be of Precambrian and early Paleozoic age (**References 5 and 13**).

~~With the exception of later diabase dikes, t~~The Lee Nuclear Site and the Make-Up Pond C study area overlie rocks of the Battleground Formation (**Figures** 2.3-8, ~~**and**~~ 2.3-9, and 2.3-33). The Battleground Formation comprises rocks primarily felsic to intermediate in composition (dacite to andesite protoliths), volcaniclastic sequences with intrusions of similar composition (meta granodiorite to metatonalite, metadiorite and meta gabbro), and interfingered, marine-influenced metasedimentary sequences. Petrographic examination of thin sections obtained from the Lee Nuclear Site revealed the following rock types: mica schist, meta quartz diorite, meta dacite porphyry, and meta basalt (Final Safety Analysis Report [FSAR] **Subsection** 2.5.1.2.3). Geologic maps show the distribution of rock types, which tend to have locally erratic outcrop and subsurface distribution patterns, but regionally trend northeast to southwest (Reference 14).

Subsection 2.3.1.5.2, Regional and Local Geology, page 2.3-15, INSERT NEW TEXT after 2nd paragraph:

The geology of the Lee Nuclear Site, including the Make-Up Pond C study area, has been extensively discussed by Horton (Reference 38), Murphy and Butler (Reference 39), Howard (Reference 40), Nystrom (Reference 41), and Schaeffer (Reference 42) among others. The Cherokee Preliminary Safety Analysis Report (PSAR) (Reference 13) presents previous investigations of the Lee Nuclear Site. The southeastern portion of the Make-Up Pond C study area is underlain by plagioclase crystal metatuff, while the northwestern portion of the study area is underlain by phyllitic metatuff. These two units are separated by a quartz pebble metaconglomerate body that forms a ridge extending in a northeast to southwest direction (approximately N55°E). This ridge roughly bisects the Make-Up Pond C study area and is visible as a lineament on the 1:40,000-scale USGS photography. Additional information on regional and local geology is included in Subsection 2.6.2.

Subsection 2.3.1.5.3, Soil Properties, page 2.3-16, 1st paragraph:

Throughout the Piedmont province, bedrock is overlain by a mantle of unconsolidated material known as regolith. The regolith includes, where present, the soil zone, a zone of weathered and decomposed bedrock known as saprolite, and alluvium, especially along stream channels. Saprolite, the product of chemical and mechanical weathering of underlying bedrock, is typically composed of clay and coarser granular material that may reflect the texture of the rock from which it was formed. The soil portion of the regolith, also termed "residual" or "residuum," differentiates from the saprolite portion on the basis of more-complete weathering to clays and silts. A transition zone at the base of the regolith can be present in many areas of the Piedmont, consisting of partially weathered bedrock and lesser amounts of saprolite. Typically, the formation of soils is attributed to the in-place weathering of the underlying rock and the deposition of material transported by water and laid down as clay, silt, sand, or large rock fragments (Reference 16).

Subsection 2.3.1.5.3, Soil Properties, page 2.3-17, INSERT NEW TEXT at end of section:

The NRCS (Reference 43) Cherokee County Soil Survey (Figure 2.3-34) indicates soil south of London Creek within the Make-Up Pond C study area is primarily comprised of Tatum very fine sandy loam, with locations of Tatum silty clay loam. North of London Creek within the Make-Up Pond C study area, soils are predominately Tatum very fine sandy loam, with Tatum silty clay loam, Nason very fine sandy loam, Manteo channery silt loam, and Orange silt loam. Tatum soils are typically composed of a surficial 0 to 8 inches (in) of silty clay loam or very fine sandy loam (CL, CL-ML, ML) overlying clay, silty clay, and silty clay loam (CH, MH) overlying shallow, weathered bedrock or silt loam.

Based on soil borings drilled within the Make-Up Pond C area, the ground surface topsoil has a variable thickness, with the upper residual soils comprised of clayey silt (MH or ML) and silty clay (CL). Beneath the residuum, saprolite comprises clayey silt (ML), sandy silt (ML), and silty sand (SM). The transition zone occurs at an approximate elevation of 60 ft below ground surface (bgs) (see **Table 2.3-27**).

Based on geotechnical analysis, the effective porosity of the soil around the Make-Up Pond C study area was assumed to be equivalent to specific yield, which was estimated based on particle size distribution (i.e., sand, silt, and clay fractions) of soils samples using trilinear graphs. A summary of soil properties is provided in **Table 2.3-28**. The range of effective porosity of the residuum is 1.6 to 15.5 percent; the geometric mean is 3.9 percent. The range of effective porosity of the saprolite is 7.5 to 17 percent; the geometric mean is 12.3 percent (**Reference 44**).

Subsection 2.3.1.5.4, Topography, page 2.3-17, 3rd Paragraph:

Numerous springs and seeps identified during the 1973 investigation were disturbed during the 1975–1982 construction activities for the Cherokee Nuclear Station. Those springs and seeps were located within valley draws and natural drainage ways (**FSAR Figure** 2.4.1-213). The springs had expected discharges ranging from 1.9 to 3 gpm (**Reference** 13). Surface conditions around these springs appear to have been altered so that no flow-through discharge occurs. Site alterations included cut and fill in the areas of springs during site grading activities to level the site to yard grade and cooling tower pad grade. Springs observed along tributaries to the make-up ponds were flooded following construction of the make-up pond dams. The remaining springs observed in 2006 within the watershed of the Lee Nuclear Station are also shown on **FSAR Figure** 2.4.1-213. These included 1) springs along a tributary to Make-Up Pond B but above the normal pond elevation, 2) seeps located along the toe of the embankment north of the Unit 2 cooling tower pad, and 3) a non-jurisdictional wetland located north-northwest of Unit 1 east of the ridgeline. The non-jurisdictional wetland is located at the planned location of the wastewater retention basin. Based on site observations, a network of storm drains and buried piping had been installed leading to Make-Up Pond A, Make-Up Pond B, and Hold-Up Pond A to manage ~~some of~~ the surface water runoff. While some stormwater control structures remain on-site, no as-built drawings for the existing storm drain system for the former Cherokee Nuclear Station were available for review.

Subsection 2.3.1.5.4, Topography, page 2.3-17, INSERT NEW TEXT at end of section:

The proposed Make-Up Pond C will be situated off-site from the Lee Nuclear Site, along London Creek. Topography along London Creek ranges from an elevation of 650 ft msl at the proposed Make-Up Pond C headwaters to 535 ft msl near the Main Dam. High topographic elevations within the watershed of London Creek range from 763 ft msl north of London Creek to 746 ft msl south of London Creek. The topography of the London Creek watershed is defined by numerous compartments. Tributaries to London Creek occur in many of the valleys. Field reconnaissance and Global Positioning System (GPS) mapping of tributary headwaters are presented in **Figure 2.3-35**. North of London Creek, topography is less steep than that south of London Creek, and hilltops more rounded. South of London Creek, topography is more rugged and steep along London Creek and its tributaries. Hilltops south of London Creek are less rounded, more pronounced, and ridge-like.

Subsection 2.3.1.5.5, Regional Hydrogeology, page 2.3-18 3rd paragraph:

Based on conditions at the Lee Nuclear Site and using Soil Conservation Service runoff curve number methods, an estimated 47 percent of annual precipitation ~~inflitrates~~infiltrates toward the water table in the Make-Up Pond A and Hold-Up Pond A watersheds. An estimated 61 percent of annual precipitation infiltrates towards the water table in the Make-Up Pond B watershed. When complete, it is estimated that 75 percent of the annual precipitation will infiltrate toward the water table in the future Make-Up Pond C watershed. Groundwater is contained in the pores that occur in the weathered material (residual soil, saprolite) above the relatively unweathered rock and within the fractures in the igneous and metamorphic rock. The depth to the water table depends on climate, topography, rock type, and rock weathering. The water table varies from ground surface elevation in valleys to more than 100 ft~~.~~ below the surface on sharply rising hills. Although the precipitation in the Piedmont is relatively evenly distributed throughout the year, the water table fluctuates noticeably, typically declining during the late spring and summer due to evapotranspiration and rises in the late fall and winter when the evaporation potential is reduced (Reference 32).

Subsection 2.3.1.5.6, Groundwater Occurrence and Usage, page 2.3-19, INSERT NEW TEXT at end of section:

Additionally, it is not expected that groundwater will be used within the off-site Make-Up Pond C study area.

RENAME Subsection 2.3.1.5.7, Site Geohydrology, to Geohydrology and INSERT NEW TEXT:

The geohydrology of on-site and off-site areas is discussed in the following sections.

RENUMBER 2.3.1.5.7, Site Geohydrology, to 2.3.1.5.7.1 (TEXT UNCHANGED).

NEW Subsection 2.3.1.5.7.1, Site Geohydrology, Page 2.3-21, 4th Paragraph:

Based on site observations, a network of storm drains and buried piping was partially installed during construction of Cherokee Units 1, 2, and 3 to manage surface water runoff towards Make-Up Pond A, Make-Up Pond B, and Hold-Up Pond A. While no as-built drawings for the existing storm drain system for the former Cherokee Nuclear Station exist, a review of stormwater plans was conducted to assess the drain system's potential effect on groundwater movement. Storm drains located upgradient (south) of the excavation appear to intercept a high water table and may allow movement of water through the annular fill material towards the make-up ponds. In effect, these upgradient storm drains may serve to divert groundwater away from the plant area. Most of the other identified storm drains appear to be above the rebounded water level and would not affect the movement of groundwater. One exception is a downgradient (north) storm drain line designed to transfer stormwater from the Cherokee power block area to Hold-Up Pond A. The depth of this storm drain pipe appears to be below the projected water table and, if left as is, could locally affect groundwater movement when groundwater recovers from the dewatering. The potential effect on groundwater movement can be mitigated by engineered controls or by removal of the stormwater drain lines and replacement with less permeable materials. Accordingly, these drain lines are not expected to significantly impact groundwater movement.

Add NEW SUBSECTION 2.3.1.5.7.2, Off-Site Geohydrology, and INSERT TEXT:

In early 2009, a groundwater investigation was initiated for the area of the proposed Make-Up Pond C. Twelve groundwater monitoring wells were installed within or in proximity to proposed Make-Up Pond C, distributed along the pond's length both south and north of London Creek (Figure 2.3-36). Eight of the twelve wells were targeted for completion across the groundwater table surface. Four of the twelve wells were targeted for completion within the transition zone. A summary of well construction details is provided in Table 2.3-29. Some wells were installed at depths not saturated at time of construction. These wells were intended to enable monitoring of groundwater conditions after construction and full pond conditions were achieved, to reflect post construction groundwater conditions.

Groundwater levels were measured from February to May 2009. Depth to groundwater across the Make-Up Pond C study area varies from approximately 27 to 50 ft bgs (approximately 567 to 682 ft msl), generally mimicking surface topography. In addition to water level measurements, headwaters of springs resulting in contiguous streams flowing to London Creek were field located and mapped using GPS technology (Figure 2.3-35). Consistent with Piedmont aquifer system, these headwater locations and their associated flowing streams generally define areas where groundwater intersects the ground surface, and were used to supplement the groundwater elevations determined from wells. Because of the influence of continuing drought, these headwaters elevations were acknowledged to be somewhat suppressed, that is, to occur at lower elevations on the landscape, at most locations.

The initial groundwater investigation and the headwaters mapping activities were conducted in February 2009. At this time the region was in a period of severe to moderate drought. By May drought conditions had subsided as a result of moderate to heavy early spring rain. As a result groundwater levels in all site wells rebounded significantly by the May monitoring period, on the order of 1.2 to 3.2 ft. These increases in groundwater level likely reflect significant recovery from the 2007–2008 drought, as well as some degree of seasonal fluctuation.

Prepared with groundwater elevations from monitoring well sites and GPS mapping, Figures 2.3-37 and 2.3-38 represent pre-construction groundwater potentiometric contours within proximity of proposed Make-Up Pond C. The post-construction groundwater conditions, just outside of the proposed Make-Up Pond C footprint and assuming a full pond, are shown in Figure 2.3-39.

Subsection 2.3.1.5.8, Permeability, page 2.3-23, INSERT NEW TEXT at end of section:

Permeability testing for Make-Up Pond C was comprised of laboratory testing of undisturbed Shelby tube samples and rising or falling hydraulic conductivity tests in completed wells. The laboratory permeability test measured vertical permeability of the sample. The hydraulic conductivity tests in the completed wells provided data to estimate the horizontal permeability of the surrounding materials. The hydraulic conductivity test data were evaluated by the Bouwer and Rice methods (Reference 45).

Laboratory (vertical) permeability results are summarized in **Table** 2.3-28. These tests were performed on relatively shallow residuum soil samples (1 to 3 ft bls) representing present near surface (future pond bottom) material. The vertical hydraulic conductivities ranged from 9.38 x 10^{-8} centimeter per second (cm/sec) to 1.29 x 10^{-4} cm/sec; the geometric mean of the vertical conductivities is 6.85 x 10^{-6} cm/sec.

Slug-test (horizontal) permeability results are summarized in **Table** 2.3-30. The horizontal hydraulic conductivities in saprolite ranged from 7.6 x 10^{-6} to 6.7 x 10^{-4} centimeters per second (cm/sec); the geometric mean in saprolite is 1.0 x 10^{-4} cm/sec. The horizontal hydraulic conductivities in the transition zone ranged from 1.4 x 10^{-5} to 3.4 x 10^{-4} cm/sec; the geometric mean in the transition zone is 1.1 x 10^{-4} cm/sec.

2.3.1.5.9, Groundwater Movement, page 2.3-23, INSERT NEW TEXT after bullet list:

There are no points of exposure associated with Make-Up Pond C.

Subsection 2.3.1.5.9, Groundwater Movement, page 2.3-25, INSERT NEW TEXT at end of section:

Within the Make-Up Pond C study area, groundwater flows from higher topography to lower, discharging to London Creek and its tributaries.

The geometric mean of the effective porosity in saprolite in the area of proposed Make-Up Pond C is 12.3 percent (**Subsection** 2.3.1.5.3). The geometric mean of the horizontal hydraulic conductivity in saprolite is 1.0 x 10^{-4} cm/sec; in the partially weathered rock (PWR) zone it is 1.1 x 10^{-4} cm/sec. These hydraulic conductivity values are typical of saprolite and PWR conditions in Piedmont aquifers (**Subsection** 2.3.1.5.8).

Groundwater wells PC-1PWR, PC-4PWR, and PC-9PWR have their screen intervals positioned across PWR and upper crystalline bedrock. PC-5PWR was dry during the initial sampling event and was not considered. For groundwater flow estimations in the combined PWR and upper crystalline rock, considering the estimates based on Lee Nuclear on-site analysis, literature, and the fine-grained nature of soil and rock at the Make-Up Pond C study area, the secondary (effective) porosity of the PWR-upper crystalline (PWR-CR) rock is assumed to be 5 percent.

Groundwater gradients were estimated at two locations: 1) north of London Creek at well group PC-1, PC-2, and PC-3; and 2) south of London Creek at well group PC-6, PC-7, and PC-8. The shallow groundwater table gradient north of London Creek ranges from approximately 0.020 to 0.041 feet per foot (ft/ft). The shallow groundwater table gradient south of London Creek ranges from approximately 0.027 to 0.071 ft/ft. The groundwater gradients in the PWR-CR are assumed similar.

Groundwater flow rates north and south of London Creek, calculated using the Darcy Equation, are in Table 2.3-31. Groundwater flow is estimated on the order of 26 to 37 feet per year (ft/yr) in the saprolite and 71 to 100 ft/yr in the PWR-CR. These groundwater flow rates are typical of Piedmont aquifer systems.

2.3.2 Water Use

Subsection 2.3.2, Water Use, page 2.3-25, 1st paragraph:

This subsection describes surface water and groundwater in the vicinity of the Lee Nuclear Station that could affect or be affected by the construction and operation of Lee Units 1 and 2, including the proposed Make-Up Pond C. In addition, a detailed assessment of water use within the vicinity of the facility, types of consumptive and non-consumptive water uses, identification of their locations, and evaluation of water withdrawals and returns is provided.

Subsection 2.3.2.1, Surface Water, page 2.3-25, INSERT NEW TEXT at end of section:

A fourth impoundment, Make-Up Pond C, will be located to the northwest of the Lee Nuclear Station on London Creek. London Creek is discussed in the following subsections and is described in detail in Subsection 2.3.1.2.3.1.

Subsection 2.3.2.1.2, Recreational and Navigation Use, page 2.3-27, 2nd paragraph:

There are several recreational areas on the Broad River within the vicinity of the Lee Nuclear Site. These sites include fishing areas, canoe access and portage trails, and recreational parks. The largest of these sites is the Cherokee Ford Recreation Area, located approximately 0.5 river mi upstream from Cherokee Falls Dam (Figure 2.3-19). The closest recreational area is Lake Cherokee on London Creek. It is managed for recreational fishing by the SCDNR (Reference 37).

Subsection 2.3.2.2.1, Local Groundwater Use, page 2.3-29, INSERT NEW TEXT at end of section:

Well locations identified to be within a ±1-mile radius of the proposed Make-Up Pond C property are on Figure 2.3-40 and Table 2.3-32.[***Withheld from Public Disclosure Under 10 CFR 2.390(a)(9). See COL Application, Part 9.***][well information] There is one residential potable water well within the proposed Make-Up Pond C inundation area that is currently in use. The well is reported as being 170 ft deep. The existing well, and any other wells discovered during construction will be decommissioned and closed in accordance with SCDHEC regulations.

2.3.3 Water Quality

NEW SUBSECTION 2.3.3.1.2.1, Broad River and On-Site Facilities, page 2.3-32:

This heading should be inserted immediately following the 2.3.3.1.2 heading. The existing text will comprise the text for this new subsection.

NEW SUBSECTION 2.3.3.1.2.2, London Creek, page 2.3-35:

The proposed Make-Up Pond C will be located on London Creek and be filled with water from the Broad River. Baseline water quality in London Creek was assessed at three locations in 2008. These included an upper site (Location 3.0) located immediately upstream of where the creek flows under SC 329; a middle site, labeled Location 1.7; and a lower site, labeled Location 0.9 (**Figure** 2.3-41). The sampling location numbers refer to the approximate distance, in river-miles, upstream of the Broad River. Water quality was assessed both in-situ and through laboratory analysis of physical and chemical parameters (**Table** 2.3-33). Samples were collected by Duke Energy personnel on 12 February, 8 May, and 14 October 2008; no samples were collected during the summer quarter due to low stream levels. The May samples were also analyzed for pesticides and herbicides.

Data analysis consisted of performing a descriptive statistical assessment of the combined data sets from three separate sampling events and included a calculation of the mean, median, minimum, and maximum for each parameter. **Table** 2.3-34 presents a summary of the conventional parameters, ions, and metals. The analyses for pesticides and herbicides produced no detectable results and hence were not reported.

London Creek is classified as Freshwaters (FW) by South Carolina Department of Health and Environmental Control (SCDHEC), meaning these waters are "suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of the Department. They are also suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora as well as suitable for industrial and agricultural uses" (**Reference 46**). In accordance with this classification, specific water-use and numeric and narrative water quality criteria apply. Note that SCDHEC does not routinely sample this stream; therefore, this classification is by inference only.

Fecal coliform sampling was conducted but no attempt was made to perform consecutive sampling and therefore insufficient samples were collected to calculate geometric mean. Although seasonal variations were observed in the sample results, all measurements of in-situ parameters (temperature, dissolved oxygen, pH, and specific conductance) were in compliance with drinking water, water classification, and standards criteria for the protection of aquatic life and human health, if applicable. Measurements were also within ranges for these parameters reported by other studies in similarly sized streams in North Carolina and South Carolina (References 47, 48, and 49).

Trace element concentrations were low and frequently below laboratory reporting limits for the analysis for specific trace elements. Reported values for arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, and silver were all below the laboratory reporting limits for the analyses. These results were similar to those reported for the Broad River (Table 2.3-19).

Ammonia concentrations ranged from less than the laboratory reporting limits for the analysis (0.020 milligrams per liter [mg/L]) to 0.350 mg/L with a mean of 0.098 mg/L. These values were similar to those reported for the Broad River and other Piedmont streams (Reference 47). Nitrate+nitrite levels (range = 0.02 to 0.87 mg/L) were generally similar to those reported for the Broad River (Table 2.3-19).

In addition to the sampling performed on London Creek during 2008, water quality has been monitored on Lake Cherokee, which is managed as a lake fishery by the SCDNR. The SCDNR conducts annual monitoring of fish populations and obtains water quality parameters during fishery sampling. Note that SCDNR staff have indicated that they periodically add lime and fertilize the lake to improve fishery production (Reference 37).

The SCDHEC has monitored water quality at station B-343, near the dam at Lake Cherokee, on a 5-year rotating schedule. Table 2.3-35 presents data obtained by SCDHEC from roughly monthly sampling during 2004 (Reference 50). The 2004 data includes surface samples collected from February 25, 2004, to December 8, 2004. The data indicate low alkalinity and turbidity, with pH units ranging from mildly acidic (5.9) to mildly basic (8.4). The nitrogen and phosphorus levels are low, and all of the metals except iron and manganese were below the quantification limits (QL).

Subsection 2.3.3.2.2, Local Groundwater Quality, page 2.3-36, INSERT NEW TEXT at end of section:

In February and May 2009, groundwater samples were collected and analyzed from eight of the twelve wells installed for hydrogeologic assessment of proposed Make-Up Pond C. Four of the wells (PC-1, PC-5PWR, PC-8, and PC-10) were either dry or had insufficient water to sample during these two sampling events. Groundwater analytical parameters, methods, reporting limits, and units are summarized in Table 2.3-36. Groundwater analytical results are summarized in Table 2.3-37 and are consistent with local groundwater conditions.

Subsection 2.3.3.3.3.1, Dams and Reservoirs, page 2.3-38, INSERT NEW TEXT at end of section:

A similar situation exists with Lake Cherokee, which impounds the runoff from approximately 512 ac of the approximate 2,500-ac drainage area upstream of the proposed Make-Up Pond C dam.

2.3.4 References

Subsection 2.3.4, References, page 2.3-42, INSERT NEW TEXT at end of section:

35. U.S. Geological Survey. Daily Stream Flow Conditions, North Carolina. http://waterdata.usgs.gov/nc/nwis/rt/

36. Topographic Engineering Center, Engineering Research and Development Center, US Army Corps of Engineers, *National Inventory of Dams*, www.tec.army.mil/nidpublic, October 2007, Alexandria, VA.

37. Rankin, D. South Carolina Department of Natural Resources. 2009. Water Quality and Management Data for Lake Cherokee.

38. Horton, J.W. Jr. 1981."Geologic Map of the Kings Mountain Belt Between Gaffney, South Carolina and Lincolnton, North Carolina," in *Geological Investigations of the Kings Mountain Belt and Adjacent Areas in the Carolinas*, Carolina Geological Society Field Trip Guidebook.

39. Murphy, C.F., and Butler, J.R. 1981. "Geology of the Northern Half of the Kings Creek Quadrangle, South Carolina," in *Geological Investigations of the Kings Mountain Belt and Adjacent Areas in the Carolinas*, Carolina Geological Society Field Trip Guidebook.

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45. Bouwer and Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifer with Completely or Partially Penetrating Wells; Bouwer and Rice, 1989. Bower and Rice Slug Test - An Update.

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47. Caldwell, W.S. 1992. Selected water-quality and biological characteristics of streams in some forested basins of North Carolina, 1985–88. U.S. Geological Survey Water Resources Investigations Report 92-4129. Raleigh, North Carolina. 114 p.

48. Johnson, FA, G.E. Spilie, and T.R. Cumming. 1968. A reconnaissance of the water resources of Pickens County, South Carolina. Report No. 1. U.S. Geol. Survey, Water Resources Division, Columbia, South Carolina. 69 pp.

49. South Carolina Department of Health and Environmental Center. 2001. Watershed Water Quality Assessment: Broad River Basin. October 2004. Technical Report 001-01. SCDHEC Bureau of Water, Columbia, South Carolina.

50. Turner, L., South Carolina Department of Health and Environmental Center. 2009. Water Quality Monitoring Data for Lake Cherokee, Station B-343, for 2004.

TABLE 2.3-3 (Sheet 1 of 2)
BROAD RIVER MONTHLY FLOW AND TEMPERATURE VARIABILITY

	Monthly Mean Stream Flow Recorded in Cubic Feet Per Second											
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998											1,098	1,253
1999	2,021	2,040	1,812	1,851	1,422	964	796	517	538	925	1,137	1,338
2000	1,619	1,840	2,142	1,997	1,301	713	591	518	678	669	1,129	890
2001	865	985	1,727	1,318	793	801	1,020	589	764	574	630	843
2002	1,336	1,139	1,473	1,104	835	560	377	242	505	865	1,592	3,312
2003	1,441	2,747	6,686	8,733	7,433	5,608	5,051	4,983	1,838	1,619	2,094	2,727
2004	1,744	3,100	1,637	2,104	1,439	2,626	1,503	1,219	8,764	2,219	3,541	4,710
2005	2,615	2,229	3,930	3,162	1,926	2,489	5,418	1,998	1,356	2,658	997	2,031
2006	2,659	1,773	1,516	1,382	1,100	1,394	982	1,254	2,054	1,245	1,828	2,143
Mean of Monthly Discharges:	1,852	2,102	2,779	2,935	2,202	2,085	2,194	1,583	2,285	1,493	1,655	2,323
Max:	2,659	3,100	6,686	8,733	7,433	5,608	5,418	4,983	8,764	2,658	3,541	4,710
Min:	865	985	1,473	1,104	793	560	377	242	393	574	630	843

Notes:
Average annual flow: 2538~2,500 cfs (1926–20068)
Maximum monthly flow: 8,764 (1998–2006)
Minimum monthly flow: 517 cfs (1998–2006)

Source:
USGS 02153551 Broad River below Ninety
Nine Islands Reservoir, SC (1998-20068)

Cherokee County, South Carolina
Hydrological Unit Code 03050105
Latitude 35°01'52", Longitude 81°29'34" NAD27
Drainage area 1.550 square miles
Gauge datum 412.20 feet above sea level NGVD29
Missing data – no information available from USGS

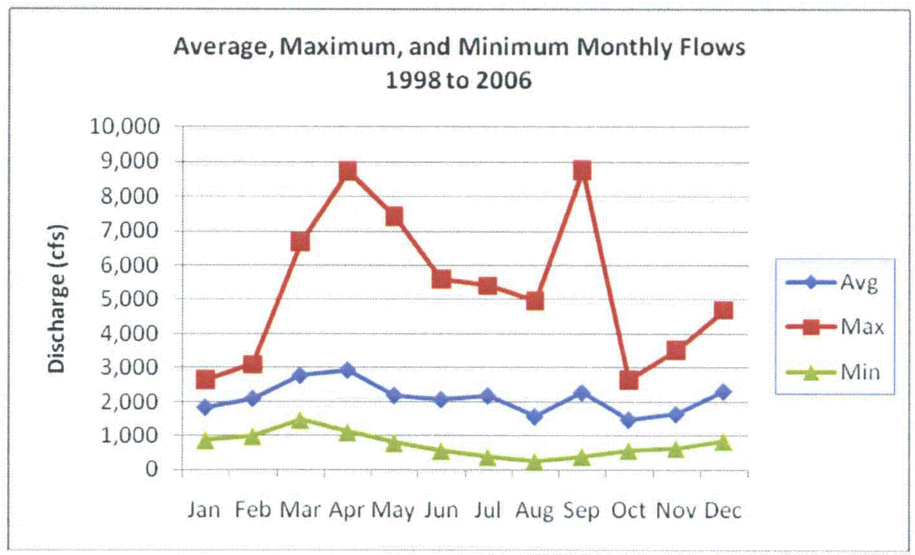


TABLE 2.3-14
ESTIMATED SURFACE WATER WITHDRAWAL AND CONSUMPTION FOR STATION OPERATIONS

Broad River Flow Rates[a]		Average Withdrawal[b]		Percent Withdrawal	Maximum Withdrawal[b]		Percent Withdrawal
cfs	gpm	gpm	cfs		gpm	cfs	
Mean Annual Flow ~~(1926-2006)~~ (1926-2008)							
~~2538 cfs~~ 2,500	~~1,139,054~~ 1,120,000	35,030	78	3%	60,001	134	5%
Regulatory Low Flow (FERC)							
483	216,867	35,030	78	16%	NA	NA	NA

Broad River Flow Rates[a]		Average Consumption[b]		Percent Consumption	Maximum Consumption[b]		Percent Consump-tion
cfs	gpm	gpm	cfs		gpm	cfs	
Mean Annual Flow ~~(1926-2006)~~ (1926-2008)							
~~2538~~ 2,500	~~1,139,054~~ 1,120,000	24,813	55	2%	28,723	64	5%
Regulatory Low Flow (FERC)							
483	216,867	24,813	55	12%	NA	NA	NA

(a) Broad River flow rates were compiled from USGS measurements recorded at the Gaffney Gauge (USGS Gauge #2153500), the Blacksburg Gauge (#2153200) and Boiling Springs Gauge (#2151500) for annual flows and from the ~~Cherokee Falls~~ Ninety-Nine Islands Gauge (#2153551) for monthly flows (see Figure 2.3-2).

(b) Average and maximum raw water withdrawals obtained from Environmental Report Figure 3.3-1. Maximum consumption was based on two unit maximum CWS tower evaporation (28,026 gpm), two unit maximum tower drift (3 gpm), two unit average SWS tower evaporation (368 gpm), two unit average SWS tower drift (1 gpm), and two unit maximum consumptive use of demineralized water.

TABLE 2.3-15
ESTIMATED DISCHARGE VOLUME FROM STATION OPERATIONS

Broad River Flow Rates[a]		Average Consumption[b]		Percentage Discharge	Maximum Discharge[b]		Percent Discharge
cfs	gpm	gpm	cfs		gpm	cfs	
Mean Annual Flow ~~(1926-2006)~~ (1926-2008)							
~~2538 cfs~~ 2,500	~~1,139,054~~ 1,120,000	8,216	18	1%	28,778	64	3%
Regulatory Low Flow (FERC)							
483	216,867	8,216	18	4%	28,228	64	13%

(a) Broad River flow rates were compiled from USGS measurements recorded at the Gaffney Gauge (USGS Gauge #2153500), the Blacksburg Gauge (#2153200) and Boiling Springs Gauge (#2151500) for annual flows and from the ~~Cherokee Falls~~ Ninety-Nine Islands Gauge (#2153551) for monthly flows (see Figure 2.3-2).

(b) Average plant consumption and maximum plant discharges obtained from Figure 3.3-1.

TABLE 2.3-26
MODELED MAKE-UP POND C INFLOW EXCEEDANCE

Percent Exceedance	Monthly Flow Rate (cfs)												Annual Rate
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
100%	1.6	1.9	2.0	1.9	1.3	0.9	0.8	0.4	0.5	1.0	1.3	1.2	0.4
98%	1.9	2.2	2.8	2.8	2.0	1.6	1.4	1.1	1.1	1.4	1.5	1.8	1.4
95%	2.2	2.7	3.3	3.3	2.6	2.0	1.6	1.4	1.3	1.5	1.8	2.0	1.9
90%	2.8	3.6	3.9	3.8	3.0	2.3	1.9	1.6	1.7	1.9	2.1	2.4	2.3
75%	4.2	4.6	5.1	5.0	4.0	3.3	2.9	2.7	2.6	2.7	3.3	3.5	3.5
50%	5.7	6.3	6.9	6.9	5.7	5.2	4.2	3.9	3.7	3.9	4.4	5.2	5.1
25%	7.6	8.6	9.8	10.1	8.3	7.4	5.9	5.5	5.1	5.7	6.0	7.1	7.3
10%	11.3	12.4	14.6	14.4	11.5	10.3	8.0	8.5	8.0	8.3	8.9	10.0	11.1
5%	14.8	17.6	21.2	19.0	14.8	13.1	9.9	12.8	11.4	12.4	13.0	13.5	14.9
2%	22.6	29.0	39.1	30.5	21.5	21.5	13.0	23.9	19.9	20.0	21.1	19.6	23.9
0.1%	87.2	90.5	114	71.7	57.1	64.9	72.6	81.7	72.6	92.5	68.4	58.8	85.9
0.01%	96.4	131	152	115	139	139	83.2	123	190	147	112	70.9	156.0

Note: Synthetic daily flows scaled from Cove Creek USGS Gauge 02149000 from January 1, 1952, through December 31, 2007.
cfs = cubic feet per second

TABLE 2.3-27
MAKE-UP POND C SOIL BORING AND HYDROSTRATIGRAPHIC UNITS

Well ID	Residual Soil & Saprolite: Residuum Depth (ft) Top	Residuum Depth (ft) Bottom	Saprolite Depth (ft) Top	Saprolite Depth (ft) Bottom	Auger Refusal Depth (ft)	Partially Weathered Rock Depth (ft) Top	Partially Weathered Rock Depth (ft) Bottom	Crystalline Rock Depth (ft) Top	Crystalline Rock Depth (ft) Bottom	Rock Coring Terminated Depth (ft)
PC-1			0	46.5	46.5					
PC-1PWR			0	55.4	55.4	55.4	60.1	60.1	65.1	65.1
PC-2	0.0	5.0	5.0	79.2	79.2					
PC-3	0.0	4.5	4.5	57.5	57.5					
PC-4	0.0	5.0	5.0	43.3	43.3					
PC-4PWR	0.0	5.0	5.0	43.3	43.3	43.3	51.0	51.0	56.0	56.0
PC-5PWR	0.0	5.0	5.0	68.0	68.0			68.0	75.0	75.0
PC-6	0.0	5.0	5.0	91.4	91.4					
PC-7	0.0	5.0	5.0	75.0	75.0					
PC-8			0.0	28.2	28.2					
PC-9PWR	0.0	3.0	3.0	74.6	74.6	74.6	85.3	85.3	90.3	90.3
PC-10			0.5	41.9	41.9					

average auger refusal depth (ft)	58.7

Notes:
Residual Soil/Saprolite defined as material above auger refusal.
Partially Weathered Rock defined as material below auger refusal and exhibiting Rock Quality Designation less than 80%.
Crystalline Rock defined as material occurring below auger refusal and exhibiting Rock Quality Designation greater than 80%.
ft = feet

TABLE 2.3-28
MAKE-UP POND C SOIL PROPERTIES

Boring ID	Depth	Sub Unit	Grain Size				Liquid Limit	Plastic Limit	Plastic Index	USCS Symbol	Moisture Content	Specific Gravity	Wet Unit Weight	Dry Unit Weight	Bulk Density	Porosity	Specific Yield (Effective Porosity)	Permeability
	bls		% Sand	% Silt	% Clay	% Passing 200					%		pcf	pcf	g/cc	%	%	cm/sec
PC-2	1-3	residuum																6.64 x 10^{-5}
	3-5	residuum	4.1	53.3	42.6	95.9	54	34	20	MH	29.1	2.731	118.4	91.7	1.47	46	1.6	
	33.5-35	saprolite	18.4	63.8	17.8	81.6	42	30	12	ML		2.739					7.5	
PC-3	1-3	residuum																4.12 x 10^{-6}
	3-5	residuum	9.1	68.2	22.7	90.9	45	33	12	ML	25.4	2.770	112.3	89.6	1.43	48	4.3	
	48.5-49.9	saprolite	13.5	79.0	7.5	86.5	37	29	8	ML		2.751					9.5	
PC-4	1-3	residuum																2.58 x 10^{-6}
	3-5	residuum	10.4	52.7	34.8	87.5	38	23	15	CL	20.4	2.676	121.9	101.2	1.62	39	2.7	
	33.5-35	saprolite	11.9	81.4	6.7	88.1	28	24	4	ML		2.717					9	
PC-5PWR	1-3	residuum	29.7	62.8	7.5	70.3	30	27	3	ML	19.7	2.658	120.9	101.0	1.62	39	15.5	
	34.3-35.7	saprolite	34.1	56.9	6.8	63.7	27	25	2	ML		2.721					16.6	
	49.3-50.8	saprolite	32.9	60.3	6.8	67.1	30	28	2	ML		2.663					16.5	
PC-6	1-3	residuum																4.39 x 10^{-5}
	3-5	residuum	6.7	58.5	34.8	93.3	63	41	22	MH	31.9	2.746	111.6	84.6	1.35	51	2.6	
	53.5-55	saprolite	24.5	67.1	7.2	74.3	47	37	10	ML		2.776					13.5	
PC-7	1-3	residuum																1.29 x 10^{-4}
	3-5	residuum	10.7	51.3	38.0	89.3	57	35	22	MH	22.9	2.692	101.9	82.9	1.33	51	2.4	
	43.5-44.8	saprolite	14.2	79.4	6.4	85.8	34	30	4	ML		2.713					10	
PC-8	18.5-19.8	saprolite	43.8	45.3	7.3	52.6	23	20	3	ML		2.671					17	
PC-9PWR	1-3	residuum																9.38 x 10^{-6}
	3-5	residuum	11.4	58.7	25.5	84.2	47	32	15	ML	32.9	2.718	110.4	83.0	1.33	51	4.1	
PC-10	1-3	residuum	19.9	61.8	18.0	79.8	35	25	10	ML	20.1	2.776	133.2	110.9	1.78	36	7.5	1.89 x 10^{-6}
	14.1-39.3	saprolite	42.8	39.4	5.2	44.6	22	20	2	SM		2.775					16.5	
		residuum min	4.1	51.3	7.50	70.3	30	23	3		19.7	2.658	101.9	82.9	1.33	36	1.6	9.38 x 10^{-6}
		residuum max	29.7	68.2	42.6	95.9	63	41	22		32.9	2.776	133.2	110.9	1.78	51	15.5	1.29 x 10^{-4}
		residuum geomean															3.9	6.85 x 10^{-6}
		saprolite min	11.9	39.4	5.20	44.6	22	20	2			2.663					7.5	
		saprolite max	43.8	81.4	17.8	88.1	47	37	12			2.776					17	
		saprolite geomean															12.3	
		collective residuum & saprolite geomean															7.2	

Notes:
ft = feet
bls = below land surface
pcf = pounds per cubic foot
g/cc = grams per cubic centimeter
cm/sec = centimeters per second
MH = high plasticity silt
ML = silt
CL = clay
SM = silty sand
Effective porosity is assumed equivalent to specific yeild (Reference 17, p. 14).

TABLE 2.3-29 (Sheet 1 of 2)
MAKE-UP POND C MONITORING WELL CONSTRUCTION DETAILS

Well I.D.	Date Completed	Northing	Easting	Survey Elevations		Casing Interval		Seal Interval		Screen Interval	
				Ground	TOC	ft-ags	ft-bgs	ft-bgs	ft-bgs	ft-bgs	ft-bgs
PC-1	2/2/2009	1170235.83	1834985.27	631.52	634.17	2.65	31.00	24.0	27.0	31.00	46.00
PC-1PWR	1/29/2009	1170233.60	1834990.44	631.17	633.73	2.56	57.05	56.1	56.3	57.05	62.05
PC-2	1/23/2009	1169429.44	1834565.56	604.53	607.20	2.67	25.33	21.0	23.0	25.33	40.33
PC-3	1/27/2009	1169522.29	1835361.01	609.63	612.51	2.88	42.39	38.0	40.0	42.39	57.39
PC-4	2/6/2009	1168355.08	1838562.80	636.11	638.73	2.62	25.48	20.0	22.0	25.48	40.48
PC-4PWR	2/6/2009	1168361.87	1838569.63	634.46	636.75	2.29	48.65	47.1	47.3	48.65	53.65
PC-5PWR	2/6/2009	1167760.09	1834643.01	687.30	690.11	2.81	69.77	68.9	69.1	69.77	74.77
PC-6	1/29/2009	1163654.52	1829244.61	728.45	731.35	2.90	46.06	41.0	43.0	46.06	61.06
PC-7	2/3/2009	1164498.34	1829686.44	694.68	697.38	2.70	31.35	26.0	29.0	31.35	46.35
PC-8	1/28/2009	1164385.54	1828762.69	709.76	712.92	3.16	12.14	9.0	11.0	12.14	27.14
PC-9PWR	1/26/2009	1168045.70	1830915.03	647.48	650.23	2.75	80.96	80.1	80.3	80.96	85.96
PC-10	1/22/2009	1168976.86	1832582.24	642.94	645.93	2.99	26.51	20.7	24.3	26.51	41.51

TABLE 2.3-29 (Sheet 2 of 2)
MAKE-UP POND C MONITORING WELL CONSTRUCTION DETAILS

Well I.D.	Date Completed	Sand Type	Sand Pack Interval		Seal Type	Boring Backfill Material & Interval Below Well						TD of Boring
						Sand		Bentonite		Cave - In		
			ft-bgs	ft-bgs		ft-bgs	ft-bgs	ft-bgs	ft-bgs	ft-bgs	ft-bgs	ft-bgs
PC-1	2/2/2009	#1 Sand	27.0	46.0	Bentonite					46.0	46.5	46.5
PC-1PWR	1/29/2009	#2 Sand	None at Screen		K-Packer	62.0	63.1	63.1	65.1			65.1
PC-2	1/23/2009	#1 Sand	23.0	43.0	Bentonite	40.3	43.0	43.0	79.2			79.2
PC-3	1/27/2009	#1 Sand	40.0	57.5	Bentonite							57.5
PC-4	2/6/2009	#1 Sand	22.0	43.3	Bentonite	40.5	43.3					43.3
PC-4PWR	2/6/2009	#2 Sand	None at Screen		K-Packer	53.7	56.0					56.0
PC-5PWR	2/6/2009	#2 Sand	None at Screen		K-Packer					74.77	75.0	75.0
PC-6	1/29/2009	#1 Sand	43.0	62.0	Bentonite	61.1	62.0	62.0	91.4			91.4
PC-7	2/3/2009	#1 Sand	29.0	48.0	Bentonite	46.4	48.0	48.0	75.0			75.0
PC-8	1/28/2009	#1 Sand	11.0	28.2	Bentonite	27.1	28.2					28.2
PC-9PWR	1/26/2009	#2 Sand	None at Screen		K-Packer	86.0	87.1	87.1	90.3			90.3
PC-10	1/22/2009	#1 Sand	24.3	41.9	Bentonite	41.5	41.9					41.9

Notes:

TOC (top of casing) & Ground Elevations were provided by professional surveyors.

TD = total depth

ft = feet

ags = above ground surface

bgs = below ground surface

Wells designated "PWR" are wells installed in the shallow portion of bedrock.

Casings & screens are 2-inch schedule 40 PVC. Screen slot sizes are 0.01-inch.

Survey information is based on S.C. virtual network and local control points,
S.C. NAD 83 Horizontal Datum and NAVD 88 vertical datum.

TABLE 2.3-30
MAKE-UP POND C HORIZONTAL HYDRAULIC CONDUCTIVITIES

Well ID	Test Type	Unit	Hydraulic Conductivity (cm/sec)
PC-1	Falling Head	Saprolite	1.0×10^{-5}
PC-1PWR	Rising Head	PWR/CR	1.4×10^{-5}
PC-2	Rising Head	Saprolite	3.2×10^{-4}
PC-3	Rising Head	Saprolite	2.9×10^{-4}
PC-4	Rising Head	Saprolite	6.7×10^{-4}
PC-4PWR	Rising Head	PWR/CR	3.4×10^{-4}
PC-5PWR			
PC-6	Rising Head	Saprolite	1.8×10^{-4}
PC-7	Rising Head	Saprolite	3.1×10^{-4}
PC-8	Falling Head	Saprolite	7.6×10^{-6}
PC-9PWR	Rising Head	PWR/CR	2.9×10^{-4}
PC-10	Falling Head	Saprolite	3.7×10^{-5}

saprolite min	7.6×10^{-6}
saprolite max	6.7×10^{-4}
saprolite geomean	1.0×10^{-4}

PWR min	1.4×10^{-5}
PWR max	3.4×10^{-4}
PWR geomean	1.1×10^{-4}

Notes:
TOC = top of casing
cm/sec = centimeters per second
PWR = partially weathered rock (rock quality designation <80%)
CR = crystalline rock (rock quality designation >80%)
Hydraulic Conductivity based on Reference 14.

TABLE 2.3-31
MAKE-UP POND C GROUNDWATER FLOW RATE CALCULATIONS

Hydrostratrigraphic Unit	Geometric Mean Hydraulic Conductivity (cm/sec)	Geometric Mean Hydraulic Conductivity (ft/yr)	Geometric Mean Effective Porosity	Geometric Mean Horizontal Groundwater Gradient (ft/ft)		Estimated Groundwater Velocity (ft/yr)	
				North of London Creek	South of London Creek	North of London Creek	South of London Creek
Saprolite	1.0×10^{-4}	103	0.123	0.031	0.044	26	37
PWR-CR	1.1×10^{-4}	114	0.050			71	100

Notes:
cm/sec = centimeters per second
ft/ft = feet per foot
ft/yr = feet per year
PWR-CR = partially weathered rock-upper crystalline

Withheld from Public Disclosure Under 10 CFR 2.390(a)(9)
(See COL Application, Part 9)

TABLE 2.3-32
WATER WELL DOCUMENTATION

TABLE 2.3-33 (Sheet 1 of 2)
ANALYTICAL METHODS USED TO DETERMINE CHEMICAL AND PHYSICAL CONSTITUENTS

Parameter	Method (EPA/APHA)	Preservation	Reporting Limit
Alkalinity, Total	Fixed endpoint titration, pH 4.5 APHA 2320 B	4 °C	10 mg/L as $CaCO_3$
Aluminum	Atomic emission/ICP EPA 200.7	0.5% HNO_3	0.05 mg/L
Arsenic, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	2.0 µg/L
Barium, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	0.001g/L
Biochemical Oxygen Demand	EPA 405.1	4 °C	2 mg/L
Boron	Atomic emission/ICP EPA 200.7	0.5% HNO_3	0.1 mg/L
Cadmium, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	0.5 µg/L
Calcium	Atomic emission/ICP EPA 200.7	0.5% HNO_3	0.03 mg/L
Chloride	Ion chromatography EPA 300.0	4 °C	1.0 mg/L
Chromium, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	1.0 µg/L
Coliforms, Fecal	APHA 9221	4 °C	2 col/100 mL
Conductance, Specific	Temperature-compensated nickel electrode APHA 2510	in situ	0.1 µS/cm *
Copper, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	2.0 µg/L
Hardness	APHA 2340 B (Sum calcium + magnesium)	NA	NA
Iron, Total Recoverable	Atomic emission/ICP EPA 200.7	0.5% HNO_3	0.01 mg/L
Lead, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	2.0 µg/L
Magnesium	Atomic emission/ICP EPA 200.7	0.5% HNO_3	0.03 mg/L
Manganese, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	1.0 µg/L
Mercury	EPA 245.1	0.5% HNO_3	0.1 µg/L
Nickel, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	2.0 µg/L
Nitrogen, Ammonia	EPA 350.1	4 °C; 0.5% H_2SO_4	0.02 mg/L
Nitrogen, Nitrite + Nitrate	EPA 353.2	4 °C; 0.5% H_2SO_4	0.02 mg/L
Nitrogen, Total Kjeldahl	EPA 351.2	4 °C; 0.5% H_2SO_4	0.1 mg/L
Phosphorus, Orthophosphate	EPA 365.1	4 °C	0.005 mg/L
Phosphorus, Total	EPA 365.1	4 °C; 0.5% H_2SO_4	0.05 mg/L

* Instrument sensitivity furnished in lieu of laboratory reporting limit.

TABLE 2.3-33 (Sheet 2 of 2)
ANALYTICAL METHODS USED TO DETERMINE CHEMICAL AND PHYSICAL CONSTITUENTS

Parameter	Method (EPA/APHA)	Preservation	Reporting Limit
Oxygen, Dissolved	Luminescent sensing probe (LDO probe) ASTM D 888-05	in situ	0.01 mg/L *
pH	Temperature-compensated glass electrode APHA 4500-H^+	in situ	0.01 unit *
Potassium	Atomic emission/ICP EPA 200.7	0.5% HNO_3	0.25 mg/L
Selenium, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	2.0 µg/L
Silica (as Si)	APHA 4500Si-F	4 °C	0.5 mg/L
Silver, Total Recoverable	ICP mass spectrometry EPA 200.8	0.5% HNO_3	0.5 µg/L
Sodium	Atomic emission/ICP EPA 200.7	0.5% HNO_3	0.1 mg/L
Solids, Total Dissolved	Gravimetric, dried at 103-105 °C EPA 160.1	4 °C	20 mg/L
Solids, Total Suspended	Gravimetric, dried at 103-105 °C EPA 160.2	4 °C	2 mg/L
Sulfate	Ion chromatography EPA 300.0	4 °C	1.0 mg/L
Temperature	NTC thermistor APHA 2550	in situ	0.01 °C[2]
Turbidity	Turbidimetric EPA 180.1	4 °C	0.4 NTU
Zinc	ICP mass spectrometry EPA 200.8	0.5% HNO_3	1.0 µg/L

* Instrument sensitivity furnished in lieu of laboratory reporting limit.

TABLE 2.3-34
DESCRIPTIVE STATISTICS FOR WATER QUALITY PARAMETERS
SAMPLED IN LONDON CREEK IN 2008

Parameter	Mean	Median	Minimum	Maximum	# Samples <ARL	ARL
Alkalinity (mg/L $CaCO_3$)	30.6	34	10	41	0	10
Aluminum (mg/L)	0.190	0.176	0.05	0.296	0	0.05
Ammonia Nitrogen (mg/L)	0.098	0.033	0.02	0.35	2	0.02
Arsenic (μg/L)	2	2	2	2	9	2.0
Barium (mg/L)	0.043	0.041	0.025	0.083	0	0.001
Biochemical Oxygen Demand (mg/L)	2.2	2	2	3.1	7	2.0
Boron (mg/L)	0.1	0.1	0.1	0.1	9	0.1
Cadmium (μg/L)	0.5	0.5	0.5	0.5	9	0.5
Calcium (mg/L)	7.6	7.6	6.1	9.1	0	0.03
Chloride (mg/L)	3.6	3.5	3.1	4.3	0	1.0
Chromium (μg/L)	1	1	1	1	9	1.0
Copper (μg/L)	2	2	2	2	9	2.0
Iron (mg/L)	0.39	0.41	0.34	0.57	0	0.01
Dissolved Oxygen (mg/L)	8.1	7.7	5.5	12.0	0	0.01
Lead (μg/L)	2	2	2	2	0	2.0
Magnesium (mg/L)	3.1	3.2	2.4	3.6	0	0.03
Manganese (μg/L)	36.2	26.1	11.2	76	0	1.0
Mercury (μg/L)	0.5	0.5	0.5	0.5	9	0.1
Nickel (μg/L)	2	2	2	2	9	2.0
Nitrite+Nitrate Nitrogen (mg/L)	0.18	0.04	0.02	0.87	1	0.02
Orthophosphate Phosphorus (mg/L)	0.009	0.008	0.005	0.018	1	0.005
pH (standard units)	7.24	7.23	6.7	7.86	0	0.01
Potassium (mg/L)	1.76	1.65	1.43	2.13	0	0.25
Selenium (μg/L)	2	2	2	2	9	2.0
Silica, as Si (mg/L)	10.2	11	4.7	13	0	0.5
Silver (μg/L)	0.5	0.5	0.5	0.5	9	0.5
Specific Conductance (μS/cm)	87.2	88	69	103.2	0	0.1
Sodium (mg/L)	6.2	6.6	4.5	7.5	0	0.1
Sulfate (mg/L)	8.5	8.4	3	15	0	1.0
Temperature (°C)	12.77	15.15	5.21	18.03	0	0.01
Total Dissolved Solids (mg/L)	88.2	88	65	110	0	20
Total Kjeldhal Nitrogen (mg/L)	0.23	0.2	0.1	0.53	2	0.1
Total Phosphorus (mg/L)	0.026	0.023	0.015	0.043	0	0.05
Total Suspended Solids (mg/L)	4.6	3	2	10	3	2.0
Total Turbidity (NTU)	6.2	3	2.1	18	0	0.4
Zinc (μg/L)	3.4	2.5	1.8	10.5	1	1.0

Note: Three sampling locations were used and three sampling events were conducted at each location for a total number of samples (N) equal to nine. Number of samples listed as "below the analytical reporting limit" (<ARL) for each specific parameter, along with the ARL itself, is also presented.

$CaCO_3$ calcium carbonate
mg/L milligrams per liter
NTU nephelometric turbidity units
pH standard pH units
μg/L micrograms per liter
uS/cm microSiemens per centimeter
ºC degrees Celsius

TABLE 2.3-35

WATER QUALITY DATA FROM LAKE CHEROKEE IN 2004

Sample Date	Depth (ft)	Alkalinity Carbonate as $CaCO_3$ (mg/L)	Biochemical Oxygen Demand (mg/L)	Total Organic Carbon (mg/L)	Dissolved Oxygen (mg/L)	Fecal Coliform (#/100 mL)	Nitrogen Ammonia (NH3) (mg/L)	Nitrogen Kjeldahl (mg/L)	Nitrogen Nitrite (NO_2) + Nitrate (NO_3) as N (mg/L)	pH	Phosphorus (mg/L)	Temperature Air (degrees Fahrenheit)	Temperature Water (degrees Fahrenheit	Turbidity (NTU)
2/25/04	1.0		2.3		12.59	1			0.095	6.8	<QL	48.2	46.8	3
3/17/04	1.0	18	<QL	5.7	10.73	<QL	0.11	0.6	<QL	5.9	<QL	64.4	58.6	2.7
4/20/04	1.0	46	2.4		8.68	72	0.12	0.2	0.29	6.3	<QL	91.4	67.5	4.8
4/22/04	1.0	21	2.4		9.44	1	0.097	0.58	<QL	6.6	<QL	84.2	72.1	2
5/11/04	1.0	21	<QL		8.04	6	0.097	0.47	<QL	6.0	<QL	84.2	80.2	1.2
6/9/04	1.0	22	<QL	6.8	7.5	1	0.1	0.57	<QL	6.73	0.06		82.9	1
7/28/04		22	<QL		7.66	11	0.1	0.61	<QL	7.42	0.027	87.8	86.5	2.6
8/24/04	1.0	21	<QL		9.61	1	0.061	0.47	<QL	8.34	0.051	84.2	82.2	2.6
9/14/04		17	6.7	7	11.94	4	0.079	0.34	<QL	8.4	0.022		78.4	21
10/19/04		21	3.2		7.46	7	0.2	0.55	0.055	6.5	0.031	68.0	67.8	3.6
11/3/04	1.0	21	2.2		6.97	8	0.27	0.49	0.052	6.2	<QL	77.0	71.1	2
12/8/04	1.0	23	<QL	6.1	6.07	28	0.48	0.65	0.12	6.64	<QL	60.8	54.1	5.9

Sample Date	Depth (m)	Total Cadmium (μg/L)	Total Chromium (μg/L)	Total Copper (μg/L)	Total Iron (μg/L)	Total Lead (μg/L)	Total Manganese (μg/L)	Total Mercury (μg/L)	Total Nickel (μg/L)	Total Zinc (μg/L)
2/25/04	1.0									
3/17/04	1.0	<QL	<QL	<QL	1100	<QL	24	<QL	<QL	<QL
4/20/04	1.0									
4/22/04	1.0									
5/11/04	1.0									
6/9/04	1.0	<QL	<QL	<QL	370	<QL	23	<QL	<QL	<QL
7/28/04										
8/24/04	1.0									
9/14/04		<QL	<QL	<QL	310	<QL	30	<QL	<QL	<QL
10/19/04										
11/3/04	1.0									
12/8/04	1.0	<QL	<QL	<QL	930	<QL	93	<QL	<QL	<QL

Source: Reference 51

QL = quantification limit
m = meter
mg/L = milligrams per liter
NTU = nephelometric turbidity units
μg/L = micrograms per liter

TABLE 2.3-36
MAKE-UP POND C GROUNDWATER ANALYTICAL PARAMETERS AND METHODS

Groundwater Component/ Test Description	Reference Method	Reporting Limit	Units
Alkalinity, Bicarbonate	SM2320 B	5.0	mg/L
Alkalinity, Total	SM2320 B	5.0	mg/L
Aluminum by ICP (Digested)	EPA 200.7/6010B	0.0500	mg/L
Ammonia (Colorimetric)	EPA 350.1	0.020	mg-N/L
Arsenic by ICP-MS (Digested)	EPA 200.8/6020	2.00	µg/L
Barium by ICP-MS (Digested)	EPA 200.8/6020	1.00	µg/L
BOD5	SM5210 B	2.0	mg/L
Boron by ICP-MS (Digested)	EPA 200.7/6010B	0.100	mg/L
Cadmium by ICP-MS (Digested)	EPA 200.8/6020	0.500	µg/L
Calcium by ICP	EPA 200.7	0.0300	mg/L
Carbon Dioxide	SM4500-CO2	0.10	mg/L
Chemical Oxygen Demand	SM5220 D	50	mg/L
Chloride (IC)	EPA 300.0	1.0	mg/L
Chromium by ICP-MS (Digested)	EPA 200.8/6020	1.00	µg/L
Copper by ICP-MS (Digested)	EPA 200.8/6020	2.00	µg/L
E. Coli	SM9223 B	0.0	per/100 ml
Fecal Coliform	SM9222 D	1.0	#/100 ml
Fecal Streptococcus	SM9230 B	0.0	mpn/100 ml
Hardness by Calculation	EPA 2340B	--	mg/L-$CaCO_3$
Iron by ICP (Digested)	EPA 200.7/6010B	0.0100	mg/L
Lead by ICP-MS (Digested)	EPA 200.8/6020	2.00	µg/L
Magnesium by ICP	EPA 200.7	0.0300	mg/L
Manganese by ICP-MS (Digested)	EPA 200.8/6020	1.00	µg/L
Mercury (CVAA)-Water	EPA 245.1/7470A	0.0500	µg/L
Nickel by ICP-MS (Digested)	EPA 200.8/6020	2.00	µg/L
Nitrate (IC)	EPA 300.0	1.0	mg/L
Nitrite (IC)	EPA 300.0	1.0	mg/L
O-Phosphate (Colorimetric)	EPA 365.1	0.00500	mg-P/L
pH	9040B	0.10	pH units
Potassium by ICP (Digested)	EPA 200.7/6010B	0.250	mg/L
Selenium by ICP-MS (Digested)	EPA 200.8/6020	2.00	µg/L
Silicon by ICP (Digested)	EPA 200.7/6010B	0.0300	mg/L
Silver by ICP-MS (Digested)	EPA 200.8/6020	0.500	µg/L
Sodium by ICP (Digested)	EPA 200.7/6010B	0.100	mg/L
Sulfate (IC)	EPA 300.0	1.0	mg/L
Total Coliform	SM9223 B	0.0	per/100 ml
Total Dissolved Solids	SM2540 C	20	mg/L
Total Suspended Solids	SM2540 D	2.0	mg/L
Total Kjeldahl Nitrogen (Colorimetric)	EPA 351.2	0.10	mg-N/L
Total Phosphorus (Colorimetric)	EPA 365.1	0.0050	mg-P/L
Zinc by ICP-MS (Digested)	EPA 200.8/6020	1.00	µg/L

Notes:
mg/L - milligrams per liter
mg-N/L - milligrams per liter as nitrogen
mg-P/L - milligrams per liter as phosphorus
ml - milliliters
mpn - most probable number
µg/L - micrograms per liter

TABLE 2.3-37 (Sheet 1 of 2)
MAKE-UP POND C SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Well ID	Date Sampled	Alkalinity, Bicarbonate	Alkalinity, Total	Aluminum[a]	Ammonia	Arsenic	Barium	BOD_5[b]	Boron	Cadmium	Calcium	Carbon Dioxide[c]	Chemical Oxygen Demand	Chloride	Chromium	Copper	E. Coli	Fecal Coliform	Fecal Streptococcus	Hardness	Iron	Lead	Magnesium	Manganese	Mercury
		mg/L	mg/L	mg/L	mg-N/L	µg/L	µg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	per/100ml	#/100ml	mpn/ 100ml	mg/L-$CaCO_3$	mg/L	µg/L	mg/L	µg/L	µg/L
PC-1	2/18/2009	well not sampled - insufficient volume of water																							
	5/27/2009	well not sampled - insufficient volume of water																							
PC-1PWR	2/18/2009	170	170	0.496	0.027	<2.00	26.2	3.0	<0.100	<0.500	31.8	38	<50	9.2	<1.00	3.49	Absent	5 est	BDL	137	0.672	<2.00	14.0	48.4	<0.0500
	5/27/2009	160	160	0.211	<0.020	<1.00	27.8	<3.8	<0.100	<1.00	32.8	78	<50	9.8	<1.00	1.50	NA	NA	NA	147	0.603	<1.00	15.8	23.2	<0.0500
PC-2	2/18/2009	79	79	27.3	0.021	2.23	405	6.0	<0.100	0.740	16.0	15	<50	2.2	5.60	31.0	Absent	BDL	7	92.7	18.7	14.3	12.8	3150	<0.0500
	5/27/2009	85	85	15.7	0.056	1.60	269	<3.8	<0.100	<1.00	12.7	20	<50	4.2	3.20	16.5	NA	NA	NA	71.7	9.58	7.40	9.72	2520	<0.0500
PC-3	2/18/2009	46	46	3.31	<0.020	<2.00	120	3.0	<0.100	2.72	6.41	55	<50	1.8	<1.00	18.6	Absent	BDL	BDL	37.2	4.30	<2.00	5.14	123	<0.0500
	5/27/2009	47	47	7.38	0.036	1.30	238	<3.8	<0.100	3.90	6.48	45	<50	4.6	1.20	28.4	NA	NA	NA	46.3	4.62	3.00	7.32	209	<0.0500
PC-4	2/19/2009	33	33	5.38	<0.020	<2.00	84.8	5.0	<0.100	<0.500	4.83	63	<50	1.8	1.65	<2.00	Present	BDL	BDL	23.7	5.16	<2.00	2.82	447	<0.0500
	5/27/2009	16	16	16.7	0.022	1.40	245	<3.8	<0.100	<1.00	3.66	36	67	3.7	3.80	4.00	NA	NA	NA	27.9	14.2	4.40	4.56	553	<0.0500
PC-4PWR	2/19/2009	29	29	0.0900	<0.020	<2.00	17.9	3.0	<0.100	<0.500	6.26	18	<50	2.6	<1.00	<2.00	Present	4 est	13	22.5	0.162	<2.00	1.68	34.1	<0.0500
	5/27/2009	33	33	0.500	0.037	<1.00	27.7	18	<0.100	<1.00	6.74	45	<50	5.0	1.00	10.6	NA	NA	NA	24.2	0.641	1.60	1.80	90.5	<0.0500
PC-5PWR	2/19/2009	well not sampled - dry																							
	5/27/2009	well not sampled - dry																							
PC-6	2/19/2009	31	31	5.21	<0.020	<2.00	204	3.0	<0.100	<0.500	5.97	57	<50	2.8	2.09	51.4	Absent	BDL	BDL	27.5	4.74	<2.00	3.07	325	<0.0500
	5/27/2009	33	33	1.13	0.026	<1.00	163	<3.8	<0.100	<1.00	5.69	75	<50	2.9	<1.00	8.80	NA	NA	NA	25.0	0.837	<1.00	2.61	326	<0.0500
PC-7	2/19/2009	67	67	24.5	<0.020	<2.00	475	2.0	<0.100	0.603	9.36	57	52	4.0	11.7	31.4	Absent	BDL	BDL	55.0	25.8	11.6	7.69	2970	<0.0500
	5/27/2009	59	59	44.9	0.024	4.40	954	<3.8	<0.100	<1.00	11.6	63	54	6.5	17.7	31.7	NA	NA	NA	71.8	43.3	23.0	10.4	8330	<0.0500
PC-8	2/19/2009	well not sampled - insufficient volume of water																							
	5/27/2009	well not sampled - insufficient volume of water																							
PC-9PWR	2/18/2009	97	97	0.199	<0.020	<2.00	76.3	5.0	<0.100	<0.500	23.9	6.5	<50	3.0	<1.00	8.99	Absent	BDL	BDL	92.3	0.744	<2.00	7.93	218	<0.0500
	5/27/2009	120	120	0.117	<0.020	<1.00	71.7	<3.8	<0.100	<1.00	22.6	17	<50	5.4	<1.00	1.90	NA	NA	NA	88.8	0.971	<1.00	7.86	38.7	<0.0500
PC-10	2/19/2009	well not sampled - dry																							
	5/27/2009	well not sampled - insufficient volume of water																							
Field Blank	2/19/2009	<5.0	<5.0	<0.0500	<0.020	<2.00	<1.00	NA	<0.100	<0.500	<0.0300	NA	<50	<0.10	<1.00	<2.00	NA	NA	NA	0.198	0.0560	<2.00	<0.0300	<1.00	<0.0500
	5/27/2009	<5.0	<5.0	<0.0500	<0.020	<1.00	1.1	NA	<0.100	<1.00	<0.0300	NA	<50	<0.10	<1.00	<1.00	NA	NA	NA	0.198	<0.0100	<1.00	<0.0300	1.10	<0.0500

Notes:

BDL = below detection limits
est = estimated
mg/L = milligrams per liter
mg-N/L = milligrams per liter as nitrogen
mg-P/L = milligrams per liter as phosphorus
ml = milliliters
mpn = most probable number
NA = not analyzed
µg/L = micrograms per liter

a) The matrix spike and duplicate recoveries for aluminum and silicon did not meet the quality control limits of 75-125% as defined for ICP analysis for groundwater in South Carolina.

b) The BOD_5 GGA recovery was outside acceptable limits.

c) Carbon Dioxide result is a minimum value because pH is less than the minimum value on the nomograph for PC-4 and PC-6.

d) Nitrate (NO_3) and nitrite (NO_2) were analyzed beyond the 48 hr EPA recommended holdtime.

e) Samples analyzed for pH were received and analyzed outside of holding time.

f) The Method Blank contained zinc greater than reporting limit. Zinc concentration in the Method Blank is 1.15 µg/L.

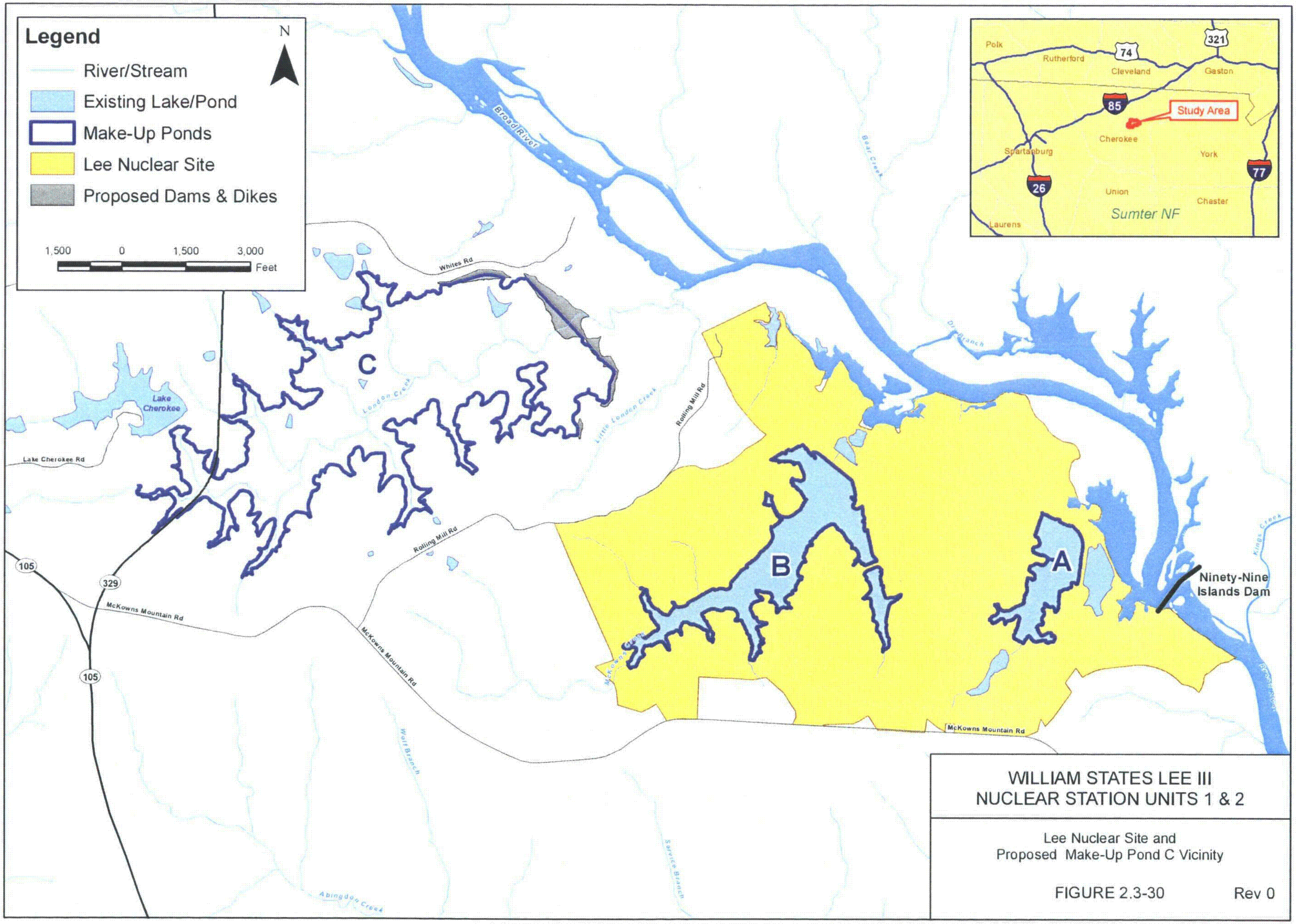
TABLE 2.3-37 (Sheet 2 of 2)
MAKE-UP POND C SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Well ID	Date Sampled	Nickel	Nitrate[d]	Nitrite[d]	O-Phosphate	Field pH	Lab pH[e]	Potassium	Selenium	Silicon[a]	Silver	Sodium	Sulfate	Total Coliform	Total Dissolved Solids	Total Suspended Solids	Total Kjeldahl Nitrogen	Total Phosphorus	Zinc[f]
		µg/L	mg/L	mg/L	mg-P/L	pH units	pH units	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	per/100ml	mg/L	mg/L	mg-N/L	mg-P/L	µg/L
PC-1	2/18/2009	well not sampled - insufficient volume of water																	
	5/27/2009	well not sampled - insufficient volume of water																	
PC-1PWR	2/18/2009	<2.00	2.5	<1.0	0.0401	7.0	7.4	3.28	<2.00	14.1	<0.500	20.2	13	Present	200	35	<0.10	0.071	10.1
	5/27/2009	1.10	1.8	<0.10	0.0300	6.7	7.0	3.11	<1.00	14.3	<1.00	21.6	14	NA	240	14	<0.10	0.052	3.50
PC-2	2/18/2009	7.11	<1.0	<1.0	0.0106	7.1	7.0	4.42	<2.00	49.3	<0.500	42.2	50	Present	24	420	0.28	0.42	142
	5/27/2009	3.90	0.16	<0.10	0.0154	7.0	7.2	3.11	<1.00	37.7	<1.00	20.3	15	NA	130	300	0.32	0.23	45.5
PC-3	2/18/2009	2.42	<1.0	<1.0	0.0819	6.3	6.9	2.55	<2.00	21.3	<0.500	7.82	<1.0	Present	60	55	0.10	0.098	27.6
	5/27/2009	2.30	0.29	<0.10	0.0773	6.4	6.8	2.75	<1.00	26.6	<1.00	7.16	0.80	NA	86	140	<0.10	0.16	23.5
PC-4	2/19/2009	2.11	<1.0	<1.0	0.00950	6.1	5.9	3.00	<2.00	22.8	<0.500	7.65	<1.0	Present	72	80	<0.10	0.13	31.6
	5/27/2009	2.90	0.79	<0.10	0.0122	5.7	6.0	5.28	<1.00	37.3	<1.00	6.41	0.28	NA	48	680	0.12	0.27	41.8
PC-4PWR	2/19/2009	<2.00	<1.0	<1.0	0.0524	6.6	6.3	1.34	<2.00	14.2	<0.500	7.80	6.0	Present	70	<5.0	<0.10	0.058	4.91
	5/27/2009	9.60	0.11	<0.10	0.0534	6.2	6.3	1.75	<1.00	15.6	1.00	7.55	11	NA	86	20	0.29	0.11	13.7
PC-5PWR	2/19/2009	well not sampled - dry																	
	5/27/2009	well not sampled - dry																	
PC-6	2/19/2009	2.19	<1.0	<1.0	0.0139	6.1	5.9	2.18	<2.00	18.8	<0.500	7.39	5.4	Present	60	180	<0.10	0.23	38.5
	5/27/2009	1.50	0.12	<0.10	0.04	5.8	6.1	1.87	<1.00	13.1	<1.00	5.87	3.9	NA	70	24	<0.10	0.071	6.80
PC-7	2/19/2009	10.2	<1.0	<1.0	0.141	6.4	6.2	5.09	<2.00	54.3	<0.500	27.3	8.4	Present	160	470	0.28	0.89	141
	5/27/2009	16.7	0.22	<0.10	0.290	6.3	6.6	8.92	1.00	75.0	<1.00	18.8	4.4	NA	150	2000	0.29	1.1	103
PC-8	2/19/2009	well not sampled - insufficient volume of water																	
	5/27/2009	well not sampled - insufficient volume of water																	
PC-9PWR	2/18/2009	<2.00	3.2	<1.0	0.193	7.5	7.9	3.89	<2.00	17.9	<0.500	10.6	2.9	Present	150	9.8	<0.10	0.21	11.8
	5/27/2009	<1.00	3.4	<0.10	0.193	7.2	7.5	3.78	<1.00	17.8	<1.00	10.4	2.4	NA	160	<13	<0.10	0.23	3.10
PC-10	2/19/2009	well not sampled - dry																	
	5/27/2009	well not sampled - insufficient volume of water																	
Field Blank	2/19/2009	<2.00	<0.10	<0.10	<0.00500	NA	5.2	<0.0250	<2.00	0.0900	<0.500	<0.100	<0.10	NA	NA	NA	<0.10	<0.0050	1.48
	5/27/2009	<1.00	<0.10	<0.10	<0.00500	NA	6.0	<0.250	<1.00	0.111	<1.00	<0.100	<0.10	NA	NA	NA	<0.10	<0.0050	2.00

Notes:

BDL = below detection limits
est = estimated
mg/L = milligrams per liter
mg-N/L = milligrams per liter as nitrogen
mg-P/L = milligrams per liter as phosphorus
ml = milliliters
mpn = most probable number
NA = not analyzed
µg/L = micrograms per liter

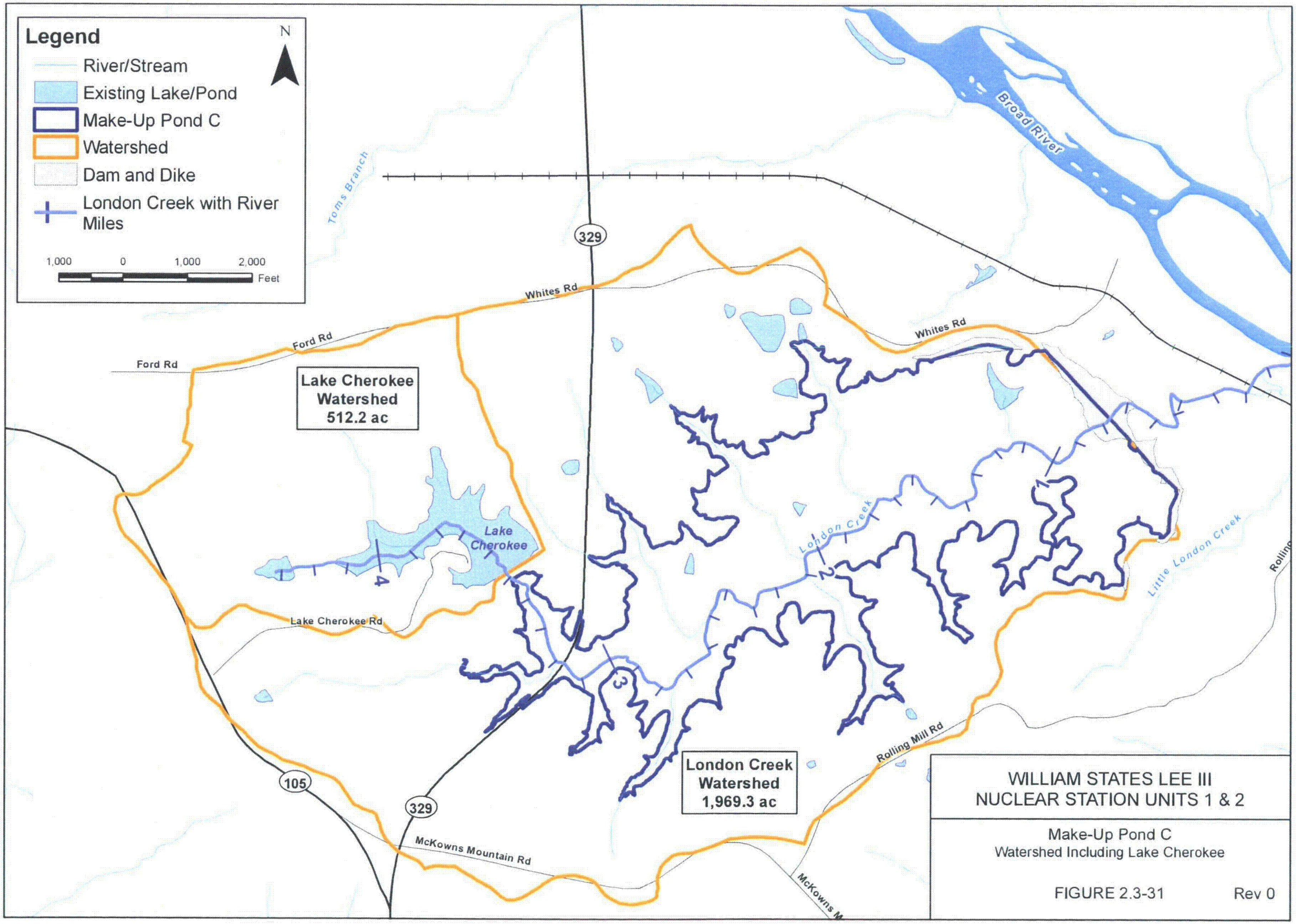
a) The matrix spike and duplicate recoveries for aluminum and silicon did not meet the quality control limits of 75-125% as defined for ICP analysis for groundwater in South Carolina.
b) The BOD_5 GGA recovery was outside acceptable limits.
c) Carbon Dioxide result is a minimum value because pH is less than the minimum value on the nomograph for PC-4 and PC-6.
d) Nitrate (NO_3) and nitrite (NO_2) were analyzed beyond the 48 hr EPA recommended holdtime.
e) Samples analyzed for pH were received and analyzed outside of holding time.
f) The Method Blank contained zinc greater than reporting limit. Zinc concentration in the Method Blank is 1.15 µg/L.



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Lee Nuclear Site and
Proposed Make-Up Pond C Vicinity

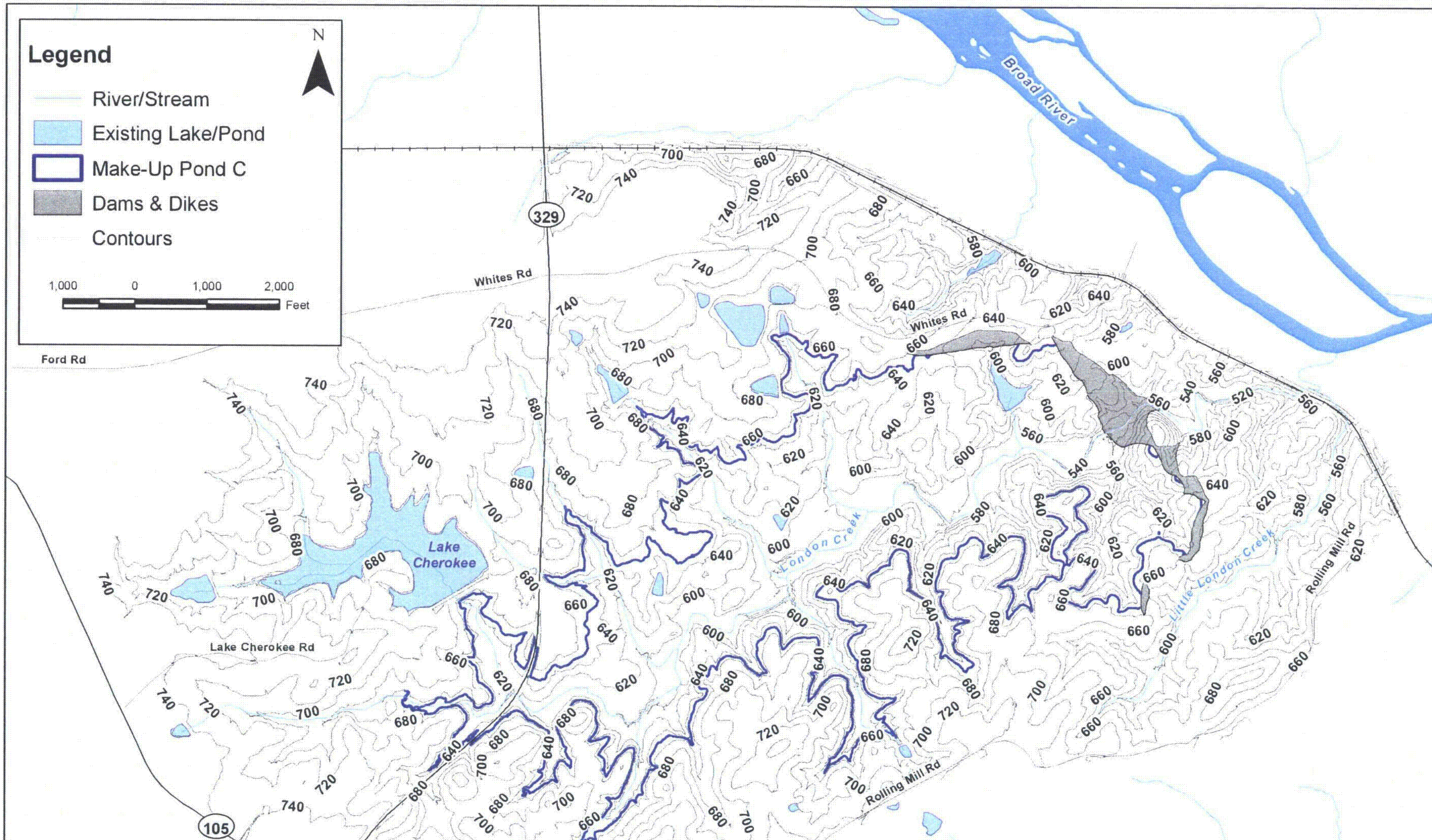
FIGURE 2.3-30 Rev 0



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
Watershed Including Lake Cherokee

FIGURE 2.3-31 Rev 0

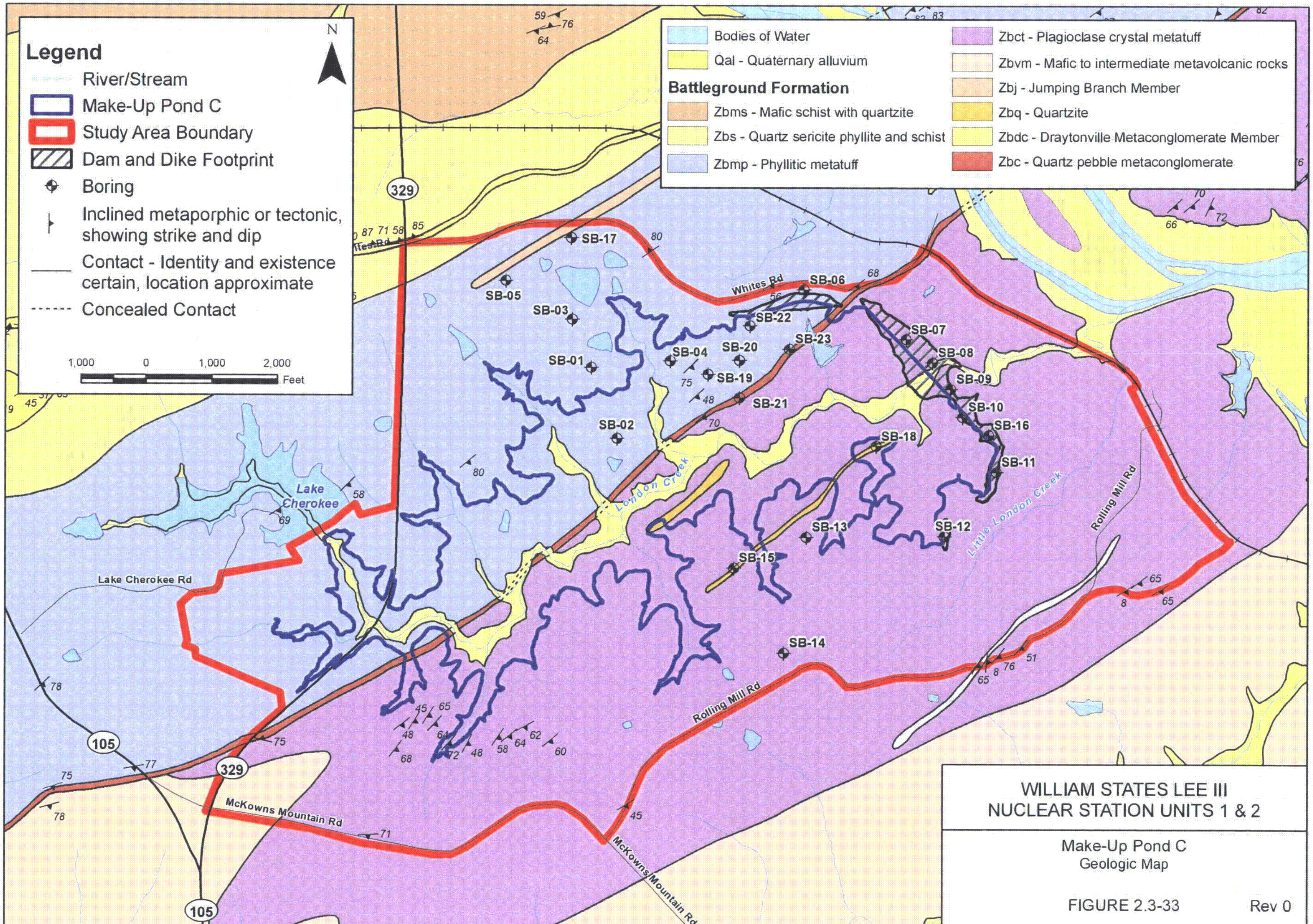


WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
Bathmetry* 20ft Contour Interval

FIGURE 2.3-32 Rev 0

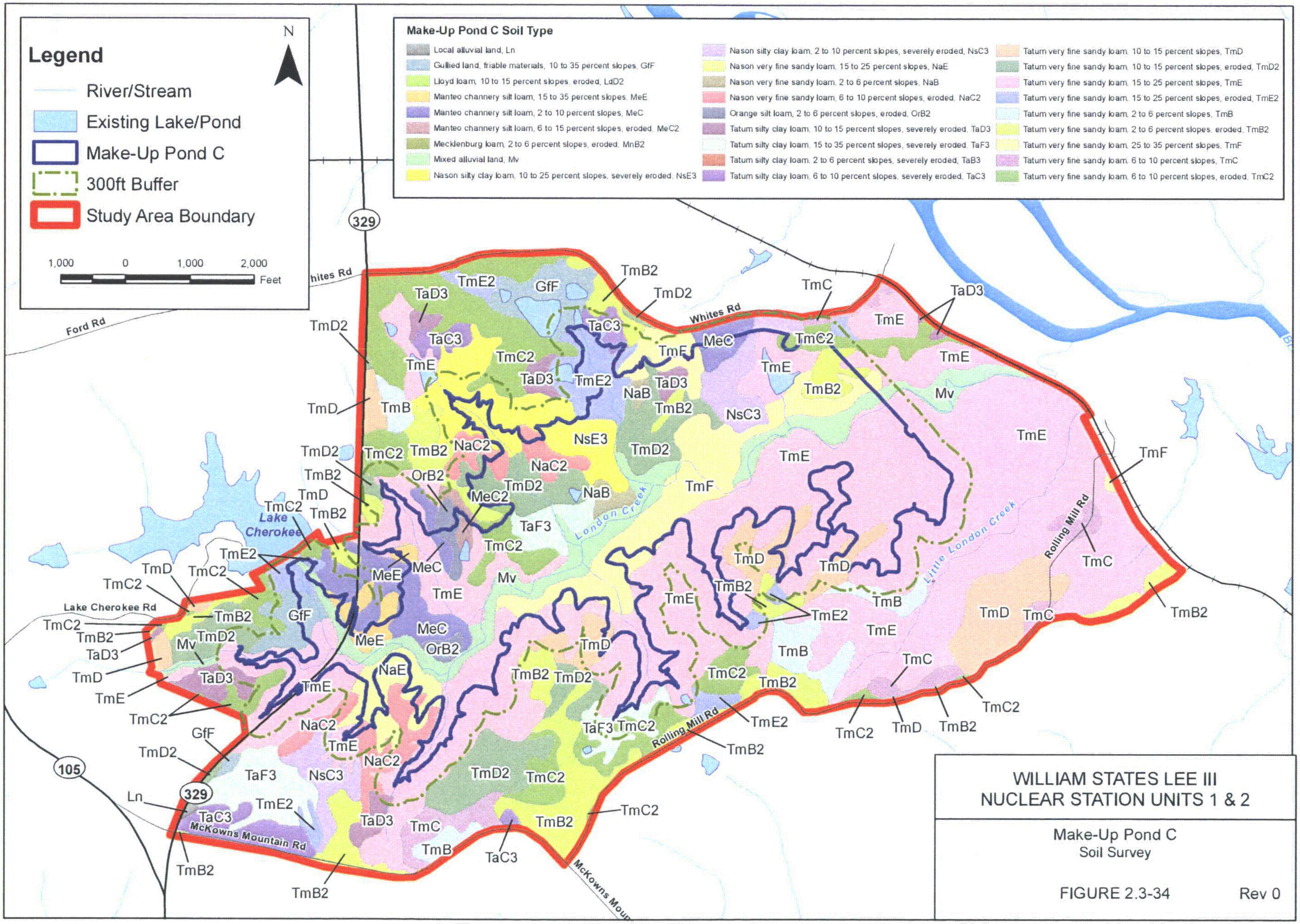
Note: *Based on current land contours.

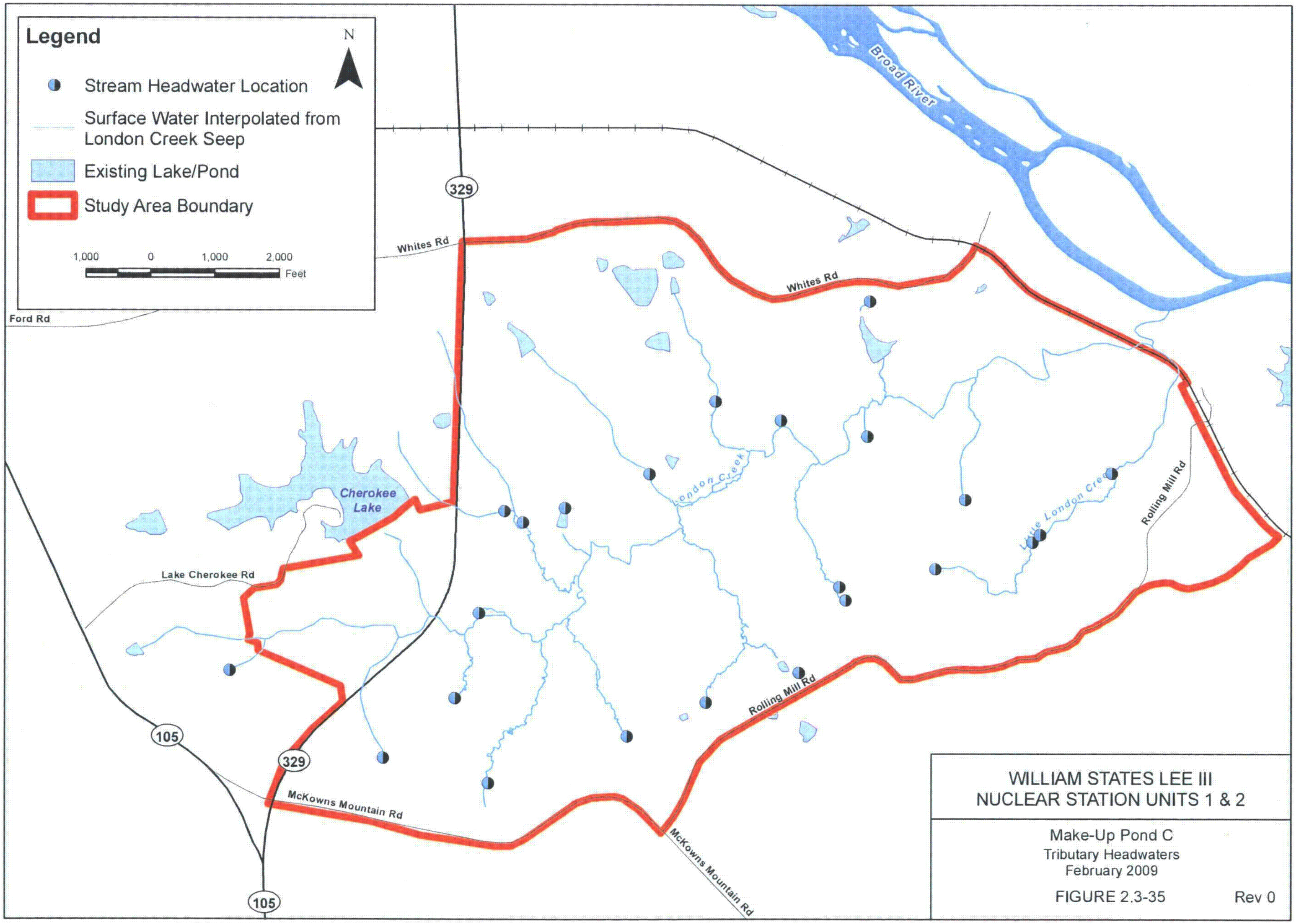


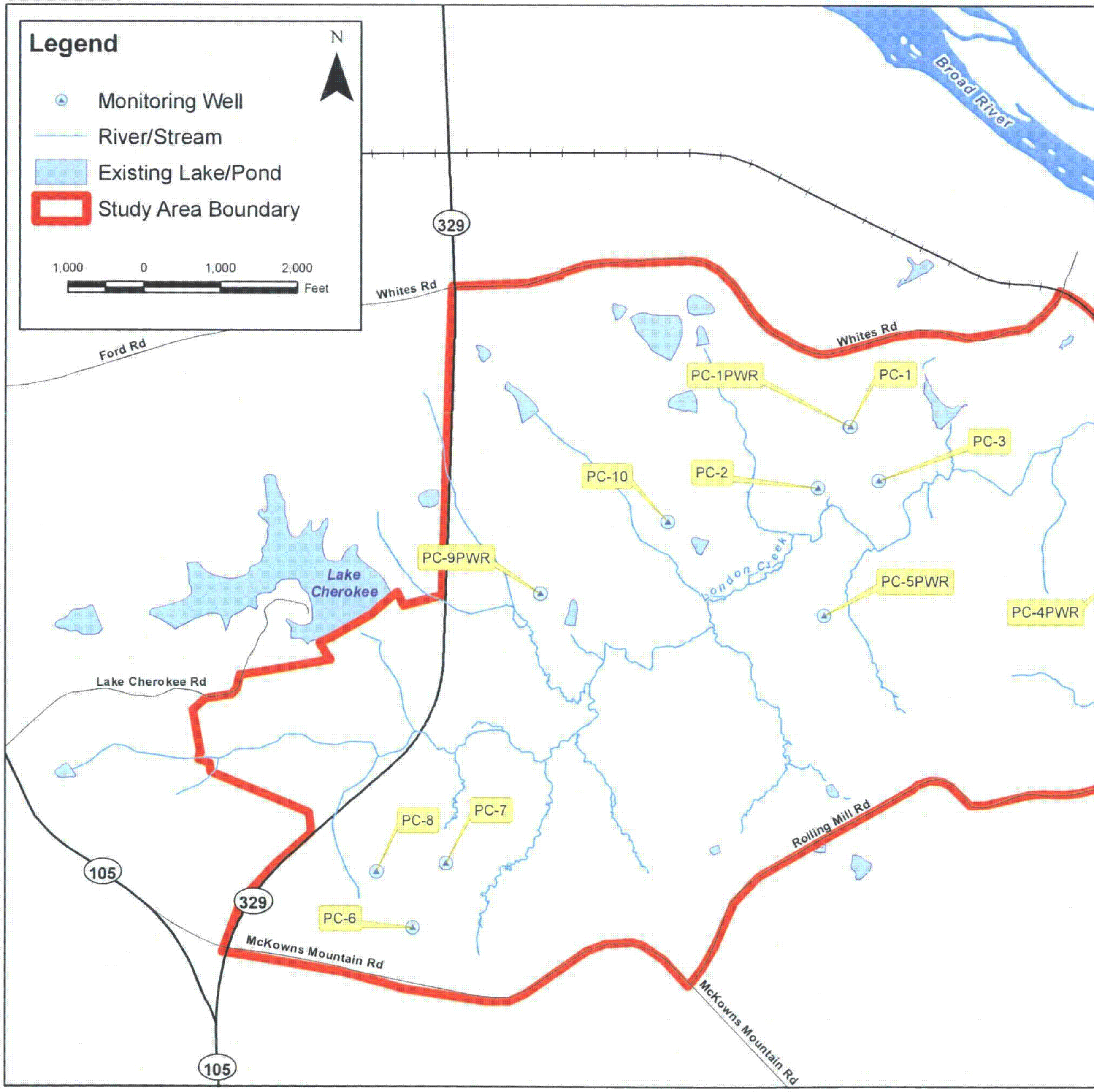
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
Geologic Map

FIGURE 2.3-33 Rev 0


Legend
N
River/Stream
Existing Lake/Pond
Make-Up Pond C
300ft Buffer
Study Area Boundary
1,000 0 1,000 2,000
Feet
Make-Up Pond C Soil Type
Local alluvial land, Ln
Gullied land, friable materials, 10 to 35 percent slopes, GfF
Lloyd loam, 10 to 15 percent slopes, eroded, LdD2
Manteo channery silt loam, 15 to 35 percent slopes, MeE
Manteo channery silt loam, 2 to 10 percent slopes, MeC
Manteo channery silt loam, 6 to 15 percent slopes, eroded, MeC2
Mecklenburg loam, 2 to 6 percent slopes, eroded, MnB2
Mixed alluvial land, Mv
Nason silty clay loam, 10 to 25 percent slopes, severely eroded, NsE3
Nason silty clay loam, 2 to 10 percent slopes, severely eroded, NsC3
Nason very fine sandy loam, 15 to 25 percent slopes, NaE
Nason very fine sandy loam, 2 to 6 percent slopes, NaB
Nason very fine sandy loam, 6 to 10 percent slopes, eroded, NaC2
Orange silt loam, 2 to 6 percent slopes, eroded, OrB2
Tatum silty clay loam, 10 to 15 percent slopes, severely eroded, TaD3
Tatum silty clay loam, 15 to 35 percent slopes, severely eroded, TaF3
Tatum silty clay loam, 2 to 6 percent slopes, severely eroded, TaB3
Tatum silty clay loam, 6 to 10 percent slopes, severely eroded, TaC3
Tatum very fine sandy loam, 10 to 15 percent slopes, TmD
Tatum very fine sandy loam, 10 to 15 percent slopes, eroded, TmD2
Tatum very fine sandy loam, 15 to 25 percent slopes, TmE
Tatum very fine sandy loam, 15 to 25 percent slopes, eroded, TmE2
Tatum very fine sandy loam, 2 to 6 percent slopes, TmB
Tatum very fine sandy loam, 2 to 6 percent slopes, eroded, TmB2
Tatum very fine sandy loam, 25 to 35 percent slopes, TmF
Tatum very fine sandy loam, 6 to 10 percent slopes, TmC
Tatum very fine sandy loam, 6 to 10 percent slopes, eroded, TmC2
Whites Rd
Ford Rd
Lake Cherokee Rd
Lake Cherokee
London Creek
Little London Creek
Rolling Mill Rd
McKowns Mountain Rd
329
105
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Make-Up Pond C
Soil Survey
FIGURE 2.3-34
Rev 0

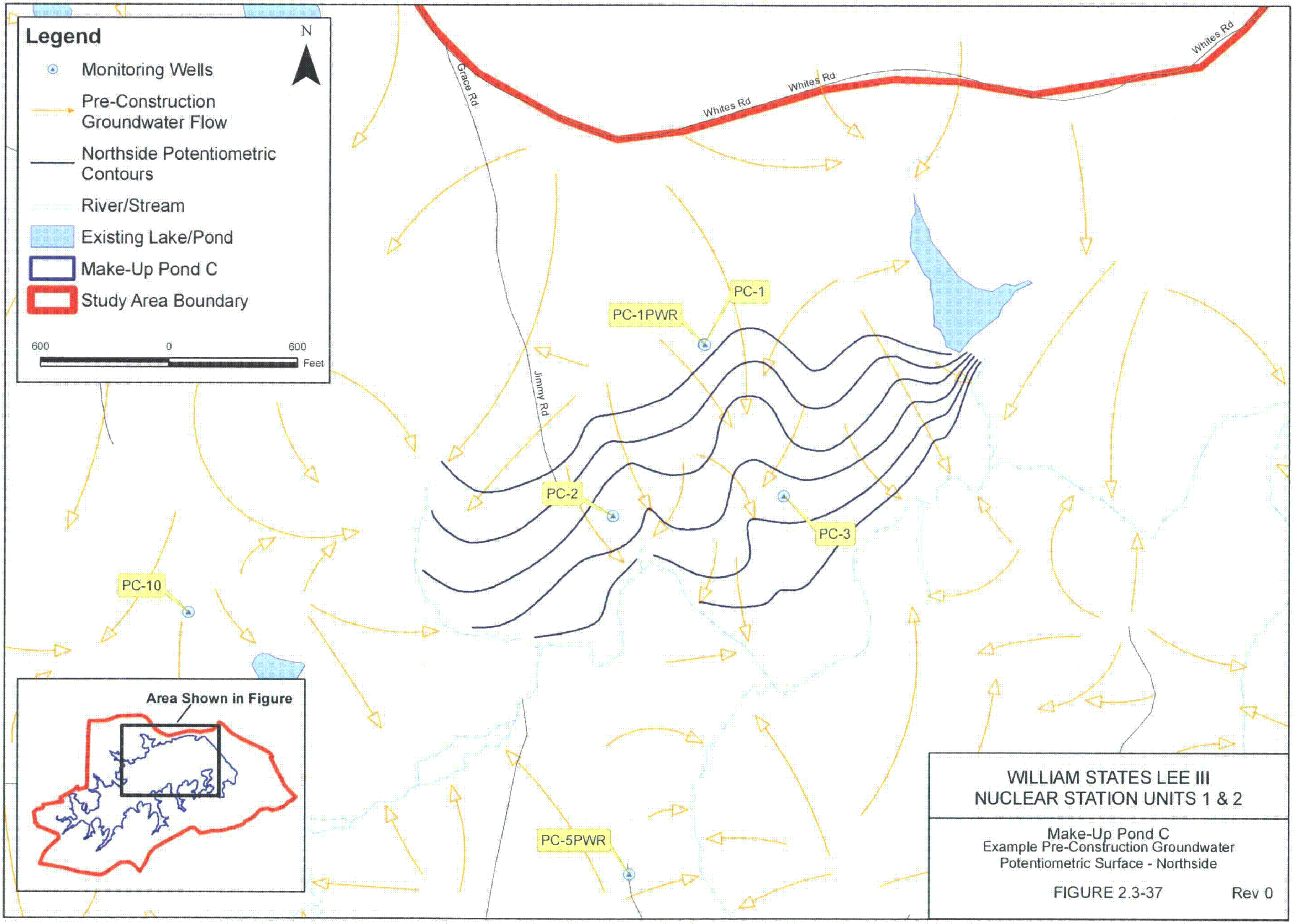

Legend
Stream Headwater Location
Surface Water Interpolated from London Creek Seep
Existing Lake/Pond
Study Area Boundary
1,000 0 1,000 2,000
Feet
N
Broad River
Whites Rd
Ford Rd
329
Cherokee Lake
Lake Cherokee Rd
London Creek
Little London Creek
Rolling Mill Rd
105
McKowns Mountain Rd
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Make-Up Pond C
Tributary Headwaters
February 2009
FIGURE 2.3-35
Rev 0

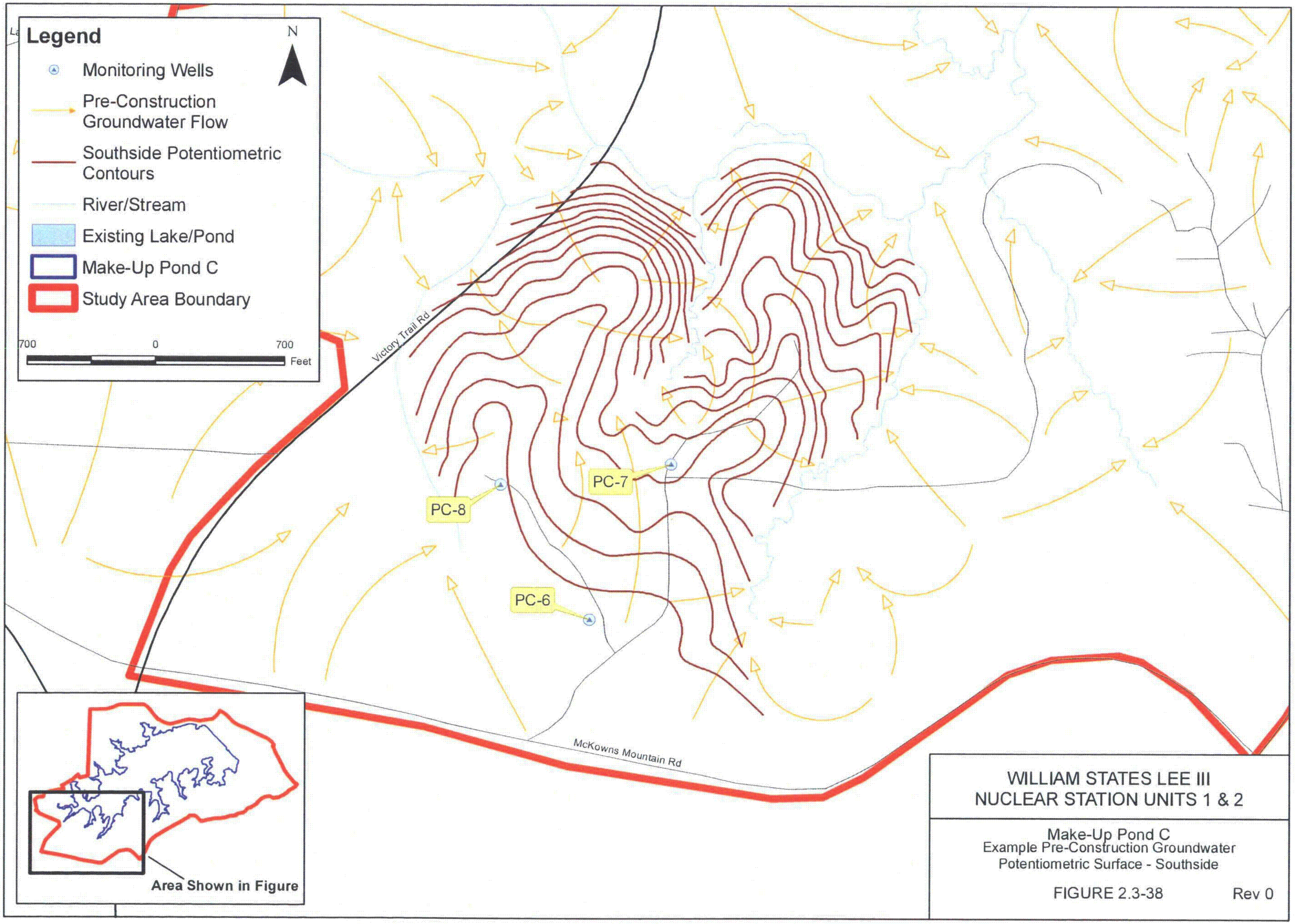


WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
Ground Water Well Location Plan

FIGURE 2.3-36 Rev 0

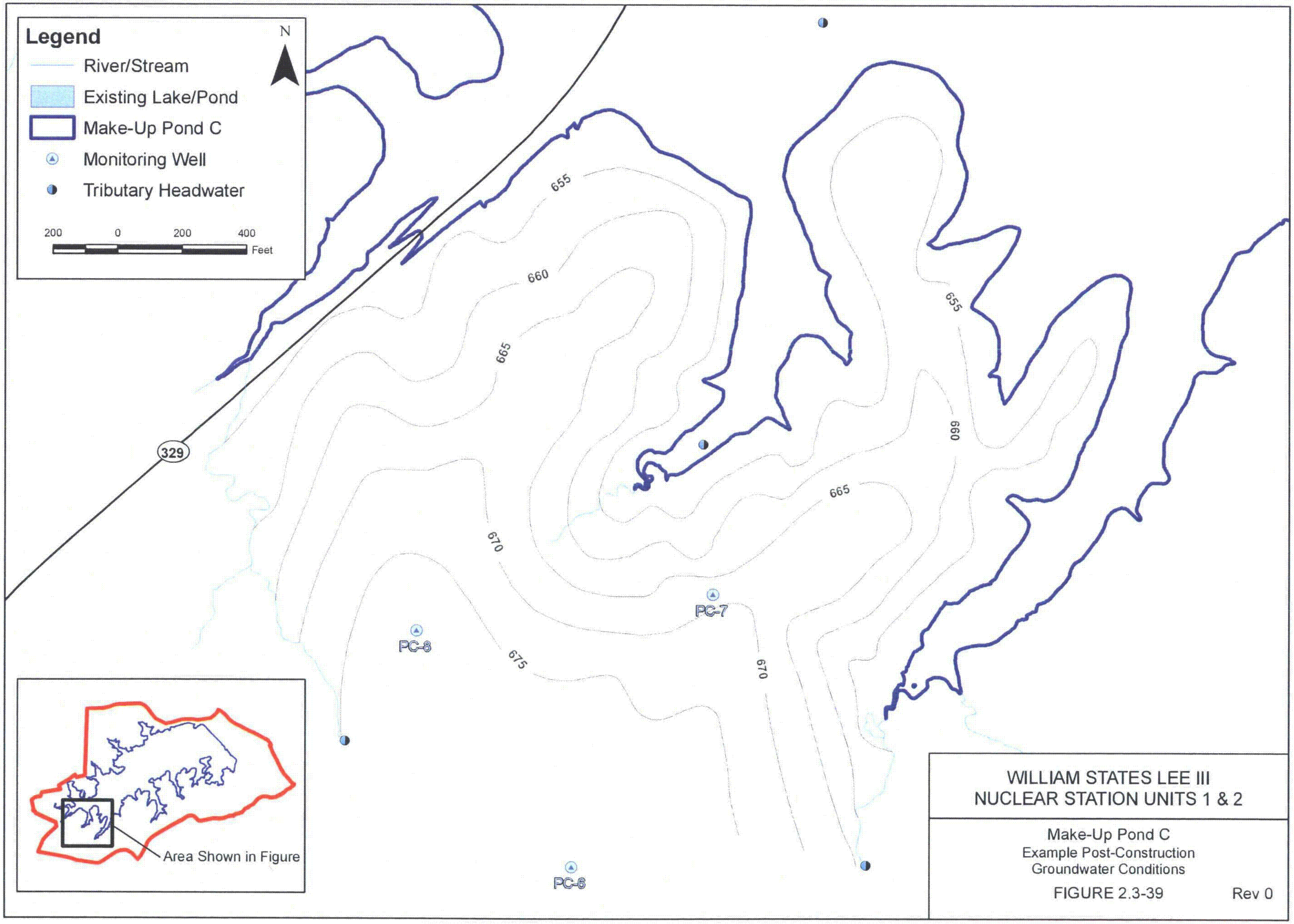

Legend
N
Monitoring Wells
Pre-Construction Groundwater Flow
Northside Potentiometric Contours
River/Stream
Existing Lake/Pond
Make-Up Pond C
Study Area Boundary
600
0
600
Feet
Whites Rd
Whites Rd
Whites Rd
Grace Rd
Jimmy Rd
PC-1
PC-1PWR
PC-2
PC-3
PC-10
PC-5PWR
Area Shown in Figure
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Make-Up Pond C
Example Pre-Construction Groundwater
Potentiometric Surface - Northside
FIGURE 2.3-37
Rev 0



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
Example Pre-Construction Groundwater
Potentiometric Surface - Southside

FIGURE 2.3-38 Rev 0

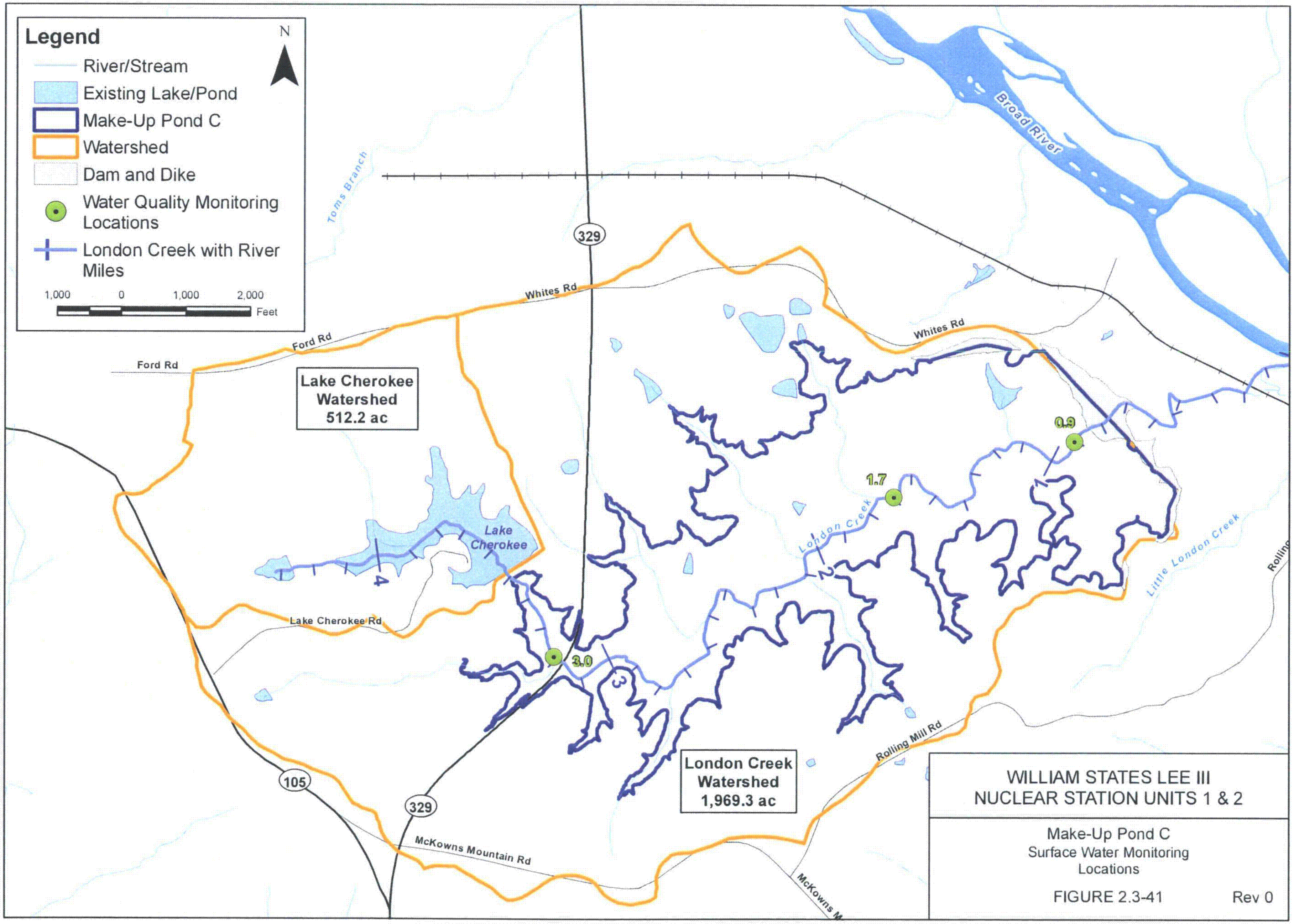

Legend
River/Stream
Existing Lake/Pond
Make-Up Pond C
Monitoring Well
Tributary Headwater
N
200 0 200 400
Feet
329
655
660
665
670
675
PC-7
PC-8
PC-6
Area Shown in Figure
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Make-Up Pond C
Example Post-Construction
Groundwater Conditions
FIGURE 2.3-39
Rev 0

[Withheld from Public Disclosure Under 10 CFR 2.390(a)(9)]

WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
Private Potable Water Wells

FIGURE 2.3-40 Rev 0


Legend
River/Stream
Existing Lake/Pond
Make-Up Pond C
Watershed
Dam and Dike
Water Quality Monitoring Locations
London Creek with River Miles
N
1,000 0 1,000 2,000
Feet
Broad River
Toms Branch
Whites Rd
Ford Rd
Lake Cherokee Watershed 512.2 ac
Lake Cherokee
Lake Cherokee Rd
London Creek
Little London Creek
London Creek Watershed 1,969.3 ac
Rolling Mill Rd
McKowns Mountain Rd
329
105
0.9
1.7
3.0
2
3
4
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Make-Up Pond C
Surface Water Monitoring Locations
FIGURE 2.3-41
Rev 0

2.4 ECOLOGY

Section 2.4, Ecology, page 2.4-2, INSERT NEW TEXT at end of section:

The Make-Up Pond C study area includes London Creek, Little London Creek, and various un-named tributaries to London Creek. London Creek is a small tributary to the Broad River, entering the Broad River within the upper reaches of the Ninety-Nine Islands Reservoir (see Subsection 2.3.1).

2.4.1 Terrestrial Ecology

Subsection 2.4.1, Terrestrial Ecology, Page 2.4-3, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Duke Energy conducted four terrestrial ecology surveys in the Make-Up Pond C study area in 2008, addressing: 1) vegetation, 2) mammals, 3) birds, and 4) reptiles and amphibians. Surveys included investigations across seasons during 2008 and were each conducted in four general biological sampling areas located along London Creek (Figure 2.4-5). The surveys included consideration of federal and state listed threatened and endangered species and species of concern. Surveys in 2008 were conducted for property to which Duke Energy had access (south side of London Creek). Additional surveys, for areas not accessible during 2008, were conducted in 2009. Additional details on sampling methods for each study are included below under the appropriate subsections.

2.4.1.1 Existing Cover Types and Vegetation

Subsection 2.4.1.1, Existing Cover Types and Vegetation, Page 2.4-4, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Ecological cover types, primarily vegetation-based, were mapped and ground-truthed for the Make-Up Pond C study area in 2008, with additional refinement in 2009 (Figure 2.4-6). Mapping consisted of photo-interpretation of 2006 false-color infrared photography coupled with ground-truthing, floristic inventories, and quantitative vegetation sampling conducted at 30 stations located in the four general biological sampling areas mentioned above (Figure 2.4-5). In addition, special targeted surveys were conducted for potential federal and state listed plant species and species of concern (findings for listed plant species including species of concern are treated separately under Subsection 2.4.1.3.1.1). The ecological cover mapping for the Make-Up Pond C study area used the same mapping classification system that was used for the Lee Nuclear Site.

Field work was conducted from January through October in 2008, with additional field work in 2009. A list of potential plant species known to occur in the Piedmont of South Carolina was compiled before fieldwork began. The list was then edited and in some cases expanded as additional undocumented plant species were observed. Among the 30 vegetation sampling stations, 28 of the stations included circular 0.10-ac plots located in forested areas. Two stations located in a non-forested power line right-of-way each consisted of a cluster of five 0.001-ac plots. Within each 0.10-ac forest plot, all tree species (single woody stems 3 inches or greater in diameter-at-breast height [DBH]) were sampled. Within a nested 0.01-ac sub-plot in the forested areas, all shrubs and saplings (trees species less than 3 inches in DBH, but greater than 10 inches tall) were sampled. Finally, within the smaller (0.001-ac) plots or sub-plots, herbs, grasses, forbs, vines, and seedlings (tree and shrub species less than 10 inches tall) were sampled.

Eight ecological cover types are identified for the Make-Up Pond C study area: 1) mixed hardwood (MH), 2) mixed hardwood-pine (MHP), 3) open areas, fields and meadows (OFM), 4) open pine-mixed hardwood (OPMH), 5) pine (P), 6) pine-mixed hardwood (PMH), 7) upland scrub (USC), and 8) open water (**Figure 2.4-6, Table 2.4-12**). Forested cover types encompass 78 percent of the Make-Up Pond C study area. Each vegetation cover type for the Make-Up Pond C study area is described in the subsections below. The open water cover type (farm ponds), as well as linear stream features (London Creek, Little London Creek, un-named tributaries), are described under aquatic habitats in **Subsection 2.4.2**.

Most of the Make-Up Pond C vegetation cover types and the plant assemblages found within them are typical for Piedmont forest stands. None of the pine, pine-mixed hardwood, or cut-over mixed hardwood (see **Subsection 2.4.1.1.2** for this subtype) stands are particularly noteworthy. The flora of the Make-Up Pond C study area is typical for the upper Piedmont. In total, 382 species of plants occur in the study area based on the field surveys, including 55 species of trees and 28 species of sedges of the genus *Carex*. Mixed hardwoods contain the greatest plant diversity compared with other cover types in the study area.

Subsection 2.4.1.1.1, Page 2.4-6, INSERT NEW TEXT at end of subsection:

2.4.1.1.1 *Alluvial and Other Wetlands*

Off-Site Characteristics

Wetlands for the Make-Up Pond C study area have not been incorporated into the ecological cover type map (**Figure 2.4-6**). Wetlands in the Make-Up Pond C study area generally comprise a relatively small component of the lowland mixed hardwood cover subtype described below (**Subsection 2.4.1.1.2**). The wetland areas for Make-Up Pond C study area could not be distinguished and photo-interpreted as separate ecological cover types, and have instead been field delineated according to U.S. Army Corps of Engineers jurisdiction (**Figure 2.4-7**).

Jurisdictional wetlands in the Make-Up Pond C study area occupy an estimated total of 9.74 ac (**Figure 2.4-7**). These wetlands mainly consist of small non-alluvial seepage areas but also include old beaver ponds, oxbow wetlands, partially-impounded streambeds, poorly-drained floodplain areas, and forested pools. These wetland areas are individually small (primarily <0.1 ac each), range in size from <0.01 to 1.16 ac, and are closely associated with stream features along London Creek, Little London Creek, and unnamed tributaries. Vegetation in these wetland areas includes green ash, red maple, black willow, alder, cottonwood, sycamore, common needlerush, sedges, and chain fern.

2.4.1.1.2 Mixed Hardwood (MH)

Subsection 2.4.1.1.2, Page 2.4-7, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The mixed hardwood cover type occupies 664.8 ac or 31.5 percent of the Make-Up Pond C study area (**Figure 2.4-6, Table 2.4-12**). This dominant cover type within the Make-Up Pond C study area consists of four subtypes that could not be distinguished using photo-interpretation, and so are not mapped separately. The mixed hardwood subtypes are: upper and mid-slope mixed hardwood, cut-over mixed hardwood, bluff mixed hardwood, and lowland mixed hardwood. Each subtype is described below.

The upper and mid-slope mixed hardwood subtype occurs on the upper and middle elevations of mesic upland slopes and is mostly dominated by white oak; however, American beech, tulip poplar, sweet gum, red oak, and red maple are also dominants in the canopy in places. Sourwood, American holly, and ironwood are common in the understory.

The cut-over mixed hardwood subtype consists of stands where the upper and mid-slope mixed hardwood subtype, mixed hardwood-pine cover type, or the pine-mixed hardwood cover type previously existed. These stands have recently (within the last 25 years) been logged for their dominant canopy species. Mixed hardwood species such as tulip poplar, red maple, red oak, white oak, sweet gum, and hickories are dominant. This subtype is widely scattered with several large blocks occurring throughout the Make-Up Pond C study area.

The bluff mixed hardwood subtype occurs on several relatively undisturbed bluffs located along or near London Creek. This subtype includes plant communities ranging from species-rich mixed hardwood slopes to rocky heath-dominated bluffs. American beech, white oak, red oak, tulip poplar, bitternut hickory, sourwood, and mountain laurel are the dominant canopy and understory species on the species-rich mixed hardwood bluffs, and the richer bluffs often have a diverse herbaceous flora. A few locations include large hardwood trees to 30–40 inches DBH. The heath bluffs have dense thickets of mountain laurel and Piedmont rhododendron with scattered sourwood.

The lowland mixed hardwood subtype includes numerous lower slope, riparian, seepage, and bottomland mixed hardwood stands located along or near London Creek, Little London Creek, and various unnamed tributaries, and includes small wetland areas described above (**Subsection** 2.4.1.1.1). Sweet gum, American beech, tulip poplar, red maple, black walnut, green ash, American elm, and white ash are present in the canopy of this subtype. Cottonwood and sycamore are dominant in the London Creek floodplain near the confluence with the Broad River. A few locations include large hardwood trees to 30–40 inches DBH. American hornbeam (or ironwood) and box elder are common in the understory of this subtype with giant cane, pawpaw, and strawberry bush as the shrub layer dominants. In the richer bottoms, mayapple and herbs such as Jack-in-the-pulpit are present in the diverse herbaceous layer of this subtype.

2.4.1.1.3 Mixed Hardwood-Pine (MHP)

Subsection 2.4.1.1.3, Page 2.4-8, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The mixed hardwood-pine cover type occupies 335.9 ac or 15.9 percent of the Make-Up Pond C study area (**Figure** 2.4-6, **Table** 2.4-12). This cover type within the Make-Up Pond C study area occurs on lower slopes and in transitional areas between pine-mixed hardwood stands and mixed hardwood stands. White oak, red oak, sweet gum, and tulip poplar are dominant in the canopy with scattered pine. Middle-aged to mature shortleaf pine is often found in the canopy of this type.

2.4.1.1.4 Open Areas, Fields and Meadows (OFM)

Subsection 2.4.1.1.4, Page 2.4-8, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The open areas, fields and meadows cover type occupies 426.6 ac or 20.2 percent of the Make-Up Pond C study area (**Figure 2.4-6, Table** 2.4-12). This cover type within the Make-Up Pond C study area occurs in residential areas, fields, pastures, and the rights-of-way (ROW) of roads and power lines (not all ROW areas are specifically mapped due to their smaller size). Numerous non-woody vascular plant species are found within these openings. Species abundant in the drier portions of this habitat include little bluestem, broomsedge, purple top, blackberry, fescue, goldenrod, asters, sunflowers, and plantains. On heavier clays, more mesic species such as skullcap, false indigo, and southern beardtongue are found. In low areas, giant cane, chaffseed, and ironweed are abundant. At ROW stream crossings, sedges, bulrushes, and needlerush are present. Pastures such as those located north of London Creek commonly include planted fescues.

2.4.1.1.5 Open Pine-Mixed Hardwood (OPMH)

Subsection 2.4.1.1.5, Page 2.4-8, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The open pine-mixed hardwood cover type (as described above) occupies 0.3 ac or <0.1 percent of the Make-Up Pond C study area (**Figure** 2.4-6, **Table** 2.4-12). This cover type within the Make-Up Pond C study area occurs in a limited area adjacent to the Lee Nuclear Site along Rolling Mill Road.

2.4.1.1.6 Pine (P)

Subsection 2.4.1.1.6, Page 2.4-8, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The pine cover type occupies 515.0 ac or 24.4 percent of the Make-Up Pond C study area (**Figure** 2.4-6, **Table** 2.4-12). This cover type within the Make-Up Pond C study area is primarily planted loblolly pine stands that are less than 50 years old. These stands are dominated by loblolly pine with scattered Virginia pine often present (in the youngest stands). This cover type is found primarily on dry, sandy ridges and upper slopes, many of which were formerly ridge top and upper slope mixed hardwood, mixed hardwood-pine, or pine-mixed hardwood cover types prior to logging and conversion to pine plantation. Understory and groundcover vegetation, especially herbaceous groundcover, is often limited to absent in many of the planted pine areas, likely due to the dense planting of pine, subsequent lack of sunlight, and accumulation of thick pine needle litter on the ground surface.

2.4.1.1.7 Pine-Mixed Hardwood (PMH)

Subsection 2.4.1.1.7, Page 2.4-9, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The pine-mixed hardwood cover type occupies 119.6 ac or 5.7 percent of the Make-Up Pond C study area (**Figure** 2.4-6, **Table** 2.4-12). This cover type within the Make-Up Pond C study area occurs on upper slopes, in transitional areas between pine stands and upland mixed hardwood stands, and in successional stands that have been recently cut-over. Loblolly pine and Virginia pine are dominant in the low to mid-level canopy. In successional stands, tulip poplar, red maple, and sweet gum are common in the canopy and understory.

2.4.1.1.8 Upland Scrub (USC)

Subsection 2.4.1.1.8, Page 2.4-9, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The upland scrub cover type occupies 28.0 ac or 1.3 percent of the Make-Up Pond C study area (**Figure 2.4-6**, **Table 2.4-12**). This cover type within the Make-Up Pond C study area occurs where forests have been logged on poor soils or where high-grade logging historically took place in erosion-prone areas. After logging, the subsequent successional vegetation of this type does not reach mature canopy size. The community is usually dominated by eastern red cedar, Virginia pine, blackberry, and sumac.

2.4.1.2 Wildlife Resources

Subsection 2.4.1.2, Page 2.4-9, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Wildlife habitat in the Make-Up Pond C study area, although somewhat similar to the Lee Nuclear Site in terms of the ecological cover types present, is different from the Lee Nuclear Site in terms of the total and relative abundance of some cover types, as well as differences in associated habitat characteristics and human use activities.

There is greater mixed hardwood cover in the Make-Up Pond C study area compared to the Lee Nuclear Site; both on an acreage and percentage basis (**Tables 2.4-12 and 2.4-1**). Mixed hardwoods in the Make-Up Pond C study area are the more dominant cover type and may be more diverse in terms of subtypes and species composition, and more connected and contiguous, as compared to the Lee Nuclear Site.

The Make-Up Pond C study area and the Lee Nuclear Site possess comparable OFM cover type based on an acreage and percentage basis of overall cover (**Tables 2.4-12 and 2.4-1**). In the Make-Up Pond C study area this cover type is dominated by pasture, whereas for the Lee Nuclear Site this cover type is dominated by cleared construction areas, including areas that are regularly mowed.

There is greater pine cover in the Make-Up Pond C study area as compared to the Lee Nuclear Site. The two sites have differing relative percentages of pine as well, with a much higher percentage of pine in the Make-Up Pond C study area (**Tables 2.4-12 and 2.4-1**). The pine cover type for the Make-Up Pond C study area consists mainly of planted pine stands where mixed hardwood and other mixed forest types formerly occurred. Dense planted pine stands generally provide less valuable wildlife habitat as compared to natural forest cover, depending on the species being considered, the arrangement of habitat types on the landscape, and management regimes.

There is also significantly less open water habitat for wildlife species in the Make-Up Pond C study area as compared to the Lee Nuclear Site, with differing relative percentages as well (Tables 2.4-12 and 2.4-1). Open water in the Make-Up Pond C study area consists of thirteen small farm ponds, as compared to the two relatively large man-made impoundments and several smaller ponds located on the Lee Nuclear Site.

The Make-Up Pond C study area includes wildlife habitats associated with small streams including London Creek and its un-named tributaries, Little London Creek, and corresponding lowland mixed hardwood (riparian and bottomland) forests which do not occur to the same extent on the Lee Nuclear Site (Figures 2.4-6 and 2.4-1). In contrast, both the Make-Up Pond C study area and the Lee Nuclear Site include forested habitats immediately adjacent to and contiguous with the Broad River (Ninety-Nine Islands Reservoir) and its associated floodplain (Figures 2.4-6 and 2.4-1).

Finally, human use activities likely have more current influence on the Make-Up Pond C study area, due to the presence of low density residential areas, roads, pastures, and planted pine areas, some of which were likely hunted until recent purchase of these lands by Duke Energy. In contrast, the Lee Nuclear Site is fenced and under security control, limiting the amount of human activity.

Wildlife surveys specific to major taxonomic groups (mammals, birds, reptiles and amphibians) were conducted in 2008 for the Make-Up Pond C study area. Additional surveys for areas not accessible during 2008 were conducted in 2009. Wildlife survey methods and results are presented separately under the corresponding wildlife subsections below.

No attempt is made in this report to describe terrestrial invertebrate species that might inhabit the Make-Up Pond C study area. Terrestrial invertebrates are expected to include common species existing in a variety of eastern forests.

2.4.1.2.1 Mammals

Subsection 2.4.1.2.1, Page 2.4-10, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The mammalian fauna of the Make-Up Pond C study area was investigated using the following approaches: 1) examination of voucher material deposited in major North American museum collections to compile a list of mammal species occurring in Cherokee County and adjacent counties in South and North Carolina; 2) review of literature and other pertinent locality records; 3) field sampling using a variety of techniques, including Museum Special snap traps and pitfall traps for small mammals, mist nets for bats, and field surveys to record mammal observations and field sign (tracks, scat, nests, dens, etc.) for small, medium, and large mammals (including some observations just outside the study area). Anecdotal observations of mammals by other reliable investigators and sources familiar with the study area and vicinity were also considered. These approaches were used to investigate mammals in general, although special focus was applied to federal and state listed mammal species, including species of concern (findings for listed mammal species and species of concern are treated separately under **Subsection** 2.4.1.3.1.2).

Museum Special snap traps were baited and set in the afternoon and retrieved the following morning. Snap traps were set in multiples of 50 traps (for a total of 1,192 trap nights). Pitfall traps were installed and checked at intervals varying from daily to weekly during the survey period (125 total traps set; totaling 7,450 trap nights). Snap and pitfall traps were located in the four general biological sampling areas mentioned previously (**Figure** 2.4-5), including the following habitat types: mixed hardwood; mixed hardwood-pine; pine-mixed hardwood; open areas, fields and meadows (in a utility ROW); and pine. Mist nets were set (stacked two-high) near the downstream end of London Creek (Biological Sampling Area 0.3). Mist nets were set at dusk across the existing railroad ROW and at two locations over London Creek (within lowland mixed hardwoods) and monitored until about midnight on two consecutive nights. Field surveys to record mammal observations and animal sign covered a wide area and the variety of habitat types in the study area, including the biological sampling areas described previously.

A total of 40 native mammal species could potentially occur within the Make-Up Pond C study area based on general geographic distributions in the region (Table 2.4-13), some species being more likely than others based on specific distribution factors, habitat associations, and the general abundance and status of individual species. A total of 21 species are documented for the Make-Up Pond C study area based on the 2008 field sampling (**Table 2.4-13**).

Common mammal species occurring in the Make-Up Pond C study area include (in taxonomic order): Virginia opossum, eastern mole, eastern red bat, eastern cottontail, eastern gray squirrel, coyote, northern raccoon, and white-tailed deer. It is possible that some potential species are not recorded for the study area due to their life-history traits, habitat-use characteristics, and/or the sampling methods employed, even though they may likely occur in the study area (e.g., southern flying squirrel). For other potential species, appropriate habitat may not occur or may be limited within the immediate study area, such that these species are uncommon, transient, or generally absent in the vicinity.

Densities of small mammals in the study area appear to be relatively low (snap trap success was estimated to be 0.5 percent; pitfall traps yielded similarly low results). Small mammals captured in traps represent relatively few individuals and species. Based on the field surveys, including mammal observations and field sign, densities of medium and large mammals in the study area appear similar to populations inhabiting comparable habitats in the region.

2.4.1.2.2 *Birds*

Subsection 2.4.1.2.2, Page 2.4-11, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The avian fauna of the Make-Up Pond C study area was investigated using the following approaches: 1) review of literature and existing data records for the region, 2) field surveys for birds in the study area, including two surveys each during the spring migration, breeding season, and fall migration time-periods. Review of existing information included field guides, state bird lists, and the compilation of Breeding Bird Survey (BBS) records (Chesnee, SC route, **Reference 65**) and Breeding Bird Atlas (BBA) data from Cherokee County (**Reference 66**), resulting in a potential list of breeding species for the study area.

Field surveys were conducted along five transects located in the four biological sampling areas mentioned previously (**Figure 2.4-5**). Transects ranged in length from 900–4,200 ft each, totaling 10,600 ft. The following three habitat types had similar coverage among transect lengths: mixed hardwood (mainly lowland mixed hardwood along London Creek); pine (mainly planted pine with some cut-over successional forest); and open areas, fields, and meadows (pasture and utility ROW, both with nearby forest edge). During the field surveys, observers recorded all birds seen or heard along each transect. Surveys for migratory species began at sunrise and continued through the day in an effort to capture both passerine and non-passerine species. Surveys for breeding birds focused on the time period from sunrise through approximately 11:00 a.m., to coincide with peak singing times for breeding species.

A total of over 200 bird species could potentially occur within the Make-Up Pond C study area based on general geographic distributions in the region, some species being more likely to occur than others based on specific distribution factors, habitat associations, and the general abundance and status of individual species. A total of 97 bird species potentially breed in the Make-Up Pond C study area. A total of 87 bird species are documented for the Make-Up Pond C study area based on field surveys, including 59 species assumed to be breeding due to their seasonal occurrence (**Table 2.4-14**). Federal and state listed bird species including species of concern are treated separately under **Subsection 2.4.1.3.1.3**.

The most common bird species in the study area (as recorded for at least one transect) include (in taxonomic order): turkey vulture, wild turkey, mourning dove, pileated woodpecker, red-bellied woodpecker, hairy woodpecker, downy woodpecker, barn swallow, blue jay, American crow, Carolina chickadee, tufted titmouse, white-breasted nuthatch, Carolina wren, northern mockingbird, American robin, eastern bluebird, blue-gray gnatcatcher, white-eyed vireo, red-eyed vireo, black-and-white warbler, northern parula, pine warbler, Louisiana waterthrush, common yellowthroat, yellow-breasted chat, hooded warbler, eastern meadowlark, common grackle, scarlet tanager, northern cardinal, American goldfinch, and eastern towhee. It is possible that some potential species are not recorded due to their life-history traits, habitat-use characteristics, and/or the survey methods employed, even though they may likely occur in the study area. For some other potential species, appropriate habitat may not occur or may be limited within the immediate study area, such that these species are uncommon, transient, or generally absent in the vicinity.

Compared to 2008 BBS data for the Chesnee, South Carolina route, bird species richness and species composition for the Make-Up Pond C study area appear typical for the region and habitat types present.

2.4.1.2.2.1 Shorebirds

Subsection 2.4.1.2.2.1, Page 2.4-11, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Shorebirds occurring in the Make-Up Pond C study area based on the field surveys include: killdeer and American woodcock (Table 2.4-14). Killdeer occur in open areas, fields, and meadows (pasture). American woodcock occur in lowland mixed hardwoods along London Creek, and are also assumed to be nesting in the study area based on observations during the breeding season.

2.4.1.2.2.2 Colonial Nesting Waterbirds

Subsection 2.4.1.2.2.2, Page 2.4-11, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Great blue heron occur in the Make-Up Pond C study area based on the field surveys (Table 2.4-14). However, no nesting behavior or nesting sites were observed in the study area according to the field survey results.

2.4.1.2.2.3 Upland Game Birds

Subsection 2.4.1.2.2.3, Page 2.4-12, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Five species of upland game birds occur in the Make-Up Pond C study area based on the field surveys: wild turkey, northern bobwhite, American woodcock, mourning dove, and ruffed grouse (Table 2.4-14). Wild turkey are abundant in the Make-Up Pond C study area and are frequently observed in mature woods, open fields, logging roads, and utility ROWs. Northern bobwhite are resident in the study area and are frequently heard calling from brushy areas, abandoned fields, and open pine forests. American woodcock occur in lowland mixed hardwoods along London Creek. Mourning doves are very common in the study area in open areas, fields, and meadows. Though documented as present in the study area, ruffed grouse were not expected to occur, as this species is considered peripheral in the state, more commonly known from Greenville, Pickens, and Oconee Counties in the mountains of South Carolina. Upland game species assumed to be nesting in the study area based on observations during the breeding season include: wild turkey, northern bobwhite, American woodcock, mourning dove, and ruffed grouse (Table 2.4-14).

2.4.1.2.2.4 Perching Birds

Subsection 2.4.1.2.2.4, Page 2.4-12, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Over 60 species of perching birds occur in the Make-Up Pond C study area based on the field surveys (Table 2.4-14), including resident breeding species, migratory species that breed in the study area, and migrant species that breed elsewhere. Over 40 species are assumed to be nesting in the study area based on observations during the breeding season. Migratory species include a number of Neotropical migrants. The most common perching birds observed are listed above under Subsection 2.4.1.2.2. Refer to Table 2.4-14 for other species of perching birds recorded during the field surveys.

2.4.1.2.2.5 Birds of Prey

Subsection 2.4.1.2.2.5, Page 2.4-12, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Birds of prey occurring in the Make-Up Pond C study area based on the field surveys include: turkey vulture, black vulture, red-tailed hawk, red-shouldered hawk, bald eagle, osprey, and great horned owl (Table 2.4-14). Species assumed to be nesting in the study area based on observations during the breeding season include: turkey vulture, black vulture, red-tailed hawk, red-shouldered hawk, and great horned owl.

2.4.1.2.2.6 Woodpeckers

Subsection 2.4.1.2.2.6, Page 2.4-13, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Woodpeckers occurring in the Make-Up Pond C study area based on the field surveys include: northern flicker, pileated woodpecker, red-bellied woodpecker, hairy woodpecker, and downy woodpecker (Table 2.4-14). Woodpecker species assumed to be nesting in the study area based on observations during the breeding season include all species except the northern flicker.

2.4.1.2.3 Reptiles and Amphibians

Subsection 2.4.1.2.3, Page 2.4-13, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The herpetofauna of the Make-Up Pond C study area was investigated using the following approaches: 1) literature review, 2) compilation of species records for Cherokee County from museums, universities, and other appropriate organizations, 3) field sampling conducted during January-October 2008, using a variety of techniques including automated recording systems, systematic dip netting, minnow traps, turtle traps, pitfall traps, and visual and auditory (frog call) field searches.

Field sampling was conducted in the four biological sampling areas mentioned previously (**Figure 2.4-5**), in and along London Creek and several tributaries including stream pool and riffle areas, a beaver pond and associated floodplain, wetland, and lowland mixed hardwood habitats. Field surveys using visual and call searches covered a wide area and a variety of habitat types.

A total of 65 species of reptiles and amphibians were determined to potentially occur within the Make-Up Pond C study area based on published distributions, specimen records, and other information (**Table 2.4-15**). Species considered to potentially occur included 13 frog, 11 salamander, 8 turtle, 8 lizard, and 25 snake species; some species being more likely to occur (probable occurrences) than others based on specific distribution factors, habitat associations, and the general abundance and status of individual species. A total of 37 species of reptiles and amphibians are documented for the Make-Up Pond C study area based on the field sampling, including 11 frog, 8 salamander, 4 turtle, 5 lizard, and 9 snake species (**Table 2.4-15**). Federal and state listed reptiles and amphibians including species of concern are treated separately under **Subsection 2.4.1.3.1.4**.

In general, species requiring stream habitat (e.g., northern dusky salamander) are extremely abundant throughout the Make-Up Pond C study area in suitable locations. Some species that typically require isolated wetlands for breeding (e.g., marbled salamander) are relatively abundant within the study area. Abundant (eight or more observations) to common species (three to seven observations) occurring in the study area include: northern cricket frog, Fowler's toad, Cope's gray treefrog, spring peeper, upland chorus frog, bullfrog, green frog, southern leopard frog, marbled salamander, northern dusky salamander, southern two-lined salamander, red spotted newt, Atlantic Coast slimy salamander, eastern box turtle, green anole, six-lined racerunner, fence lizard, worm snake, black racer, ringneck snake, rat snake, northern watersnake, and copperhead. It is possible that some probable and potentially occurring species were not detected due to their life-history traits, habitat-use characteristics, and/or the sampling methods employed, even though they may likely occur in the study area. Some other potential species may be uncommon or generally absent in the vicinity. Overall, the herpetofauna for the Make-Up Pond C study area is relatively typical for the Piedmont region and the habitat types present on the site.

2.4.1.3 Other Important Terrestrial Species

2.4.1.3.1 Listed Threatened and Endangered Species

Subsection 2.4.1.3.1, Page 2.4-15, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Listed threatened and endangered and species of concern potentially occurring in the Make-Up Pond C study area include the species considered for the Lee Nuclear Site (see also **Table** 2.4-5). In addition, ecological studies conducted by Duke Energy for the Make-Up Pond C study area identified several additional listed or species of concern potentially occurring or present in the study area. Finally, other species described herein as potentially occurring or documented for the surrounding area were also checked against the state-wide SCDNR Heritage Trust Program (HTP) database (**Reference 67**) and USFWS county lists (**Reference 68**) to confirm the listing status of a few species for which the HTP may not have records from Cherokee or York Counties, though the species occur or potentially occur in the region.

2.4.1.3.1.1 Plants

Subsection 2.4.1.3.1.1, Page 2.4-17, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The potentially occurring federal and state listed plant species including species of concern considered as having suitable habitat on the Lee Nuclear Site are also considered to have suitable habitat for the Make-Up Pond C study area. Targeted field searches were conducted for these plant species in the Make-Up Pond C study area and the results were similar to those for the prior Lee Nuclear Site surveys, with a few exceptions (described below).

No federally listed plant species are known to occur in the Make-Up Pond C study area based on targeted field surveys. Field surveys for dwarf-flowered heartleaf revealed no occurrences of this species in the study area, similar to results for the Lee Nuclear Site. Field surveys for federally listed plants in the Make-Up Pond C study area also included searches for Schweinitz's sunflower (federal and state endangered). Suitable habitats for this species are not located in the Make-Up Pond C study area and no occurrences of this species are known in the study area based on the field surveys.

In contrast to findings for the Lee Nuclear Site, Georgia aster (federal candidate for listing, state species of concern) was documented in the Make-Up Pond C study area during the field surveys. The single occurrence of this species documented in the Make-Up Pond C study area consisted of five individual plants in the open areas, fields, and meadows cover type. The specific location was in a utility ROW (open areas, fields, and meadows) crossing through a mixed hardwood forest and near a tributary to London Creek (**Figure 2.4-6**). Though there are relatively few known occurrences of this species, this particular occurrence/population would be rated as having "poor" viability based on its size and location (Reference 84).

Four additional plants considered state species of concern occur in the Make-Up Pond C study area based on the field survey results. Southern adder's tongue fern occurs in the study area, as it does for the Lee Nuclear Site. This species occurs in two documented locations in lowland mixed hardwoods near London Creek, consisting of hundreds of plants (Figure 2.4-6). In addition, three other state species of concern occur in the Make-Up Pond C study area, each in a single location and co-located with Southern adder's tongue fern: drooping sedge (approximately 20 plants), southern enchanter's nightshade (approximately 25 plants), and single-flowered cancer root (2 stems). These three species were not recorded for the Lee Nuclear Site. Though designated as state species of concern, these four plant species are not considered imperiled on a range-wide basis (Reference 84). No other state listed plants or species of concern are documented for the Make-Up Pond C study area.

2.4.1.3.1.2 Mammals ~~(Southeastern Myotis Bat [FSC] [SC])~~

Subsection 2.4.1.3.1.2, Page 2.4-17, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

No federally listed mammals potentially occur in the Make-Up Pond C study area (Table 2.4-5). The eastern cougar, whose range includes South Carolina, continues to be federally listed as endangered, but this subspecies is widely considered to be extinct by the USFWS (Reference 69).

Two federal and state species of concern could potentially occur in the Make-Up Pond C study area, southeastern myotis and eastern woodrat.

As determined for the Lee Nuclear Site, the southeastern myotis could potentially occur in the Make-Up Pond C study area due to the proximity of the Broad River and the presence of open water habitats (farm ponds) and lowland mixed hardwood forest (riparian and bottomland hardwoods). The eastern woodrat is considered very unlikely to occur in the study area. Neither species is known to occur in the Make-Up Pond C study area based on the 2008 mammal surveys.

Several additional mammals considered to be state species of concern could potentially occur in the Make-Up Pond C study area (Table 2.4-5); however, all but the hoary bat are unlikely to occur or would only occur minimally in the study area. No mammal species of concern are known to occur in the study area based on the field surveys. Though not documented in the study area, the hoary bat is likely seasonally distributed throughout the Make-Up Pond C study area where it potentially varies in abundance from absent in the summer months to relatively common during migration.

2.4.1.3.1.3 Birds

Subsection 2.4.1.3.1.3, Page 2.4-18, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

No federal listed threatened or endangered bird species potentially occur in the Make-Up Pond C study area (Table 2.4-5). Similar to the Lee Nuclear Site, two federal species of concern potentially occur in the open areas, fields, and meadows cover type in the Make-Up Pond C study area, the American kestrel and loggerhead shrike. Neither species is documented as occurring in the Make-Up Pond C study area based on the 2008 bird surveys.

Two additional species of federal and/or state interest are known to occur in the Make-Up Pond C study area, based on the 2008 bird surveys: bald eagle and black-throated green warbler. The bald eagle was de-listed under the U.S. Endangered Species Act, but is still federally protected under the Bald and Golden Eagle Protection Act (BGEPA). The bald eagle is also state endangered in South Carolina. Though recorded flying over the site during the field surveys, the bald eagle is not known or expected to nest in the study area. The black-throated green warbler is a state species of concern. Though present, this species is not considered to be breeding in the study area.

2.4.1.3.1.4 Reptiles and Amphibians ~~(Northern Cricket Frog [SC])~~

Subsection 2.4.1.3.1.4, Page 2.4-18, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

No federally listed threatened or endangered reptile or amphibian species potentially occur in the Make-Up Pond C study area (Table 2.4-5).

Several reptiles and amphibians that are state species of concern potentially occur in the Make-Up Pond C study area, including: northern cricket frog, pickerel frog, canebrake rattlesnake, pine snake, and scarlet kingsnake (milksnake). Species known to occur in the Make-Up Pond C study area based on the 2008 reptile and amphibian surveys were the northern cricket frog and pickerel frog, both occurring in or along London Creek. The northern cricket frog is considered abundant in the study area (eight or more observations), while the pickerel frog is considered to be somewhat rare (two observations). The canebrake rattlesnake is not known to occur but is considered probable in the study area. Though designated as state species of concern, these species are not considered imperiled on a range-wide basis (Reference 84).

2.4.1.3.2 Species of Commercial or Recreational Value

Subsection 2.4.1.3.2, Page 2.4-19, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well. Pine plantation forest (see Subsection 2.4.1.1.6) and pasture grasses (see Subsection 2.4.1.1.4) established for commercial purposes are both components of the Make-Up Pond C study area. Hunting and fishing (limited to farm ponds) were likely former private recreational activities in the study area.

2.4.1.3.3 Essential Species

Subsection 2.4.1.3.3, Essential Species, Page 2.4-20, INSERT NEW TEXT at end of subsection:

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well.

2.4.1.3.4 Critical Species

Subsection 2.4.1.3.4, Critical Species, Page 2.4-21, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well.

2.4.1.3.5 Biological Indicators

Subsection 2.4.1.3.5, Page 2.4-21, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well. However, marbled salamander and spotted salamander were both recorded for the Make-Up Pond C study area and rely on isolated wetlands for breeding. These wetland-dependent amphibians could potentially serve as biological indicators.

2.4.1.3.6 Nuisance Species

Subsection 2.4.1.3.6, Page 2.4-22, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well.

2.4.1.4 Important Terrestrial Habitats

2.4.1.4.1 Wildlife Sanctuaries, Refuges, and Preserves

Subsection 2.4.1.4.1, Page 2.4-22, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well.

2.4.1.4.2 Unique and Rare Habitats or Habitats with Priority for Protection

Subsection 2.4.1.4.2, Page 2.4-22, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

There are no unique and rare habitats or habitats with priority for protection in the Make-Up Pond C study area.

2.4.1.4.3 Critical Habitat

Subsection 2.4.1.4.3, Page 2.4-23, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

No critical habitat occurs in the Make-Up Pond C study area.

2.4.1.4.4 Travel Corridors

Subsection 2.4.1.4.4, Page 2.4-23, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well, with the exception that the Make-Up Pond C study area is not fenced and that London Creek and its associated tributaries and forest cover likely provide a localized travel corridor for some species to and from the Broad River (Ninety-Nine Islands Reservoir) floodplain.

2.4.1.4.5 Recreation Areas

Subsection 2.4.1.4.5, Page 2.4-23, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well.

2.4.1.4.6 Environmentally Sensitive Areas

Subsection 2.4.1.4.6, Page 2.4-23, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well.

2.4.2 Aquatic Ecology

Subsection 2.4.2, Aquatic Ecology, Page 2.4-25, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Duke Energy conducted two aquatic ecology surveys for London Creek in the Make-Up Pond C study area in 2008, addressing: 1) fish, and 2) macroinvertebrates. Both surveys included seasonal sampling during March and September 2008 and each was conducted in three of the biological sampling areas within London Creek (Biological Sampling Areas 0.9, 1.7, and 2.6; **Figure 2.4-5**). These surveys included consideration of federal and state listed threatened and endangered species including species of concern. Additional details on sampling methods for each survey are included below under the appropriate subsections.

2.4.2.1 Aquatic Habitats

Subsection 2.4.2.1, Page 2.4-25, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

London Creek and its associated un-named tributaries will be impounded for the proposed off-site Make-Up Pond C. London Creek is a small tributary to the Broad River, entering the Broad River within the upper reaches of Ninety-Nine Islands Reservoir (see **Subsection 2.3.1**). Little London

Creek also occurs within the Make-Up Pond C study area, flowing into London Creek downstream of the intended dam, and therefore is not part of the proposed Make-Up Pond C reservoir. Little London Creek flows into London Creek immediately downstream of the existing railroad ROW which crosses both London and Little London Creeks (Figure 2.4-5). Thirteen small farm ponds also occur in the Make-Up Pond C study area (Figure 2.4-5). None of these features are significant aquatic habitats in a regional context.

2.4.2.1.1 Broad River

There are no revisions associated with Make-Up Pond C in this section.

2.4.2.1.2 Ninety-Nine Islands Reservoir

There are no revisions associated with Make-Up Pond C in this section.

2.4.2.1.3 ~~On-site~~ Impoundments and Ponds

As discussed above, Duke Power Company constructed dams to form the existing Make-Up Pond B, Hold-Up Pond A, and Make-Up Pond A. The Make-Up Pond B now receives water from McKowns Creek, runoff from the site, and McKowns Creek watershed. The Make-Up Pond A now receives water primarily as runoff from the surrounding area on the site. The Hold-Up Pond A is fed mainly by culverts that carry stormwater runoff from the core construction area of the site. Additional information concerning the Make-Up Pond B, Make-Up Pond A, and Hold-Up Pond A is presented in Subsection 2.3.1.3.2.

Subsection 2.4.2.1.3, Page 2.4-26, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The Make-Up Pond C study area includes 13 small "farm ponds" occupying 20.1 ac or 1.0 percent of the study area (**Figure 2.4-6, Table 2.4-12**). These ponds are classified as the open water (OW) cover type. The ponds were presumably constructed for watering livestock in most cases, and possibly for private recreational fishing.

2.4.2.1.4 London Creek and Tributaries

INSERT NEW SUBSECTION 2.4.2.1.4, Page 2.4-26, INSERT NEW TEXT:

Off-Site Characteristics

The Make-Up Pond C study area includes London Creek, Little London Creek, and various unnamed tributaries to London Creek (**Figure 2.4-7**). Refer to **Subsection 2.3.1.2.3.1** for a hydrologic description of London Creek and associated tributaries. The Lake Cherokee reservoir and dam near the headwaters of London Creek have affected the hydrology within portions of London Creek. Farm ponds and/or converted land uses have affected the hydrology of several un-named tributaries to London Creek. SC 329 culverts on the upstream end of London Creek and on several tributaries, culverts at the railroad crossing on the downstream end of London and Little London Creeks, and culverts on unnamed tributaries elsewhere may also affect hydrology within portions of the London Creek system.

Refer to **Subsection** 2.3.3.1.2.2 for a description of water quality in London Creek. Additional water quality sampling was conducted in London Creek concurrent with the fish and/or macroinvertebrate surveys, including measurements of water temperature, dissolved oxygen, specific conductance, and pH. Results for these parameters, similar to those described in **Subsection** 2.3.3.1.2.2, are consistent with state water quality criteria and within expected ranges for similarly sized streams in the region (see references in **Subsection 2.3.3.1.2.2**).

London Creek is a shallow Piedmont stream with alternating riffles and pools, and an associated lowland mixed hardwood riparian and/or bottomland forest throughout its length. Forest canopy typically shades the stream channel. Upstream and midstream reaches are steeper and less stabilized than downstream reaches. Downstream reaches are less incised and have more stable banks. Instream habitats within the reaches examined were similar and included shallow riffles with cobbles, pools, root masses, leaf packs, woody debris, smaller amounts of sand and silt substrate, and minor amounts of trash in places. Some reaches also include bedrock substrate, partially covered by algae where conditions are favorable.

London Creek was flowing during both the March and September 2008 sampling events. However, between sampling events, London Creek ceased to flow in many places due to severe to extreme drought conditions in the region. Severe drought conditions in the region began in September 2007. Extreme drought was declared in June 2008 and was downgraded to severe in mid-September 2008 (**Reference 70**). Low water levels in the Lake Cherokee reservoir due to drought and the concomitant lack of, or reduced water releases to London Creek have likely been a contributing factor to low, or no flow conditions in London Creek. Prior to the September sampling period, riffle areas in London Creek dried up leaving only isolated pools. Rainfall associated with Tropical Storm Fay in late August 2008 and other rainfall events in early September 2008 returned flow to the entire length of London Creek prior to the September sampling event. Cherokee County remained under severe drought conditions from September 2008 through February 2009 (**Reference 70**). The county was under moderate drought conditions as of April 2009. On June 10, 2009, drought conditions were lifted for the county and the entire state (**Reference 70**).

2.4.2.2 Fisheries Resources

Subsection 2.4.2.2, Page 2.4-26, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Fisheries resources for the Make-Up Pond C study area are described below by habitat category.

2.4.2.2.1 Broad River Fisheries

There are no revisions associated with Make-Up Pond C in this subsection.

2.4.2.2.2 ~~On-Site~~ Impoundments and Ponds

Subsection 2.4.2.2.2, Page 2.4-28, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The extent of fishery resources in the small ponds within the Make-Up Pond C study area is unknown. Many of the ponds in the Make-Up Pond C study area likely contain bass-bluegill recreational fisheries. The majority of the ponds appear to have been used as livestock watering ponds and as such most support little shoreline vegetation and are generally turbid. Fish populations may or may not be present in these ponds. All of the ponds will be sampled for fish prior to project construction and decisions will be made at that time pertaining to the potential relocation of fauna.

2.4.2.2.3 London Creek Fishery

INSERT NEW SUBSECTION 2.4.2.2.3, Page 2.4-28, INSERT NEW TEXT:

Off-Site Characteristics

The London Creek fishery in the Make-Up Pond C study area was investigated using electrofishing in March and September 2008. Sampling was conducted at three Biological Sampling Areas 0.9, 1.7, and 2.6 (**Figure 2.4-5**). The stream segments sampled at each station were approximately 100 m (328 ft) long and were measured for total length and width (every 10 m [32.8 ft]) to calculate the area sampled. One or two backpack electrofishing units were used depending on stream width, to achieve adequate coverage. Sample segments were blocked with nets at the upstream and downstream ends to prevent fish movement into, or out of the stream reach during sampling. Fish numbers were estimated with multiple pass depletion methodology. In all cases, three electrofishing passes were sufficient to achieve depletion of the resident fish population.

Seventeen species of fish (excluding hybrids), representing six families, occur in London Creek based on the 2008 sampling results (**Table 2.4-16**). Fish collected in March and September were numerically dominated by cyprinids (minnows) and secondarily by centrarchids (sunfish and bass). These 17 species are consistent with those observed from streams in the Broad River drainage in North Carolina and in a survey of ten nearby South Carolina streams.

At the species level, fish sampling results from March 2008 are numerically dominated by bluehead chub at 38 percent composition and redbreast sunfish at 24 percent composition; with greenhead shiner, highback chub, and tessellated darter also each at ≥5 percent composition (**Table 2.4-16**). Fish sampling results from September 2008 are numerically dominated by redbreast sunfish at

18 percent composition and creek chub, eastern mosquitofish, and green sunfish each at 16 percent composition; with bluehead chub, rosyside dace, and highback chub also each at >5 percent composition (Table 2.4-16).

Tolerance ratings for fish species indicate the relative tolerance of a species to pollution or other environmental perturbations. North Carolina Department of Environmental and Natural Resources (NCDENR) tolerance ratings for fish species captured during the 2008 sampling include one intolerant species (highback chub), 10 intermediate species, and six tolerant species (Table 2.4-16). The intolerant highback chub is found in relatively equal numbers in the March and September 2008 sampling results. Mixtures of intermediate to tolerant species are present in both the March and September 2008 sampling results, however, fish species with intermediate tolerance numerically dominate the March 2008 sampling results, while tolerant fish species numerically dominate the September 2008 collections.

Based on NCDENR criteria, the integrity of the London Creek fish community rates "Good" in both March and September based on the presence of the intolerant highback chub. However, also based on NCDENR criteria, the percentage of tolerant individuals in London Creek rates "Fair" for the March sampling, and "Poor" for the September sampling event.

Trophic guilds of fish species captured during the 2008 sampling include 14 species of insectivores, two species of omnivores (bluehead chub and white sucker), one species of piscivore (largemouth bass), and no herbivores (Table 2.4-16). Insectivores are numerically dominant in samples from both March and September, although omnivores (bluehead chub) are also relatively abundant in the March samples. Piscivores are absent in the March samples and have low abundance in the September samples.

According to NCDENR criteria, the trophic status of the fish community in London Creek rates "Fair" for the combined percentage of omnivores and herbivores, "Good" for the percentage of insectivores, and "Poor" for the percentage of piscivores from the March samples. The trophic status of the fish community in London Creek rates "Good" for the combined percentage of omnivores and herbivores, "Good" for the percentage of insectivores, and "Poor" for the percentage of piscivores from the September samples.

Estimated total fish densities range from 58–6,320 fish/acre (fish/ac) in the March samples and from 4,993–7,652 fish/ac in the September samples. Estimated total fish biomass values range from 1.11–14.30 lbs/acre (lbs/ac) in the March samples and from 13.29–29.73 lbs/ac in the September samples.

2.4.2.3 Macroinvertebrates

Subsection 2.4.2.3, Page 2.4-29, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

London Creek macroinvertebrates in the Make-Up Pond C study area were investigated in March and September 2008. Sampling was conducted at three stream stations located in Biological

Sampling Areas 0.9, 1.7, and 2.6 (**Figure 2.4-5**). Sampling procedures and assessment criteria for benthic communities were determined using the Standard Qualitative Bioassessment Method as outlined in the NCDENR Standard Operating Procedures (SOP) (**Reference 71**). This protocol is accepted by the State of South Carolina. Samples were collected from each major instream habitat and the organisms were sorted from debris in the field. Organisms were placed into labeled containers, preserved in 95% ethyl alcohol, returned to the laboratory, and identified to the lowest practicable taxon. Analysis resulted in a bioclassification for each location which gives equal consideration to the number of Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa present and the biotic index value. The biotic index value is calculated using taxa tolerance values assigned by NCDENR biologists. A score is assigned to the EPT value and to the mean biotic index. The mean of these two scores is used to assign one of five bioassessment scores; Poor, Fair, Good-Fair, Good, or Excellent (**Reference 71**). Bioassessment scores were determined using Piedmont criteria, with appropriate seasonal corrections, as outlined in the NCDENR SOP. The bioassessment method also requires a visual assessment of the substrate and habitat types at each sampling location. The assessment of the balanced and indigenous nature of the benthic community is determined by comparing both total and EPT taxa abundance which results in the bioassessment scores.

Macroinvertebrate taxa occurring in London Creek and their abundance ratings during the 2008 sampling are provided in **Table 2.4-17**. No consistent spatial or seasonal trends of Total or EPT taxa are apparent among samples from the three London Creek sampling locations and the two sampling periods. Macroinvertebrate bioassessment scores are "Fair" for samples from all three London Creek sampling locations in both March and September. These results are likely influenced to some degree at least by drought conditions, including limited, or no stream flow prior to the September sampling event.

Duke Energy has never conducted macroinvertebrate sampling at other streams in Cherokee County comparable to London Creek. The South Carolina Department of Health and Environmental Control (SCDHEC) conducted macroinvertebrate sampling at nine other streams in Cherokee county during the summer periods of 1989–2004, using the same methods used for London Creek. The total numbers of summer taxa (86) collected for London Creek are similar to the mean and equal to the median number of taxa recorded for the nine streams sampled by SCDHEC (range 49–151, mean 90, median 86 taxa). Common taxa among London Creek samples and the SCDHEC-sampled streams have similar abundance ratings. Bioassessment scores from London Creek in March and September are lower than those of most streams sampled by SCDHEC. Additionally, London Creek samples demonstrate the highest proportion of taxa in the high perturbation tolerance range (with values similar to two of the SCDHEC-sampled streams); while the proportion of low-tolerance taxa in London Creek samples is lower than all but one stream sampled by SCDHEC (and similar to another). It is not currently known if any of the SCDHEC-sampled streams were sampled under comparable drought conditions as those experienced with the London Creek surveys, or if any of the comparison streams included similar land use and cover or headwater reservoirs and ponds similar to the Make-Up Pond C study area.

2.4.2.4 Mussels

Subsection 2.4.2.4, Page 2.4-31, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

No targeted mussel surveys have been conducted for London Creek or elsewhere in the Make-Up Pond C study area. Swamp fingernail clam occurs in London Creek, based on the macroinvertebrate sampling discussed above (Subsection 2.4.2.3, Table 2.4-17 as does the non-native Asiatic clam (see also Subsection 2.4.2.5.7).

2.4.2.5 Other Important Aquatic Species and Habitats

There are no revisions associated with Make-Up Pond C in this section.

2.4.2.5.1 Federally Listed Threatened and Endangered Species

Subsection 2.4.2.5.1, Page 2.4-32, INSERT NEW TEXT at the end of subsection:

Off-Site Characteristics

No federally listed threatened or endangered aquatic species potentially occur in London Creek or the Make-Up Pond C study area (Table 2.4-5).

One aquatic federal species of concern, Carolina darter, occurs in Cherokee and/or York Counties (also a state species of concern). This species is not considered to have appropriate habitat in London Creek or elsewhere in the Make-Up Pond C study area nor was it collected in the 2008 fisheries surveys.

2.4.2.5.2 State Listed Threatened and Endangered Species

Subsection 2.4.2.5.2, Page 2.4-33, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Several aquatic species of state concern occur or potentially occur in Cherokee and/or York Counties: fantail darter, paper pondshell, and gravel elimia (Table 2.4-5). None of these species are considered to have appropriate habitat in London Creek or elsewhere in the Make-Up Pond C study area. None of these species are known to occur in London Creek based on the 2008 fisheries and macroinvertebrate surveys.

2.4.2.5.3 Species of Commercial or Recreational Value

Subsection 2.4.2.5.3, Page 2.4-34, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The lengths of centrarchid (sunfish and bass) species collected during the 2008 fisheries surveys were examined to provide information on the size distribution of recreational species inhabiting London Creek. It was determined that London Creek is dominated by numerous small individuals of negligible fishing value. None of the bluegill, redbreast sunfish, green sunfish, or warmouth collected exceeds 124 mm (4.8 inches) in length. These represent Age 0 or Age 1 fish. Only two largemouth bass were collected in London Creek and these did not exceed 61 mm (2.4 inches) in total length.

Many of the small ponds in the Make-Up Pond C study area likely contain bass-bluegill recreational fisheries.

No commercial fisheries operate on London Creek or elsewhere in the Make-Up Pond C study area.

2.4.2.5.4 Essential Species

Subsection 2.4.2.5.4, Page 2.4-34, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

No essential aquatic species are thought to occur in London Creek or the Make-Up Pond C study area.

2.4.2.5.5 Critical Species

Subsection 2.4.2.5.5, Page 2.4-34, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well.

2.4.2.5.6 Biological Indicators

Subsection 2.4.2.5.6, Page 2.4-35, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The 2008 fisheries and macroinvertebrate survey results for London Creek (Subsections 2.4.2.2 and 2.4.2.3) include information such as species tolerance ratings, trophic guild structure, and bioassessment scores that can serve the function of biological indicators.

2.4.2.5.7 Nuisance Species

Subsection 2.4.2.5.7, Page 2.4-36, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The Asiatic clam occurs in London Creek in the Make-Up Pond C study area, as documented during the macroinvertebrate surveys. No other nuisance aquatic species are known to occur.

2.4.2.5.8 Other Aquatic Species of Special Interest

Subsection 2.4.2.5.8, Page 2.4-36, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Two other aquatic species of state conservation interest are documented for London Creek based on the 2008 fisheries surveys: highback chub and flat bullhead. Both species have recently been designated as species of moderate conservation concern in the South Carolina Comprehensive Wildlife Conservation Strategy (Reference 72). The highback chub is found in creeks and small rivers in riffles and runs with sandy, gravely, and rocky bottoms. Because they largely occur only in the Carolinas and Georgia and only in a few major drainages there is some concern for the long term status of this species. Approximately one-half of the global distribution of this fish occurs in South Carolina (Reference 72). The flat bullhead occurs in the Piedmont and coastal plain of the Atlantic Slope from the Roanoke River Drainage in Virginia south to Altamaha River drainage in Georgia. The largest populations of the flat bullhead are probably located in the Broad River drainage. It is typically found along the banks and in pool areas in slow moving streams and rivers occupying areas with mud, sand, or rock bottoms. Decreasing population trends for this species have been noted for major rivers systems, presumably following the introduction of the non-native flathead catfish (Reference 72).

2.4.2.5.9 Recreation Areas

Subsection 2.4.2.5.9, Page 2.4-37, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well. In addition, Lake Cherokee, adjacent to the Make-Up Pond C study area is a state-owned public fishing area.

2.4.2.5.10 Other Environmentally Sensitive Areas

Subsection 2.4.2.5.10, Page 2.4-37, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

The information provided for the Lee Nuclear Site applies to the Make-Up Pond C study area as well.

2.4.2.6 Waters of the United States

Subsection 2.4.2.6, Page 2.4-37, last paragraph:

Waters of the United States are broadly defined as waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including (1) all waters which are subject to the ebb and flow of the tide; (2) the territorial sea; (3) interstate waters and wetlands; (4) all other waters (such as intrastate lakes, rivers, streams and wetlands), if their use, degradation, or destruction could affect intrastate or foreign commerce; (5) tributaries to waters or wetlands identified above; and (6) wetlands adjacent to waters identified above. Stormwater and waste treatments systems, including treatment ponds or lagoons designed to meet the requirements of the Clean Water Act, are not waters of the United States.

Subsection 2.4.2.6, Page 2.4-38, INSERT NEW TEXT at end of subsection:

Off-Site Characteristics

Waters of the U.S. in the Make-Up Pond C study area include jurisdictional wetlands (discussed under Subsections 2.3.1.2.4 and 2.4.1.1.1), jurisdictional streams, and several jurisdictional open-water ponds (Figure 2.4-7). Jurisdictional streams include London Creek, Little London Creek, and several unnamed tributaries. Delineated stream features for the Make-Up Pond C study area total an estimated of 101,485 linear ft of jurisdictional streams (Table 2.4-18). Jurisdictional open-water ponds total an estimated 15.42 ac, consisting of nine farm ponds ranging in size from 0.26 to 6.21 ac.

2.4.3 References

Subsection 2.4.3, Page 2.4-42, INSERT NEW TEXT at end of subsection:

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82. Conant, R., and J. T. Collins. 1991. A field guide to reptiles and amphibians: eastern and central North America.

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~~TABLE 2.4-5 (Sheet 1 of 9)~~
~~ENDANGERED, THREATENED, AND OTHER NOTEWORTHY SPECIES POTENTIALLY OCCURRING IN THE VICINITY OF THE LEE NUCLEAR SITE~~

NOTE: THIS TABLE IS REPLACED IN ITS ENTIRETY WITH THE FOLLOWING TABLE

TABLE 2.4-5 (Sheet 1 of 7)
LISTED THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN
POTENTIALLY OCCURRING IN THE VICINITY OF THE LEE NUCLEAR SITE (WLS) AND/OR MAKE-UP POND C (MUPC)

Common Name	Listing Source [(a)]	Federal Status [(b)]	State Status [(c)]	Brief Description of Preferred Cover Type (Table 2.4-1)/Habitat	Cover/ Habitat at WLS?	Cover/ Habitat at MUPC?	Recorded for WLS?	Recorded for MUPC?
Plants								
Dwarf-flowered heartleaf	USFWS	FT	ST	Rich, north-facing MH with ravines, coves, and springheads on Pacolet and Madison soils (Reference 53)	MH present but soil types absent	Yes	No	No
Pool sprite	YORK	FT	ST	Vernal pools on granite flatrocks (Reference 57)	No	No	No	No
Schweinitz's sunflower	YORK	FE	SE	Piedmont prairies (References 56 and 57)	No	No	No	No
Georgia aster	CHEROKEE, YORK	FC	SC	OFM and roadsides adjacent to open MH with Iredell and Mecklenberg soils (Reference 57)	Yes	Yes	No	Yes
Biltmore greenbrier	USFWS	FSC	SC	Open woods in Blue Ridge Mountains (Reference 55)	No	No	No	No
Prairie birdsfoot-trefoil	USFWS	FSC	NL	Piedmont prairies (Reference 56)	No	No	No	No
Ashy hydrangea	CHEROKEE	NL	SC	Mountain bluffs in Blue Ridge (Reference 55)	No	No	No	No
Blue grass	YORK	NL	SC	MH (Reference 57)	No	No	No	No
Canada lily	YORK	NL	SC	Wet Piedmont prairies (Reference 56)	No	No	No	No
Canada moonseed	CHEROKEE	NL	SC	MH with rich coves and AW (Reference 55)	Yes	Yes	No	Yes
Common or Creeping spikerush	YORK	NL	SC	Wet Piedmont prairies (Reference 56)	No	No	No	No
Creel's azalea	YORK	NL	SC	MH over "nearly neutral soils" (Reference 54)	Yes	Yes	No	No
Culver's-root	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No

TABLE 2.4-5 (Sheet 2 of 7)
LISTED THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN
POTENTIALLY OCCURRING IN THE VICINITY OF THE LEE NUCLEAR SITE (WLS) AND/OR MAKE-UP POND C (MUPC)

Common Name	Listing Source [(a)]	Federal Status [(b)]	State Status [(c)]	Brief Description of Preferred Cover Type (Table 2.4-1)/Habitat	Cover/ Habitat at WLS?	Cover/ Habitat at MUPC?	Recorded for WLS?	Recorded for MUPC?
Drooping sedge	New record for Cherokee County	NL	SC	Shaded seeping ravines in MH (Reference 73)	No	Yes	No	Yes
Dwarf bulrush	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Dwarf skullcap	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Ear-leaved foxglove	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Early buttercup	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Georgia rush	YORK	NL	SC	Granitic flatrocks (References 55 and 57)	No	No	No	No
Granite-loving flatsedge	YORK	NL	SC	Granitic flatrocks (References 55 and 57)	No	No	No	No
Gray-headed prairie coneflower	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Heart-leaved foamflower	YORK	NL	SC	Moist MH and AW (Reference 57)	No	No	No	No
Mullein foxglove	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Narrow-leaved vervain	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Nodding onion	CHEROKEE	NL	SC	Open, calcareous MH (Reference 57)	Yes	Yes	No	No
Oglethorpe's Oak	YORK	NL	SC	Wet, poorly drained clay soils and seepage swamps (Reference 74)	Yes	Yes	No	No
One-flowered stichwort	YORK	NL	SC	Granitic flatrocks (References 55 and 57)	No	No	No	No
Pale manna grass	YORK	NL	SC	NAW/AW (Reference 57)	No	No	No	No
Piedmont quillwort	YORK	NL	SC	Granitic flatrocks (References 55 and 57)	No	No	No	No

TABLE 2.4-5 (Sheet 3 of 7)
LISTED THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN
POTENTIALLY OCCURRING IN THE VICINITY OF THE LEE NUCLEAR SITE (WLS) AND/OR MAKE-UP POND C (MUPC)

Common Name	Listing Source [(a)]	Federal Status [(b)]	State Status [(c)]	Brief Description of Preferred Cover Type (Table 2.4-1)/Habitat	Cover/ Habitat at WLS?	Cover/ Habitat at MUPC?	Recorded for WLS?	Recorded for MUPC?
Prairie goldenrod	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Prairie rosinweed	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Rigid prairie goldenrod	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Riverbank wild-rye	YORK	NL	SC	Moist MH and AW (Reference 57)	No	No	No	No
Rough sedge	CHEROKEE	NL	SC	Gravelly seepages (Reference 55)	Yes	Yes	No	No
Single-flowered cancer root	New record for Cherokee County	NL	SC	Parasitic on roots of herbaceous plants; Found in wet woods. (Reference 75)	Yes	Yes	No	Yes
Slender naiad	YORK	NL	SC	Lakes and rivers (Reference 57)	No	No	No	No
Smooth blue aster	YORK	NL	SC	Dry woodland over mafic rock (Reference 57)	No	No	No	No
Smooth sunflower	CHEROKEE, YORK	NL	SC	OFM with Carolina slate belt rocks (Reference 57) and Kings Mountain gravel	Yes	Yes	No	No
Soft grooveburr	YORK	NL	SC	Moist MH and AW (Reference 57)	Yes	Yes	No	No
Soft-haired thermopsis	CHEROKEE	NL	SC	Mountain slopes in the Blue Ridge (Reference 55)	No	No	No	No
Southern adder's tongue fern	New record for Cherokee County	NL	SC	Rich, open MH (Reference 55)	Yes	Yes	Yes	Yes
Southern enchanter's nightshade	New record for Cherokee County	NL	SC	Shady rich woods with moist soil (Reference 76)	No	Yes	No	Yes
Southern nodding trillium	YORK	NL	SC	MH with rich, north-facing bluffs (Reference 57)	Yes	Yes	No	No

TABLE 2.4-5 (Sheet 4 of 7)
LISTED THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN
POTENTIALLY OCCURRING IN THE VICINITY OF THE LEE NUCLEAR SITE (WLS) AND/OR MAKE-UP POND C (MUPC)

Common Name	Listing Source [(a)]	Federal Status [(b)]	State Status [(c)]	Brief Description of Preferred Cover Type (Table 2.4-1)/Habitat	Cover/ Habitat at WLS?	Cover/ Habitat at MUPC?	Recorded for WLS?	Recorded for MUPC?
Swamp white oak	YORK	NL	SC	AW over mafic rocks (Reference 57)	No	No	No	No
Turkey-beard	CHEROKEE	NL	SC	Sandy mountain ridges in the Blue Ridge Province (Reference 55)	No	No	No	No
Vasey's dogfennel	YORK	NL	SC	Piedmont prairies (Reference 56)	No	No	No	No
Virginia bunchflower	YORK	NL	SC	MH with rich bluffs (Reference 55)	Yes	Yes	No	No
White walnut	YORK	NL	SC	MH with rich, calcareous ravines, coves, and bottoms and AW (Reference 55)	No	No	No	No
American ginseng	YORK	NL	RC	MH with rich ravines and coves (Reference 55)	Yes	Yes	No	No
Wild hyacinth	YORK	NL	RC	Piedmont prairies (Reference 56)	No	No	No	No
Shoals spider-lily	YORK	NL	NC	Rocky shoals in large rivers (Reference 55)	No	No	No	No
Sun-facing coneflower	YORK	NL	NC	OFM along MH/MHP margins (Reference 57)	Yes	Yes	No	No
Mammals								
Eastern cougar	USFWS	FE (extinct)	SE (extinct)	Eastern cougar is extinct in SC	No	No	No	No
Eastern woodrat	SCDNR	FSC	SC	Dry deciduous woods and old fields in Southern Appalachian Mts. (Reference 77)	No	No	No	No
Southeastern myotis bat	USFWS	FSC	SC	Migratory - In summer occupies tree cavities and abandoned buildings near water (Reference 28)	Yes	Yes	No	No

TABLE 2.4-5 (Sheet 5 of 7)
LISTED THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN
POTENTIALLY OCCURRING IN THE VICINITY OF THE LEE NUCLEAR SITE (WLS) AND/OR MAKE-UP POND C (MUPC)

Common Name	Listing Source [(a)]	Federal Status [(b)]	State Status [(c)]	Brief Description of Preferred Cover Type (Table 2.4-1)/Habitat	Cover/ Habitat at WLS?	Cover/ Habitat at MUPC?	Recorded for WLS?	Recorded for MUPC?
American black bear	SCDNR	NL	SC	Prefer forested and shrubby areas but also known to live on ridgetops, burned areas, riparian areas, and agricultural fields. (Reference 78)	Yes	Yes	No	No
Hoary bat	SCDNR	NL	SC	Roosts in trees, caves and cracks in rocks. (Reference 78)	Yes	Yes	No	No
Little brown myotis bat	SCDNR	NL	SC	Use human-made structures for resting and maternity sites; also utilizes caves and hollow trees (Reference 78)	No	No	No	No
Meadow vole	SCDNR	NL	SC	Open fields meadows, and moist areas along streams (Reference 79)	No	No	No	No
Northern long-eared myotis bat	SCDNR	NL	SC	Use buildings, hollow trees, loose bark of trees, in crevices of cliffs, and beneath bridges as day roosts; use caves as night roosts. (Reference 78)	No	No	No	No
Birds								
Loggerhead shrike	USFWS	FSC	SC	Feeds in grass/forb openings with bare ground (OFM), and shrubs or low trees for nesting (Reference 58)	Yes	Yes	Yes	No
American kestrel	USFWS	FSC	NL	Forages in OFM with widely scattered trees or fields adjacent to woodlands used for nesting (Reference 59)	Yes	Yes	Yes	No

TABLE 2.4-5 (Sheet 6 of 7)
LISTED THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN
POTENTIALLY OCCURRING IN THE VICINITY OF THE LEE NUCLEAR SITE (WLS) AND/OR MAKE-UP POND C (MUPC)

Common Name	Listing Source [(a)]	Federal Status [(b)]	State Status [(c)]	Brief Description of Preferred Cover Type (Table 2.4-1)/Habitat	Cover/ Habitat at WLS?	Cover/ Habitat at MUPC?	Recorded for WLS?	Recorded for MUPC?
Bald eagle	USFWS, YORK	BGEPA	SE	Prefers habitat close to coast or other water bodies such as lakes and reservoirs with an abundance of fish. It is also generally in areas that are free from human interference. (Reference 80)	Yes	Yes	No	Yes
Black-throated green warbler	SCDNR	NL	SC	Distributed within a narrow belt of forested wetlands of the outer Coastal plain from southern Virginia to the Edisto River in SC (Reference 81)	No	Yes	No	Yes
Reptiles								
Canebrake rattlesnake	SCDNR	NL	SC	Lowland cane thickets to river bottoms to pine plantations. (Reference 82)	Yes	Yes	No	No
Pine snake	SCDNR	NL	SC	Found in dry habitats with open canopies in Sandhills and Coastal Plain. (Reference 83)	Yes	Yes	No	No
Scarlet kingsnake (milksnake)	SCDNR	NL	SC	Oak and pine forests with well drained sandy soils Most common in Coastal Plain. (Reference 83)	Yes	Yes	No	No
Amphibians								
Northern cricket frog	YORK	NL	SC	Shallow ponds and slow-moving waterways adjacent to sunny muddy areas. (Reference 31)	Yes	Yes	Yes	Yes

TABLE 2.4-5 (Sheet 7 of 7)
LISTED THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN
POTENTIALLY OCCURRING IN THE VICINITY OF THE LEE NUCLEAR SITE (WLS) AND/OR MAKE-UP POND C (MUPC)

Common Name	Listing Source [(a)]	Federal Status [(b)]	State Status [(c)]	Brief Description of Preferred Cover Type (**Table 2.4-1**)/Habitat	Cover/ Habitat at WLS?	Cover/ Habitat at MUPC?	Recorded for WLS?	Recorded for MUPC?
Pickerel frog	YORK	NL	SC	Cool, clear, high-quality stream water as opposed to warm, sluggish ponds (**Reference 60**)	Yes	Yes	Yes	Yes
Fish								
Robust redhorse	USFWS	FSC	NL	Deep, moderately swift rivers with woody debris and clean, shallow gravel deposits for spawning (**Reference 61**)	Yes	No	No	No
Carolina darter	USFWS	FSC	SC	Small- to moderately-sized streams with low current velocity (**Reference 45**)	No	No	No	No
Fantail darter	STATE	NL	SC	Gravel or rubble riffles in creeks with stronger current (**Reference 46**)	Yes	No	Yes	No
Mussels								
Paper pondshell	STATE	NL	SC	Ponds, pools, and backwaters with silt and sand substrate (**Reference 63**)	Yes	No	Yes	No
Snails								
Gravel elimia	YORK	NL	SC	Typically found in rocky riffles with good flow (**Reference 84**)	No	No	No	No

a) Sources: CHEROKEE County List = **Reference 20**; YORK County List = **Reference 21**; USFWS = **Reference 68**; STATE = **Reference 67**.

b) Federal Status: FT = federally listed as threatened; FE = federally listed as endangered; FC = federal candidate, not yet listed; FSC = federal species of concern; BGEPA = Bald and Golden Eagle Protection Act.

c) State Status: ST = state listed as threatened; SE = state listed as endangered; NC = state listed as of national concern; RC = state listed as of regional concern; SC = state listed as of state concern; NL = not listed.

TABLE 2.4-12
ACREAGE OCCUPIED BY ECOLOGICAL COVER TYPES
FOR THE MAKE-UP POND C STUDY AREA

Coverage Type	Map Symbol	Brief Description of Type	Acres	Percent of Total
Mixed Hardwoods	MH	Stands dominated by mixed hardwoods with little or no pine in the canopy.	664.8	31.5
Pine	P	Pine stands/pine plantations with no or limited hardwoods in canopy.	515.0	24.4
Open Areas / Fields / Meadows	OFM	Nonforested areas dominated by grasses, herbs, etc., maintained by cattle grazing, mowing, and/or other vegetation management, past or present.	426.6	20.2
Mixed Hardwood - Pines	MHP	Stands dominated by mixed hardwoods with pine in the canopy.	335.9	15.9
Pine - Mixed Hardwoods	PMH	Stands dominated by pine with mixed hardwoods in the canopy and understory.	119.6	5.7
Upland Scrub	USC	Partially forested early successional, scrubby areas, including cut-over areas lacking forest canopy development.	28.0	1.3
Open Water	OW	Reservoirs and ponds (farm ponds).	20.1	1.0
Open Pine / Mixed Hardwoods	OPMH	Selectively cut stands with scattered pine in canopy and mixed hardwood understory.	0.3	<0.1
		Total*	2,110.3	100.0

* Rounded values not reflected in acreage and percent totals.

TABLE 2.4-13
POTENTIAL AND RECORDED MAMMALS
FOR THE MAKE-UP POND C STUDY AREA

Common name	Recorded	Common name	Recorded
Virginia opossum	X	Eastern harvest mouse	X
Southeastern shrew	X	Eastern woodrat	
Southern short-tailed shrew	X	White-footed mouse	X
Least shrew	X	Golden mouse	
Eastern mole	X	Hispid cotton rat	
Silver-haired bat		Meadow vole	
Little brown myotis		Woodland vole	X
Southeastern myotis		House mouse	
Northern long-eared myotis		Coyote	X
Eastern pipistrelle		Red fox	X
Big brown bat	X	Common gray fox	X
Eastern red bat	X	American black bear	
Seminole bat		Northern raccoon	X
Hoary bat		Long-tailed weasel	X
Evening bat		American mink	
Brazilian free-tailed bat		Northern river otter	
Eastern cottontail	X	Striped skunk	X
Eastern gray squirrel	X	Bobcat	X
Southern flying squirrel		Eastern cougar (extinct)	
American beaver	X	White-tailed deer	X

TABLE 2.4-14
BIRD SPECIES RECORDED IN THE MAKE-UP POND C STUDY AREA

Common Names	Breeding	Common Names	Breeding
Great Blue Heron		Wood Thrush	X
Canada Goose	X	Hermit Thrush	
Turkey Vulture	X	Golden-crowned Kinglet	
Black Vulture	X	Ruby-crowned Kinglet	
Red-tailed Hawk	X	Eastern Bluebird	X
Red-shouldered Hawk	X	Blue-gray Gnatcatcher	X
Bald Eagle		European Starling	
Osprey		Yellow-throated Vireo	X
Ruffed Grouse	X	White-eyed Vireo	X
Northern Bobwhite	X	Red-eyed Vireo	X
Wild Turkey	X	Blue-headed Vireo	
Killdeer		Black-and-White Warbler	X
American Woodcock	X	Prothonotary Warbler	
Mourning Dove	X	Northern Parula	X
Yellow-billed Cuckoo	X	Magnolia Warbler	
Great Horned Owl	X	Black-throated Blue Warbler	
Whip-poor-will	X	Yellow-rumped Warbler	
Chimney Swift		Black-throated Green Warbler	
Ruby-throated Hummingbird	X	Yellow-throated Warbler	
Belted Kingfisher		Chestnut-sided Warbler	
Northern Flicker		Pine Warbler	X
Pileated Woodpecker	X	Prairie Warbler	X
Red-bellied Woodpecker	X	Ovenbird	X
Hairy Woodpecker	X	Louisiana Waterthrush	X
Downy Woodpecker	X	Common Yellowthroat	X
Eastern Kingbird	X	Yellow-breasted Chat	X
Great Crested Flycatcher	X	Hooded Warbler	X
Acadian Flycatcher	X	Eastern Meadowlark	X
Eastern Phoebe	X	Orchard Oriole	X
Eastern Wood-Pewee		Common Grackle	X
Barn Swallow	X	Brown-headed Cowbird	X
Purple Martin		Scarlet Tanager	X
Blue Jay	X	Summer Tanager	X
American Crow	X	Northern Cardinal	X
Carolina Chickadee	X	Rose-breasted Grosbeak	
Tufted Titmouse	X	Indigo Bunting	X
White-breasted Nuthatch	X	Purple Finch	
Brown-headed Nuthatch		American Goldfinch	X
House Wren		Eastern Towhee	X
Carolina Wren	X	Chipping Sparrow	X
Northern Mockingbird	X	Field Sparrow	
Gray Catbird	X	White-throated Sparrow	
Brown Thrasher	X	Swamp Sparrow	
American Robin	X		

TABLE 2.4-15
POTENTIAL AND RECORDED AMPHIBIANS AND REPTILES
FOR THE MAKE-UP POND C STUDY AREA

Common Name	Recorded	Common Name	Recorded
Amphibians		*Reptiles* - continued	
Northern Cricket Frog	X	Green anole	X
American Toad	X	Six-lined racerunner	X
Fowler's Toad	X	Five-lined skink	
Eastern Narrowmouth Toad	X	Southeastern five-lined skink	
Cope's Gray Treefrog	X	Broadhead skink	X
Gray Treefrog		Slender glass lizard	
Spring Peeper	X	Fence lizard	X
Upland Chorus Frog	X	Ground skink	X
Bullfrog	X	Copperhead	X
Green Frog	X	Worm snake	X
Pickerel Frog	X	Scarlet snake	
Southern Leopard Frog	X	Black racer	X
Eastern Spadefoot Toad		Canebrake rattlesnake	
Spotted Salamander	X	Ringneck snake	X
Marbled Salamander	X	Corn snake	
Northern Dusky Salamander	X	Rat snake	X
S. Two-lined Salamander	X	Eastern hognose snake	
Three-lined Salamander		Mole kingsnake	
Spring Salamander	X	Eastern kingsnake	X
Four-toed Salamander		Scarlet kingsnake-milksnake	
Red Spotted Newt	X	Coachwhip	
Atl. Coast Slimy Salamander	X	Northern watersnake	X
Mud Salamander		Rough green snake	
Red Salamander	X	Pine snake	
Reptiles		Queen snake	
Spiny softshell turtle		Pigmy rattlesnake	
Common snapping turtle	X	Brown snake	X
Painted turtle		Redbelly snake	
Eastern mud turtle	X	Southeastern crowned snake	
Eastern river cooter	X	Ribbon snake	
Common musk turtle		Garter snake	X
Eastern box turtle	X	Smooth earth snake	
Yellow-bellied slider		Rough earth snake	

TABLE 2.4-16
FISH SPECIES COLLECTED DURING 2008 IN LONDON CREEK
MAKE-UP POND C STUDY AREA

			March		September	
Common Name	Tolerance Rating	Trophic Guild	No.	%	No.	%
Rosyside dace	Intermediate	Insectivore	21	3.0	70	5.1
Whitefin shiner	Intermediate	Insectivore			34	2.5
Highback chub	Intolerant	Insectivore	59	8.3	62	4.5
Bluehead chub	Intermediate	Omnivore	267	37.6	144	10.5
Greenhead shiner	Intermediate	Insectivore	68	9.6	14	1.0
Sandbar shiner	Intermediate	Insectivore	31	4.4	30	2.2
Creek chub	Tolerant	Insectivore	18	2.5	225	16.5
White sucker	Tolerant	Omnivore			17	1.2
Brassy jumprock	Intermediate	Insectivore			5	0.4
Flat bullhead	Tolerant	Insectivore	2	0.3	4	0.3
Eastern mosquitofish	Tolerant	Insectivore	29	4.1	219	16.0
Redbreast sunfish	Tolerant	Insectivore	169	23.8	241	17.6
Green sunfish	Tolerant	Insectivore	1	0.1	213	15.6
Warmouth	Intermediate	Insectivore			58	4.2
Hybrid sunfish*	Tolerant	Insectivore			2	0.2
Bluegill	Intermediate	Insectivore			14	1.0
Largemouth bass	Intermediate	Piscivore			2	0.2
Tessellated darter	Intermediate	Insectivore	45	6.3	14	1.0
Total			710	100	1368	100

* Hybrids are not considered a distinct species.

TABLE 2.4-17 (Sheet 1 of 5)
MACROINVERTEBRATES COLLECTED FROM LONDON CREEK IN 2008
Samples were collected March 10–11, 2008, and September 22–23, 2008
An "R" = Rare (1–2 individuals collected), "C" = Common (3–9 individuals collected), and an "A" = Abundant (10 or more individuals collected)

Locations:	0.9		1.7		2.6	
Taxon	Mar 08	Sep 08	Mar 08	Sep 08	Mar 08	Sep 08
ANNELIDA						
Oligochaeta						
Branchiobdellida						
Branchiobdellidae		R				
Tubificida						
Enchytraeidae	A		R			
Naididae			R		R	
Nais communis	R			R		
Nais veriabilis				R		
Pristina sima	R		R			
Pristinella osborni			R			
Stephensoniana tandyi				R		
Tubificidae	C		A	R	A	R
Telmatodrilus vejdovskyi				R		R
Lumbriculida						
Lumbriculidae	C	C	C	C	A	A
Lumbriculus spp.	R	R		R	A	R
ARTHROPODA						
Crustacea						
Amphipoda						
Talitridae						
Hyalella azteca	A	C	A	R	A	C
Decapoda						
Cambaridae						
Cambarus acuminatus		A	C	C	C	A
Procambarus acutus		R	C	C	C	C
INSECTA						
Coleoptera						
Dryopidae						
Helichus spp.	C	A	A	A	A	A
Dytiscidae						
Neoporus spp.	C	A	R	A	A	C
Elmidae						
Ancyronyx variegates		R			R	
Dubiraphia vittata	R				C	
Macronychus glabratus	C	R	C		R	
Optioservus spp.		C				
Stenelmis spp.	C	A	C	A	C	A
Gyrinidae						
Dineutus spp.		A	R			C
Gyrinus spp.	R				R	
Haliplidae						
Peltodytes spp.	C	C	C	R	R	C
Hydrophilidae						
Sperchopsis tessellates	R					

TABLE 2.4-17 (Sheet 2 of 5)
MACROINVERTEBRATES COLLECTED FROM LONDON CREEK

Locations:	0.9		1.7		2.6	
Taxon	Mar 08	Sep 08	Mar 08	Sep 08	Mar 08	Sep 08
Psephenidae						
Ectopria nervosa	R		R			
Psephenus herricki	A		A		A	
Ptilodactylidae						
Anchytarsus bicolor				R		R
Diptera						
Ceratopogonidae						
Palpomyia-Bezzia complex		C				
Chironomidae-Chironominae						
Chironomus spp.			C		C	R
Cladotanytarsus spp.				R		
Dicrotendipes neomodestus		R	R	A	R	R
Glyptotendipes spp.						R
Microtendipes spp.		R	A	R		
Nilothauma spp.				R		
Paratendipes spp.		R		C		A
Phaenopsectra spp.	C	R	C	R		R
Polypedilum aviceps			R		R	R
Polypedilum fallax		R				
Polypedilum flavum		A		A		A
Polypedilum illinoense		A		R		A
Polypedilum scalaenum	R					
Rheotanytarsus spp.			C			
Stempellina spp.		R				R
Stenochironomus spp.	R					
Tanytarsus spp.	C	C	A	C	R	C
Chironomidae-Diamesinae						
Potthastia spp.						R
Chironomidae-Orthocladiinae						
Chaetocladius spp.	A					
Corynoneura spp.	C	R				
Cricotopus bicinctus		A		R		
Cricotopus vierriensis		C				
Diplocladius cultriger	C		C		C	
Eukiefferiella spp.	C	R	A		R	
Nanocladius spp.	R		R	R		
Orthocladius doranus	A		A		R	
Orthocladius lignicola	C		R		R	
Orthocladius nigritus	R		R		R	
Orthocladius robacki	A		A		R	
Parakiefferiella spp.					R	
Parametriocnemus spp.	C	R	A	R	C	R
Psectrocladius spp.			C		R	
Thienemanniella xena	R	R				
Zalutschia spp.			R			
Chironomidae-Tanypodinae						
Ablabesmyia spp.						R
Ablabesmyia mallochi	R	C	R	C		C

TABLE 2.4-17 (Sheet 3 of 5)
MACROINVERTEBRATES COLLECTED FROM LONDON CREEK

Locations:	0.9		1.7		2.6	
Taxon	Mar 08	Sep 08	Mar 08	Sep 08	Mar 08	Sep 08
Clinotanypus spp.			R			
Coelotanypus spp.			R			
Conchapelopia gp.	R	C	A	C		R
Labrundinia spp.						C
Natarsia spp.			R		C	
Procladius spp.			C			
Zavrilimyia gp.	R		R		C	
Dixidae						
Dixella spp.				C		R
Simuliidae						
Prosimulium mixtum	A		A		A	
Simulium venustum		R	C			
Tabanidae						
Tabanus spp.		R			R	
Tipulidae						
Hexatoma spp.					R	
Tipula spp.	R	C	A	R	C	C
Ephemeroptera						
Baetidae						
Baetis flavistriga		R				R
Baetis intercalaris		R				
Centroptilum spp.		C		R		R
Plauditus dubius gp.	C		C			
Pseudocloeon spp.		R		R		
Caenidae						
Caenis spp.	R	R	A			
Ephemerellidae						
Eurylophella versimilis	R				A	
Serratella deficiens			C		A	
Heptageniidae						
Maccafertium modestum			A	A		
Maccaffertium terminatum		R				
Stenonema femoratum		C				R
Stenacron interpunctatum	R		R	R		
Leptophlebiidae						
Leptophledia spp.					A	
Siphlonuridae						
Ameletus lineatus	C		A		A	
Hemiptera						
Corixidae						
Sigara spp.				R	R	
Megaloptera						
Corydalidae						
Chauliodes rastricornis				R		
Corydalus cornutus		C		R	C	
Nigronia fasciatus		C			A	C
Nigronia serricornis			R	R	C	C

TABLE 2.4-17 (Sheet 4 of 5)
MACROINVERTEBRATES COLLECTED FROM LONDON CREEK

Locations:	0.9		1.7		2.6	
Taxon	Mar 08	Sep 08	Mar 08	Sep 08	Mar 08	Sep 08
Sialidae						
Sialis spp.		R		R		R
Odonata						
Anisoptera						
Aeshinidae						
Basiaeshna janata				R		R
Boyeria vinosa			C	R		
Cordulegastridae						
Cordulegaster maculate	R		R	R	R	
Corduliidae						
Helocordulia uhleri			C	R	R	R
Soomatochlora spp.		C		C	R	R
Tetragoneuria spp.						R
Gomphidae						
Gomphus spp.	R	R	R			
Hagenius brevistylus			R			
Lanthus spp.				R		
Stylogomphus albistylus			C			
Libellulidae						
Plathemis Lydia			R			
Odonata						
Zygotera						
Calopterygidae						
Calopteryx spp.				C		
Coenagrionidae						
Argia spp.		R	R			
Ischunura spp.			C	R		
Plecoptera*						
Peltoperlidae						
Tallaperla spp.				R		
Perlidae						
Acroneuria abnormis						R
Eccoptura xanthenes		R				
Perlesta spp.	C		A			
Trichoptera						
Hydropsychidae						
Cheumatopsyche spp.		C		C		C
Diplectrona modesta		R		A		C
Hydropsyche bettini						R
Limnephilidae						
Ironoquia puntatissima	C					
Ironoquia spp.			R		C	
Pycnopsyche spp.	R					
Odontosceridae						
Psilotreta frontalis					R	
Philopotamidae						
Chimarra spp.		R	R	C		C

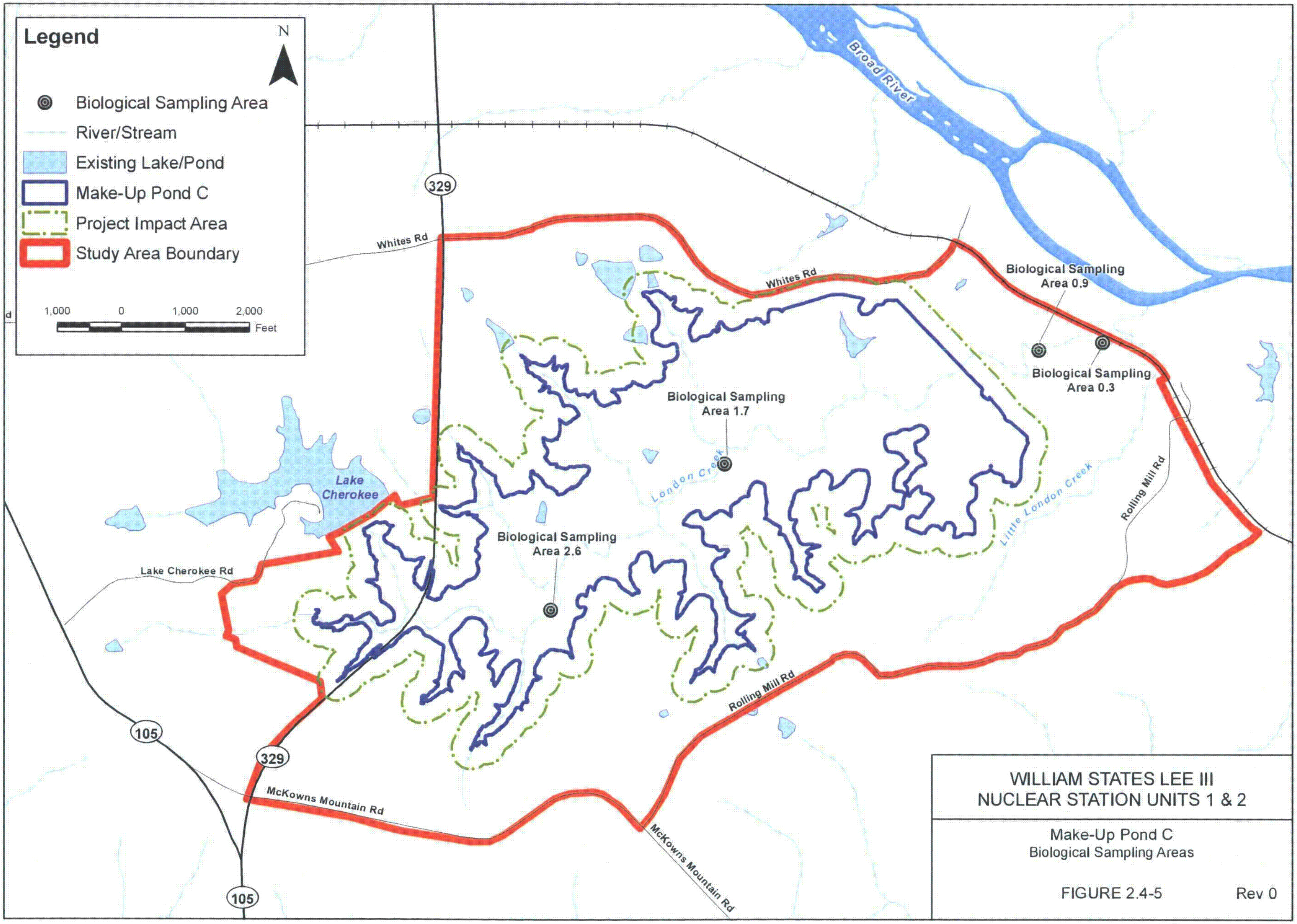
TABLE 2.4-17 (Sheet 5 of 5)
MACROINVERTEBRATES COLLECTED FROM LONDON CREEK

Locations:	0.9		1.7		2.6	
Taxon	Mar 08	Sep 08	Mar 08	Sep 08	Mar 08	Sep 08
Phryganeidae						
Ptilostomis spp.		C				R
Psychomyiidae						
Lype diversa					C	
Psychomyia flavida	R				R	
Uenoidae						
Neophylax oligius			R			
MOLLUSCA						
Gastropoda						
Basommatophora						
Physidae						
Physella spp.	C	C	A		A	C
Mesogastropoda						
Pleuroceridae						
Elimia proxima	C	R	A		A	A
Pulmonata						
Planorbidae						
Helisoma anceps	A	C			C	
Pelecypoda						
Heterodonta						
Sphaeriidae						
Musculium partumeium	A	R	A	R	A	C
Heterodontida						
Corbiculidae						
Corbicula fluminea	C	R	R		R	R
Total Taxa Collected	53	58	68	54	54	51
Total EPT Taxa Collected	9	12	10	8	8	9
Biotic Index Value	6.23	6.54	6.1	6.04	5.99	6.08
EPT Score	1.6	2	2	1.6	1.6	1.6
Biotic Index Score	3	2	3	3	3	3
Final Bioclassification	Fair	Fair	Fair	Fair	Fair	Fair

* NOTE: Five Plecoptera were identified from samples collected in March, but were not included in the taxa list. These taxa are considered winter/spring Plecoptera and were omitted from all March 2008 analyses to derive an appropriate seasonal correction, as outlined in the SOP (NCDENR 2006). The taxa were: *Allocapnia* spp. and *Strophopteryx* spp (all locations), *Taeniopteryx* spp. (Locations 0.9 and 1.7), *Isoperla biliniata* (Locations 1.7 and 2.6), and *Clioperla cilo* (Location 2.6).

TABLE 2.4-18
JURISDICTIONAL STREAMS FOR THE
MAKE-UP POND C STUDY AREA

Stream Name	Est. Length (linear feet)
London Creek	21,016
Little London Creek	9,176
Unnamed tributaries	71,293
Total	101,485



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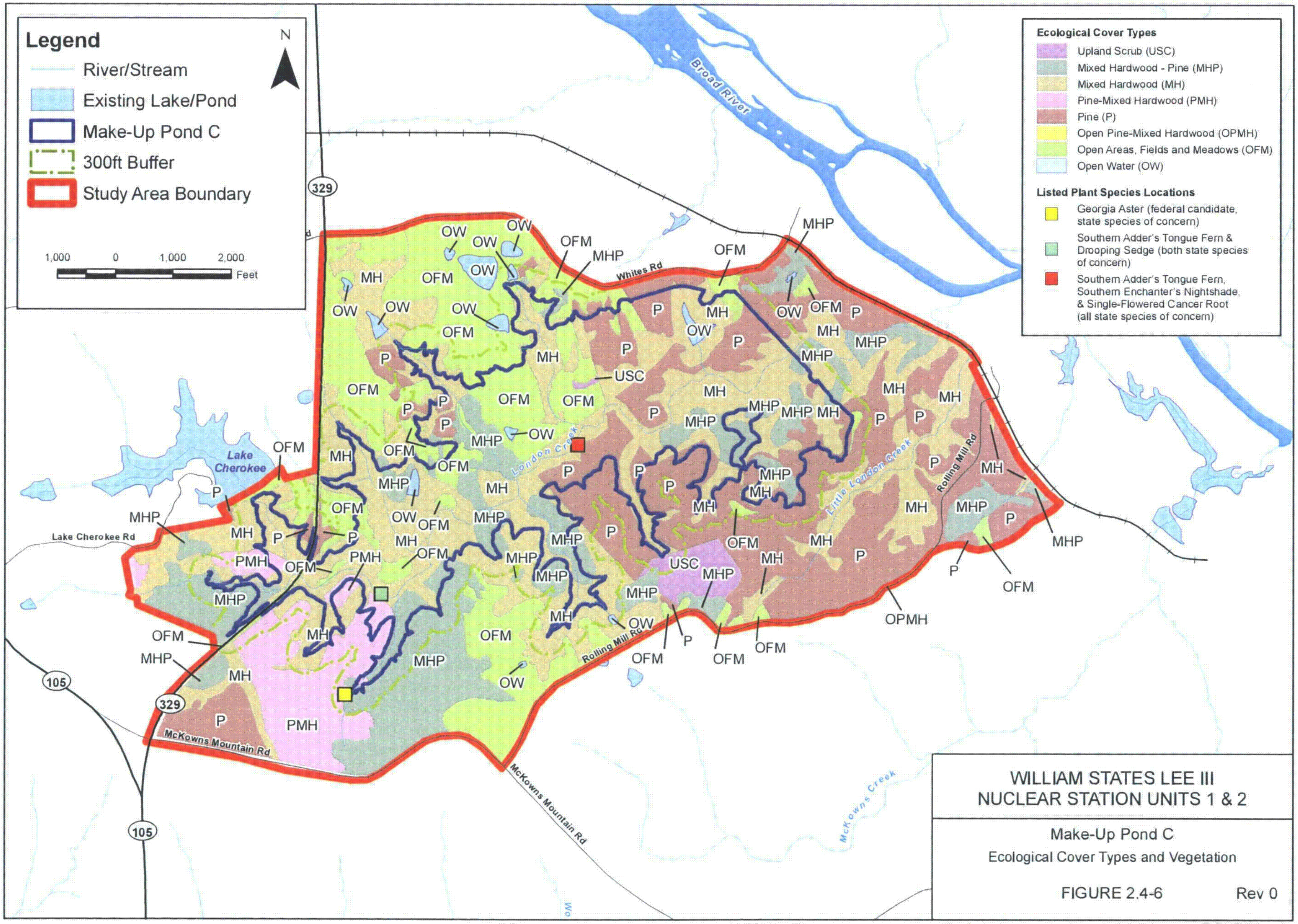
Make-Up Pond C
Biological Sampling Areas

FIGURE 2.4-5 Rev 0


Legend
River/Stream
Existing Lake/Pond
Make-Up Pond C
300ft Buffer
Study Area Boundary
N
1,000 0 1,000 2,000
Feet
Ecological Cover Types
Upland Scrub (USC)
Mixed Hardwood - Pine (MHP)
Mixed Hardwood (MH)
Pine-Mixed Hardwood (PMH)
Pine (P)
Open Pine-Mixed Hardwood (OPMH)
Open Areas, Fields and Meadows (OFM)
Open Water (OW)
Listed Plant Species Locations
Georgia Aster (federal candidate, state species of concern)
Southern Adder's Tongue Fern & Drooping Sedge (both state species of concern)
Southern Adder's Tongue Fern, Southern Enchanter's Nightshade, & Single-Flowered Cancer Root (all state species of concern)
Broad River
Lake Cherokee
Lake Cherokee Rd
Whites Rd
London Creek
Little London Creek
Rolling Mill Rd
McKowns Mountain Rd
McKowns Creek
329
105
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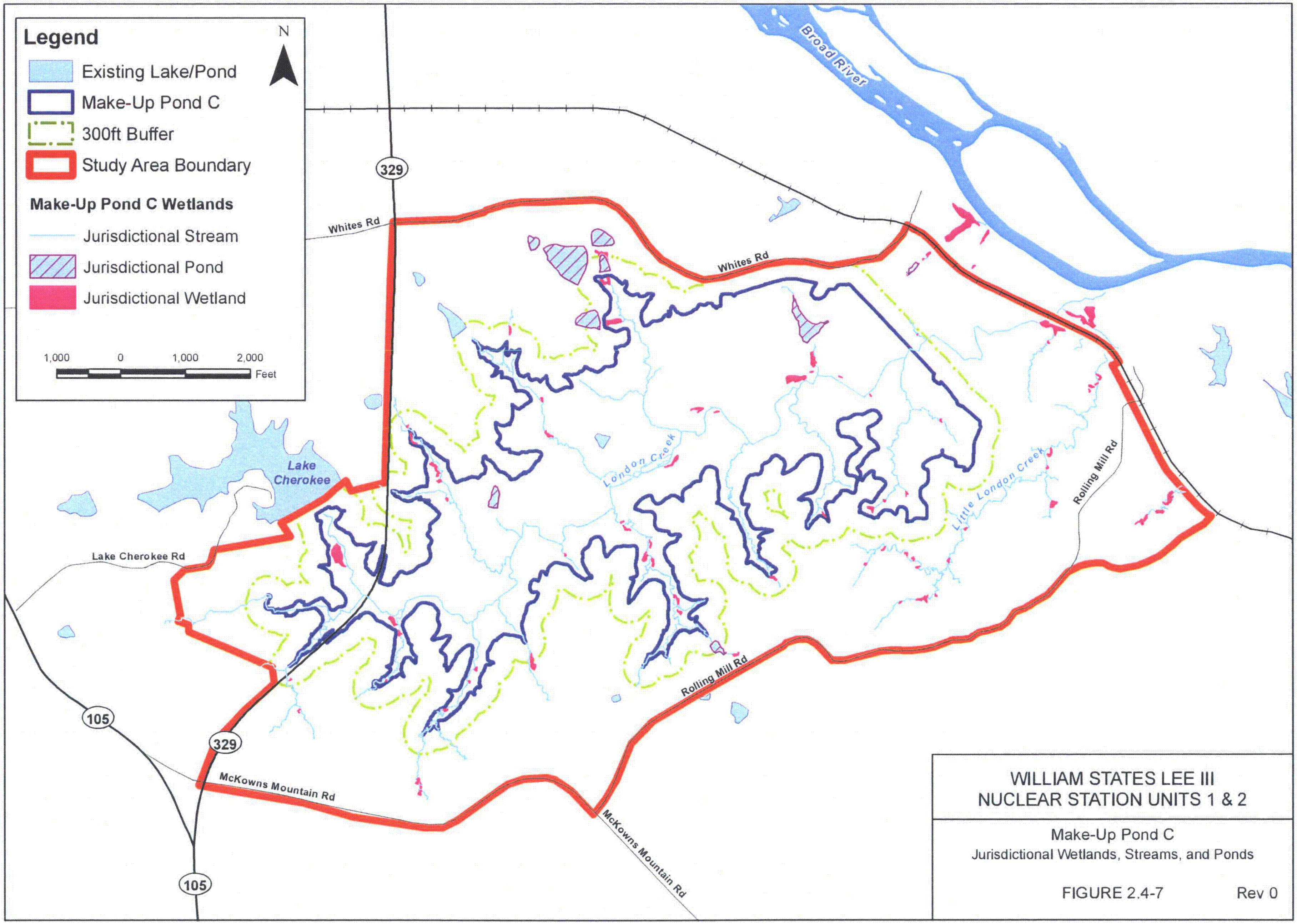
Make-Up Pond C
Ecological Cover Types and Vegetation
FIGURE 2.4-6
Rev 0



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Make-Up Pond C
Jurisdictional Wetlands, Streams, and Ponds

FIGURE 2.4-7 Rev 0

2.5 SOCIOECONOMICS

2.5.1 Demography

There are no revisions associated with Make-Up Pond C in this section.

2.5.2 Community Characteristics

Subsection 2.5.2.4, Land Use and Zoning, page 2.5-13, INSERT NEW TEXT at end of section:

Based on USGS land categories and the latest data from the National Land Cover Dataset, the land use designated within the Make-Up Pond C study area is shown in **Figure 2.2-6**. The portion of the study area that will be inundated by Make-Up Pond C has been primarily identified as evergreen, deciduous, and mixed forest (431.6 ac of the site, approximately 70 percent). Other uses include pasture (17.2 percent), grassland (7.5 percent), shrub/scrub (2.5 percent), open development (2.2 percent), cropland (0.5 percent), water (0.2 percent), woody wetlands (0.1 percent), and low-intensity residential development (0.02 percent). While this land use data is similar to the land cover data presented in **Section 2.4**, Ecology, it is distinct, as the land cover data presented in **Section 2.4** focuses on ecological cover types as opposed to land uses.

The Make-Up Pond C study area is bounded by Whites Road to the north, with adjacent lands consisting of woodland and some residential development. The Lee Nuclear Site is located southeast of the Make-Up Pond C study area. To the south and west of the study area, there is a mixture of forested land and some residential development.

2.5.3 Historic Properties

Subsection 2.5.3, Historic Properties, page 2.5-19, 3rd paragraph:

In Cherokee and York counties, 69 aboveground historic properties are located within a 10-mi. radius of the Lee Nuclear Site boundary (**Table 2.5-20**). Six National Register of Historic Places (NRHP)-listed historic districts and one listed national military park contain another 184 aboveground historic sites that contribute directly to their historical significance and integrity. The 2009 archaeological surveys of the Make-Up Pond C study area identified one historic cemetery within the Area of Potential Effect (APE). The 2009 Phase I intensive survey identified additional historic properties. These cultural resources are described in **Subsection 2.5.3.8.3**.

Subsection 2.5.3.8, Historic Properties in Transmission Corridors and Off-Site Areas, page 2.5-26:

This subsection describes the existing historic properties environment in the proposed transmission line corridors and railroad spur right-of-way (ROW) for the Lee Nuclear Station, as well as the Make-Up Pond C study area and the pipeline corridor.

NEW SUBSECTION 2.5.3.8.3, Make-Up Pond C, page 2.5-27:

Duke Energy conducted a cultural resources literature review field reconnaissance and a Phase I survey specifically for the Make-Up Pond C study area. The Area of Potential Effect (APE) of the project was considered to be the full pond elevation of 650 ft plus a 300-ft buffer, a 100-ft-wide transmission line corridor that extends north–south across the reservoir, as well as a 150-ft-wide pipeline corridor extending from the Broad River to Make-Up Pond B and the proposed Make-Up Pond C. The study area extends 1 mile beyond the reservoir APE and 300 ft beyond the transmission line and pipeline APEs. **Figure 2.5-27** shows the APE of the Make-Up Pond C study area.

On December 16, 2008, Duke Energy initiated NHPA Section 106 compliance by meeting with staff from the SCDAH to discuss the additional proposed Make-Up Pond C facility for the Lee Nuclear Station. Based on the results of this meeting, on March 26, 2009, Duke Energy submitted a written study plan to the SHPO for approval. The SHPO approved this scope of work in a letter dated April 21, 2009. Consultation letters to the SHPO and the responses are provided in **Appendix B**.

As part of ongoing consultation, a letter was sent to the Native American Tribal Historic Preservation Officer (THPO) of the Eastern Band of Cherokee Indians. The Eastern Band of Cherokee Indians is the federally recognized tribe that has a historical, cultural, and traditional interest in the lands of Cherokee and York counties.

Literature reviews were conducted for all previously recorded architectural resources located within the Make-Up Pond C study area.

A January 2009 pedestrian field reconnaissance of the Make-Up Pond C study area identified one historic cemetery within the APE. Investigators revisited the cemetery during the 2009 phase I survey. The Service Family Cemetery (38CK142) is located on a small wooded hill within an open pasture. A low, metal 25-by-30-ft fence surrounds the cemetery. The cemetery contains approximately six inscribed markers for graves that range in date from 1865 to 1932. Several of the monuments and grave markers have fallen. There appear to be several unmarked graves within the fence as well. **Figure 2.5-28** presents a plan and views of the cemetery.

Cemeteries typically are not eligible for the NRHP. The Advisory Council for Historic Preservation (ACHP) recently reiterated this during an open forum workshop held at the South Carolina Department of Archives and History (SDCAH) in Columbia. While the Service Family Cemetery is likely to be determined not eligible for the NRHP, all cemeteries are protected by state law. Prior to inundation, Duke Energy will seek input from the public and then petition Cherokee County for a resolution approving relocation of the cemetery to a predetermined location.

During the 2009 Phase I survey, investigators also identified two prehistoric archaeological sites (Sites 38CK145 and 38CK147) and one site (Site 38CK146) with prehistoric components. Investigators also identified four historic archaeological sites (Sites 38CK144 and 38CK148 and Stills 1 and 2) and one site (Site 38CK146) with historic components. Investigators are recommending these sites not eligible for the NRHP.

Investigators identified 71 historic sites outside of the London Creek project footprint, but within the 1.25-mile radius (slightly larger radius than the 1-mile radius the Study Plan called for) architectural APE of the project. Of the 71 recorded historic architectural resources, the historian identified one area that has the potential to be a historic district, the former Cherokee Falls Mill and parts of the surrounding mill village, located in the northeast corner of Cherokee County along the Broad River. The area contains 52 resources, with 43 resources that could contribute to a potential district and nine noncontributing resources. The nine noncontributing resources are modern buildings and mobile homes and were not surveyed; therefore, they do not have survey numbers. The historian found that Cherokee Falls Mill might be eligible for the NRHP under Criterion A for its association with the economic development of Cherokee County's textile industry and Criterion C for its assortment and quality of late nineteenth- and early-twentieth-century residential buildings associated with the textile industry. While the mill area is not formally determined a historic district, Brockington staff treated the Cherokee Falls Mill and mill village as a historic resource during assessment of effect. The area is located across the Broad River and not on land that will be acquired by this project; therefore, it will not be affected by the proposed undertaking. The remaining 28 resources in the survey universe are recommended not eligible for the NRHP. These resources are recommended not eligible for the NRHP.

2.5.4 Environmental Justice

There are no revisions associated with Make-Up Pond C in this section.

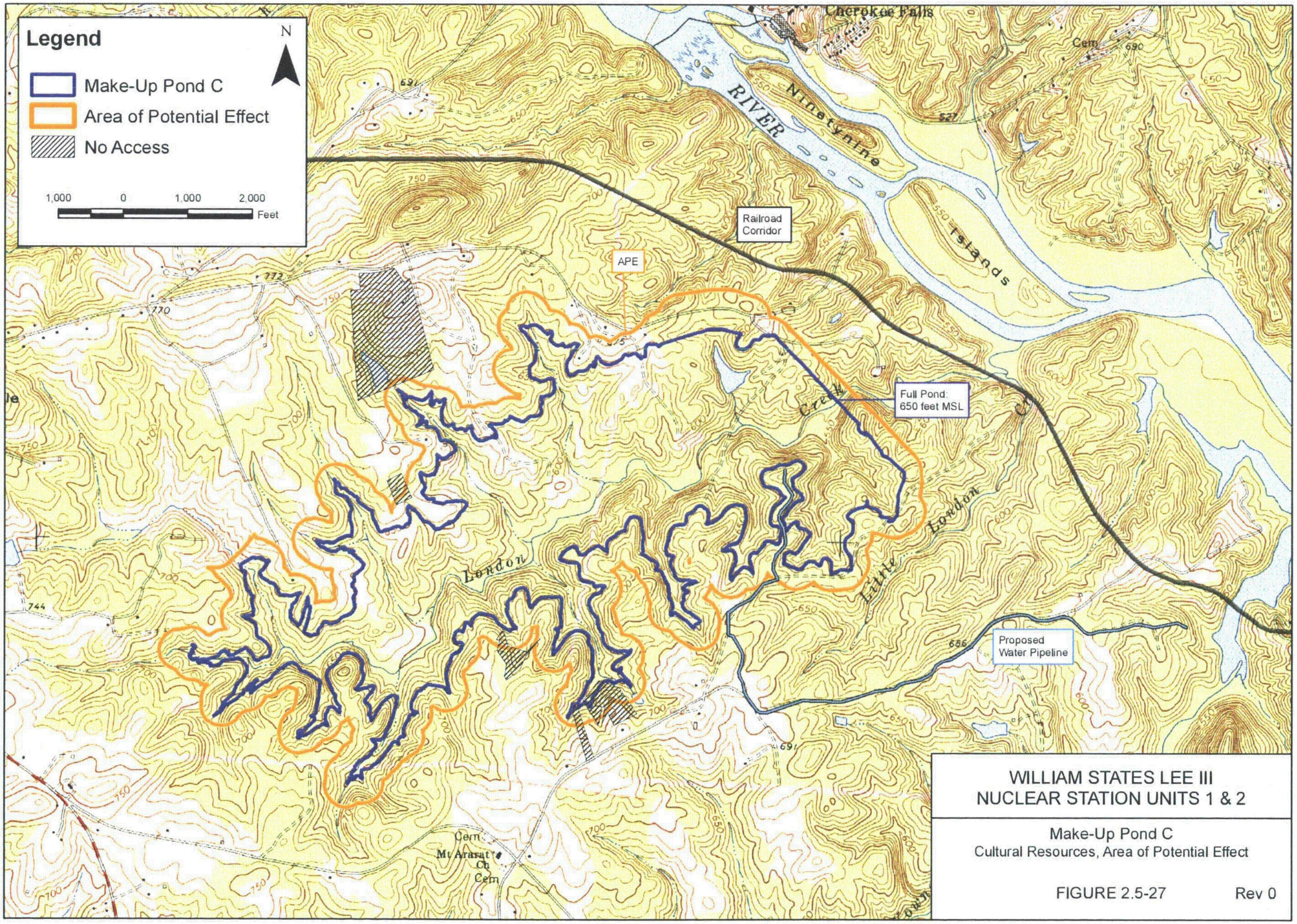
2.5.5 Noise

Subsection 2.5.5, Noise, page 2.5-31, INSERT NEW TEXT at end of section:

Similar to the Lee Nuclear Site, developed land use in the vicinity of the proposed Make-Up Pond C is characterized as rural with some low density residential. Ambient noise sources are primarily natural such as wildlife and wind through foliage, which are noted as sources in the ambient noise survey conducted for the Lee Nuclear Site in June 2006. Considering the similarity in land use, ambient noise monitoring performed as part of the ambient noise survey for the Lee Nuclear Site also describes the existing noise environment in the vicinity of the proposed Make-Up Pond C.

2.5.6 References

There are no revisions associated with Make-Up Pond C in this section.



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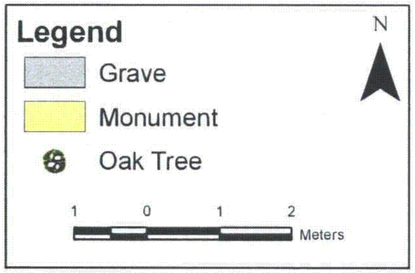
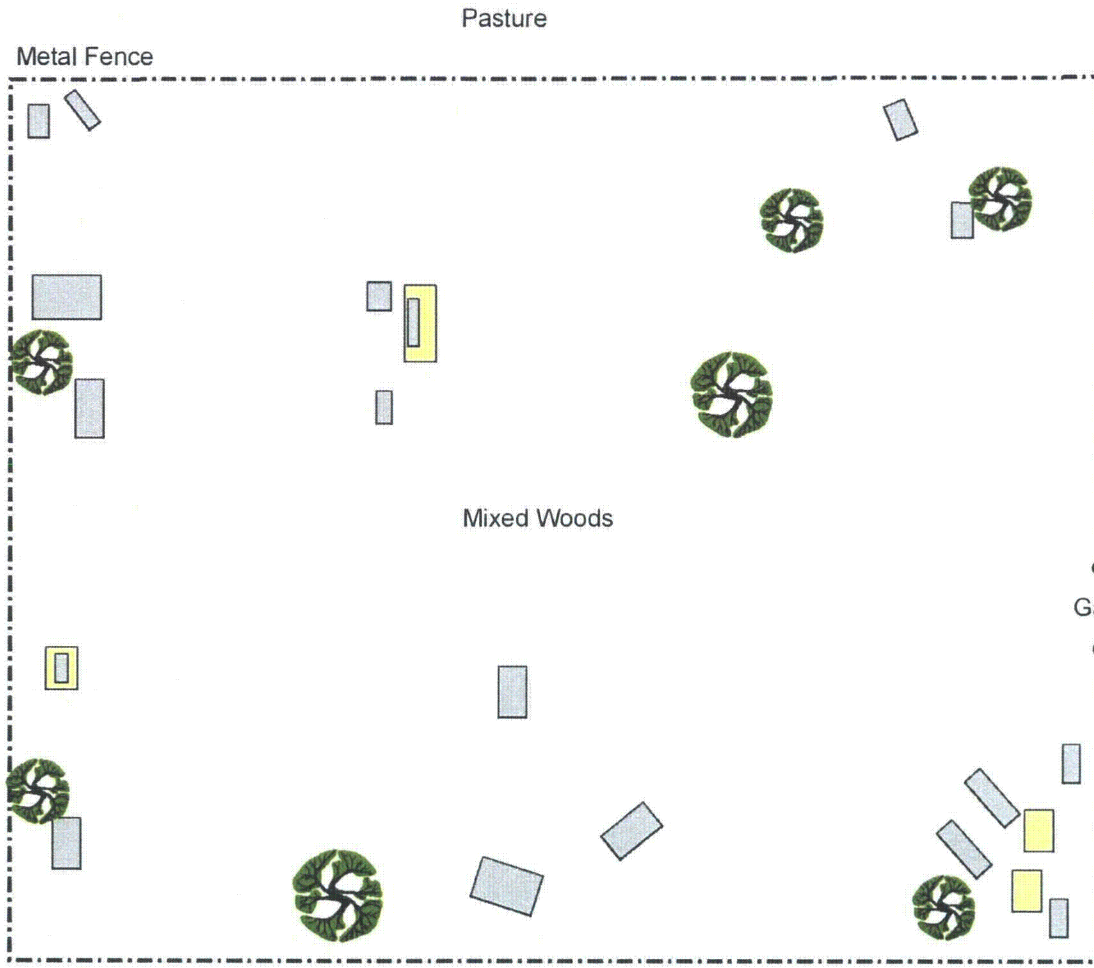
Make-Up Pond C
Cultural Resources, Area of Potential Effect

FIGURE 2.5-27 Rev 0



West Facing View of Service Cemetery

South Facing View of Fallen Monuments



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NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
Service Cemetery 38CK142

FIGURE 2.5-28 Rev 0

2.6 GEOLOGY

Section 2.6, Geology, page 2.6-1, REPLACE Section 2.6 in its entirety as follows:

A detailed discussion of regional and site geology is presented in FSAR Section 2.5 This Environmental Report section provides a brief summary of the physiographic setting and the regional and local geology of the Lee Nuclear Site and the Make-Up Pond C study area. Regional and local geologic characteristics and descriptions contained herein are largely based on a review of pertinent published data. Site-specific geologic interpretations are based on the results of field reconnaissance and rock core analysis.

2.6.1 Physiographic Setting

The Lee Nuclear Site and the associated Make-Up Pond C study area on London Creek are located within the Charlotte Terrane of the Carolina Zone (Reference 1, Kings Mountain belt of the older belt terminology) within the Piedmont physiographic province. The Piedmont province is an 80- to 120-mi-wide, southwest to northeast-oriented province of the Appalachian Mountain system, and is situated between the Blue Ridge province, a mountainous region to the northwest, and the Atlantic Coastal Plain province to the southeast (Figure 2.3-7). The province is a seaward-sloping plateau, dominated by a monotonous topography of low rounded ridges with gentle slopes and ravines largely underlain by saprolite developed on crystalline rock. There is minimal relief in most of the Piedmont (averaging about 50 ft). In the vicinity of Lee Nuclear Station and Make-Up Pond C, the Kings Mountain belt consists of metasedimentary and metavolcanic rocks and they are primarily nonresistant rocks, such as metasiltstone, phyllite, and volcanic flow, tuffs, and breccias interlayered with resistant rocks including quartzite, kyanite quartzite, and metaconglomerate. These resistant rocks form chains of low hills cut by valleys of steeper slopes and greater depths, often several hundred feet. The correlation between local relief and rock type is pronounced and the unusual topography (for the Piedmont) in the area is controlled by rock resistance (Reference 2).

Near the larger streams, tributaries cut through deep and steep valleys that (when traced headward) become wide, shallow, and of gentle gradient. The principal stream in the site vicinity is the Broad River. The regional southeastward drainage of the Upper Broad River basin is reflected in the trend of the Broad River. The Broad River is incised 200 to 250 ft below the summit levels of the Piedmont. The Broad River valley is narrow with little or no floodplain development and its tributary streams cut downward to the level of the Broad River where they have caused locally rugged topography (Reference 8). The local tributaries, including London Creek, drain into the Broad River. Figure 2.6-1 shows the Lee Nuclear Site within an array of USGS 7.5-minute topographic maps. Within about 5 miles of the site area, the topography ranges from about 400 ft to 1,000 ft in elevation. The topography of the Make-Up Pond C study area ranges from approximately 535 ft msl along London Creek at the downstream limit of the dam site to 650 ft msl at the proposed waterline of Make-Up Pond C.

2.6.2 Regional and Local Geology

2.6.2.1 Regional Geology

The site is located within the Charlotte Terrane of the Carolina Zone (Kings Mountain belt) within the Piedmont Physiographic province; the Kings Mountain belt is characterized by a distinctive sequence of metasedimentary rocks including quartzite, metaconglomerate and marble interlayered within mica schists and phyllites that are partly volcanic in origin. The major structures within the Kings Mountain belt are gently plunging, tight-to-isoclinal folds and faults generally subparallel to fold limbs. The two largest folds are the South Fork antiform and the Cherokee Falls synform (**Reference 3**). Smaller folds such as the Canoe Creek and McKowns Creek antiforms, are also present, although less defined because of the lack of marker beds and/or the effects of intrusive bodies. The fold patterns show disruption on all scales. There are numerous discontinuities that generally parallel the regional strike. For example, one large discontinuity truncates map units that define the Cherokee Falls synform on the north, but a quartzite-metaconglomerate unit just to the south, and within the Make-Up Pond C area, is continuous entirely across the area (**Reference 4**).

Rock units in the site area belong to the Battleground Formation. These units have been intruded by plutonic rocks (metamorphosed) and cut by later Mesozoic diabase dikes (**Reference 5**). The Battleground Formation is a volcaniclastic sequence, primarily felsic (dacitic) to intermediate (andesitic) in composition, with intrusions of similar composition (metagranodiorite to meta-quartz diorite, metatonalite, metadiorite and metagabbro) with minor, interfingered, marine metasedimentary sequences. Rocks of the Blacksburg Formation, northwest of the site area, are part of the same volcanic arc sequence that makes up the Battleground Formation. The Blacksburg Formation includes more marine-sediment-dominated units (**Reference 3**). Based on textures and the similarity of composition of the plutonic and volcaniclastic units, the entire sequence is considered to be a volcaniclastic pile that was intruded by its own parent magmas (**Reference 6**). The occurrence of metasedimentary carbonate rocks is indicative of a marine environment. Reworking of the pile resulted in both clastic and chemical deposition. Locally the composition of the volcaniclastics was altered to various degrees by hydrothermal leaching due to large-scale circulation of seawater interacting with hot volcanic rocks. The leached rocks are enriched in aluminum and titanium oxides (e.g. kyanite, corumdum, rutile) during metamorphism. The leachate is deposited locally as chert, barite, and metallic sulfides as exhalatives.

Due to intense deformation, few primary features survive with which to determine stratigraphic order. However, inferences (**References 3 and 6**) consider the South Fork antiform to be an upright feature and the Battleground Formation to be a homocline that "youngs" to the northwest (**Reference 6**). This inference is supported by the occurrence of the metasedimentary component primarily northwest of the proposed Make-Up Pond C and the expected stratigraphic relationships for deposition of marine-dominated clastic and chemical precipitate rocks at the later stages of the volcanic pile accumulation.

Descriptions of individual members of the Battleground Formation are provided below, as taken from Murphy and Butler (Reference 6), Howard (Reference 7) and Nystrom (Reference 8).

Metaandesite to metadacite (Zbvm). The oldest unit mapped within the Lee Nuclear Site area is a medium to dark gray and green hornblende-rich phyllite, hornblende gneiss, and amphibolite. This unit forms the core of McKowns Creek Antiform. These rocks are mapped as mafic to intermediate metavolcanic rocks, and are described as mainly volcanic rocks and shallow intrusions.

Metatonalite to dacite metatuff complex (Ztrs). This unit is mapped as "Interlayered mafic and felsic gneiss" by Howard (Reference 7) and consists of interleaving mafic and felsic rocks. The felsic gneiss is composed mainly of feldspar, quartz and muscovite with biotite, chlorite, and epidote as accessory minerals. The felsic gneiss contains scattered, 0.08 to 0.12 in. diameter feldspar clasts. The mafic gneiss is composed of dark green hornblende and feldspar.

Also part of this complex is a mixed unit that is interpreted as tonalite intrusions and dacite flows, as well as reworked (epiclastic) sediments derived from intrusions and flows. The metatonalite is coarse-grained and consists of quartz, feldspar, biotite, and blue quartz. Mafic inclusions and xenoliths are sporadic. Where mafic inclusions and xenolith concentrations are denser, they form mappable (at 1:24,000-scale) bodies. The metatonalite records a homogenous fabric defined by poorly developed biotite folia. Mafic inclusions and xenoliths consist of hornblende gneiss and epidote rich rocks.

The metavolcanic and metasedimentary components are schists and fine- to medium-grained, poorly foliated gneisses. These lithologies consist of quartz and feldspar with some blue quartz accompanied by accessory chlorite, pyrite, and magnetite. The foliation in the foliated gneisses is defined by sericite and chlorite.

Murphy and Butler (Reference 6) interpret this complex association of rocks to represent a volcaniclastic accumulation intruded by its parent magma. Based on the relatively fine-grained texture and the presence of concordant and discordant intrusions, Murphy and Butler (Reference 6) interpret these as shallow intrusions (plugs and sills) in the volcanic pile.

One of these intrusions serves as the foundation for the Lee Nuclear Site structures. The lithology at this location ranges from metagranodiorite to meta-quartz diorite (metatonalite) intrududed by dikes of metadiorite and amphibolites (FSAR Subsection 2.5.1.2.3).

The following primary lithologies are noted within the Lee Nuclear Station and proposed Make-Up Pond C areas:

- Metatonalite (Zto). Light to medium gray, coarse-grained, with large potassium feldspar and quartz grains.
- Plagiocalse Crystal Metatuff (Zbct). Gray, generally well foliated, assorted volcanics of mainly felsic to intermediate composition, with crystal and less abundant lithic metatuffs.

- Phyllitic Metatuff (Zbmp). Gray to dark gray varied volcanics including crystal and lithic metatuff with interlayered metasedimentary rocks. Includes Jumping Branch maganiferous beds.
- Quartz Pebble Metaconglomerate (Zbc). Light gray, schistose with quartz pebbles one to two centimeters in diameter.
- Quartzite (Zbq). White to gray, fine- to medium-grained quartzite.
- Alluvium (Qal). River and stream valleys are filled with alluvial sands and silty to clayey sands.

The distribution and orientation of geologic formations of the Lee Nuclear Station site (**Figure** 2.3-9), Make-Up Pond C study area (**Figure** 2.3-33), and the surrounding area (**Figure 2.3-8**) are typical of the region.

2.6.2.2 Local Geology

2.6.2.2.1 Published Data

The geology of the Lee Nuclear Site, including the Make-Up Pond C study area, has been extensively discussed by Horton (**Reference** 5), Murphy and Butler (**Reference** 6), Howard (**Reference** 7), Nystrom (**Reference** 8), and Schaeffer (**Reference** 9) among others. The Duke Power Company Project 81 Preliminary Safety Analysis Report (PSAR) presents previous investigations of the Lee Nuclear Site and the Final Safety Analysis Report (FSAR), **Section** 2.5 presents additional investigations of the powerhouse block site.

The eastern portion of the Lee Nuclear Site is underlain by a metagranodiorite to metatonalite intrusive body. Western portions of the site are underlain by mafic to intermediate metavolcanic rocks that consist primarily of hornblende phyllite, hornblende gneiss, and amphibolite. The metavolcanic rocks locally contain quartzite bodies that form geomorphically prominent linear ridges (**FSAR Subsection** 2.5.1.2.5.3).

The southeastern portion of the proposed Make-Up Pond C area is underlain by plagioclase crystal metatuff, while the northwestern portion of the site is underlain by phyllitic metatuff, as mapped by Nystrom (**Reference** 8) and as shown on **Figure** 2.3-33. The plagioclase crystal metatuff is characteristically greenish- to blue-gray schist and gneiss comprising fine-grained quartz and feldspar with magnetite, pyrite, chlorite, and biotite as accessories. The phyllitic metatuff is characterized by gray to dark gray interlayered metavolcanics and metasiltstone (**Reference** 8). These two units are separated by a quartz pebble metaconglomerate body that forms a ridge extending in a northeast to southwest direction (approximately N55°E) and roughly bisects the proposed Make-Up Pond C and is visible as a lineament on the 1:40,000-scale USGS photography. Within the reservoir area, London Creek flows northeastward along much of the length at the base of the ridge, before joining with the Broad River near the southernmost tip of Ninety-Nine Islands. The linear topographic expression of this ridge is the result of erosion by London Creek and the erosion resistance of the quartz pebble metaconglomerate bed. The pronounced lineament, recognized on the USGS photography, terminates northeastward at the Broad

River and is not expressed in the topography northeast of the river, although the quartz pebble metaconglomerate has been mapped by Nystrom (**Reference 8**) continuing to the northeast.

Several smaller-scale quartzite lineaments are mapped either within or proximal to the proposed Make-Up Pond C. These quartzite lineaments project as topographic ridges within the site due to their resistance to weathering.

According to mapping by Nystrom (**Reference 8**), alluvial material is present surrounding London Creek and the Broad River. However, this material does not extend significantly outward from the surficial water bodies due to the steepness of the incised valleys.

2.6.2.2.2 Field Data

As part of the Feasibility-Level Geotechnical Investigation of the proposed Make-Up Pond C dam and Make-Up Pond C study area, 23 borings were advanced, 9 of which (identified as SB-06 through SB-12, SB-16, and SB-18) extended into bedrock. The remaining borings were limited to overburden soils and partially weathered rock and terminated at soil boring refusal, likely correlating to the top of bedrock. The locations of the borings, in relation to the bedrock geology, are shown on **Figure 2.3-33**.

Based on description of the rock cores, bedrock underlying the proposed Make-Up Pond C dam and the proposed Make-Up Pond C was characterized as felsic to intermediate meta-volcanics with quartz, plagioclase, and mafic accessory minerals. Interlayered metavolcanic and metasedimentary rock was identified in the core obtained from boring SB-06. Note that SB-06 represents the only rock core advanced into the phyllitic metatuff unit (mapped as Zbmp) and north of the quartz pebble metaconglomerate that bisects the proposed Make-Up Pond C. Also of note was the high degree of weathering noted in the core obtained from boring SB-18, which was advanced proximal to a quartzite lineament located along the southern boundary of the proposed Make-Up Pond C.

This weathering profile starts with a more weathered zone in the upper, near-surface horizon which is distinguished from the underlying saprolite by a lack of relict features from the parent bedrock, and is termed "residual soil". The residual soil is underlain by the saprolite, which retains its relict features of the parent bedrock. The overall degree of weathering lessens with increasing depth, as the saprolite grades into "partially weathered rock" (PWR). The PWR is generally identified in the field by SPT values of 100 or more blows per foot. This PWR zone is transitional between the saprolite and the underlying, less weathered rock. The depth of weathering is variable.

Depth to the beginning of the PWR in the borings ranged from 13 ft to 38.5 ft. Depth to refusal of soil boring methods and the beginning of rock coring methods ranged from 20 ft to 54 ft. The cored rock is variably weathered to total depths of 36 ft to 70 ft, where generally unweathered, fresh rock was encountered. Fresh rock was not encountered in three borings (SB-09, SB-10 and SB-18) advanced at the site; boring SB-09 was cored to a total depth of 120 ft below ground surface.

In general, the rock cores were characterized as highly foliated with steep to moderately steep foliation joints present in most of the cores. Healed foliation joints were typically filled with quartz, plagioclase or mafic minerals. In unfractured rock, these minerals were commonly elongated parallel to the foliation plane. To a lesser degree, random fracturing and fractures zones were also noted in the cores. Random fracturing appeared to be more prevalent in cores SB-11 and SB-16. Multiple fracture zones were observed in cores SB-09 and SB-12. Small chemical dissolution cavities (pits) were observed in the core obtained from boring SB-10. According to rock characteristic data presented in the **FSAR Subsection** 2.5.4.1.2, rock at the Lee Nuclear Station site is not soluble in water. While some are composed of up to 10 percent ferroan calcite, this material is broadly distributed within the rock mass. If it were to completely weather out, which is highly unlikely, it would not leave voids of large enough size to create a geologic hazard.

2.6.3 References

Subsection 2.6.3, References, page 2.6-2, INSERT NEW TEXT at end of section:

1. Hibbard, J. P., Stoddard, E. F., Secor, D. T., Jr., and Dennis, A. J. 2002. "The Carolina Zone: Overview of Neoproterozoic to Early Paleozoic Peri-Gondwanan Terranes Along the Eastern Flank of the Southern Appalachians," *Earth Science Reviews* 57:299–339.

2. Hack, J. T. 1982. "Physiographic Divisions and Differential Uplift in the Piedmont and Blue Ridge," *United States Geological Survey Professional Paper* 1265, pp. 49.

3. Horton, J.W. Jr., and Butler, J.R. 1981."Geology and Mining History of the Kings Mountain belt in the Carolinas; a Summary and Status Report," in *Geological investigations of the Kings Mountain belt and adjacent areas in the Carolinas*, Carolina Geological Society field trip guidebook.

4. Butler, J.R. 1981."Geology of the Blacksburg South Quadrangle, South Carolina," in *Geological investigations of the Kings Mountain belt and adjacent areas in the Carolinas*, Carolina Geological Society field trip guidebook.

5. Horton, J.W. Jr. 1981. "Geologic Map of the Kings Mountain belt Between Gaffney, South Carolina and Lincolnton, North Carolina," in *Geological investigations of the Kings Mountain belt and adjacent areas in the Carolinas*, Carolina Geological Society Field Trip Guidebook.

6. Murphy, C.F., and Butler, J.R. 1981 "Geology of the Northern Half of the Kings Creek Quadrangle, South Carolina," in *Geological investigations of the Kings Mountain belt and adjacent areas in the Carolinas*, Carolina Geological Society Field Trip Guidebook.

7. Howard, C. Scott. 2004. *Geologic Map of the Kings Creek Quadrangle, Cherokee and York Counties, South Carolina*, GQM-16, South Carolina Department of Natural Resources Geological Survey, 1:24,000 scale, 1 sheet.

8. Nystrom, P. Jr. South Carolina Geological Survey, 2009. Digital Geologic Map Data of the Blacksburg South Quadrangle, Cherokee County, South Carolina, Digital Geologic Data, DGD-56, Columbia, South Carolina, Scale 1:24,000.

9. Schaeffer, Malcolm F. 1981. "Polyphase folding of a portion of the Kings Mountain belt, north-central South Carolina," in *Geological investigations of the Kings Mountain belt and adjacent areas in the Carolinas*, Carolina Geological Society Field Trip Guidebook.

2.7 METEOROLOGY

There are no revisions associated with Make-Up Pond C in this section.

2.8 RELATED FEDERAL PROJECT ACTIVITIES

There are no revisions associated with Make-Up Pond C in this section.

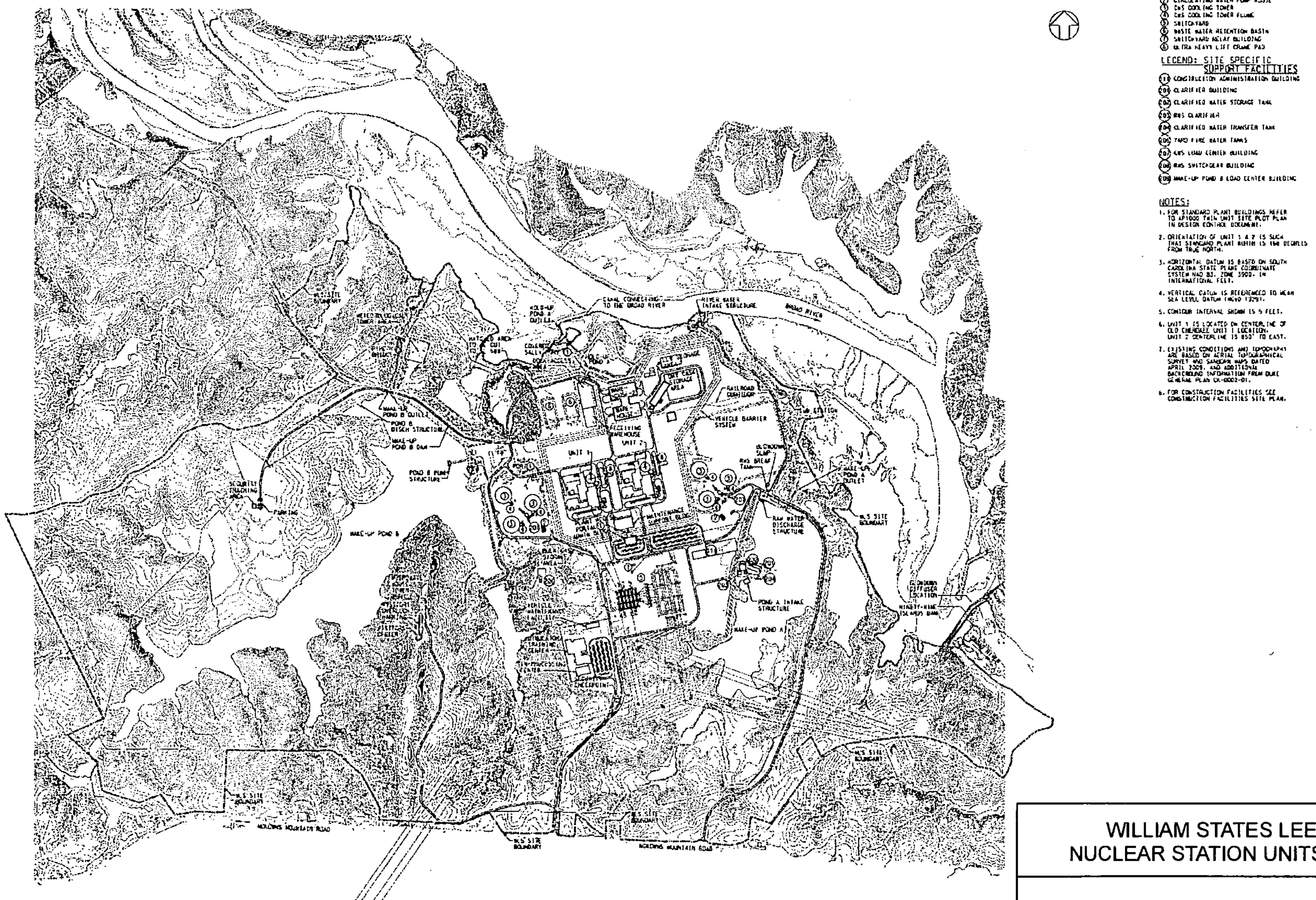
3 PLANT DESCRIPTION

3.0 PLANT DESCRIPTION

3.1 EXTERNAL APPEARANCE AND PLANT LAYOUT

Subsection 3.1, External Appearance and Plant Layout, page 3.1-2, INSERT NEW TEXT at end of section:

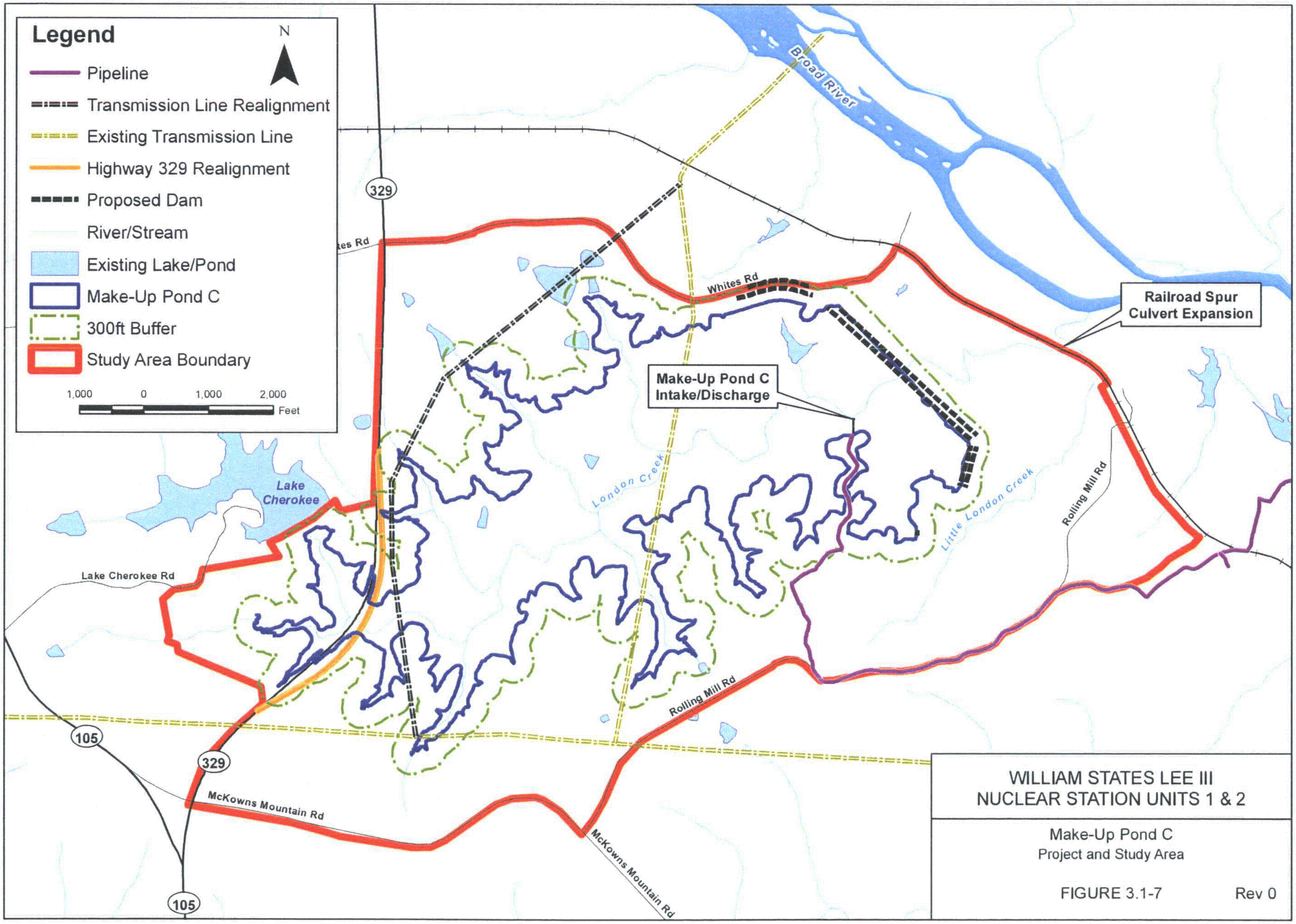
External to and west of the Lee Nuclear Station site, an approximately 620-ac pond on London Creek, Make-Up Pond C, will provide additional make-up water during those periods when the flow in the Broad River is below the withdrawal limit. The dam and inundation area, plus a 300-ft buffer compose the Make-Up Pond C project area (Figure 3.1-7). The property surrounding the project area that is owned or being acquired by Duke Energy defines the Make-Up Pond C study area (Figure 3.1-7). Facilities associated with Make-Up Pond C include the pipeline from the Broad River to Make-Up Pond B and Make-Up Pond C, a 44-kV transmission line to supply power to pumps at Make-Up Pond C, re-alignment of an existing transmission line, re-alignment of SC 329, and improvements of the railroad spur crossing of London Creek downstream from the Make-Up Pond C dam (Figure 3.1-7).



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Site Layout

FIGURE 3.1-1 Rev 2



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
Project and Study Area

FIGURE 3.1-7 Rev 0

3.2 REACTOR POWER CONVERSION SYSTEM

There are no revisions associated with Make-Up Pond C in this section.

3.3 PLANT WATER USE

Subsection 3.3, Plant Water Use, page 3.2-5, 4th paragraph

Figure 3.3-1 is a water balance summary for Lee Nuclear Station Units 1 and 2. Table 3.3-1 provides estimates of water use and blowdown discharged. The blowdown discharges upstream of the Ninety-Nine Islands Dam. Average and maximum water consumption is given in Table 2.3-14 along with mean annual and Federal Energy Regulatory Commission (FERC) minimum stream flowrates. Monthly stream flow values are given in Table 2.3-3 for USGS station ~~02152551~~ 02153551 on the Broad River below Ninety-Nine Islands Reservoir~~Cherokee Falls~~.

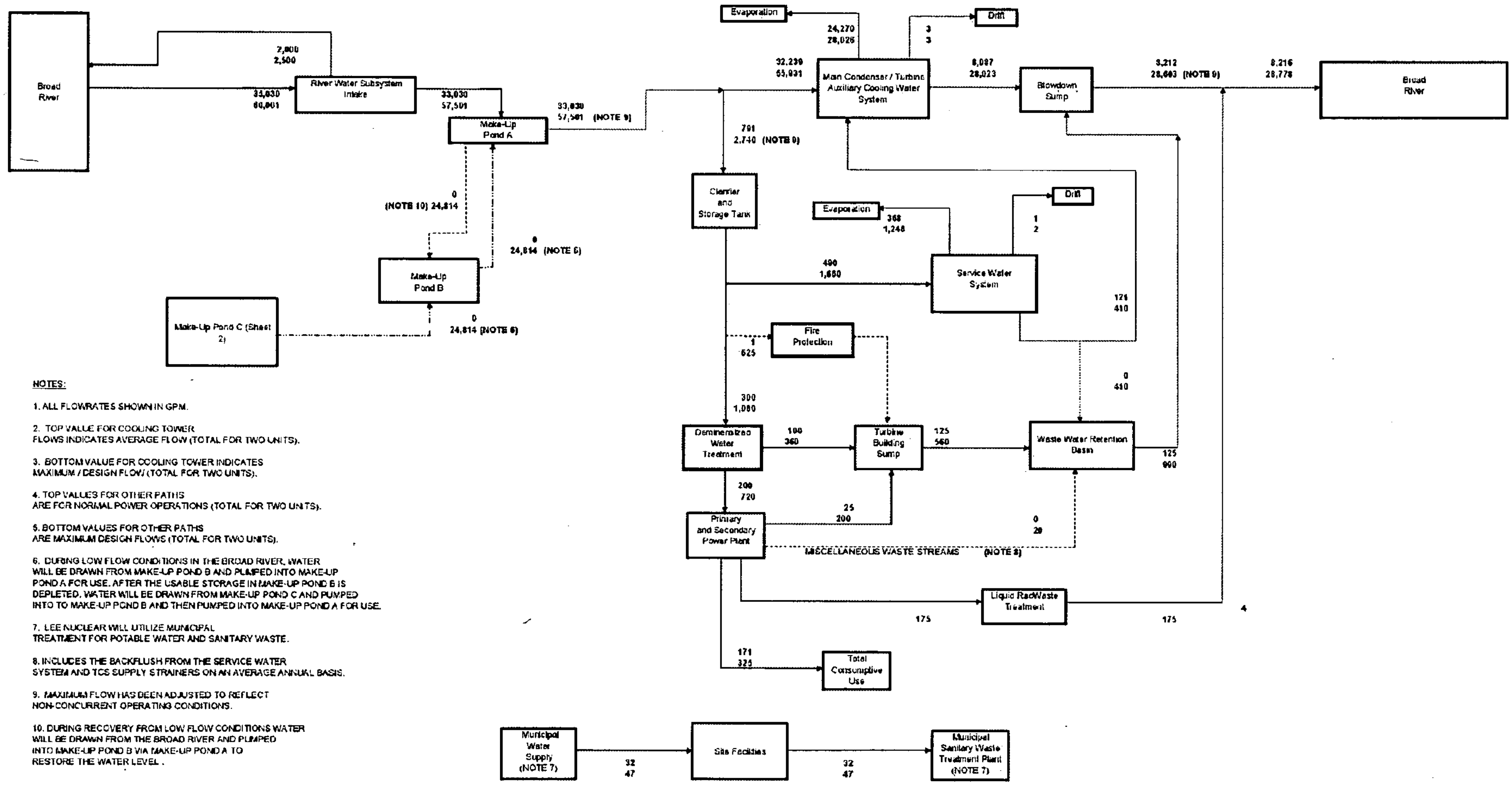
3.3.1 Water Consumption

Subsection 3.3.1.1, Raw Water Sources, page 3.3-1:

Waste heat is transferred from the main condenser to the atmosphere through the circulating water system (CWS). Make-up water from the Broad River is used to replenish water losses due to evaporation, drift and blowdown. Flowrates are as shown on Figure 3.3-1 and are tabulated in Table 3.3-1. During periods of low flow~~when Broad River flow is below the Federal Energy Regulatory Commission (FERC) minimum release value of 483 cfs for Ninety-Nine Islands Hydroelectric Station~~, make-up water is supplied by ~~the~~ one onsite pond~~s~~ (Make-Up Pond B) and one off-site pond (Make-Up Pond C). Make-Up Pond A is reserved for normal plant shutdown and maintaining plant in a shutdown condition. A discussion of operations during periods of low flow is presented in Subsection 5.3.1.1.3. Cooling tower blowdown is routed along the reservoir side of the Ninety-Nine Islands Dam and discharged upstream of the dam.

3.3.2 Water Treatment

There are no revisions associated with Make-Up Pond C in this section.



NOTES:

1. ALL FLOWRATES SHOWN IN GPM.

2. TOP VALUE FOR COOLING TOWER FLOWS INDICATES AVERAGE FLOW (TOTAL FOR TWO UNITS).

3. BOTTOM VALUE FOR COOLING TOWER INDICATES MAXIMUM / DESIGN FLOW (TOTAL FOR TWO UNITS).

4. TOP VALUES FOR OTHER PATHS ARE FOR NORMAL POWER OPERATIONS (TOTAL FOR TWO UNITS).

5. BOTTOM VALUES FOR OTHER PATHS ARE MAXIMUM DESIGN FLOWS (TOTAL FOR TWO UNITS).

6. DURING LOW FLOW CONDITIONS IN THE BROAD RIVER, WATER WILL BE DRAWN FROM MAKE-UP POND B AND PUMPED INTO MAKE-UP POND A FOR USE. AFTER THE USABLE STORAGE IN MAKE-UP POND B IS DEPLETED, WATER WILL BE DRAWN FROM MAKE-UP POND C AND PUMPED INTO TO MAKE-UP POND B AND THEN PUMPED INTO MAKE-UP POND A FOR USE.

7. LEE NUCLEAR WILL UTILIZE MUNICIPAL TREATMENT FOR POTABLE WATER AND SANITARY WASTE.

8. INCLUDES THE BACKFLUSH FROM THE SERVICE WATER SYSTEM AND TCS SUPPLY STRAINERS ON AN AVERAGE ANNUAL BASIS.

9. MAXIMUM FLOW HAS BEEN ADJUSTED TO REFLECT NON-CONCURRENT OPERATING CONDITIONS.

10. DURING RECOVERY FROM LOW FLOW CONDITIONS WATER WILL BE DRAWN FROM THE BROAD RIVER AND PUMPED INTO MAKE-UP POND B VIA MAKE-UP POND A TO RESTORE THE WATER LEVEL.

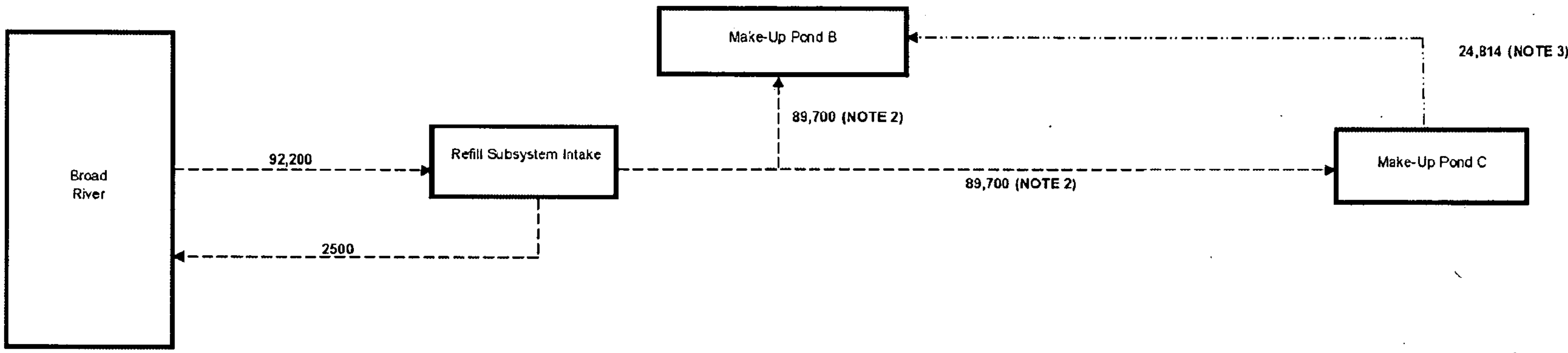
LEGEND

- Normal Flow
- Flow Dependent on System Alignment
- Broad River Low Flow Condition
- Alternate Flow
- High Flow Condition on the Broad River

WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Water Balance Summary
For Annual Average and
Maximum Cases

FIGURE 3.3-1 - Sheet 1 of 2 Rev 1



NOTES:

1. All FLOW RATES SHOWN IN GPM.

2. DURING RECOVERY FROM LOW FLOW CONDITIONS WATER MAY BE DRAWN FROM THE BROAD RIVER AND PUMPED INTO MAKE-UP POND B AND /OR C TO RESTORE WATER LEVEL.

3. WATER WILL BE DRAWN FROM MAKE-UP POND C AND PUMPED INTO MAKE-UP POND B TO RESTORE LEVEL.

WILLIAM STATES LEE III NUCLEAR STATION UNITS 1 & 2
Water Balance Summary For Make-Up Pond B and C Refill Operation FIGURE 3.3-1 - Sheet 2 of 2 Rev 1

3.4 COOLING SYSTEM

3.4.1 Description and Operational Modes

Subsection 3.4.1.1.1, Raw Water System, page 3.4-2, 2nd paragraph:

At times of low river flow in the Broad River, water can be ~~proportionally~~ withdrawn from the ~~onsite~~ make-up ponds to augment make-up water from the river. This is a backup supply of make-up water for the CWS, SWS, DWS, and fire protection system~~.~~ (Reference 4).

3.4.2 Component Descriptions

Subsection 3.4.2, Component Descriptions, page 3.4-5, 1st paragraph:

Lee Nuclear Station is designed with an intake system which supplies the necessary water to the plant from the Broad River and when needed from Make-Up Ponds B and C. The intake system includes the river intake structure, Make-Up Pond A intake structure, ~~and~~ Make-Up Pond B intake structure, Make-Up Pond C intake structure, Make-Up Pond A, Make-Up Pond B, and Make-Up Pond C. The intake system will comply with Section 316(b) requirements. The location of the intake and discharge structures~~system~~ for Make-Up Ponds A and B is illustrated in Figure 3.1-1. This system is described in Subsection 3.4.2.1 and (Reference 4). The location of the intake/discharge structure for Make-Up Pond C is illustrated in Figure 3.1-7.

Subsection 3.4.2.1, Intake System, page 3.4-6, 1st paragraph:

The intake system consists of the river intake structure, the Make-Up Pond A intake structure, the Make-Up Pond B intake structure, the Make-Up Pond C intake structure, Make-Up Pond A, ~~and~~ Make-Up Pond B, and Make-Up Pond C. The general site location of the on-site intake system is shown in Figure 3.1-1. The location of the intake structure for Make-Up Pond C is illustrated in Figure 3.1-7. A cross-section of the intake system is illustrated in Figure 3.4-1 and (Reference 4). Bathymetric data and water use data are provided in Section 2.3.

Subsection 3.4.2.1, Intake System, page 3.4-6, 3rd and 4th paragraph:

Sizing of the river intake screens provides for less than 0.5 feet per second (fps) through screen velocity ~~and a design flow no greater than 5 percent of the mean annual river flow~~. ~~The four (4) fourteen foot traveling screens provide for less than 0.5 fps through screen velocity. The USGS annual flow data for the Broad River was reviewed and the raw water requirement for the plant is less than 5 percent of the mean annual flow.~~ (Reference 4).

Operation during periods of low flow and use of Make-Up Ponds B and C are ~~is~~ discussed in Subsections 3.4.1.1.1 and 5.3.1.1.3.

3.4.3 References

There are no revisions associated with Make-Up Pond C in this section.

3.5 RADIOACTIVE WASTE MANAGEMENT SYSTEM

There are no revisions associated with Make-Up Pond C in this section.

3.6 NONRADIOACTIVE WASTE SYSTEMS

There are no revisions associated with Make-Up Pond C in this section.

3.7 POWER TRANSMISSION SYSTEM

There are no revisions associated with Make-Up Pond C in this section.

3.8 TRANSPORTATION OF RADIOACTIVE MATERIALS

There are no revisions associated with Make-Up Pond C in this section.

4 ENVIRONMENTAL IMPACTS OF CONSTRUCTION

4.0 ENVIRONMENTAL IMPACTS OF CONSTRUCTION

4.1 LAND USE IMPACTS

Section 4.1, Land Use Impacts, page 4.1-1

The following subsections describe the effects of site preparation and construction to the Lee Nuclear Site and the surrounding area. **Subsection** 4.1.1 describes effects to the site and vicinity. **Subsection** 4.1.2 describes impacts to land use during construction of transmission lines, Make-Up Pond C, and other off-site facilities. **Subsection** 4.1.3 describes effects to historic properties at the site and along transmission corridors, Make-Up Pond C, and other off-site facilities.

4.1.1 The Site and Vicinity

Subsection 4.1.1.2, The Vicinity, page 4.1-2, 1st paragraph:

Land use in the vicinity of the Lee Nuclear Site is described in detail in **Subsection** 2.2.1.2 and is shown in **Table** 2.2-1 and **Figure** 2.2-2. Adverse effects to land use in the vicinity of the site are confined to reactivation of the rail spur, impacts to the roads during construction, impacts connected with construction of electric transmission lines, and impacts associated with the construction of Make-Up Pond C and its associated facilities (see **Subsection** 4.1.2). Impacts associated with the reactivation of the rail spur and construction of transmission lines are discussed in **Subsections** 4.1.3.2.2 and 4.1.2.1, respectively. Impacts associated with the construction of Make-Up Pond C and associated facilities are discussed in **Subsection** 4.1.2.2.

Subsection 4.1.1.2, The Vicinity, page 4.1-3, last paragraph in section:

Construction effects to land use in the vicinity of the Lee Nuclear Site are associated with the following (see **Subsection** 4.1.2):

- the realignment of SC 329
- the addition of a new transmission line and a rerouted transmission line for Make-Up Pond C
- the addition of new 230-kV and 525-kV transmission lines
- construction of Make-Up Pond C and associated pipelines, and an expanded box culvert at the railroad spur crossing of London Creek
- rehabilitation of the railroad spur

~~The only construction effects to land use in the vicinity of the Lee Nuclear Site are expected from the new transmission line corridors and the reclaimed railroad spur.~~ No additional land is expected to be required for the Lee Nuclear Station. ~~Transmission line corridors are discussed in Subsection 4.1.2.~~ The railroad spur is designated as an abandoned railroad; however, its status change to an active railroad spur is not a significant land-use change (Reference 4). The construction of Make-Up Pond C requires approximately 1,900 ac of land, which will be converted and/or isolated. No other land-use changes in the vicinity are expected. ~~While the impacts of construction of the transmission line corridors is not known at this time,~~ ~~the~~ The overall effect of construction on land use in the vicinity of the site is expected to be MODERATE, due to the extent of land that will be converted and/or isolated, affecting potential development in the area. ~~SMALL based on minimal impacts to local transportation systems, pipelines, National Wild and Scenic Rivers, and other federal projects.~~

4.1.2 Transmission Corridors and Off-Site Areas

Subsection 4.1.2, Transmission Corridors and Off-Site Areas, page 4.1-3, INSERT NEW TEXT before 1st paragraph:

The following subsections describe impacts to land use during construction of transmission line corridors (Subsection 4.1.2.1) and during construction of Make-Up Pond C (Subsection 4.1.2.2).

NEW SUBSECTION 4.1.2.1, Transmission Line Corridors, page 4.1-3:

This heading should be inserted immediately following the 4.1.2 heading and newly inserted text. The existing text will comprise the text for this new subsection.

NEW SUBSECTION 4.1.2.2, Make-Up Pond C, page 4.1-4:

Make-Up Pond C and its associated facilities will also be constructed to support the plant. Approximately 620 ac of land will be cleared and inundated. Currently the inundation area is comprised mostly of forest (70 percent) and pasture (17 percent). A 300-ft natural vegetated buffer surrounds Make-Up Pond C with the exception of 50 ft along the shoreline, which is cleared and grubbed. Temporary structures related to construction include contractor offices, mechanic's shop, and laydown areas. The construction of Make-Up Pond C requires some land for spoil and mulch areas, as non-merchantable timber cleared from the site will be mulched (Figure 4.1-2). Construction activities also affect some local transportation facilities, which are discussed in Subsection 4.4.1.3.

Current land use in the Make-Up Pond C study area is primarily forested and pasture. Other uses include open development, water, grassland, cropland, and shrub/scrub. In addition to the inundation area and 50 ft buffer, portions of this land will be converted as ROW for the pipeline, transmission lines, and SC 329.

Within the Make-Up Pond C study area, there is approximately 260 ac of prime farmland and farmlands of statewide importance. Of these 260 ac, approximately 20 ac is converted to water as a result of the inundation of Make-Up Pond C, and approximately 40 ac is part of the 300 ft buffer surrounding Make-

Up Pond C. All of this land will be isolated and not available as farmland. The construction of the pipeline requires the permanent clearing of approximately 60 ac of land for ROW use. This conversion/isolation of land to construct Make-Up Pond C will cause a MODERATE effect to the land use both within the study area and on a site and vicinity scale. The land currently supports residences, which will be removed. Impacts to residences are discussed in Subsection 4.4.2.4.

4.1.3 Historic Properties

Subsection 4.1.3.2, Transmission Corridors and Off-Site Areas, page 4.1-8:

Construction of the Lee Nuclear Station includes the construction of two transmission lines, ~~and~~ construction of a railroad spur from East Gaffney to the Lee Nuclear Site, and construction of Make-Up Pond C and its associated facilities. This subsection addresses the effects of construction on historic properties within the transmission corridors, ~~and~~ railroad spur right-of way (ROW), and Make-Up Pond C project area.

Subsection 4.1.3.2.2, Railroad Spur, pages 4.1-8 and 4.1-9, 2nd and 3rd paragraphs:

The two ~~only~~ exceptions to this are ~~is~~ the box culvert expansion at the London Creek crossing, and the approximately 1,300 ft of new rail bed and track required to detour the railroad spur at the location of Reddy Ice, an ice manufacturing and distribution plant on the west end of the railroad bed (see **Subsection** 2.5.3.8.2). The current railroad route crosses the driveway to the ice plant. As part of the right-of-way agreement, Duke Energy and the owner have agreed to detour the route to a new path just north of the main ice plant buildings.

~~Duke Energy plans to conduct a Phase I intensive survey to better assess previous construction effects on historic properties in the ROW and to identify any additional historic properties that might be present. When the results of the survey are available, the effects of the railroad construction on historic properties can be assessed. Any identified mitigation measures are reviewed and approved by the SHPO.~~ In November 2007, Brockington and Associates, Inc., conducted an intensive cultural resources survey of the proposed railroad corridor that will serve the Lee Nuclear Station. The archaeological survey did not identify any sites or isolated finds that lie within the APE of the corridor, and there are no architectural resources near the corridor. The SHPO concurred that the proposed railroad line will not affect any historic properties (see Appendix B).

NEW SUBSECTION 4.1.3.2.3, Make-Up Pond C, page 4.1-9:

Historic properties in the Make-Up Pond C and their eligibility are described in **Subsection** 2.5.3.8.3 While the Service Family Cemetery (38CK142) is likely to be determined not eligible for the NRHP, relocation of cemeteries subject to inundation are governed by the state law (49 SC Code §9-10).

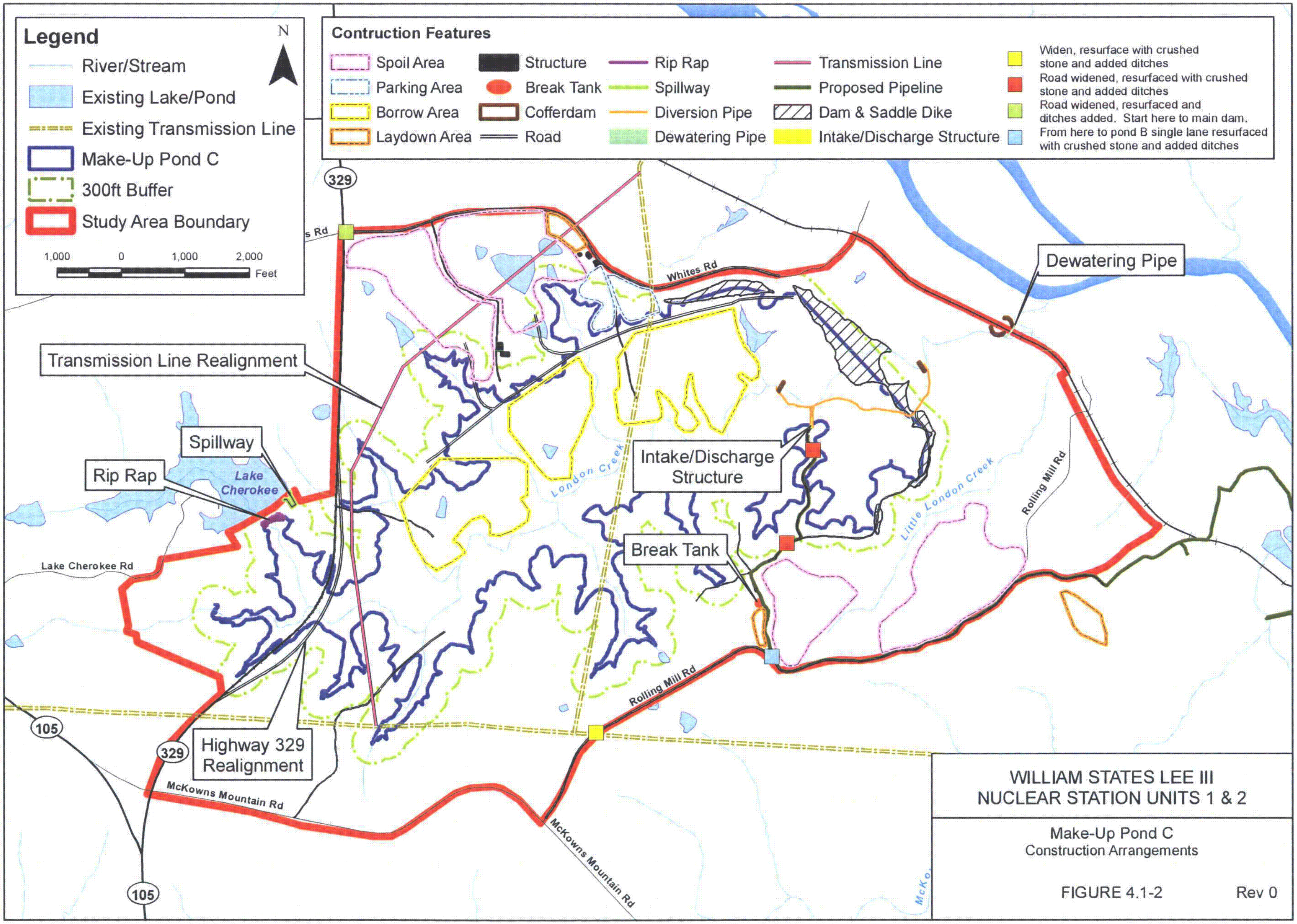
Based on its lack of historic significance and intended relocation, the effects of construction on historic properties within the Make-Up Pond C area are SMALL.

Subsection 4.1.3.3, Inadvertent Discoveries During Construction, page 4.1-9, 1st Paragraph

If artifacts, features, or human remains are encountered inadvertently during construction of the Lee Nuclear Station and Make-Up Pond C, an event considered unlikely, Duke Energy plans to stop work immediately in the area of the discovery and contact the SHPO in accordance with Duke Energy procedures.

4.1.4 References

There are no revisions associated with Make-Up Pond C in this subsection.


Legend
River/Stream
Existing Lake/Pond
Existing Transmission Line
Make-Up Pond C
300ft Buffer
Study Area Boundary
1,000 0 1,000 2,000 Feet
N
Contruction Features
Spoil Area
Parking Area
Borrow Area
Laydown Area
Structure
Break Tank
Cofferdam
Road
Rip Rap
Spillway
Diversion Pipe
Dewatering Pipe
Transmission Line
Proposed Pipeline
Dam & Saddle Dike
Intake/Discharge Structure
Widen, resurface with crushed stone and added ditches
Road widened, resurfaced with crushed stone and added ditches
Road widened, resurfaced and ditches added. Start here to main dam.
From here to pond B single lane resurfaced with crushed stone and added ditches
Transmission Line Realignment
Spillway
Rip Rap
Lake Cherokee
Lake Cherokee Rd
Whites Rd
Dewatering Pipe
Intake/Discharge Structure
Break Tank
London Creek
Little London Creek
Rolling Mill Rd
Highway 329 Realignment
McKowns Mountain Rd
329
105
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Make-Up Pond C
Construction Arrangements
FIGURE 4.1-2
Rev 0

4.2 WATER-RELATED IMPACTS

Section 4.2, Water-Related Impacts, page 4.2-1, 4th paragraph:

Duke Energy has selected the Westinghouse AP1000 certified plant design for the Lee Nuclear Station. The proposed AP1000 units, referred to as Units 1 and 2, are rated at 3,400 megawatts thermal (MWt), with a net electrical output of at least 1,000 megawatts electrical (MWe) DCD-Rev 17 (**Reference** 2). The units use mechanical-draft cooling towers for circulating water system and service water system cooling, with make-up water coming from the Broad River and potentially from the Make-Up Pond B and/or the Make-Up Pond C during low-flow conditions. The Units 1 and 2 elevations are currently set at 590 feet (ft.) above mean sea level (msl). An extensive site stormwater system is expected to be installed as part of the construction of Units 1 and 2.

Section 4.2, Water-Related Impacts, page 4.2-1, INSERT NEW TEXT at end of section:

Make-Up Pond C Area

Make-Up Pond C involves construction activities in previously undisturbed areas in the London Creek watershed. A description of Make-Up Pond C is in **Subsection** 2.3.1.2.3.1.

Potential water-related impacts of constructing Make-Up Pond C result from a number of land disturbing activities associated with the impoundment and related structures. These include: (1) foundations for the dam and dikes, (2) borrow and spoil areas, (3) spillway, (4) site access and haul roads, (5) construction support areas, (6) reservoir clearing, (7) pipeline from Broad River, including the pipe bridge over the Make-Up Pond B discharge (downstream of spillway), (8) highway bridge for SC 329, and (9) railroad spur rehabilitation and culvert expansion at the London Creek crossing. Most of the area impacted for reservoir construction is under the dam and Make-Up Pond C footprint. Construction of the railroad spur culvert expansion at the London Creek Crossing includes measures to avoid construction-related impacts in waters of the U.S.

The first of two potential water quality-related impacts of Make-Up Pond C construction is sediment entering London Creek and moving downstream into the Broad River, Ninety-Nine Islands Reservoir, and its associated backwaters. The second is possible construction equipment oil and fuel spills being washed into London Creek and flowing downstream into the Broad River. All Make-Up Pond C construction activities in the London Creek watershed include erosion control and spill prevention measures as required by SCDHEC and the USACE. The potential water-related impacts within the site and vicinity associated with the construction of Make-Up Pond C are SMALL, considering the hydrology of London Creek.

4.2.1 Demolition Activities Prior to Construction

Subsection 4.2.1, Demolition Activities Prior to Construction, page 4.2-2, INSERT NEW TEXT at end of section as a new paragraph:

Demolition activities associated with the construction of Make-Up Pond C include the removal of eighty-six residences. All state, county, and local regulations are followed in the demolition of these residences.

4.2.2 Hydrologic Alterations

Subsection 4.2.2, Hydrologic Alterations, page 4.2-3, 1st paragraph:

The Lee Nuclear Site is not located in the 100-year floodplain or the 500-year floodplain for the Broad River. The safety-related facilities, systems, and equipment are expected to be housed in structures that provide protection from potential flooding. The toe of the Make-Up Pond C dam falls within the 100-year floodplain for the Broad River (Figure 4.2-1).

Subsection 4.2.2, Hydrologic Alterations, page 4.2-3, INSERT NEW TEXT at end of section:

Make-Up Pond C Area

The Make-Up Pond C impoundment is maintained at operating level (elevation ±650 ft msl) by pumping from the Broad River and flow from London Creek. The initial filling of Make-Up Pond C is with water from the Broad River.

The groundwater table currently intercepts the ground surface along London Creek and its flowing tributaries within the watershed. During filling of Make-Up Pond C, there will be a period of "leakage" from the pond to previously unsaturated surrounding soil. As previously unsaturated soils become saturated, the groundwater table will rise to intercept the ground surface at or near full pond elevation ±650 ft msl. This will result in shallower groundwater gradients from the groundwater divides at the watershed boundaries to the pond edges.

Groundwater levels near the perimeter of the Make-Up Pond C watershed, where groundwater is recharged solely by precipitation, are not largely affected by construction and filling of Make-Up Pond C. A projection of this future groundwater condition is represented in Figure 2.3-39.

During the construction of Make-Up Pond C, impacts to wetlands may occur as a result of draining and inundating activities. Stream diversions around construction sites at the dam, at the railroad culvert, and at the new highway bridge will temporarily drain wetlands in the construction areas. Where possible, these wetlands are expected to be restored after construction is complete. The dewatering pumps around the dam foundation will lower the phreatic surface locally during construction, which may impact wetland areas in the vicinity. The Make-Up Pond C dam foundation fills any wetlands in the dam footprint area and permanently inundates any wetlands in the reservoir area. The removal of a number of small farm ponds on the tributaries that flow into Make-Up Pond C will also drain the wetlands around the perimeters of these ponds. The construction of cofferdams may temporarily inundate wetlands upstream. New wetlands may be created by the pool of the Make-Up Pond C reservoir.

London Creek flow is diverted (i.e., blocked by cofferdams and pumped) around the dam foundation area so that downstream flow is not interrupted during the construction of Make-Up Pond C. After the dam is completed, London Creek's flow downstream of the dam is completely interrupted while the reservoir is filled. The duration of this flow interruption will vary with the pumping rate. At a pumping rate of 125 cfs Make-Up Pond C fills in approximately 90 days. However, when Make-Up Pond C is full and the phreatic line in the dam and abutments is elevated, the stream below the dam is fed by groundwater and dam seepage as well as from dam and abutment surface runoff.

Figure 2.3-32 shows the location of the dam and other earth embankments constructed for Make-Up Pond C. The aerial extent of current wetlands inundated by the construction of Make-Up Pond C is discussed in Subsection 4.3.1.2.3.2. Due to the intermittent nature of stream flows in London Creek, the hydrologic impacts to wetlands are expected to be SMALL depending on hydrologic conditions during construction.

Subsection 4.2.2.1, Intake Construction, page 4.2-3, 1st paragraph:

Water intakes are expected to be constructed at the Broad River~~,~~ and Make-Up Pond A, with combined intakes/discharge structures in Make-Up Pond B, and Make-Up Pond ~~B~~C. Cofferdams are expected to be built to isolate the intake and/or the combined intake/discharges ~~construction areas~~ from the river and ~~ponds~~ in Make-Up Pond A and Make-Up Pond B, allowing water to be removed for excavation work. ~~Dry access would be created to construct the intake structures.~~ Partially weathered rock, soil, and sediment ~~would~~ will be removed, classified, and delivered to an on-site stockpile or spoils area on the south side of the site toward McKowns Mountain Road (on-site) or north side of Rolling Mill Road (off-site). Rock may be delivered to a crusher for use in on-site non-engineered fill operations. Unsuitable fill materials would be segregated from general fill materials within this on-site stockpile.

Subsection 4.2.2.1, Intake Construction, page 4.2-3, last paragraph:

At Make-Up Pond A, the existing intake structure and remains of the existing water treatment plant would be removed. Approximately 40,000 cu. yd. of materials would also be removed. At Make-Up Pond B, the existing nuclear service water intake inlet box and a portion of the existing steel intake pipes would be removed and disposed of off-site. Approximately 72,000 cu. yd. of material, mostly partially weathered rock, would be removed for construction of this intake structure. Cofferdams would be placed within both Make-Up Ponds A and B to allow localized dewatering during construction of the intake~~s~~ structure in Make-Up Pond A and the combined intake/discharge structure in Make-Up Pond B.

Subsection 4.2.2.1, Intake Construction, page 4.2-4, INSERT NEW TEXT before last paragraph of section:

At Make-Up Pond C the single intake/discharge structure serves to receive water from the Broad River and pump water between Make-Up Pond B and Make-Up Pond C. Construction of the intake structure in Make-Up Pond C prior to filling eliminates the potential for hydrologic impact. The intake/discharge structure is connected by buried piping as discussed in Subsection 4.2.2.4.3.

Subsection 4.2.2.4, Construction of Rail Line, page 4.2-4, RENAME HEADING TO Off-Site Construction, and INSERT NEW TEXT:

In addition to the expected hydrological impacts of on-site construction activities, there are hydrological impacts associated with necessary off-site construction activities. These potential impacts are discussed in the following subsections.

INSERT NEW SUBSECTION 4.2.2.4.1, Rail Line Improvements, page 4.2-5, above existing Construction of Rail Line text, INSERT NEW TEXT following existing paragraph:

During construction of Make-Up Pond C, the hydraulic capacity of the existing London Creek culvert under the rail line is improved by replacing it with a larger culvert. During construction of the new culvert, the stream flow is diverted around the construction area per SCDOT and SCDHEC BMP. After construction, the stream channel will be restored. Placement of excavated material on top of the rail embankment reduces potential hydrologic impacts by avoiding placement in sensitive areas such as wetlands. The potential water-related impacts associated with the culvert expansion of the rail line at the London Creek crossing are expected to be SMALL, due to the isolation of construction activities within existing right of way and use of cofferdams and other streamflow diversionary measures.

NEW SUBSECTION 4.2.2.4.2, Highway Bridge Construction, page 4.2-5:

Construction of Make-Up Pond C requires the re-route of SC 329 and a new highway bridge over the reservoir. Extensive earthwork is necessary prior to bridge construction activities. Some of the removed material may be suitable for dam construction, and some may be spoiled outside the Make-Up Pond C footprint. All spoil areas will be managed in accordance with SCDHEC's BMPs for erosion and sediment control (Reference 3). Cofferdams and diversions route existing flow around the excavation area, and following bridge construction, the former stream channel is inundated by an arm of Make-Up Pond C. The potential water-related impacts associated with the construction of the new highway bridge are expected to be SMALL during construction, and minor in comparison to the normal pool inundation of Make-Up Pond C, discussed in Subsection 4.2.2.

NEW SUBSECTION 4.2.2.4.3, Pipeline and Transmission Line Construction, page 4.2-5:

An on-site/off-site pipeline from the Broad River Intake to Make-Up Pond C (Figure 4.2-2) will require conventional trenching on the site and along upland areas and roadways. The length of the pipe route is approximately 2.5 miles. Construction impacts are generally confined to a 150-ft-wide area along the route of the pipe. An additional length of pipe connects Make-Up Pond B to the Broad River intake structure. A portion of the pipeline runs underground, and a portion is aboveground. The pipeline follows existing roadways to the extent possible and crosses no wetlands. The minimal construction-related hydrologic impacts associated with installation of the pipeline, primarily potential erosion and runoff during rainfall, are temporary and SMALL. Following construction the right-of-way is stabilized and restored. An electric transmission line runs from the existing 44-kV line to Rolling Mill Road and then follows the same route as the pipeline to the Make-Up Pond C pumps. All work is performed using best management practices for erosion and sediment control, in compliance with SCDHEC regulations (Reference 3).

Subsection 4.2.2.7, Effects of Alterations on Water Users, page 4.2-5, last paragraph:

~~Potable water for use during construction, including temporary fire protection, concrete batching, and other construction uses, is supplied by the Draytonville Water District.~~

Subsection 4.2.2.7, Effects of Alterations on Water Users, page 4.2-6, INSERT NEW TEXT at end of section:

The effects of dewatering the foundation area of the Make-Up Pond C dam during construction are localized. As the filling of Make-Up Pond C progresses, there is a gradual rise of the phreatic surface in the immediate area of the new reservoir. These effects are local, and wells within 1 mile may experience an increase in water levels as Make-Up Pond C fills.

Since the flow from London Creek (estimated 7 cfs) is less than 0.3 percent of the Broad River flow (estimated 2,500 cfs), construction of Make-Up Pond C should have no measurable impacts on downstream Broad River water users.

Subsection 4.2.2.8, Effects of Alterations on Terrestrial or Aquatic Ecosystems, page 4.2-6, INSERT NEW TEXT at end of section:

Construction related terrestrial impacts of Make-Up Pond C are associated with the potential loss of wetlands due to filling, inundating, or draining activities (Subsection 4.3.1.2.3.2). Construction related aquatic impacts of Make-Up Pond C include the temporary interruption of flow in London Creek below the dam. Similar temporary dewatering impacts are likely to occur to wetlands downstream of the rail spur crossing of London Creek during construction of the expanded culvert. These impacts are discussed in Section 4.2, Subsection 4.2.2, and Section 4.3. Other minor construction impacts are discussed in

Subsection 4.2.2.4. Best management practices will be employed to ensure that off-site construction impacts (sediment or contamination) are minimized.

Subsection 4.2.2.9, Construction Stormwater Control and Other Minimizing Actions, page 4.2-7, revise paragraph after bullet list:

~~Of importance is the fact that m~~Much of the Lee Nuclear ~~proposed new~~ site footprint is located within areas where construction was previously completed and established stormwater drainage systems and roadways exist.

Subsection 4.2.2.9, Construction Stormwater Control and Other Minimizing Actions, 4.2-7, INSERT NEW TEXT at end of section:

All Make-Up Pond C construction activities in the London Creek watershed are similarly governed by NPDES permit requirements as discussed above, including limitations on releases of sediment or oil contaminants and development and implementation of the construction SWPPP. Construction activities in other areas (railroad right-of-way, highway right-of-way) have erosion control measures installed for the duration of land disturbing activities and impacts will be SMALL.

4.2.3 Water Use Impacts

Subsection 4.2.3.1, Water Sources for Construction, page 4.2-7, 1st sentence of 1st paragraph:

Duke Energy does not plan to use groundwater or surface water for on-site construction activities; however, surface water may be used for temporary fire protection. Water for ~~temporary fire protection,~~ concrete batching~~,~~ and other construction uses is expected to be obtained from the Draytonville Water District.

Subsection 4.2.3.1, Water Sources for Construction, page 4.2-8, INSERT NEW TEXT at end of section:

The principal use of water during construction of Make-Up Pond C is for spray application to haul and access roads for dust control, adding water to the fill material placed on the dam embankment to achieve the specified compaction, and irrigating newly grassed embankment surfaces to establish vegetative cover to stabilize the slope. The pools formed behind cofferdams (surface water) are a good source of construction water. Groundwater will not be utilized during construction. Water is brought over from the main Lee Nuclear Station construction site out of Make-Up Pond B for non-potable uses. All potable water is supplied from the existing Draytonville Water System. As noted in **Subsection 4.4.2.3**, the increase in population during construction is expected to be a maximum of 185 workers with a potential regional population increase of 226 people. This increase is not substantial enough to result in an increase in the potable water consumption estimates presented above.

Subsection 4.2.3.2, Surface Water-Use Impacts, page 4.2-8, INSERT NEW TEXT at end of section:

During Make-Up Pond C construction activities, as described in Subsection 4.2.3.1, there may be periods when construction and/or filling activities consume the flow of London Creek, and there may be times when dewatering flow augments London Creek. Since the flow of London Creek is very small compared to the magnitude of flows in the Broad River as described in Subsection 2.3.1.2.1.3, potential impacts to downstream water users should be very SMALL. Make-Up Pond C will be initially filled during high flow conditions and therefore impacts to the Broad River would be minimal.

Subsection 4.2.3.3, Groundwater-Use Impacts, page 4.2-8, 2nd paragraph:

Dewatering of the excavation during construction of on-site facilities and the resultant cone of depression due to pumping are expected to temporarily affect groundwater flow in the vicinity of the excavation. The dewatering associated with the removal of Cherokee Unit 1 provides an experience based example of the impacts to groundwater from excavation dewatering. This ongoing experience at the on-site demolition project has shown that the dewatering has had a minor impact on groundwater in the immediate vicinity of the excavation. Once the dewatering drawdown was achieved for site characterization and demolition, maintenance dewatering flow was the result of rainwater collecting in the excavation and groundwater inflow. These low groundwater inflows are expected to be similar for other excavations on the Lee Station site because the soils on site generally have very low permeability. Therefore the extent of dewatering impacts on groundwater resources is anticipated to be SMALL and limited to the immediate area around the excavation of on-site facilities.

Subsection 4.2.3.3, Groundwater-Use Impacts, page 4.2-9, INSERT NEW TEXT at end of section:

In the Make-Up Pond C construction area, dewatering of the dam foundation may temporarily affect groundwater levels and flow in the immediate vicinity of dam construction. Anticipated low soil permeability similar to the soils on the main Lee Nuclear Station construction site will limit the extent of groundwater impacts to the immediate area around the dam foundation and are therefore anticipated to be SMALL. Groundwater is not used for construction of the Make-Up Pond C.

Potable water wells located north of Whites Road near Grace Road and along Old McKowns Farm Road and Fawn Trail may experience an increase in water levels during filling of Make-Up Pond C. These wells may also experience some temporary increase in turbidity as groundwater levels rise during the filling of Make-Up Pond C. These conditions should quickly dissipate after steady state conditions are reached. The increase is from increased regolith storage and/or hydraulic communication between fractures intercepted by the wells and Make-Up Pond C. No effects from construction are expected to potable water wells further northwest of Make-Up Pond C as they are located topographically up-gradient and beyond Make-Up Pond C headwaters.

Subsection 4.2.3.4, Measures to Mitigate Water Impacts, page 4.2-9, 1st paragraph:

Water use for new construction of the facility is temporary. Because most of the water needed for construction of on-site facilities is expected to come from the Draytonville Water District, the ultimate source of which is the Broad River, there are no expected long-term effects to the water supply or detrimental impacts that would affect any other user's consumption.

4.2.4 Water Quality Impacts

Section 4.2.4, Water Quality Impacts, page 4.2-9

Duke Energy has conducted aquatic ecosystem studies on the Broad River and London Creek and compared the findings with set standards for water quality management. In addition, ecological health of the water is monitored in the area around the Lee Nuclear Site (Subsection 2.3.3).

Subsection 4.2.4.1, Effluents to Surface Waters, page 4.2-10, INSERT NEW TEXT at end of section:

Rainfall runoff from the various off-site London Creek construction areas flow into settling basins prior to discharge, directly or indirectly, to London Creek. Discharges will be monitored in accordance with the requirements of the approved SWPPP and meet applicable NPDES and State water quality standards. Erosion control measures and sedimentation ponds reduce potential effects during construction; therefore, impacts are expected to be SMALL. The impact of potential increased sediment loads from the construction activity in London Creek on the Broad River will likely be detectable near the mouth of London Creek but would be SMALL on the Broad River downstream, as London Creek flows are very small relative to Broad River flows.

Subsection 4.2.4.3, Impacts to Groundwater Quality, page 4.2-10, INSERT NEW TEXT at end of section:

Impacts to groundwater quality from construction of the off-site Make-Up Pond C are limited to times when excavation occurs below the water table to construct the dams (e.g., routing of London Creek during dam construction, key trench installation, etc.). These impacts are relatively short-term and isolated. They are not expected to have significant influence on groundwater quality.

Impacts to groundwater during filling of Make-Up Pond C include leakage from the pond basin to groundwater within close proximity. Make-Up Pond C is filled with water pumped directly from the Broad River. In as much as Broad River surface water characteristics differ from groundwater characteristics in the proximity of Make-Up Pond C, these waters mix during the filling and operating periods. The impact of this mixing is SMALL.

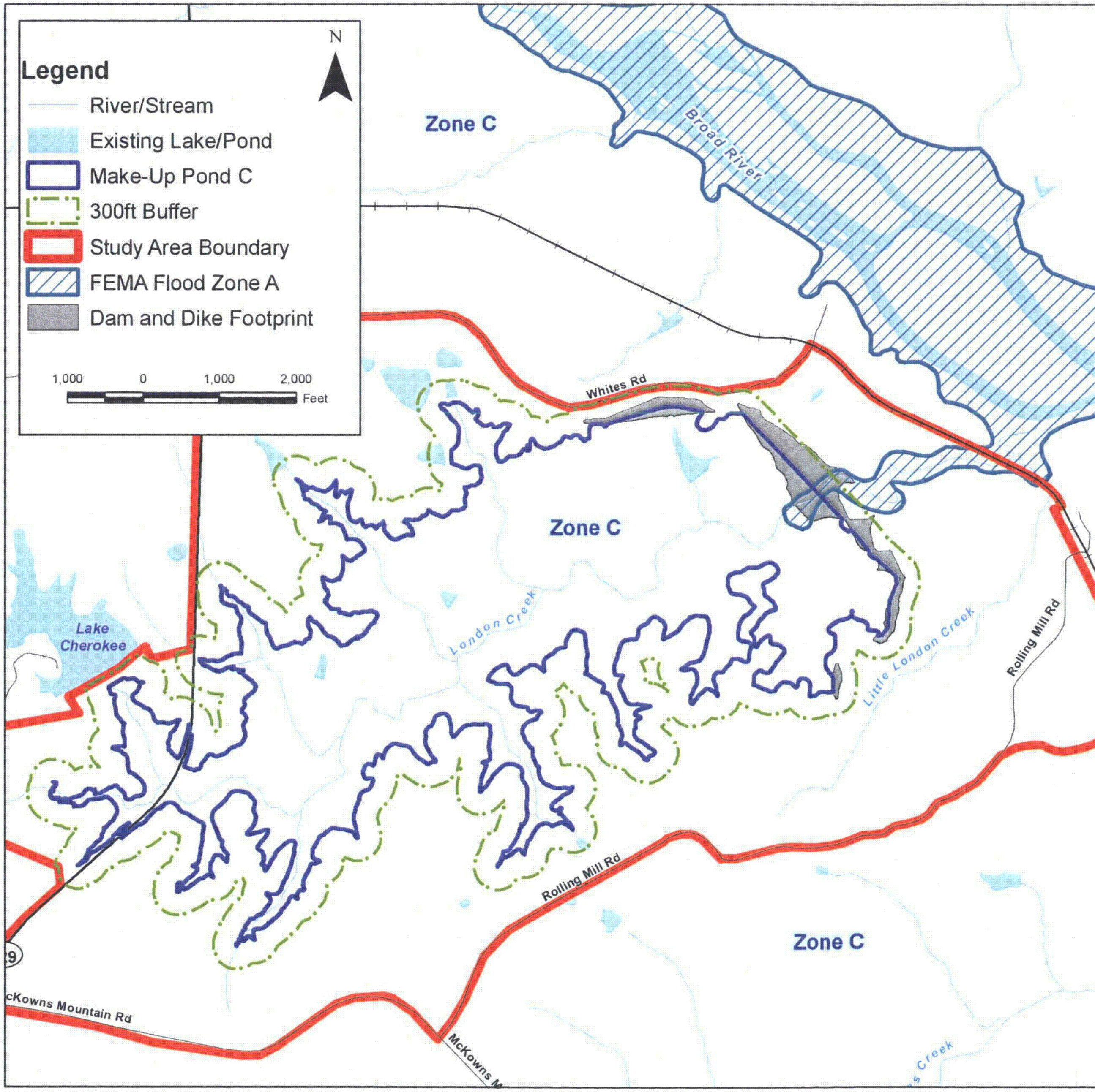
Subsection 4.2.4.4, Measures to Mitigate Water Quality Impacts, page 4.2-10, 1st paragraph:

All construction area runoff will be directed through the Make-Up Pond B, Make-Up Pond A, ~~or~~ Hold-Up Pond A, or ~~to~~ permitted temporary construction outfalls. The routing of runoff to these water bodies will achieve the necessary reduction in total suspended solids to meet state water quality discharge standards. Each discharge outfall will be equipped with an oil recovery boom in the event of an unanticipated discharge of oil or grease.

4.2.5 References

Subsection 4.2.5, References, page 4.2-11, INSERT NEW TEXT at end of section:

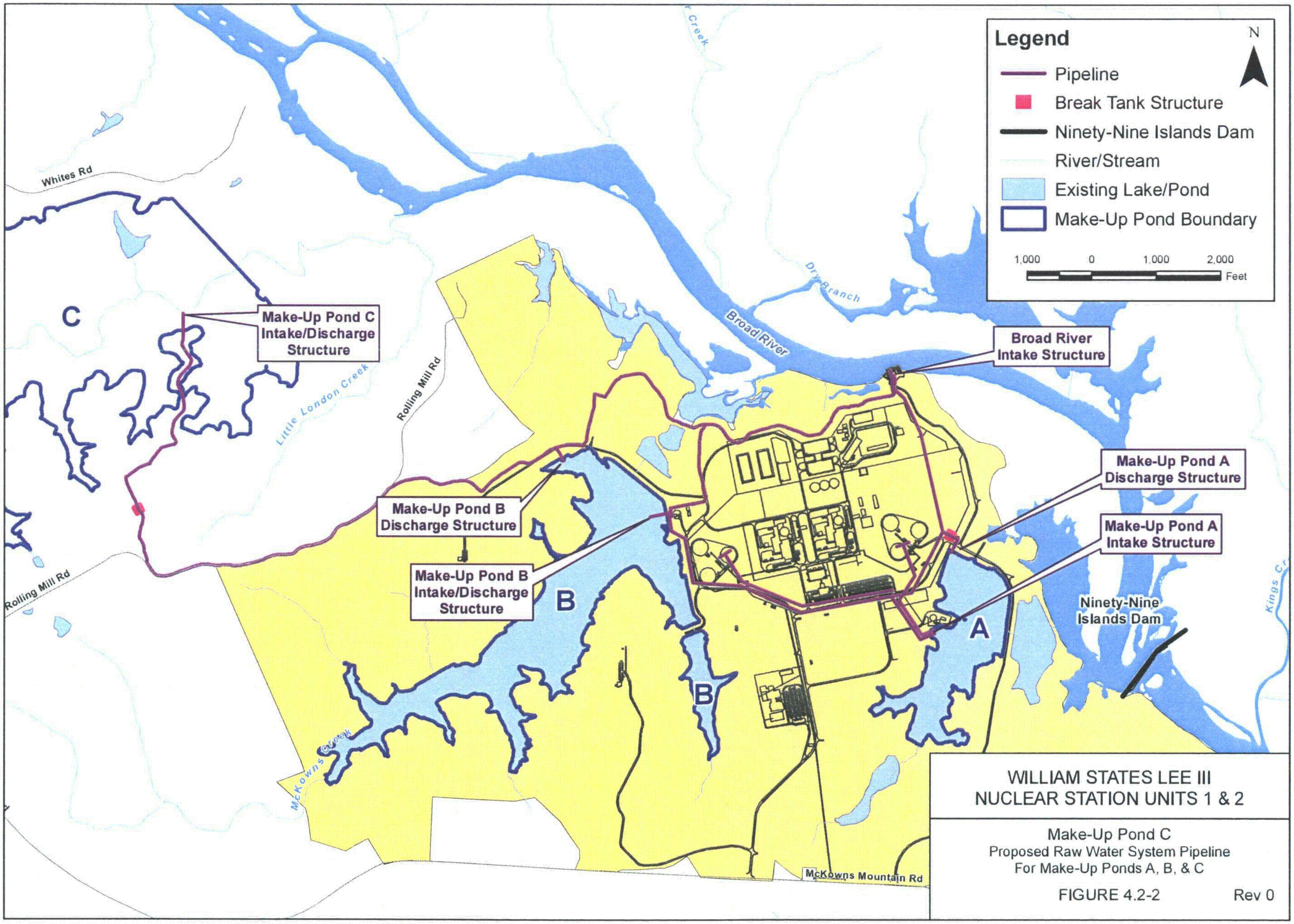
3. South Carolina Department of Health and Environmental Central. 1985. Erosion and Sediment Reduction and Stormwater Management Regulation. 72-101 through 72-108. June 28.



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
FEMA Flood Zone Map

FIGURE 4.2-1 Rev 0



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C
Proposed Raw Water System Pipeline
For Make-Up Ponds A, B, & C

FIGURE 4.2-2 Rev 0

4.3 ECOLOGICAL IMPACTS

4.3.1 Terrestrial Ecosystems

4.3.1.2, Off-Site Facilities, page 4.3-13, INSERT NEW TEXT following heading:

Construction impacts to terrestrial resources associated with off-site facilities, including the rail line, transmission lines, SC 329 realignment, and Make-Up Pond C (see Figure 4.3-3) are discussed in the subsections below.

Site preparation and construction activities in terrestrial habitats for off-site facilities, including Make-Up Pond C and its associated infrastructure include the following:

- Installing erosion and sediment control devices and practices.
- Clearing vegetation in the basin by harvesting merchantable trees and chipping non-merchantable material. No grubbing occurs within the proposed Make-up Pond C footprint, except for the removal of soil from borrow areas.
- Clearing and grubbing vegetation within 50 ft beyond full pool elevation and where areas must be cleared for construction.
- Demolishing residences in selected areas to prepare for construction.
- Disposing of vegetative debris by recycling the debris (mulching or chipping) and using the material for erosion control/landscaping purposes or selling it to the logging contractor for commercial purposes.
- Leveling the land by grading or filling as needed for areas such as new parking lots and internal roadways.
- Preparing temporary construction areas such as spoil, laydown, borrow, and field office areas.
- Constructing the dam embankment, water control structure, emergency spillway, saddle dike structures, and reservoir outfall; including flooding of terrestrial resources associated with the impoundment.
- Excavating and constructing pump/intake structure, break tank, buildings and other structural foundations.
- Excavating within borrow areas to supply fill material for the reservoir dam and saddle dikes.
- Clearing and grading associated with installation of the water pipeline, other station piping, and utility connections.
- Clearing and grading for installation of temporary logging roads.
- Installation of temporary culverts and other stream crossings.
- Disposing of spoil in locations both north and south of the proposed reservoir (but within the property boundaries).
- Pouring concrete foundations for permanent structures.

- Constructing buildings and other structures on the new foundations.
- Constructing a holding tank for sanitary facilities in the contractor's office area.
- Improving existing roadways by additional vegetative clearing along edges, grading, excavating road-side ditches, and placement of crushed stone.
- Constructing a bridge and new approaches to the bridge over London Creek during the realignment of SC 329.
- Removing the existing road surface of SC 329 after the new alignment and bridge is complete.
- Improving roadway to intake structure and installation of transmission line to intake pumps.
- Re-routing the existing 44-kV transmission line crossing the London Creek valley.
- Improving the rail line culvert crossing at London Creek, Little London Creek and associated tributaries.
- Final grading and application of erosion control grasses or other measures to permanently control erosion and runoff.
- Clearing for establishment of power transmission lines and minimal grading for construction of four tower locations along a relocated transmission easement.
- Installation of security measures, such as fences along the 300-ft buffer surrounding Make-Up Pond C, and other physical barriers along the perimeter of the property.

The total area of land to be disturbed during these activities is summarized in Table 4.3-2. Estimating the maximum area of soil to be disturbed at any time during construction depends on review of a detailed construction schedule that is not currently available.

INSERT NEW SUBSECTION HEADING: 4.3.1.2.1, Rail Line, page 4.3-13, before 6th paragraph

Subsection 4.3.1.2.1, Rail Line, page 4.3-13, INSERT NEW TEXT following 6th paragraph

Associated with the reactivation, additional terrestrial impacts are located where the railroad crosses over London Creek, Little London Creek and associated tributaries. Previously, London Creek flowed under the railroad through two, 10-ft-diameter culverts. In association with the construction of Make-Up Pond C, these culverts are removed and replaced with a large box culvert (i.e., four cell box culvert) that not only facilitates conveyance of London Creek waters to the Broad River but also provides a stable crossing for trains. The previous railroad bed was narrow and steep. Therefore, the repair and replacement of the culverts result in the proximate clearing of Mixed Hardwood (MH), Pine (P), and Mixed Hardwood-Pine (MHP) adjacent to the railroad embankment (Table 4.3-2). Temporary up- and downstream impacts to wetlands are due to stream diversions around the construction sites where the crossing is being upgraded. Due to the relatively small size of the area, impacts associated with the rail line crossings are considered to be SMALL.

INSERT NEW SUBSECTION HEADING: 4.3.1.2.2, Transmission Line, page 4.3-13, before 7th paragraph

Subsection 4.3.1.2.2, Transmission Line, page 4.3-13, INSERT NEW TEXT following 7th paragraph

A re-route of a 44-kV transmission line crosses Make-Up Pond C (Figure 4.3-3). This 100-ft wide easement requires the clearing of additional acres outside of Make-Up Pond C study area. Table 4.3-2 itemizes the impact quantities by cover type. Due to the small size of the area and the ability to avoid environmentally sensitive sites, impacts associated with the transmission line are considered SMALL.

INSERT NEW SUBSECTION, 4.3.1.2.3, Make-Up Pond C

Terrestrial ecological effects from constructing a new reservoir vary based on landscape perspective. Although clearing 600–700 ac for Make-Up Pond C is a LARGE impact at the London Creek watershed level, terrestrial impacts resulting from this project are considered MODERATE at the site and vicinity perspective. However, these impacts are SMALL at the regional level, primarily because the majority of terrestrial ecosystems that are present are considered typical for Piedmont forest stands and similar habitats are common within the region. Impoundment causes the permanent loss of approximately 620 ac of terrestrial habitat that is replaced with a lentic environment. The loss of terrestrial habitat affects a variety of cover types, including: Mixed Hardwood (MH), Mixed Hardwood-Pine (MHP), Open Areas, Fields and Meadows (OFM), Pine (P), Pine-Mixed Hardwood (PMH), and Upland Scrub (USC) (Table 4.3-2).

INSERT NEW SUBSECTION, 4.3.1.2.3.1, Terrestrial Vegetation

Botanical surveys identified seven terrestrial habitat types: 1) Mixed Hardwood (MH), 2) Mixed Hardwood-Pine (MHP), 3) Open Areas, Fields and Meadows (OFM), 4) Open Pine-Mixed Hardwood (OPMH), 5) Pine (P), 6) Pine-Mixed Hardwood (PMH), and 7) Upland Scrub (USC), (Figure 2.4-6, Table 2.4-12). Descriptions of habitat types are included in Subsection 2.4.1.1. Figure 4.3-3 is an overlay of construction impacts on the ecological type map. A total of 1053.4 ac of habitat in various ecological types have temporary and long-term alteration and loss, resulting from impacts such as clearing and flooding (Table 4.3-2).

Portions of all seven terrestrial community types are disturbed by construction of the reservoir and associated infrastructure. However, over half is in previously disturbed areas (Subsection 2.4.1.1.2), for example P, OFM, USC, and PMH (Table 4.3-2). Due to these existing conditions, reservoir development will not destabilize the diversity of plants and plant communities. Federal and state listed plants and plant species of concern are treated separately under Subsection 4.3.1.2.3.4.

The MH and MHP cover types are forests of higher quality habitat relative to other existing cover types; however, part of the MH cover type includes a cut-over mixed hardwood sub-type which is present in several large blocks occurring throughout the Make-Up Pond C study area (**Subsection** 2.4.1.1.2). Cumulatively, the MH and MHP cover types account for 47.4 percent of the cover in the Make-Up Pond C area (**Table** 2.4-12). Analysis indicates that approximately 527.5 ac, or 52.7 percent of these cover types are impacted during reservoir development (Table 4.3-2).

The MH cover type (**Subsection** 2.4.1.2) occupies 31.5 percent of the Make-Up Pond C study area. Approximately 308.5 ac of this cover type are impounded and approximately 5.6 ac are disturbed from reservoir infrastructure (i.e., dam and saddle dike footprints).

The MHP cover type (**Subsection** 2.4.1.3) occupies 15.9 percent of the Make-Up Pond C study area. Approximately 101.1 ac of this cover type are impounded and approximately 2.85 ac are disturbed from reservoir infrastructure (i.e., dam and saddle dike footprints).

Other cover types include P, PMH, USC, and OFM. These cover types occupy over 1089.2 ac or 51.6 percent of Make-Up Pond C study area. Analysis indicates that approximately 509.7 ac or 46.8 percent of these cover types are impacted during reservoir development (**Table** 4.3-2). Habitat quality in these cover types is relatively lower, due to intensive management from past silvicultural and agricultural activities. A small area of OPMH (**Subsection** 2.4.1.5), occurs near Rolling Mill Road (**Figure** 4.3-3). This cover type is disturbed from improvements to Rolling Mill Road. **Table** 4.3-2 provides quantities of impacts/disturbance to each of these areas, based on the nature of impact.

Merchantable timber occurs within areas of the MH, PMH, MHP, and P cover types. Prior to clearing, grading, and/or flooding activities, merchantable timber within marked areas of the reservoir boundary are harvested. Remaining trees are felled and chipped. Grubbing occurs within portions of Make-Up Pond C used as borrow areas. Locations outside of the borrow areas, but within the full-pool elevation are cleared of vegetation. The first 50 ft of the 300-ft buffer next to Make-Up Pond C are cleared, grubbed and grassed to prevent debris from washing into the impoundment and blocking the spillway. The remainder of the 300-ft buffer is left natural, but fenced. Within permanent facility footprints (other than the impoundment area), stumps, shrubs, and saplings are grubbed, and groundcover and leaf litter are cleared to prepare the land surface for grading.

The OFM cover type is comprised of pasture and open fields/meadows as well as linear segments such as utility ROWs (power transmission and distribution lines) and unimproved roads (**Subsection** 2.4.1.1.4). Much of the non-linear OFM areas are maintained as active cattle pastures or hay fields. The impoundment of the reservoir is impacting approximately 88.1 ac of the OFM cover type (**Table** 4.3-2).

The majority of the proposed pipeline that connects Make-Up Pond C to the existing Make-Up Pond B is installed along unimproved roads. Although the majority of the new ROW for this pipeline is placed within the footprint of existing roads, vegetation clearing occurs during construction and during routine line maintenance (**Figure** 4.3-3). In addition, an area located north of Rolling Mill Road, is cleared and graded for a break tank that is part of the water pipeline (**Figure** 4.3-3). The ROW for the water pipeline main is a 150 ft easement width. Impacted cover types in this ROW include OFM, MHP, USC, and P

(Table 4.3-2). The break tank impacts an area within the USC cover type. Refer to Table 4.3-2 for quantities of all impacts by cover type. Much of the impacts to the cover types from roads are minimal because the alignment was designed to follow existing roads. However, the road width increases and requires additional grading activities and excavation of roadside ditches. Following construction, the water pipeline ROW contains a gravel service road and vegetated areas. The vegetated areas are seeded with native grasses that provide wildlife habitat or other species that do not require fertilizer or other amendments. Following initial seeding, the disturbed area re-vegetates naturally with native herbaceous and small shrub species. Regeneration of trees and large shrubs are prevented by mechanical mowing, cutting, trimming, or herbicide application on the permanent ROW for the water pipelines. Precluding large shrubs and trees also establishes a permanent corridor that is maintained for safety and maintenance of the water pipeline.

A pump/discharge facility is at the terminus of the water pipeline. This facility, due to its location on relatively steep slopes, requires a substantial quantity of clearing in relation to the size of the facility. These facilities also require grading and excavation to provide a level building footprint and permanently established with a concrete foundation. The pump/discharge facility at Make-Up Pond C is located within the impact area for the road to Make-Up Pond C and therefore does not have an impact acreage entry in **Table 4.3-2**.

Temporary haul roads and paths are established to access Make-Up Pond C for clearing/logging purposes (**Figure 4.3-3**). These roads are abandoned upon completion of the clearing/logging activities. The acreage impacts to each cover type are provided in **Table 4.3-2**.

A road segment of SC 329 is realigned and a new bridge over London Creek is constructed (**Figure 4.3-3**). Once construction is complete, traffic is re-routed to the new alignment and the existing road surface is removed. Although much of the realignment is sited within Make-Up Pond C (where vegetation clearing has been discussed above), approximately 31.1 ac of impact occur outside of the footprint. The cover types and acres impacted by the realignment are provided in **Table 4.3-2**. Cover types of these areas are common on other properties in the vicinity and impacts to vegetation are expected to be SMALL.

Three temporary laydown areas store materials during construction (**Figure 4.3-3**). These areas are generally sited in habitat of relatively lower value. Clearing of vegetation occurs within these areas. The impact quantities for the laydown areas are provided in **Table 4.3-2**.

Three borrow areas are located north of London Creek and within the Make-Up Pond C full pool elevation (**Figure 4.3-3**). These areas impact the MH, MHP, OFM, and P cover types (**Table 4.3-2**). All vegetation within these areas is cleared and soils excavated used for site development.

The clearing of forest vegetation, has several secondary effects as discussed in detail in **Subsection 4.3.1.1.1**. These secondary effects occur along the water pipeline ROW and along the edges of Make-Up Pond C; however, long-term impacts are expected to be negligible.

All land clearing and erosion and sediment control techniques (**Subsection 4.3.1.1.1**) at Make-Up Pond C comply with Clean Water Act (CWA) Section 404 permits.

In summary, a significant quantity of vegetation clearing is included in construction of Make-Up Pond C, but overall habitat quality of these areas, especially the P, PMH, USC, and OFM vegetation types, has been reduced due to previous land use. In Make-Up Pond C study area 46.8 percent of impacts occur to the P, PMH, USC, and OFM cover types; 52.7 percent of the impacts occur to the MH and MHP cover types. Other than isolated fragments, the MH and MHP habitat types are dominated by mid-successional species and are not considered climax community forests. Because these habitats are regionally common, the loss of existing vegetation will not destabilize these resources. Nevertheless, the quantity of disturbance is significant. Therefore, effects on vegetation are considered MODERATE on a site and vicinity scale, although LARGE on the London Creek watershed scale.

INSERT NEW SUBSECTION, 4.3.1.2.3.2, Wetlands

Descriptions of wetlands in Make-Up Pond C are included in **Subsection 2.4.1.1.1**. Preliminary direct impacts to wetlands in the Make-Up Pond C study area are approximately 4.30 ac. This amount includes fill impacts such as the dam and saddle dike construction and flooding impacts from the impoundment of London Creek and associated tributaries (**Table 4.3-3**). During the construction of Make-Up Pond C, various indirect hydrologic impacts to wetlands could occur as a result of draining and inundating activities (**Subsection 4.2.2**). For instance, the construction of cofferdams may temporarily inundate wetlands upstream of the cofferdams. **Table 4.3-3** describes the wetlands nature of impact and quantity of impact. A small amount of new wetlands may be created by the pool of Make-Up Pond C reservoir and in tributaries of the reservoir (**Subsection 4.2.2**).

The wetland impacts described above are jurisdictional, meaning that they are wetlands under the legal jurisdiction of the USACE. The USACE regulates dredging, filling, or any other physical alteration (adverse modification) of such wetlands under the Section 404 permit program, pursuant to the federal Clean Water Act (**Reference 1**). Duke Energy's standard practices prohibit all dredge and fill activities within jurisdictional waters or wetlands without first obtaining the appropriate USACE permit.

The Section 404 permit issued by the USACE will specify any needed mitigation. In accordance with the terms of the Section 404 permit and its associated State 401 water quality certification, construction contractors are required to implement recognized good practices outlined in **Subsection 4.3.1.1.2**. In addition to federal and state permitting requirements, all work in regulated areas is performed according to BMPs or other conditions stated in the permit. Although each permit is site-specific, when construction occurs in proximity to jurisdictional waterways or wetlands, BMPs as outlined in **Subsection 4.3.1.1.2** are followed.

The referenced BMPs are employed near and adjacent to wetlands downstream of the dam location. However, all wetlands located within the reservoir dam and impoundment footprint are permanently altered. Proposed borrow areas are located within this footprint to minimize disturbance and impacts to wetlands and waters downstream of the dam.

No impacts to wetlands (outside of the reservoir, dam, and its associated buffer) are anticipated to occur from the water pipeline connecting Make-Up Pond B to Make-Up Pond C. The pipeline routing tends to follow ridgelines along unimproved roads for the majority of its path. This road is improved to a single lane road that is graded, shaped, and surfaced (crushed stone) with ditches.

Relative to other projects that are similar in nature, the total acreage of wetland disturbance is small. Wetlands found within the reservoir footprint are common to the Piedmont physiographic province. Therefore, the environmental effect on wetlands due to the construction of Make-Up Pond C is expected to be SMALL. Compensatory mitigation for direct impacts to wetlands will be provided with the Section 404 permit.

INSERT NEW SUBSECTION, 4.3.1.2.3.3, Wildlife

There are no designated wildlife sanctuaries, wildlife refuges, or wildlife preserves on or in the vicinity of Make-Up Pond C. There are no terrestrial habitats identified by state or federal agencies as unique, rare, or of priority for protection. There are no land areas identified as critical habitat for species listed as threatened or endangered by the U.S. Department of the Interior Fish and Wildlife Service. Make-Up Pond C does not represent a significant or important regional wildlife travel corridor. Thus, effects on important habitat are SMALL.

Direct mortality of common wildlife species could occur throughout different periods of construction at Make-Up Pond C. Construction machinery and vehicles sometimes collide with wildlife on construction sites as detailed in **Subsection** 4.3.1.1.3. Significant effects on wildlife populations are not anticipated from these activities because they are temporary. Construction operations can disturb and displace vagile wildlife as outlined in **Subsection** 4.3.1.1.3. However, disturbance and displacement are generally temporary and appropriate measures can be implemented to minimize detrimental effects. For example, temporary displacement of wildlife by fugitive dust can be minimized by watering access roads and cleared areas to attenuate fugitive dust. Highly mobile species including vertebrates such as large mammals, avian species, and some reptiles will respond to the disturbance by vacating the area. Other less mobile species such as burrowing mammals, amphibians, and some reptiles will be directly affected during site mobilization and ongoing construction. Construction within or near certain habitats, including those used for significant life history functions such as nesting, may result in a greater effect. Species restricted to single habitats and those with very small home ranges (e.g., some small mammals, amphibians, and reptiles) are most affected. For these species, clearing and grading reduces available habitat within the immediate area. Wildlife that uses several habitat types and species with larger home ranges are less affected by local habitat loss or alteration. These impacts would be largely limited to the actual construction period and are, therefore, temporary and SMALL.

Short-term and long-term impacts occur during and immediately following construction of the dam, saddle dikes, and associated permanent infrastructure within the construction footprint. Short-term impacts occur to various terrestrial vertebrates when impoundment displaces wildlife from their nesting and foraging habitat. Impacts from clearing, grading, excavating, burying, and/or flooding habitats within the Make-Up Pond C study area may lead to mortality of individual small mammals, reptiles, amphibians, invertebrates, nesting birds with eggs or young, and other less mobile species. Loss of individuals or numbers of common species would not have a destabilizing effect when evaluating the resource at the population or community level. Therefore, short-term impacts are SMALL. However, because of the permanent nature of the reservoir and its infrastructure, long-term impacts are inevitable. The impoundment of approximately 620 ac (**Table** 4.3-2) for Make-Up Pond C permanently alters the ecological community. Terrestrial and lotic communities within Make-Up Pond C are converted to a lentic community, and therefore these long-term impacts are MODERATE at the London Creek watershed level. From a site and vicinity perspective, impacts to wildlife are SMALL.

Flooding, due to impoundment, also has the potential for mortality; however, most vagile, terrestrial species have the opportunity to react to changing conditions and relocate to other areas due to the length of time expected for Make-Up Pond C to reach full-pool (**Subsection 4.2.2**). Large, medium, and some small mammals that have larger ranges and are mobile, can relocate to other suitable habitats in the vicinity, but may face relocation challenges due to mortality from road crossings, carrying capacity exceedances, and habitat fragmentation. Certain species having a spatially limited range (e.g., burrowing vertebrates (**Subsection 4.3.1.1.3**) may experience an inability to relocate to similar habitats in adjacent watersheds and are impacted. The estimated abundance and density of burrowing species as a whole at Make-Up Pond C is unknown. Mammal surveys at Make-Up Pond C (**Subsection 2.4.1.2.1**) observed low densities of small mammals, many of which make or utilize burrows. It is unlikely that loss of individuals or small groups of common mammals on the site would influence population levels in the general area. This impact is considered to be SMALL on populations of common terrestrial mammal species.

Herpetological surveys at Make-Up Pond C revealed (qualitatively) an abundance of terrestrial amphibians and reptiles that require stream/aquatic habitats during a portion of their life-cycle (**Subsection 2.4.1.2.3**). Flooding of riparian habitats and other direct impacts such as clearing, grading, excavating, and construction of permanent structures cause a significant reduction in resident amphibian and reptile populations. It is possible that some of these losses might be partially off-set due to an aquatic community being established in Make-Up Pond C; however, there would be a new species composition replacing the former community. Due to species being common and similar habitat existing in the vicinity, impacts to reptiles and amphibians are SMALL.

Impacts to shorebirds (**Subsection 2.4.1.2.2.1**) and colonial nesting birds (**Subsection 2.4.1.2.2.2**) are expected to be SMALL due either to generally low abundance on Make-Up Pond C, lack of habitat, high mobility, opportunistic use of a variety of habitats, and/or an abundance of required habitats in close proximity to Make-Up Pond C. Perching birds (**Subsection 2.4.1.2.2.4**), upland game birds (**Subsection 2.4.1.2.2.3**), birds of prey (**Subsection 2.4.1.2.2.5**), and woodpeckers (**Subsection 2.4.1.2.2.6**) were relatively common on the site and/or had species assumed to be nesting on the site. Due to the clearing of the entire reservoir footprint, there will be loss of breeding sites in the affected area. Potential impacts to nesting birds during construction are outlined in **Subsection** 4.3.1.1.3. Planning for dam and associated construction activities for Make-Up Pond C to occur outside of the avian breeding/nesting period would minimize mortality. If impacts occur, they are experienced at the level of the individual or small groups of individuals. The likelihood that such losses on the site would influence population levels in the region is negligible. If clearing activities occur outside the breeding period as recommended, this is considered to be a SMALL impact on populations of common bird species.

The forest clearing required for the construction of Make-Up Pond C changes the amount of forest edge, interior habitat and local vegetative structure that currently exists. Seven different vegetative cover types exist within Make-Up Pond C. Impoundment and dam construction significantly reduce the acreage of MH, MHP, and OFM cover types. These cover types are minimally represented in other areas of the reservoir property. Consequently, the effects of construction may significantly lower the overall carrying capacity of the site for wildlife that relies on these habitats, but construction has no significant effect on wildlife beyond the site. Aerial and satellite photographs indicate that the cover types identified within Make-Up Pond C are common in adjacent watersheds. Thus, the overall effect of the project on common wildlife species of the type now occupying the site is SMALL.

An accidental release of sediments or chemicals (including petroleum products), could occur during the construction project and would have consequences to wildlife. This risk would be minimized by the measures outlined in **Subsections** 4.2.2.9 and 4.3.1.1.3 (e.g., the Stormwater Pollution Prevention Plan [SWPPP] and the Spill Prevention, Control, and Countermeasure [SPCC] Plan). An example of such a measure would include locating equipment maintenance in an established yard away from wetlands and water. Therefore, serious releases or spills represent a SMALL potential adverse impact to wildlife.

INSERT NEW SUBSECTION, 4.3.1.2.3.4 Species of Special Interest

Important terrestrial species of special interest are defined in **Subsection** 4.3.1.1.4. The general construction impacts of Make-Up Pond C, as discussed in preceding subsections, also apply to endangered and threatened wildlife and to other species of special interest. However, because the distributions and abundance of most threatened and endangered species are limited or in decline, any construction effects whether direct or indirect could have a greater effect on the size or viability of these populations than on populations of non-endangered or non-threatened species. In addition, habitat availability is usually a limiting factor for species of special interest, and the short- or long-term loss of suitable habitat can contribute to the decline of populations. Further, direct short-term effects, such as mortality and displacement, can be much more severe than with other more common species because mortality of individuals can have a significant effect on the total population. Displacement from suitable to less suitable habitats in surrounding areas may also decrease reproductive success and individual survival.

Surveys of Make-Up Pond C found a small population of Georgia aster (federal candidate species, state species of concern) along a power line right-of-way, which is part of the OFM cover type (**Figure 4.3-3**). Clearing and flooding impacts from the proposed reservoir project occur in this area. Since this is a candidate species with poor viability (**Subsection** 2.4.1.3.1.1) but it is impacted, the significance is SMALL with mitigation. The impact could be mitigated through possible relocation. The botanical survey also recorded the presence of the state species of concern Southern adder's tongue fern, drooping sedge, Southern enchanter's nightshade, and single-flowered cancer root (**Subsection** 2.4.1.3.1.1). Locations of these species are depicted in **Figure** 4.3-3. As depicted in this figure, all species and their respective populations are adversely affected by the impoundment of the reservoir; however, impacts could be mitigated through possible relocation. These species are generally rare in South Carolina, but are not imperiled or vulnerable range-wide; therefore, the effect on these species is considered SMALL.

Surveys for mammals found no federally listed or federal and state species of concern occurring in the Make-Up Pond C study area (**Subsection** 2.4.1.3.1.2). The southeastern myotis (federal and state species of concern) and the hoary bat (state species of concern), could potentially occur in Make-Up Pond C; however, the bats would likely avoid active construction sites. If present the bats would probably forage along the Broad River and possibly Make-Up Pond C, once constructed. As with other bats, the echo-location capability of the species helps to avoid collisions with man-made and other objects that might occupy or be constructed on the site. Accordingly, the possibility of adversely affecting these species is SMALL.

Surveys for birds found no federally listed or federal species of concern occurring in Make-Up Pond C (**Subsection** 2.4.1.3.1.3). Although they were not documented, the American kestrel and loggerhead shrike (federal species of concern) potentially occur in the vicinity of Make-Up Pond C. Both birds actively forage in open cover types such as the OFM areas that occur on the north side of Make-Up Pond C. Loss of OFM habitat would have an effect on these species' foraging opportunities; however, OFM habitat (e.g., 50 ft buffer around Make-Up Pond C) is created as a result of construction activity. Two additional species of federal and/or state interest were recorded for Make-Up Pond C during the surveys, bald eagle (state endangered and federally protected under the Bald and Golden Eagle Protection Act [BGEPA]) and black-throated green warbler (state species of concern) (**Subsection** 2.4.1.3.1.3). Though recorded during the field surveys, the bald eagle was not observed nesting in the study area and the black-throated green warbler was not considered to be breeding in the study area. Like the bat, these bird species are mobile and would likely move to undisturbed habitat nearby during construction. Proposed impacts to these species are expected to be SMALL.

Surveys for reptiles and amphibians found no federally listed or federal species of concern occurring in the Make-Up Pond C study area. The northern cricket frog and pickerel frog (state species of concern) were observed in the Make-up Pond C study area (**Subsection** 2.4.1.3.1.4). Unlike other species discussed above, these frogs are not highly mobile. The northern cricket frog is typically confined to small, shallow ponds and pools of water or slow-moving streams, especially during the breeding season (**Reference** 2). The pickerel frog's preferred habitat varies regionally ranging from mountain streams to coastal plain bogs (**Reference 2** and **Reference 3**). Suitable habitats for both species are found throughout the reservoir footprint. The habitats for both species are permanently altered during clearing and reservoir flooding. Nevertheless, the expansion of a lentic environment with shallow edges may increase the pickerel frog's current habitat. The global status of the northern cricket frog and pickerel frog is secure (**Subsection 2.4.1.3.1.4**). Long-term impacts to the amphibian species mentioned above are expected to be SMALL. The canebrake rattlesnake is a state species of concern that was not observed, but it is probable that this species occurs in the area (**Subsection 2.4.1.3.1.4**). The scarlet kingsnake-milksnake and pine snake are state species of concern and potentially occur in the Make-Up Pond C study area (**Subsection 2.4.1.3.1.4**). Construction of Make-Up Pond C would likely affect any potential resident populations of these three reptile species, but their mobility lowers the adverse effect to these species. Long-term impacts to the reptile species mentioned above are expected to be SMALL.

The NRC also includes as important species those that are essential to the maintenance and survival of species that are rare or commercially or recreationally valuable. No species of special interest that possibly occur or do occur on Make-Up Pond C have clearly established and essential trophic relationships to any other specific species. Thus, the possibility that Make-Up Pond C construction affects any essential species is SMALL.

Forests at Make-Up Pond C with timber are commercially harvested during the construction period to clear the basin for Make-Up Pond C. The type of commercial timber is common in, and around Lee Nuclear Station and associated properties. The Make-Up Pond C timber resource is not essential to maintaining commercial timber harvest opportunities immediately adjacent or elsewhere in the area. Pasture grasses (**Subsection 2.4.1.1.4**) were established in select areas at the Make-Up Pond C for commercial purposes. The type of commercial pasture grass cultivation found is common in, and around Lee Nuclear Station and associated properties. The pasture grass resource is not essential to maintaining commercial grass harvest opportunities immediately adjacent or elsewhere in the area. The loss of pasture grass cultivation and timber harvest opportunities in Make-Up Pond C represents a SMALL economic effect.

Duke Energy prohibits any commercial and recreational trapping and recreational hunting that might have occurred on Make-Up Pond C in the past by local residents. The recreational hunting species of interest such as deer, rabbits, squirrels, and game birds may be readily hunted elsewhere in the area. Species of commercial or recreational trapping value include furbearers such as beaver, bobcat, fox, coyote, opossum, raccoon, otter, mink, weasel, striped skunk, and muskrat. Many of these species are common and potentially occur or have been observed on Make-up Pond C. These species are disturbed or their patterns disrupted by the development. However, Make-Up Pond C and associated facilities may be attractive to many of these species and long-term effects are minimal as their movement patterns along the Broad River would not be impeded. Discontinuing the hunting and trapping opportunities on Make-Up Pond C is not essential to maintaining recreational hunting and trapping opportunities on adjacent properties under private control. This represents a SMALL effect on recreational hunting and trapping opportunities previously available to local residents.

The NRC also includes as important species those that are critical to the structure and function of the local terrestrial ecosystem or those that serve as bioindicators. Salamanders, through information such as species tolerance ratings, trophic guild structure, and bioassessment scores, can serve the function of biological indicators. The wetland breeding marbled salamander and spotted salamander were found during site surveys (**Subsection** 2.4.1.2.3). These species could serve as bioindicators and are affected by construction.

Because of the wide variety of ecological communities within the region, the abundance of individual species, especially plants, can vary significantly from location to location where different species serve similar ecological roles in the community. Accordingly, there is no evidence suggesting that any individual species at Make-Up Pond C is critical to structure or function at the ecosystem level or that any adverse effect occurs at that level.

4.3.2 Aquatic Ecosystems

4.3.2.2, Off-Site Facilities, page 4.3-20, INSERT NEW TEXT following heading:

Construction impacts to aquatic resources associated with off-site facilities, including the rail line, transmission lines, and Make-Up Pond C (see **Figure** 4.3-4) are discussed in the subsections below.

In addition to activities listed under **Subsection** 4.3.1.2, site preparation and construction activities in aquatic habitats for off-site facilities, including Make-Up Pond C include the following:

- Constructing a dam across London Creek.
- Impounding London Creek and its associated tributaries.
- Constructing new pump stations and intake/discharge facility at Make-Up Pond C.
- Breaching, draining, and filling and/or excavating open water areas (farm ponds) and associated removal of fish from these features in the Make-Up Pond C study area.
- Improving the rail line culvert crossing at London Creek, Little London Creek and associated tributaries.

INSERT NEW SUBSECTION HEADING, 4.3.2.2.1, Rail Line, before 6th paragraph, page 4.3-20

Subsection 4.3.2.2.1, Rail Line, page 4.3-20, INSERT NEW TEXT following 6th paragraph:

London Creek, Little London Creek, and associated tributaries are temporarily impacted due to improving the rail line culvert crossings; however, there are no direct, permanent impacts to jurisdictional areas (Tables 4.3-3 and 4.3-4). Temporary up- and downstream impacts to these creeks occur due to stream diversions around the construction sites where the crossing is being upgraded. In addition, the steep slopes and narrow footprint of the railroad require temporary disturbance for equipment to access the area. This increases the potential for downstream turbidity and sedimentation within London Creek and

Little London Creek. This component of the project is subject to applicable permitting requirements and Best Management Practices (**Subsection** 4.3.1.1.1) to reduce and/or eliminate sediment downstream and to protect downstream water quality. Impacts to aquatic ecosystems resulting from this activity include temporary drying of the streambed and resulting loss of benthic macroinvertebrates, fish, and larval salamanders at the railroad crossing. However, since this activity is temporary, the footprint is narrow and the crossing is being improved (i.e., increasing the hydraulic capacity), the overall impact to aquatic ecosystems is SMALL. The CWA Section 404 permit process will address impacts and compensatory mitigation, as applicable.

INSERT NEW SUBSECTION HEADING, 4.3.2.2.2, Transmission Line, before 7th paragraph, page 4.3-20

Subsection 4.3.2.2.2, Transmission Line, page 4.3-20, INSERT NEW TEXT following 7th paragraph:

A rerouted 44-kV transmission line crosses Make-Up Pond C (**Figure** 4.3-4). This 100-ft wide easement requires crossing several unnamed tributaries and impoundments. **Table** 4.3-4 and **Table** 4.3-5 quantify the impact. Due to the small size of the area and the ability to avoid environmentally sensitive sites, impacts associated with the transmission line are considered SMALL.

INSERT NEW SUBSECTION, 4.3.2.2.3, Make-Up Pond C, following Subsection 4.3.2.2.2 page 4.3-20

Aquatic habitats in Make-Up Pond C study area are described in **Subsection** 2.4.2.1 and were generally characterized as non-significant in a regional context. Like effects on wildlife and terrestrial plants, effects on aquatic resources are evaluated based on whether they are temporary, short term, or long term. Three major groups of aquatic organisms are typically included: aquatic plants, benthic macroinvertebrates, and fish. Construction of Make-Up Pond C impacts impoundments and streams. Wetland impacts are discussed in **Subsection** 4.3.1.2.3.2. The aquatic ecological effects from constructing Make-Up Pond C are LARGE at the London Creek watershed level and MODERATE at the site and vicinity level. These impacts are subject to compensatory mitigation as required in association with CWA Section 404 permitting and State 401 water quality certification in addition to generally accepted measures employed during construction.

No commercial or recreational fishing currently occurs in London Creek. As a result, there is no impact to a recreational fishery as a result of construction.

INSERT NEW SUBSECTION, 4.3.2.2.3.1, Existing Impoundments

Existing impoundments (farm ponds) within the Make-Up Pond C study area are affected by the project (**Table** 4.3-4). **Figure** 4.3-4 shows the location of these impoundments. The extent of fishery resources in these areas is currently unknown (**Subsection** 2.4.2.2.2). These impoundments are breached and drained as part of construction of Make-Up Pond C. Clearing and breaching of the impoundment dams are performed during dry periods to prevent excess sedimentation and erosion from impacting downstream of the dams. All fish in the ponds are removed. Benthic macroinvertebrates and aquatic plants are displaced. Ponds within the full pool elevation are flooded from the impoundment and ponds outside of the full pool elevation are cleared of remaining debris/vegetation and revegetated with herbaceous vegetation (erosion control and permanent grasses). Some of the ponds are used as storage for organic debris during construction. Others are used as spoil areas. Ponds within the reservoir footprint have organic material removed prior to impoundment. All of the aquatic resources associated with the existing farm ponds are replaced by resources associated with Make-Up Pond C. Because these systems are small, man-made, and likely have limited aquatic resources, the ecological impacts associated with this activity are considered SMALL.

INSERT NEW SUBSECTION, 4.3.2.2.3.2, Streams

The majority of aquatic impacts associated with the construction of Make-Up Pond C occur on London Creek and its tributaries (**Table** 4.3-5, **Figure** 4.3-4). Refer to **Subsection** 2.4.2.1.4 for a description of London Creek and its tributaries. Descriptions of the fisheries and benthic macroinvertebrates of London Creek are included in **Subsection** 2.4.2.2.3 and **Subsection** 2.4.2.3, respectively. Very limited aquatic vegetation exists within London Creek. Any impacts to aquatic vegetation are expected to be SMALL.

London Creek and its tributaries experience a variety of impacts and disturbances based on duration. Temporary, short-term, and long-term impacts occur as a result of the dam construction and impoundment.

Temporary impacts occur to streams at temporary logging road crossings and where existing roadways are improved by additional vegetative clearing along edges, grading, excavating road-side ditches, and placement of crushed stone. Clearing, grubbing and grading have the potential to introduce sediment into streams, which could lead to degraded water quality for benthic macroinvertebrates and fish. Equipment disturbance around construction areas could also provide a temporary impact to streams. Temporary impacts may also occur from leaks and spills of petroleum products during construction activities. The spill prevention plan for this project and other procedures to minimize the potential for spills are outlined in **Subsection** 4.3.1.1.1. Erosion and sedimentation impacts are minimized through the installation of appropriate BMP measures (**Subsection** 4.3.1.1.1). All Make-Up Pond C construction activities are included in the Stormwater Pollution Prevention Plan (SWPPP) and the Spill Prevention, Control, and Countermeasure (SPCC) Plan, so that no sediment or contaminants leave the site in excess of National Pollutant Discharge Elimination System (NPDES) permit levels. Therefore, the temporary impacts to London Creek described above are considered SMALL.

Short-term impacts occur from the clearing of vegetation within the full pool elevation and the first 50 feet of the 300-ft buffer around Make-Up Pond C (**Table** 4.3-5, **Figure** 4.3-4). Water temperature is expected to increase in the stream above and below the dam construction site due to the clearing of riparian vegetation, thus removing shading from the creek. Increased water temperatures decrease the capacity for water to hold dissolved oxygen. Lower dissolved oxygen concentrations generally have negative effects on benthic macroinvertebrates and fish. Removal of vegetation may reduce input of woody debris and leaf litter, which alter channel structure and carbon source, respectively (Reference 4). Alterations in channel structure and carbon source may impact benthic macroinvertebrates and fish. A realignment of a road segment of SC 329 and construction of a new bridge over London Creek are a short-term impact to London Creek (Table 4.3-5). Short-term construction activities such as clearing, grading, and paving have the potential to increase stream water temperatures and introduce sediment to London Creek. Much of the realignment is sited within Make-Up Pond C, which is inundated. Another short-term impact occurs during construction when London Creek flow is diverted (i.e., blocked by cofferdams and pumped) around the dam foundation area so that downstream flow will not be interrupted (Table 4.3-5). These diversions temporarily drain a portion of London Creek in the construction areas. Impacts to the diverted stream sections include displacement of fish from habitats and localized loss of benthic macroinvertebrates. All of these short-term impacts are expected to be SMALL due to their short duration and they can be minimized through use of BMPs.

Long-term impacts occur during site preparation, fill placement, and construction of permanent structures, such as the dam embankment, water control structure, emergency spillway, saddle dike structures, reservoir outfall, pump/intake structure, break tank, buildings and other structural foundations (Table 4.3-5 and Figure 4.3-4). A portion of the London Creek stream channel is filled for the dam and associated structures (Table 4.3-5). Demolition occurs in selected areas to prepare for construction. Impacts from fill activities and permanent structures include loss of benthic macroinvertebrates and some fish. However, there is the potential that a small number of fish could relocate downstream while the stream is diverted around the construction area.

The long-term impoundment of London Creek and associated tributaries at or below 650 ft mean sea level results in significant alteration. The total length of London Creek and associated tributaries to be impounded is included in Table 4.3-5. Upon completion of the dam, the existing streams are inundated and lose function as lotic systems. Stream flow morphology is also disrupted as flows are absent. The current lotic benthic macroinvertebrate and fish community that requires flowing stream conditions are eliminated. Most benthic macroinvertebrates and fish in London Creek are replaced by lentic species after impoundment.

Long-term impacts to London Creek and associated biota from fill, permanent structures, and impoundment are MODERATE at the site and vicinity scale and LARGE at the London Creek watershed scale. Stream impacts fall under the CWA 404 permitting process and require compensatory mitigation.

Long-term impacts to London Creek below the dam from construction include changes in hydrology and nutrient input (e.g., shift from allochthonous nutrient input to autochthonous input [Reference 4]). The resulting change in nutrient dynamics to downstream reaches changes the benthic macroinvertebrate community and other trophic associations within the section of stream before the confluence with the Broad River. These impacts are SMALL.

INSERT NEW SUBSECTION, 4.3.2.2.3.3, Species and Habitats of Special Interest

No aquatic federal or state-listed threatened, endangered, or species of concern are known or thought to potentially occur within the Make-Up Pond C study area. London Creek and its associated tributaries do not support rare and commercially or recreationally valuable aquatic species (Subsection 2.4.2.5). Therefore, adverse effects from this project are considered SMALL for aquatic species and habitats of special interest.

Important aquatic species also include those that are critical to the structure and function of the local ecosystem and those that are bioindicators of the health of local water bodies and streams. There is no evidence suggesting that an individual species is critical to structure or function at the ecosystem level. Fish and benthic macroinvertebrates, through information such as species tolerance ratings, trophic guild structure, and bioassessment scores, can serve the function of biological indicators (Subsections 2.4.2.2 and 2.4.2.3); however, changes in the type of fish and macroinvertebrate communities present (changes from lotic to lentic communities) do not affect the ability for these general resource groups to serve as bioindicators. Adverse effects to these groups are considered SMALL.

INSERT NEW SUBSECTION, 4.3.3. References, page 4.3-20

4.3.3 References

Subsection 4.3.3, References, page 4.3-20, INSERT NEW TEXT:

1. 33 USC 1344-Section 1344. 2008. "Permits for Dredged or Fill Material."

2. Mount, Robert H. 1975. The Reptiles and Amphibians of Alabama. University of Alabama Press. 92 pp.

3. University of Georgia Savannah River Ecology Laboratory. http://www.uga.edu/srelherp/anurans/ranpal.htm. (accessed February 9, 2009).

4. Allan, J.D. 1995. *Stream Ecology*, Kluwer Academic Publishers, The Netherlands.

TABLE 4.3-2
COVER TYPES IMPACTED DURING MAKE-UP POND C CONSTRUCTION

	Estimated Disturbed Acreage	OFM	P	PMH	USC	MH	MHP	OPMH	OW
Permanent Facilities									
Impoundment	618.58	88.13	104.44	9.91	1.06	308.53	101.11	-	5.41
Dam Footprint	14.92	0.62	6.64	-	-	4.81	2.85	-	-
Saddle Dikes	6.96	0.95	5.27	-	-	0.74	-	-	-
Pipeline	0.34	0.03	0.22	-	0.08	-	0.02	-	-
SC 329 – New Alignment	31.12	15.96	2.43	4.36	-	7.45	0.91	-	-
Pond C Pumphouse	-	-	-	-	-	-	-	-	-
Pipeline Break Tank	0.16	-	-	-	0.16	-	-	-	-
Transmission Line	18.45	7.17	1.66	2.36	-	5.19	0.23	-	1.84
Rail Line Crossings	4.74	-	1.86	-	-	1.67	1.21	-	-
Construction Period									
Heavy Haul Roads and Haul Paths	11.62	6.92	0.01	-	-	3.75	-	-	0.94
Parking	13.04	9.37	1.95	-	-	0.61	1.10	-	-
Laydown	4.78	3.21	-	-	1.04	-	0.53	-	-
Logging Roads	12.80	0.25	3.36	6.98	1.19	1.02	-	-	-
Borrow Area	7.67	4.15	0.65	-	-	1.70	1.17	-	-
Spoils Area	186.23	73.61	67.99	-	8.76	26.76	1.29	-	7.80
Field Office	0.11	0.11	-	-	-	-	-	-	-
Vegetation Clearing	72.67	6.80	14.89	4.71	-	30.66	15.61	-	-
Other									
BuckMill Road	4.88	0.82	3.96	-	-	0.07	0.04	-	-
Dewatering Pipe	0.03	-	-	-	-	0.03	-	-	-
Diversion Pipe	0.36	-	-	-	-	0.34	0.02	-	-
Grace Road	2.07	1.69	0.13	-	-	0.14	0.11	-	-
Mechanics Shop	0.17	0.17	-	-	-	-	-	-	-
Newly Built Road	3.41	-	0.16	-	2.14	-	1.10	-	-
Old Barn Road	8.03	8.03	-	-	-	-	-	-	-
Peeler Ridge Road	1.48	0.03	1.45	-	-	-	-	-	-
Rip Rap	0.28	0.23	-	-	-	0.06	-	-	-
Road to Pond C	6.50	0.61	1.60	-	-	1.37	2.91	-	-
Rolling Mill Road	15.10	7.15	5.54	-	-	1.22	0.93	0.26	-
Spillway	0.43	0.43	-	-	-	-	-	-	-
Upstream Cofferdam	0.18	-	-	-	-	0.12	0.06	-	-
White Road	6.32	5.64	0.64	-	-	0.05	-	-	-
Total	1,053.43	242.08	224.85	28.32	14.43	396.29	131.20	0.26	15.99

Cover Type Key: 1) Open Areas, Fields and Meadows (OFM), 2) Pine (P), 3) Pine-Mixed Hardwood (PMH), 4) Upland Scrub (USC), 5) Mixed Hardwood (MH), 6) Mixed Hardwood-Pine (MHP), 7) Open Pine-Mixed Hardwood (OPMH), 8) Open Water (OW).

Construction impacts outside of the Make-Up Pond C Study Area boundary are not included in the figures above.

TABLE 4.3-3
WETLANDS (PRELIMINARY) IMPACTED
DURING MAKE-UP POND C CONSTRUCTION

Nature of Wetland Impact	Quantity of Wetland Impact (Acres)
Cofferdam	0.05
Dam Footprint	-
Dewatering Pipe	0.01
Hwy 329	0.01
Impoundment	3.95
Logging Road	0.04
Rail Line Crossings	-
Spoil Area	0.25
Transmission Line	-
Vegetation Clearing	-
Total	4.30

*Wetland delineations have not been confirmed by USACE. Construction impacts outside of the Make-Up Pond C study area boundary are not included in the figures above.

TABLE 4.3-4
EXISTING IMPOUNDMENTS (PRELIMINARY) IMPACTED DURING MAKE-UP POND C CONSTRUCTION

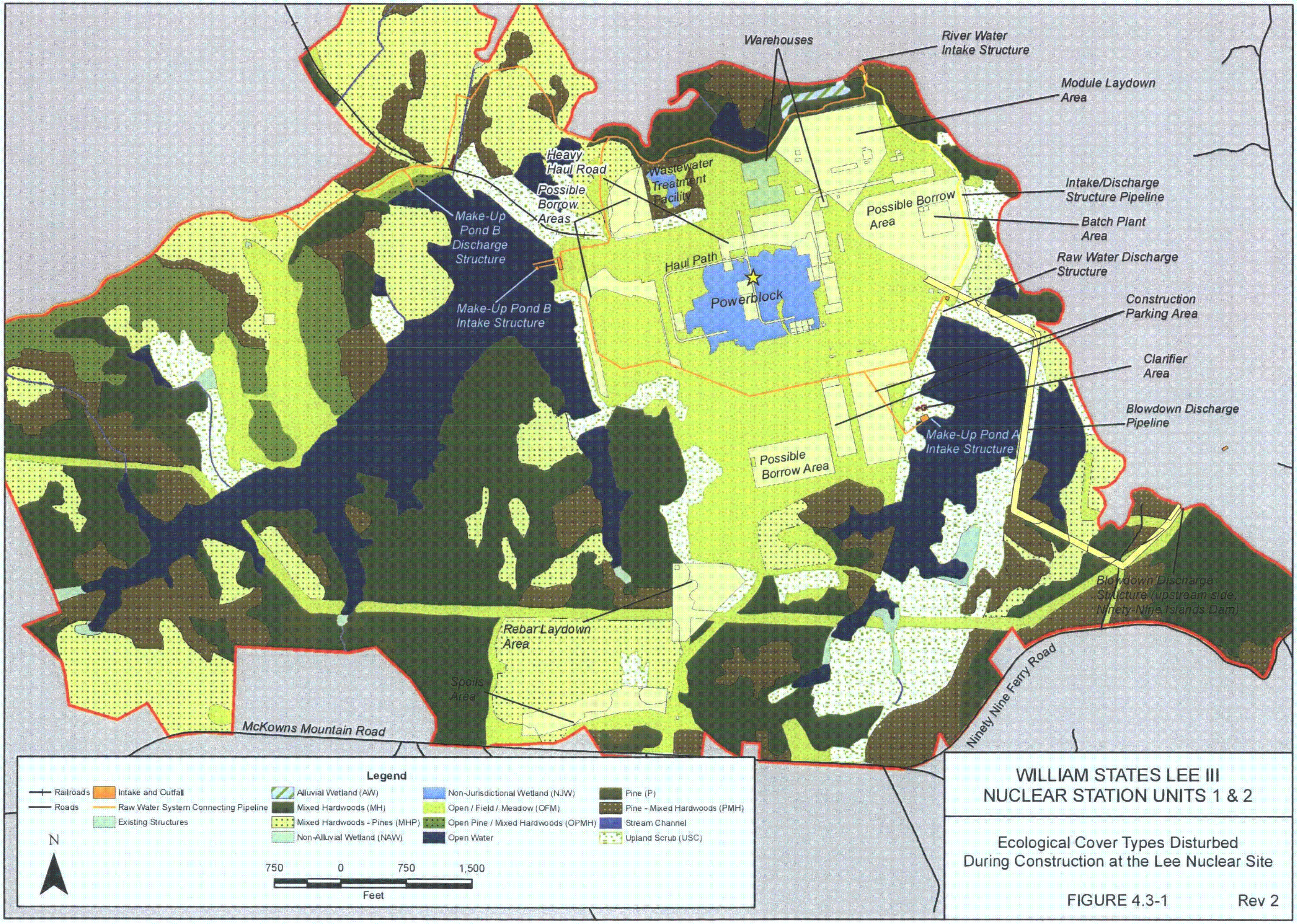
Nature of Impact	Quantity of Impact (Acres)
Cofferdam	-
Dam Footprint	-
Dewatering Pipe	-
Hwy 329	-
Impoundment	3.54
Haul Road	0.85
Rail Line Crossings	-
Spoil Area	7.42
Transmission Line	1.87
Vegetation Clearing	-
Total	13.67

*Wetland delineations have not been confirmed by USACE. Construction impacts outside of the Make-Up Pond C study area boundary are not included in the figures above.

TABLE 4.3-5
STREAMS (PRELIMINARY) IMPACTED
DURING MAKE-UP POND C CONSTRUCTION

Stream	Nature of Impact	Quantity of Impact (Linear Feet)
London Creek	Cofferdam	45
	Dam Footprint	655
	Diversion Pipe	32
	Hwy 329	-
	Impoundment	16,962
	Logging Road	-
	Rail Line Crossings	-
	Spoil Area	-
	Transmission Line	-
	Vegetation Clearing	-
Little London Creek	Cofferdam	-
	Dam Footprint	-
	Diversion Pipe	-
	Hwy 329	-
	Impoundment	-
	Logging Road	-
	Rail Line Crossings	-
	Spoil Area	-
	Transmission Line	-
	Vegetation Clearing	-
Unnamed Tributaries	Cofferdam	-
	Dam Footprint	728
	Diversion Pipe	-
	Hwy 329	600
	Impoundment	45,780
	Logging Road	16
	Rail Line Crossings	-
	Spoil Area	631
	Transmission Line	229
	Vegetation Clearing	1,700
Total		67,379

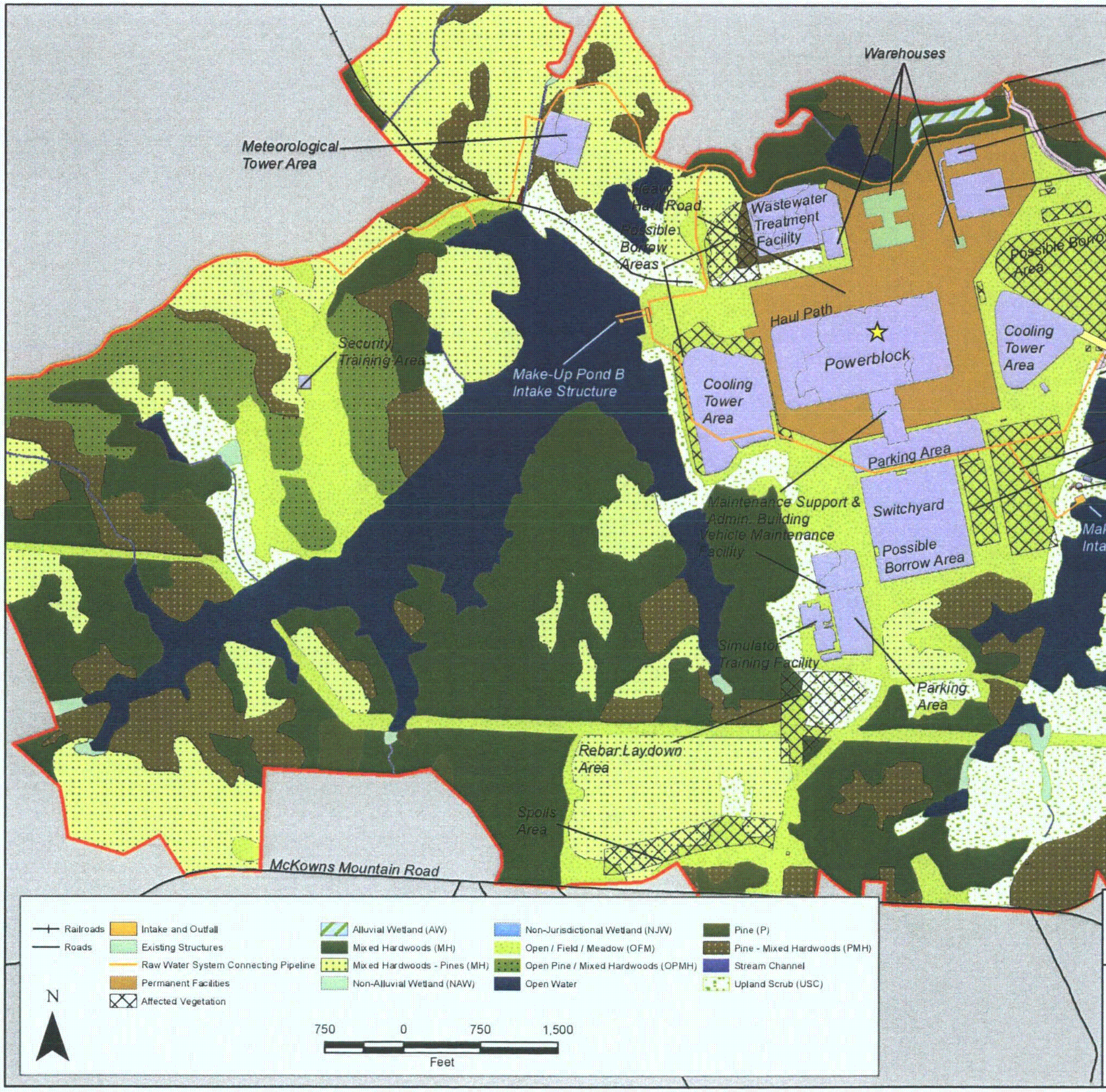
*Wetland delineations have not been confirmed by USACE.
Construction impacts outside of the Make-Up Pond C Study Area boundary are not included in the figures above.



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Ecological Cover Types Disturbed During Construction at the Lee Nuclear Site

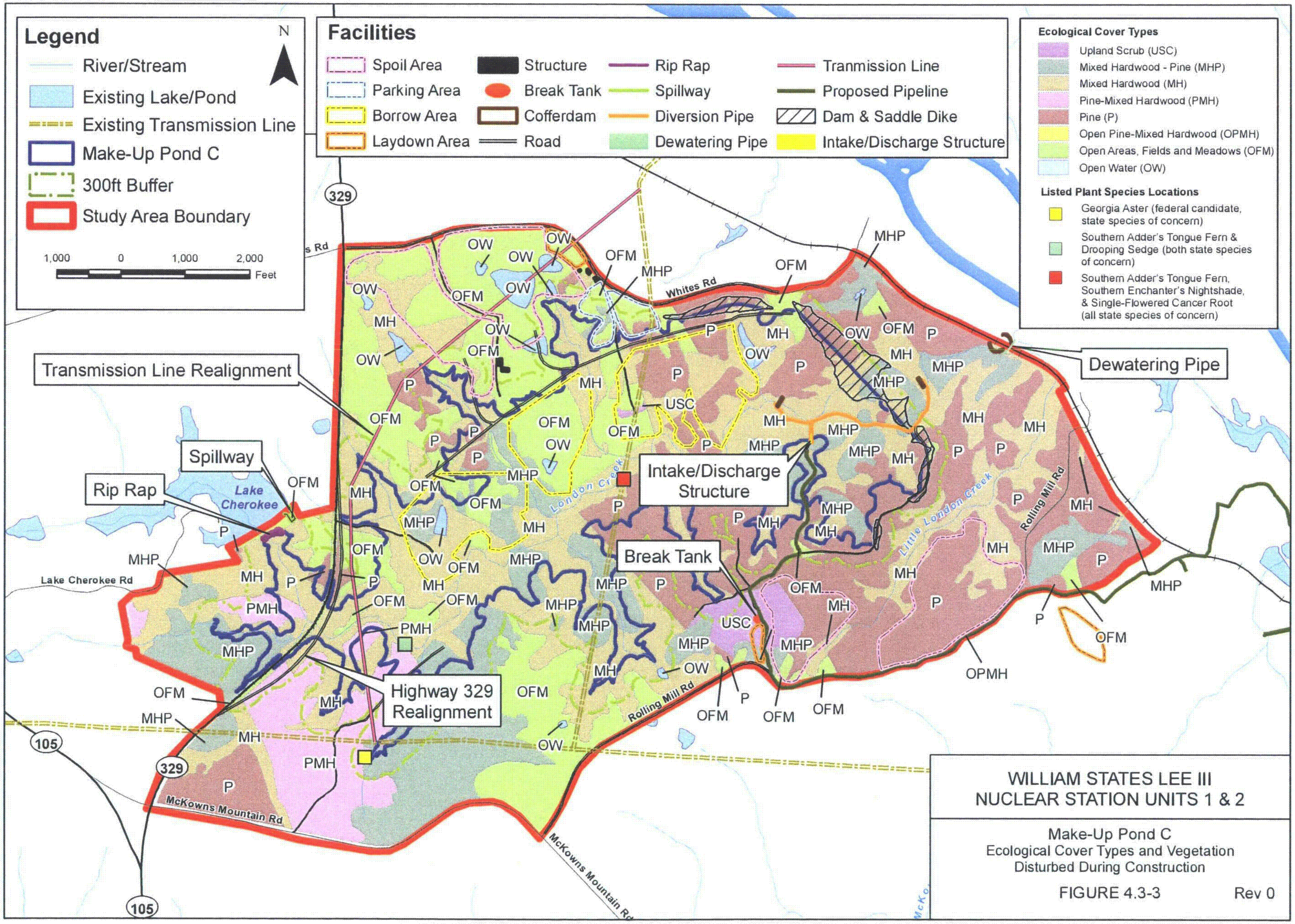
FIGURE 4.3-1 Rev 2

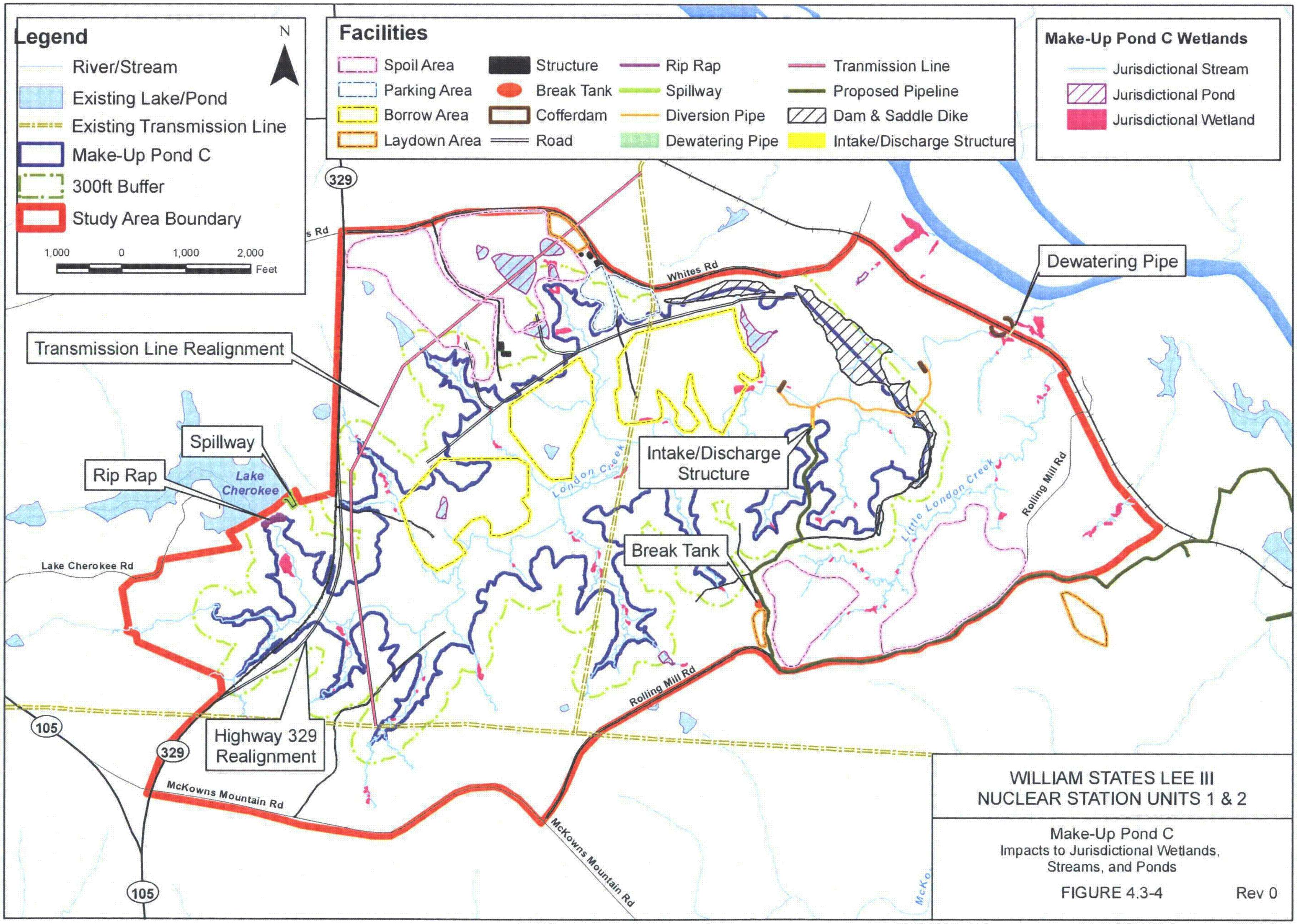


WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Ecological Cover Types Disturbed by Permanent Structures at the Lee Nuclear Site

FIGURE 4.3-2 Rev 2


Legend
N
River/Stream
Existing Lake/Pond
Existing Transmission Line
Make-Up Pond C
300ft Buffer
Study Area Boundary
1,000 0 1,000 2,000
Feet
Facilities
Spoil Area
Parking Area
Borrow Area
Laydown Area
Structure
Break Tank
Cofferdam
Road
Rip Rap
Spillway
Diversion Pipe
Dewatering Pipe
Tranmission Line
Proposed Pipeline
Dam & Saddle Dike
Intake/Discharge Structure
Ecological Cover Types
Upland Scrub (USC)
Mixed Hardwood - Pine (MHP)
Mixed Hardwood (MH)
Pine-Mixed Hardwood (PMH)
Pine (P)
Open Pine-Mixed Hardwood (OPMH)
Open Areas, Fields and Meadows (OFM)
Open Water (OW)
Listed Plant Species Locations
Georgia Aster (federal candidate, state species of concern)
Southern Adder's Tongue Fern & Drooping Sedge (both state species of concern)
Southern Adder's Tongue Fern, Southern Enchanter's Nightshade, & Single-Flowered Cancer Root (all state species of concern)
Transmission Line Realignment
Spillway
Rip Rap
Intake/Discharge Structure
Break Tank
Dewatering Pipe
Highway 329 Realignment
Lake Cherokee
Lake Cherokee Rd
Whites Rd
London Creek
Little London Creek
Rolling Mill Rd
McKowns Mountain Rd
329
105
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Make-Up Pond C
Ecological Cover Types and Vegetation
Disturbed During Construction
FIGURE 4.3-3
Rev 0



Legend
River/Stream
Existing Lake/Pond
Existing Transmission Line
Make-Up Pond C
300ft Buffer
Study Area Boundary
1,000 0 1,000 2,000
Feet
N
Facilities
Spoil Area
Parking Area
Borrow Area
Laydown Area
Structure
Break Tank
Cofferdam
Road
Rip Rap
Spillway
Diversion Pipe
Dewatering Pipe
Tranmission Line
Proposed Pipeline
Dam & Saddle Dike
Intake/Discharge Structure
Make-Up Pond C Wetlands
Jurisdictional Stream
Jurisdictional Pond
Jurisdictional Wetland
Transmission Line Realignment
Spillway
Rip Rap
Lake Cherokee
Lake Cherokee Rd
Whites Rd
Dewatering Pipe
Intake/Discharge Structure
Break Tank
London Creek
Little London Creek
Rolling Mill Rd
Rolling Mill Rd
Highway 329 Realignment
McKowns Mountain Rd
McKowns Mountain Rd
329
329
105
105
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Make-Up Pond C
Impacts to Jurisdictional Wetlands, Streams, and Ponds
FIGURE 4.3-4
Rev 0

4.4 SOCIOECONOMIC IMPACTS

4.4.1 Physical Impacts

Subsection 4.4.1.1, Construction Activities, page 4.4-1, INSERT NEW TEXT after 2nd paragraph:

The maximum total number of workers required for the construction of Make-Up Pond C and its associated facilities will be 185 workers. Similar to the construction workforce for the Lee Nuclear Station, it is assumed that 70 percent of the workforce will in-migrate to the region, and of that 70 percent, 25 percent are likely to bring their families.

Subsection 4.4.1.1, Construction Activities, page 4.4-1, 3rd paragraph:

Most of the construction for the Lee Nuclear Station occurs on 750 ac. of land that has been disturbed by previous construction and site preparation. Additional land disturbance is expected to occur during construction of the intake and discharge structures, as well as some of the temporary and permanent roadways and buildings. Off-site activities include construction of the rail spur and transmission corridors as well as expansion of the culvert along the rail spur at the London Creek crossing, a new transmission line to the Make-Up Pond C pumps, a new pipeline, rerouting of an existing transmission line, and rerouting and adding a bridge on SC 329, in addition to Make-Up Pond C. ~~Off-site construction encompasses construction of the rail spur and transmission corridors.~~ Construction activities result in elevated noise and dust levels and traffic on roads. In addition to dust, construction equipment locally increases air emissions. Blasting to remove native rock could result in both noise and shock impacts. Erection of cranes and buildings may affect aesthetic qualities of the community.

Subsection 4.4.1.2, Impacts to Off-Site Structures, page 4.4-1, INSERT NEW TEXT following 1st paragraph:

Impacts to residential development are discussed in Subsection 4.4.2.4.

Subsection 4.4.1.3, Impacts to Transportation, page 4.4-2, 2nd paragraph:

As detailed in **Subsection** 2.2.1.2, an abandoned railroad spur enters the site on its northern boundary, extends across the northern half of the site, and ends in a former construction area. Upgrading this existing rail spur is necessary to support equipment delivery. The upgrade of this abandoned railroad spur requires new ballast and track and is expected to take place within the existing right-of-way. Because reconstruction of the rail line spur outside the site boundary makes use of a pre-existing right-of-way that is already zoned for industrial use and has already been disturbed, construction impacts are expected to be minimal. The existing culvert located at the railroad spur crossing of London Creek will be replaced. The new crossing will be a box culvert, the construction of which will require the installation of sheet pile cofferdams on both sides of the existing rail line with a system to pump water around the construction area to allow installation of the new box culvert. Because the proposed construction of the railroad spur is currently located within existing ROW, no impacts as a result of land conversion to transportation use are expected.

Subsection 4.4.1.3, Impacts to Transportation, page 4.4-3, INSERT NEW TEXT at end of subsection

As noted in Subsection 4.4.1.1, the maximum number of workers associated with construction of Make-Up Pond C will be 185 persons. Based on the relatively small size of this workforce compared with that for construction of the Lee Nuclear Station, the number of vehicles added to the roadway is not expected to increase potential impacts within the immediate vicinity.

Construction of Make-Up Pond C causes impacts to existing transportation facilities. The inundation of the pond would result in the realignment of SC 329. Major road reconstruction occurs where SC 329 crosses London Creek, which involves a bridge over London Creek and new approaches constructed at a higher level. The new bridge and approaches are constructed while allowing local residents access to the current SC 329 alignment. Once completed, traffic would be diverted to the new SC 329 alignment. This would result in a SMALL impact to SC 329 usage.

Construction activities within the Make-Up Pond C study area cause SMALL to MODERATE impacts to local roads. Large volumes of truck traffic will use Whites Road during the construction of Make-Up Pond C. The road will be widened, drainage ditches established, and a crushed stone surface placed. A temporary road off of either Smith Road or Old McKowns Farm Road will be constructed to provide access to the timber within the new pond. An un-named road off of McKowns Mountain Road ¼ mile east of SC 329 appears to be a newly plated temporary road. It will be used by the clearing subcontractor to access the south side of London Creek. Improvements to this road will make it useable for heavy equipment. Rolling Mill Road will be used as a permanent access road to the pump house at Make-Up Pond C, with improvements similar to those performed on Whites Road. Peeler Ridge Road/Buckmill Road will be used as a permanent access road to the small dikes and to the pump house at Make-Up Pond C. Upgrades are similar to those for Whites Road and Rolling Mill Road.

Subsection 4.4.1.4, Impacts to Aesthetics, page 4.4-3, INSERT NEW TEXT at end of subsection

The construction of Make-Up Pond C involves clearing of forested land, which has a negative effect on aesthetics. This impact is limited to travelers on SC 329 and residents in the vicinity of the Make-Up Pond C study area on the west side of SC 329. The impact from the clearing of land for the construction of Make-Up Pond C and its associated facilities is expected to be SMALL to MODERATE and temporary in nature, and requires no mitigation efforts. The impact from the inundation has positive impacts to area aesthetics, as water features are generally viewed as pleasant geographical features.

NEW SUBSECTION 4.4.1.5.4, Noise Associated with Make-Up Pond C Construction, page 4.4-7:

Noise generated by equipment used to construct Make-Up Pond C temporarily increases noise levels at residential sites. The increase is caused by internal combustion engines and safety alarms (machine backup alarms, horns, etc.) as the equipment performs an operation during the construction of Make-Up Pond C. The amount of noise caused by construction will depend on sound intensity, frequency, duration, distance between the construction equipment and residences, amount of construction equipment in operation at the same time, and weather conditions. Time of day also affects the response that people may have to construction noise.

Using the equation provided in Table 4.4-1, maximum noise levels may exceed 65 dBA when operation of the loudest construction equipment (dozer, 102 dBA at 50 ft) occurs less than 3,540 ft from a residence. For the majority of equipment, the distance at which 65 dBA may be exceeded during operation ranges from 500 to 1,000 feet depending on the type of equipment. Residences are known to exist within the calculated distances that a 65 dBA noise level may occur. Notably, the calculation only considers the reduction in noise due to distance (i.e., divergence) and represents a worst-case scenario. The actual distance where a noise level of 65 dBA, or greater, occurs is probably less since the calculated noise level does not account for site specific intervening structures and terrain features between the noise source and residence. However, nearby residences are subjected to a noise level of 65 dBA or higher, even at reduced distances to the 65 dBA contour. Construction activities that generate noise above 65 dBA at a residence are temporary. The affect of the elevated noise level on the day–night average sound levels (Ldn) depends on the duration of the construction activity and time of day the activity occurs.

Best management practices are implemented to attenuate construction noise, if necessary. Muffler systems on all engines are in working condition. Stationary noise sources (e.g., generators) are placed as far from residential areas as practical. Unnecessary noise sources are not permitted (e.g., needless tailgate banging). Most construction activities occur during normal working schedules between 0700 and 1700 hours. However, some construction activities are scheduled during night-time hours.

Equipment operation is continuous throughout the construction period; however, the effect on the noise environment is temporary. Therefore, the impact on the surrounding community is considered SMALL to MODERATE.

The noise levels along existing highways will increase as workers commute, equipment is transported to the construction site for Make-Up Pond C, and construction material is moved into or out of the construction site. There will be a sizable volume of truck traffic on Whites Road during construction of the main dam, hauling of crushed stone, and hauling of fill. Truck hauling occurs on SC 329 for the transportation of crushed stone materials from nearby commercial quarries. As the main access to the Make-Up Pond C construction site, construction vehicle traffic on existing roads are most heavily concentrated on Whites Road between SC 329 and the construction site access. The majority of noise sensitive areas along this section of Whites Road, residences located to the south, are being acquired. Considering that construction noise would be temporary and the small number of residences impacted, noise impacts are expected to be SMALL.

Subsection 4.4.1.6, Impacts to Air Quality, page 4.4-7, 1st paragraph:

Regional air quality, including SCDHEC air quality standards, is discussed in Subsection 2.7.1.2.6. Areas having air quality that is worse than the National Ambient Air Quality Standards (NAAQS) are designated by the U.S. Environmental Protection Agency (EPA) as nonattainment areas. The Lee Nuclear Site is not located in a non-attainment area. The nearest nonattainment area to Lee Nuclear Site is ~~Spartanburg County, South Carolina, a non-attainment area under the 8-hour ozone standard.~~ located within the Charlotte-Gastonia-Rock Hill metropolitan statistical area which includes a portion of York County, South Carolina. The Charlotte-Gastonia-Rock Hill, NC-SC nonattainment area is designated as a moderate nonattainment area under the 8-hour ozone standard (Reference 16).

Subsection 4.4.1.6, Impacts to Air Quality, page 4.4-8, INSERT NEW TEXT at end of section:

Site clearance activities associated with the construction of Make-Up Pond C result in temporary and minor impacts to local ambient air quality. It is anticipated that merchantable timber will be hauled off for sale and non-merchantable timber will be mulched with the mulch and other debris being hauled off to a recycling facility or landfill, or sold. Fugitive dust and particulate matter emissions, including those less than 10 microns in size (PM_{10}), are generated during land clearing and mulching activities. Construction equipment used for cutting, clearing, and mulching and off-site vehicles used for hauling merchantable timber, debris, and mulch also produce emissions from burning of fuel in the equipment engines and from the disturbance of dust on haul roads and roadways. The pollutants of primary concern include PM_{10} fugitive dust, reactive organic gases, oxides of nitrogen, carbon monoxide, and, to a lesser extent, sulfur dioxides. Variables affecting construction emissions related to clearance activities (e.g., type of construction equipment and vehicles, timing and phasing of clearance activities, and haul routes) will be further refined as construction plans are finalized. The impacts to air quality will be minimized from mulching of non-merchantable timber versus burning this material.

Normal construction activities associated with the construction of Make-Up Pond C also result in temporary and minor impacts to local ambient air quality. Fugitive dust and fine particulate matter emissions, including PM_{10}, are generated during earth-moving and material-handling activities related to Make-Up Pond C as well as borrow areas, laydown areas, access roads, and transmission line and pipeline corridors. Construction equipment and off-site vehicles used for hauling debris, equipment, and supplies also produce emissions from burning of fuel in the equipment engines and from the disturbance of dust on the haul roads and roadways. The pollutants of primary concern include PM_{10} fugitive dust, reactive organic gases, oxides of nitrogen, carbon monoxide, and, to a lesser extent, sulfur dioxides. Variables affecting construction emissions (e.g., type of construction vehicles, timing and phasing of construction activities, and haul routes) cannot be accurately determined until the project is initiated. Actual construction-related emissions cannot be effectively quantified before the project begins. The impacts on air quality can be minimized by following the EPA's guidance on preferred control measures for different construction activities (Reference 12) and by compliance with all federal, state, and local regulations that govern construction activities and emissions from construction vehicles (Reference 16).

Because clearance and construction at the Make-Up Pond C involves typical clearing, construction and grading equipment and will be of a one-time, relatively short-term duration, impacts to air quality from construction are SMALL with the above measures and do not warrant mitigation beyond these measures.

4.4.2 Social and Economic Impacts

Subsection 4.4.2, Social and Economic Impacts, page 4.4-9

This subsection evaluates the demographic, economic, infrastructure, and community impacts to the vicinity and region as a result of constructing two Westinghouse AP1000 nuclear units at the Lee Nuclear Site, and constructing Make-Up Pond C and its associated facilities. ~~The~~ This evaluation assesses impacts of construction-related activities and an in-migrating construction workforce on population, regional labor, tax revenues, infrastructure and community services, housing, education, and recreational activities within the vicinity and region.

Subsection 4.4.2.1, Demography, page 4.4-9, 3rd paragraph:

During peak construction, there are 4,512 total on-site workers. Figure 4.4-2 illustrates the temporal distribution of on-site workers for construction of the new units. Off-site construction of Make-Up Pond C and its associated facilities will involve a maximum of 185 workers during the construction phase. Some of the different trade skills represented in the labor pool include electrical workers, welders, pipe fitters, etc. To ensure the necessary labor ~~pool~~ force is available, as the demand for workers increases, construction companies recruit employees from local technical school programs and work with school administrators to build up curriculum in the necessary labor trade areas. National labor trade union organizers, such as the American Federation of Labor, have made it a high priority to train new entrants in the construction industry as the need for labor increases. ~~ramps up.~~ In addition, local recruiting of craft personnel, supplemental skills training, attractive compensation packages, and use of specialty contractors are expected to mitigate competition for craft workers between industries.

Subsection 4.4.2.1, Demography, page 4.4-10, INSERT NEW TEXT at end of subsection

Because the number of workers required for the construction of Make-Up Pond C will be significantly less than the number of workers required for the construction of the two Westinghouse AP1000 nuclear units (185 workers at peak construction versus 4,512 workers), impacts associated with the additional workers required for construction of Make-Up Pond C and its associated facilities are expected to be SMALL.

Subsection 4.4.2.3, Infrastructure and Community Services, page 4.4-12, 4th paragraph:

During the peak construction phase, 5,552 total in-migrating workers and family members are expected to move into the region, with 50 percent, or 2,776 people, expected to reside in Cherokee County and the other 50 percent, or 2,776 people, expected to reside in York County. For the construction of Make-Up Pond C, the peak construction phase involves approximately 130 in-migrating workers (70 percent of the 185 workers). Of these workers, approximately 32 bring their families (an additional 96 people, assuming a family of four), for a total number of 226 individuals (96 family members in addition to the 130 workers) moving to the region during peak construction of Make-Up Pond C. Of these, it is anticipated that fifty percent (113 persons) reside in Cherokee County and fifty percent (113 persons) reside in York County. ~~There~~ Currently, there are 105 police officers and 350 firefighters in Cherokee County, South Carolina, and 263 police officers and 688 firefighters in York County, South Carolina. Based on 2005 county population estimates, the ratio of current residents to police officers in Cherokee County, South Carolina is 513:1 and the firefighter ratio is 154:1. The ratio of current residents to police officers in York County, South Carolina, is approximately 721:1 and the firefighter ratio is 276:1. Based on the projected increase in county population by 2015, and in-migrating construction and operations workers with families, the resident-to-firefighter ratios would become 181:1 and 315:1 in Cherokee and York counties, respectively. The resident-to-police officer ratios would become 603:1 and 825:1 in Cherokee and York counties, respectively. The number of additional workers required during peak construction of Make-Up Pond C is small compared to the number required for the construction of the Lee Nuclear Site (113 persons per county as opposed to 2,776 persons per county) and would not have a significant impact on these ratios. Although these ratios increase during the construction of the Lee Nuclear Station, the increases would only be short term (approximately six years, with peak construction occurring over approximately two years).

Subsection 4.4.2.4, Housing, page 4.4-13, INSERT NEW TEXT at end of subsection

The construction of Make-Up Pond C affects residences located within or adjacent to the Make-Up Pond C inundation area, as the inundation involves unavoidable property acquisitions. Approximately 1,900 ac of property is purchased for the construction of Make-Up Pond C.

Relocation assistance was offered to property owners and renters. For property owners, Duke Energy Real Estate allows current residents to remain in their current home from 1 month to 18 months rent free after closing to provide time for each owner to find replacement property and to move. The length of time to remain on property has been negotiated to June 2010. The selling price of the property includes sufficient funds for relocation costs. For renters, the existing written rental agreements Duke Energy Real Estate has encountered to date are month-to-month and one is a week-to-week rental. Where existing rental agreements beyond verbal existed, the current owner/seller has worked with their tenant to provide reasonable notice to vacate or has assigned the rental agreement(s) to Duke Energy Real Estate at closing. If the assignment of rental agreement(s) had not been done, the current owner/seller was planning to notify the renters at closing that they would need to vacate the property within 30 days. Those currently renting Duke Energy property have been notified that they would be given at least a 90-day notice to vacate the property. This notice could be longer based upon Duke Energy's plans and schedule for needing complete access and use of the property.

Subsection 4.4.2.5, Education, page 4.4-13, 2nd paragraph:

At peak construction it is estimated that 3,120 on-site workers and their families in-migrate into the region, resulting in an estimated total of 5,552 people (one-quarter of 70 percent of the 4,398 construction workers plus 36 percent of the 114 operation workers, multiplied by a household size of four, plus the number of individuals moving to the region without families). Approximately 185 workers are required during peak construction of Make-Up Pond C and its associated facilities. Of these workers, approximately 70 percent move into the region (130 workers), and of that number, approximately 32 bring their families (an additional 96 people, assuming a family of four), for a total of 226 individuals moving into the region. According to the 2005 Census estimate, Cherokee and York counties' percentages of children between the ages of 5 and 18 are 19 and 18 percent, respectively (**Reference 4**). Applying the same percentage to the total in-migrating population, the anticipated school-age population derived from the construction family total is 1,027 (5,552 multiplied by the average of 18.5 percent based on total population). For the construction workers of Make-Up Pond C, the anticipated school-age population is 42 (226 multiplied by the average of 18.5 percent based on total population). It is assumed that 50 percent of the in-migrants settle in Cherokee County and 50 percent settle in York County. It is anticipated that with the in-migration of construction workers, the public school student population in Cherokee County increases by 5.5 percent. The number of students attending public schools in York County increases by approximately 1.5 percent (see **Subsection** 2.5.2.8.2 for base student population counts per county). Currently there are 43,983 school-age students in York and Cherokee counties. For the combined school districts of Cherokee and York counties, this represents a 2.3 percent ~~change~~ increase in student population. Because the workforce at peak construction of Make-Up Pond C represents a small number of school-age individuals (an estimated twenty-one individuals per county), there is no effect on the student population of the counties.

4.4.3 Environmental Justice Impacts

Subsection 4.4.3.1, Potential Environmental Impacts, page 4.4-15, INSERT NEW TEXT at end of subsection:

Because the Make-Up Pond C study area is adjacent to the Lee Nuclear Site, conditions related to potential environmental justice issues are similar to those described for the Lee Site. Since there were no minority populations identified adjacent to the site, it is anticipated that there are no disproportionate impacts from construction of Make-Up Pond C and associated facilities on minority populations.

Subsection 4.4.3.2, Potential Socioeconomic Impacts, page 4.4-16, 4th paragraph:

This impact is reduced due to the fact that the nearest low-income populations are 15 mi. away. Using Table 2.5-1, the population at 10 mi. is 43,132 people. If all 5,552 of the total site population and family members associated with the peak construction phase (one-quarter of 70 percent of the 4,398 construction workers plus 36 percent of the 114 operation workers, multiplied by a household size of four, plus the number of individuals moving to the region without families) move into that radius, there would be a population increase of nearly 13 percent. Using Table 2.5-2, the next radius is 25 mi., resulting in a population increase of 1.3 percent. The number of available houses is proportional to the population. The effect on the housing market of adding population numbers to the area decreases as the distance from the site increases. Therefore, the effects are reduced at the distances that the low-income populations start to appear. For the construction of Make-Up Pond C and facilities, the peak construction phase involves approximately 130 in-migrating workers (70 percent of the 185 workers). Of these workers, approximately 32 bring their families (an additional 96 people, assuming a family of four), for a total number of 226 individuals moving into the region during peak construction of Make-Up Pond C. The number of additional workers required during peak construction of Make-Up Pond C is small compared with the number required for the construction of the Lee Nuclear Site (226 individuals as opposed to 5,552 individuals) and would not have a significant impact.

Subsection 4.4.3.3, Transmission Corridors, page 4.4-18, INSERT NEW TEXT at end of subsection

As previously noted, the nearest low income population is located over 15 miles from the Lee Nuclear Site and no minority populations were identified within or adjacent to the Make-Up Pond C study area. Therefore, no impacts to minority or low-income populations are expected as a result of construction of Make-Up Pond C.

4.4.4 References

Subsection 4.4.4, References, page 4.4-17, revise reference

12. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Vol. I, Stationary Point and Area Sources, Section ~~11.2.4~~ 13.2.3, "Heavy Construction Operations," AP-42, ~~Fourth~~ Fifth Ed. September 1985.

Subsection 4.4.4, References, page 4.4-18, INSERT NEW TEXT at end of section:

16. U.S. Environmental Protection Agency, "Greenbook," located on the world wide web at http://www.epa.gov/oar/oaqps/greenbk/sc8.html (accessed March 30, 2009).

4.5 RADIATION EXPOSURE TO CONSTRUCTION WORKERS

Section 4.5, Radiation Exposure to Construction Workers, page 4.5-1, 1st paragraph:

This section evaluates the potential radiological dose impacts to construction workers at the Lee Nuclear Station resulting from the operation of the Lee Nuclear Station, Unit 1. Because a portion of the Unit 2 construction period overlaps operation of Unit 1, construction workers at Unit 2 would be exposed to direct radiation and gaseous radioactive effluents from Unit 1. Doses to construction workers during construction of Unit 1 are not evaluated because the only radiation sources prior to startup of Unit 1 are background sources. It is also assumed that construction for Make-Up Pond C will be complete before the start of station operations.

4.6 MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

Section 4.6, Measures and Controls to Limit Adverse Impacts During Construction, page 4.6-1, 7th paragraph:

Based on a review of the construction impacts described in this chapter, applicable measures and controls for reducing these impacts at the Lee Nuclear Station (including Make-Up Pond C) are described in Table 4.6-1 and include:

- The completion of Phase I archaeological surveys to clearly identify ~~survey was performed to clearly identified~~ areas of interest or concerns.
- The completion of ecological surveys to characterize local terrestrial and aquatic ecosystems.
- The completion of planning and engineering studies to determine how best to locate and construct infrastructure facilities (parking lots, storage facilities, office buildings, roads, etc.) so as to reduce construction impacts.
- Geologic borings, soil tests, and groundwater well data are used in combination with the planning and engineering studies to develop a stormwater pollution prevention plan in accordance with SC DHEC NPDES stormwater permit.
- Fugitive dust emissions are suppressed by spraying water on excavated soil.
- Construction is conducted in compliance with U.S. Occupational Safety and Health Administration regulations and SC Occupational Safety and Health regulations.
- Material safety data sheets are required for use of applicable hazardous materials at the Lee Nuclear Station. Construction employees are trained in the appropriate use of hazardous materials. Hazardous materials are used in accordance with applicable federal, state, and local laws and regulations.
- Hazardous wastes are treated, stored, and disposed of in accordance with the Resource Conservation and Recovery Act (RCRA) (**Reference** 1), and any other applicable federal, state,

and local laws and regulations. Construction employees are trained in the appropriate handling and disposal of hazardous wastes.

- Construction activities are performed in accordance with applicable local, state, and federal ordinances, laws, and regulations intended to prevent or minimize adverse environmental effects of construction activities on air, water, and land, and on workers and the public.
- Pertinent construction permits and environmental requirements are included in construction contracts.
- Impoundment of London Creek for creation of Make-Up Pond C is conducted in compliance with USACE 404 Permit and DHEC 401 Water Quality Certification.
- Impacts to wetlands and streams are mitigated as identified in the Mitigation Action Plan.

4.6.1 References

There are no revisions associated with Make-Up Pond C in this section.

TABLE 4.6-1 (Sheet 1 of 7)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Impacts[(a)(b)]														
Section Reference	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Protection / Restoration	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Construction Workforce	Effect Description or Activity	Specific Measures and Controls
4.1 Land-Use Impacts															
4.1.1 The Site and Vicinity		S						S-M						1. Ground-disturbing activities, including grading and re-contouring, and conversion/isolation of land for construction of Make-Up Pond C. 2. Construction of new buildings and impervious surfaces. 3. Removal of existing vegetation. 4. Use of hazardous materials. 5. Stockpiling of soils.	(1 and 2) Limit ground disturbances to the smallest amount of area necessary to construct and maintain the plants. (1 and 2) Avoid wetlands when possible. (1 and 2) Ground disturbing activities are performed in accordance with South Carolina Department of Health and Environmental Control (SCDHEC) stormwater permit requirements. Use erosion control and stabilization measurements to minimize impacts. (1, 2, and 3) Limit vegetation removal to the area designated for construction activities. (4) Minimize potential spills of hazardous wastes/materials through training and rigorous compliance with applicable regulations. (5) Restrict soil stockpiling and reuse to designated areas on the Lee Nuclear Site.
4.1.2 Transmission Corridors and Off-Site Areas		S						S-M		S				1. Construction of transmission line in new corridor. 2. Construction of Make-Up Pond C and associated facilities (pipeline corridor, transmission line, SC 329 realignment). 3. Conversion of 20 ac of prime farmland to water, and conversion of 40 ac of prime farmland to buffer area.	(1) Site new corridor to avoid critical or sensitive habitat or species and avoid wetlands. (1) Limit vegetation removal and construction to defined corridors during fall and winter to avoid nesting activities. (1 and 2) Minimize potential impacts via avoidance and compliance with permitting requirements and best management practices.

TABLE 4.6-1 (Sheet 2 of 7)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Impacts[(a)(b)]														
Section Reference	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Protection / Restoration	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Construction Workforce	Effect Description or Activity	Specific Measures and Controls
4.1.3 Historic Properties		S								S				1. Erosion and ground-disturbing activities including grading and re-contouring, and construction of new transmission lines and Make-Up Pond C that could affect ~~effect~~ cultural resources.	(1) Conduct cultural resource surveys, including subsurface sampling prior to initiating ground disturbing activities to identify buried historic, cultural, or paleontological resources. (1) Consult with State Historic Preservation Office if a cultural resource is discovered. (1) Establish Duke Energy procedures to halt work if a potential historic, cultural or paleontological resource is discovered.
4.2 Water-Related Impacts															
4.2.2 Hydrologic Alterations		S				S	S							1. Increased turbidity of Broad River during construction and dredging. 2. Land disturbing activities from construction of Make-Up Pond C and associated facilities. 3. Increase in groundwater table from filling of Make-up Pond C. 4. Impacts to wetlands from draining and inundating activities. 5. Interruption of flow to London Creek during construction. 6. Impact of filling Make-Up Pond C on downstream users of Broad River. 7. Impacts of sediment or oil/fuel spills entering Broad River.	(1) Installation of rip rap, stemwalls, etc. to stabilize banks. (1, 2, and 7) Develop and implement a site specific construction SWPPP and erosion control plan. (1, 2, 4, 5, and 7) Conduct construction and dredging activities in compliance with United States Army Corps of Engineers (USACE) requirements, SCDHEC and NPDES Stormwater permit. (1) Dispose of pond dredge soils in an approved county landfill or onsite spoil area. (2) Placement of spoil material on top of rail bed during construction of box culvert expansion at London Creek crossing (6) Volume of flow from portion of London Creek above dam is very small compared to volume of Broad River at confluence.

TABLE 4.6-1 (Sheet 3 of 7)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Impacts[a][b]														
Section Reference	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Protection / Restoration	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Construction Workforce	Effect Description or Activity	Specific Measures and Controls
4.2.3 Water-Use Impacts						S	S	S						1. Water use in dust suppression, concrete batch operations, and to establish new cover. 2. Surface water used from London Creek watershed during construction of Make-Up Pond C. 3. Dewatering of dam foundation.	(1) No measures or controls are necessary because impacts are expected to be too small to warrant consideration of any mitigation measures and water will be obtained from local municipality. (2) Surface water pools formed behind cofferdams and water brought from Make-Up Pond B will be used to supply water for construction activities. (3) Low soil permeability will limit extent of groundwater impacts to inundated area around dam construction.
4.2.4 Water Quality Impacts		S			S	S	S	S						1. Potential construction of intake and discharge structures, or disposal of dredging wastes or materials. 2. Potential erosion and sedimentation associated with stormwater runoff from construction activities into water bodies. 3. Potential minor spills of hazardous materials or wastes. 4. Surface water disturbance to London Creek watershed from construction of Make-Up Pond C and associated facilities.	(1 and 4) ~~Install~~ Construct cofferdams, settling basins ~~or~~and use other standard engineering controls to protect affected water bodies. (2 and 4) Install stormwater drainage system or settling basins at construction site and stabilize disturbed soils. (2 and 4) Use best management practices during construction to minimize erosion and sedimentation. (3 and 4) Use best construction practices to maintain equipment, and prevent spills and leaks. (3 and 4) Develop ~~Storm Water Pollution Prevention Plan (~~SWPPP~~)~~ and erosion control plans as required by SCDHEC stormwater permit for construction practices. (3) Develop spill response plan for construction practices.

TABLE 4.6-1 (Sheet 4 of 7)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Impacts[(a)(b)]														
Section Reference	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Protection / Restoration	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Construction Workforce	Effect Description or Activity	Specific Measures and Controls
4.3 Ecological Impacts (i.e., Effects on the Physical Environment)															
4.3.1 Terrestrial Ecosystems	S	S	S			S				S-M				1. Loss of vegetation, ~~mostly~~ some with low wildlife habitat value and individual wildlife, to land clearing/ grading. 2. Disturbance of small wetlands by river dredging and on-site excavation for Lee Site. 3. Temporary displacement of wildlife by construction noise and fugitive dust. 4. Loss of wildlife to oil or chemical spill. 5. Bird collisions with cranes, buildings, and other high manmade structures. 6. Clearing and subsequent impoundment of Make-Up Pond C will cause approximately 620 acres of impact to bottomland and upland habitat. 7. Land disturbing activities from construction of Make-Up Pond C and associated facilities (e.g., box culvert expansion, pipeline/distribution line) 8. Draining, filling, and inundating wetlands. 9. Impacts to species of special interest from clearing and flooding of Make-Up Pond C.	(1 and 6) Perform land clearing/grading and excavation in compliance with regulations, permits, and best management practices. Perform revegetation/landscaping with fertilization. (1 and 6) Habitats are regionally common, so loss of vegetation will not destabilize these resources. (2, 6, 8) Comply with Clean Water Act (CWA) Section 404 permits (Reference 2) and best management practices (erosion fabric or silt fences). (3) Water access roads and cleared areas to attenuate fugitive dust. (3) Planning for construction activities outside of avian breeding/nesting period would minimize mortality. (4) Locate equipment maintenance in an established yard away from wetlands and water. (5) Impact is very small and no reasonable mitigation measures have been identified. (7) Avoid environmentally sensitive areas as feasible. (8) Mitigation Action Plan will be developed for wetland/stream impacts. (9) Possible relocation of species of special interest.

TABLE 4.6-1 (Sheet 5 of 7)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Impacts[(a)(b)]														
Section Reference	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Protection / Restoration	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Construction Workforce	Effect Description or Activity	Specific Measures and Controls
4.3.2 Aquatic Ecosystems		S			S	S			S		S-M			1. Potential impacts to surface water from stormwater pollution and spills. 2. Erosion and runoff into nearby water bodies. 3. Potential impacts to surface water from increased sediment load during construction. 4. Temporarily degraded aquatic habitat due to construction near the Broad River or wetlands. 5.Site disturbance from culvert expansion at London Creek rail crossing 6. Site preparation and construction activities in aquatic habitats for intake structure at Make-Up Pond B and reservoir at Make-Up Pond C (including breaching of farm ponds). 7. Impacts to benthic macroinvertebrates and fish from construction of Make-Up Pond C. 8. Alteration of aquatic habitats in London Creek and associated tributaries/streams.	(1) Develop and implement a construction SWPPP plan. (1) Develop SRP plan for construction activities. (2 and 3) Implement erosion and sediment control plans that incorporate recognized best management practices. (2, 3, and 4) Install appropriate barriers and use best management practices to protect river prior to construction. (5,6, 8) Comply with Clean Water Act (CWA) Section 404 permits (Reference 2) and best management practices. (6, 7, 8) Mitigation Action Plan will be developed for wetland/stream impacts.

TABLE 4.6-1 (Sheet 6 of 7)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Impacts[(a)(b)]														
Section Reference	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Protection / Restoration	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Construction Workforce	Effect Description or Activity	Specific Measures and Controls
4.4 Socioeconomic Impacts (i.e., Effects on the Human Community)															
4.4.1 Physical Impacts	S-M		S	S-M	S							S		1. Potential temporary and limited impacts to sensitive populations from noise, fugitive dust, and exhaust emissions during construction. 2. Potential impacts to existing traffic in amount and flow due to construction traffic and realignment of SC 329. 3. Potential for increased traffic accidents due to increased construction traffic. 4. Potential construction accidents. 5. Increased debris to existing landfills. 6. Impact on aesthetics and recreational opportunities. 7. Impacts to local ambient air quality from clearing Make-Up Pond C site.	(1) Implement construction contractual requirements to reduce the risk of potential exposure to noise, dust and exhaust emissions. (2) Stagger shifts, encourage car pooling; time deliveries to avoid shift change or commute times. (2) Allow continued traffic flow during construction of new bridge and approaches for SC 329 alignment, then divert traffic to new alignment once complete. (3) Perform construction activities in accordance with US OSHA and SC OSHA requirements. (3 and 4) Provide appropriate job-training to construction workers. (1) Use dust control measures (such as watering, stabilizing disturbed areas, covering trucks). (1, 2, 3, and 4) Post signs near construction entrances and exits to make the public aware of potentially high construction traffic areas. (3) Develop traffic control mitigation plan. (5) Establish procedures to ensure that all waste is disposed of according to applicable regulations such as the Resource Conservation and Recovery Act (RCRA) (Reference 1). (7) Minimize impacts to air quality by mulching non-merchantable timber versus burning.

TABLE 4.6-1 (Sheet 7 of 7)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Impacts[(a)(b)]														
Section Reference	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Protection / Restoration	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Construction Workforce	Effect Description or Activity	Specific Measures and Controls
4.4.2 Social and Economic Impacts					M				S			S-M		1. Potential short-term housing shortage. 2. Potential short-term school overcrowding. 3. Increase in potable water use. 4. Increase in non-recyclable refuse. 5. Acquisition of residences as part of Make-Up Pond C construction.	(1) Temporarily house employees in hotels, rental properties, park facilities. (2) Increased revenues to offset additional school resources, police and fire protection. (3) Increase water production at local facilities that are not operating at full capacity. (4)Use existing landfills. (5) Offer relocation assistance; after closing residences have option of staying in home up to 18 months rent-free, in order to find a replacement residence.
4.4.3 Environmental Justice Impacts	S-M			S-M				S	S	S	S	S		1. No disproportionably high or adverse impacts identified.	(1) No mitigation measures required beyond those identified above.
4.5 Radiation Exposure to Construction Workers															
4.5.1 Worker Impacts													S	1. Actions to protect construction workers while the first unit is operating and the second is being built.	(1) Take measures that could include monitoring workers, providing radiation worker training, and developing work plans that minimize worker radioactive exposure.

a) The assigned significance levels [Small (S), Moderate (M), or Large (L)] are based on the assumption that for each impact, the associated proposed mitigation measures and controls (or equivalents) are implemented.

b) A blank in the element (Potential Environmental Impacts) column denotes "no impact" on that specific element due to the assessed impacts.

4.7 CUMULATIVE IMPACTS RELATED TO CONSTRUCTION ACTIVITIES

There are no revisions associated with Make-Up Pond C in this section.

4.8 SEPARATION OF CONSTRUCTION AND PRECONSTRUCTION IMPACTS

Section 4.8.2, Separation of Construction and Preconstruction Impacts, Page 4.8-2, INSERT NEW TEXT at end of section:

According to NRC guidance (COL/ESP-ISG-004), all activities associated with Make-Up Pond C are considered pre-construction activities. Potential impacts associated with these activities are discussed throughout Section 4, as appropriate.

5 ENVIRONMENTAL IMPACTS OF STATION OPERATION

5.0 ENVIRONMENTAL IMPACTS OF STATION OPERATION

5.1 LAND-USE IMPACTS

5.1.1 The Site and Vicinity

Subsection 5.1.1.2, The Vicinity, page 5.1-1, 1st paragraph:

Land use in the vicinity of the Lee Nuclear Site is discussed in Subsection 2.2.1, and Figure 2.2-2 shows current land use in the vicinity of the site. Subsection 4.1.2 discusses the additional land use associated with the construction of the transmission corridors and Make-Up Pond C. No new land is disturbed after the construction phase~~, and operational land use effects are confined to the Lee Nuclear Site~~. Therefore, operations at the Lee Nuclear Station are expected to have SMALL effects on forest, pasture, and farmland in the vicinity of the site. No mitigation is necessary.

5.1.2 Transmission Corridors and Off-Site Areas

Subsection 5.1.2, Transmission Corridors and Off-Site Areas, page 5.1-2, 1st paragraph:

A description of the proposed transmission line corridors for the Lee Nuclear Station, and Make-Up Pond C and its associated facilities is provided in Subsection 2.2.2.

Subsection 5.1.2, Transmission Corridors and Off-Site Areas, page 5.1-2, INSERT NEW TEXT at end of section:

Operation of Make-Up Pond C will have minimal to no effects on land use. Access to formerly open land may be restricted, and occasional ROW maintenance activities associated with transmission line and pipeline ROW may affect transportation use, but these impacts are expected to be SMALL. Make-Up Pond C is fenced along the 300-ft buffer restricting public access.

5.1.3 Historic Properties

Subsection 5.1.3.2, Transmission Corridors and Off-Site Areas, page 5.1-6:

During operation of the Lee Nuclear Station, Duke Energy plans to pursue parallel and related operations on its railroad spur and within its two transmission line corridors. In addition, Make-Up Pond C will be used to supply supplemental water when needed (described in Section 5.2). This subsection describes the potential effects on historic properties from operations along the railroad spur and within the transmission corridors, as well as from the operation of Make-Up Pond C.

NEW SUBSECTION 5.1.3.2.3, Off-Site Areas: Make-Up Pond C, page 5.1-6:

Potential impacts to historic properties from construction of Make-Up Pond C are discussed in Subsection 4.1.3.2. No additional potential impacts to historic properties occur from operation (drawdown/ refill) of Make-Up Pond C.

5.1.4 References

There are no revisions associated with Make-Up Pond C in this section.

5.2 WATER-RELATED IMPACTS

5.2.1 Hydrologic Alterations and Plant Water Supply

Subsection 5.2.1, Hydrologic Alterations and Plant Water Supply, page 5.2-1, 1st paragraph:

Hydrological alterations were evaluated to assess waters affected directly and indirectly by Lee Nuclear Station operations. Waters integral to plant operations include the Broad River, the Make-Up Pond A and, during low flow conditions, the Make-Up Pond B and Make-Up Pond C. Waters inadvertently affected by plant operations include ~~storm water~~stormwater and groundwater.

Subsection 5.2.1, Hydrologic Alterations and Plant Water Supply, page 5.2-1, 4th paragraph:

To facilitate movement of water around the Lee Nuclear Station, the plant has a river water system intake and ~~two~~ three additional raw water system (RWS) intake structures. The river intake structure on the Ninety-Nine Islands Reservoir (Broad River) is used to draw water from the river and discharge it into Make-Up Ponds A, B, or C. ~~Pond A.~~ The Make-Up Pond A intake structure is used to supply water to the plant to compensate for normal evaporative losses, as well as supplying a clarified water supply subsystem. This intake structure is also used to transfer water to Make-Up Pond B. The Make-Up Pond B intake/discharge structure is used to transfer water to Make-Up Pond A during low-flow conditions in the Broad River and to Make-Up Pond C during pond refill conditions. The Make-Up Pond B intake/discharge structure can also be used to receive water from Make-Up Pond A during pond refill conditions. Make-Up Pond C has an intake/discharge structure that is used to transfer water to Make-Up Pond B. The locations of these intake structures are shown in ~~Figure 3.1-1~~ Figure 4.2-2.

Subsection 5.2.1, Hydrologic Alterations and Plant Water Supply, page 5.2-2, 2nd paragraph:

Under low-flow conditions, water is transferred from Make-Up Pond B to Make-Up Pond A. Water is transferred through the Make-Up Pond A intake to the CWS. Water from Make-Up Pond C can also be transferred through Make-Up Pond B to Make-Up Pond A. When flows in the Broad River rise above the target level, the Lee Nuclear Station resumes withdrawing water from the Ninety-Nine Islands Reservoir to provide make-up water and withdraw additional water to refill Make-Up Ponds B and C. If ~~the~~ water in both Make-Up Pond B and Make-Up Pond C is no longer available~~depleted~~, and the Broad River flow is insufficient to support power operations while passing the minimum flow downstream, the Lee Nuclear Station suspends power operations.

Subsection 5.2.1, Hydrologic Alterations and Plant Water Supply, page 5.2-2, INSERT NEW TEXT at end of section:

The Ninety-Nine Islands FERC license minimum release is 483 cfs (see **Subsection** 2.3.1.3.1). Normally, (98 percent of the time) Broad River flows are well above this level. However, during droughts, flows fall below 483 cfs. When the river flow drops below 538 cfs (FERC minimum release of 483 cfs + Lee Nuclear Station average consumptive use of 55 cfs) the Lee Nuclear Station will begin to draw proportionally from the river and the ponds. Once the river is at or below 483 cfs, Lee Nuclear Station relies on Make-Up Ponds B and C to provide cooling water needs (the volume of Make-Up Pond A being maintained for station shutdown cooling water needs). Cooling water is withdrawn from Make-Up Pond B until Make-Up Pond B is drawn down 30 ft below full pond (from 570 ft msl to 540 ft msl). Cooling water is then withdrawn from Make-Up Pond C until it is drawn down 45 ft below full pond (from 650 ft msl to 605 ft msl). Once flows in the river exceed 538 cfs, Lee Nuclear Station resumes operating from the river and uses any excess flow (>538 cfs) to refill the ponds, within permit conditions. Make-Up Pond B is refilled first followed by Make-Up Pond C, if necessary.

To determine how often low flow conditions in the Broad River would result in Lee Nuclear Station having to rely on Make-Up Ponds B or C for supplemental cooling water, a spreadsheet model was developed to analyze water balance needs to support station operations. The spreadsheet model was based on Broad River daily average flows covering the 83-year period of record (1926–2008). The USGS gauge used was the Broad River at Gaffney, South Carolina (Gauge No. 2153500) (**Reference 17**), chosen due to its proximity to Lee Nuclear Station. Daily average flows for this gauge were compiled using a combination of actual data from the gauge at Gaffney (1938–1971, 1986–1990) and pro-rated flow data from two upstream USGS gauges on the main stem of the Broad River. The two upstream gauges used were the Broad River near Blacksburg, South Carolina (No. 2153200, 3.1 river miles upstream from the Gaffney gauge), and the Broad River near Boiling Springs, North Carolina (No. 2151500, 16.2 river miles upstream from the Gaffney gauge). For periods where data were not available from the Gaffney USGS gauge, the preference was to use pro-rated data from the Blacksburg gauge. If Blacksburg gauge data were not available, the Boiling Springs gauge was used. Pro-rated flows were calculated using drainage area ratios for the two upstream gauges resulting in an 83-year period of record for the Broad River at the Gaffney gauge location (1926–2008) (see **Subsection** 2.3.1.2.1.3).

The model includes the logic of how all three make-up ponds will operate to support cooling water needs at Lee Nuclear Station during low flow conditions. The model also includes daily evaporation losses from Make-Up Ponds B and C, as well as the 55-cfs average plant consumptive use. Evaporation losses at

Make-Up Pond A were assumed to be negligible given the pond's relatively small surface area (61.2 ac). The model also included a 60-cfs allowance for future upstream water demands.

Evaporation rates were estimated from multiple sources to provide the estimated average monthly loss in the reservoir (Reference 14, 15, and 16). First, an annual pan evaporation estimate for the reservoir location was determined from map 3 of National Oceanic and Atmospheric Administration (NOAA) Technical Report (TR) 33 (Reference 14). Next an annual value was distributed to a monthly value using the monthly pan evaporation distribution data for the evaporation coefficients for the region (Clemson University [NOAA-TR34]) (Reference 15). Finally, the estimated monthly pan evaporation coefficients were converted to free water surface using the average basin free water surface coefficient from NOAA-TR33 (Reference 14).

Calculated evaporation rates ranged from 0.11 ft/month during cooler, wetter months (typical of December and January) to 0.41 ft/month during warmer, drier months (typical of July) (Table 5.2-7). Based on these estimated evaporation rates, the estimated monthly average evaporative loss to the full pond surface area of Make-Up Pond C in terms of flow was 1.1 cfs to 4.2 cfs, respectively. Evaporation also has more effect on Make-Up Pond C due to its full pond surface area being approximately four times larger than Make-Up Pond B and 10 times larger than Make-Up Pond A.

The analysis indicated that if Lee Nuclear Station operated during this 83-year period of record (1926–2008), the station would have withdrawn water from Make-Up Pond B 176 times. The rates of decline based on pool elevation for Make-Up Pond B and Make-Up Pond C are shown in Table 5.2-5. Figure 5.2-1 illustrates the number of times Make-Up Pond B or Make-Up Pond C would have been used during the 83-year period of record and the magnitude of the drawdowns. The water available in Make-Up Pond B would have been insufficient five times during the 83-year period of record and the station would have drawn additional water from Make-Up Pond C. Supplemental water from Make-Up Pond C would have been used in 1954, 1956, 2002, 2007, and 2008 (Figure 5.2-2), with drawdown magnitudes of 5 to 19 ft. Additionally, while Make-Up Pond B supplied supplemental water, Make-Up Pond C would have been drawn down numerous times less than a foot due to evaporation losses. Table 5.2-3 contains the drawdown occurrences and duration for Make-Up Pond B. Table 5.2-4 depicts the drawdown occurrences and duration for Make-Up Pond C. Note that the level in Make-Up Pond B dropped slightly below 540 ft msl in a few instances; this decrease was due to continual evaporation.

Figure 5.2-3 shows the two Make-Up Pond C drawdown events that would have hypothetically occurred in 1954 and 1956, where Make-Up Pond C would have supplied supplemental water for 25 and 21 days, respectively. In both of these drawdown events, Make-Up Pond C would have drawn down approximately 5 feet and would have taken between 7 and 8 days to fully recover. During the 2002 event (Figure 5.2-4), Make-Up Pond C would have been used for supplemental water for 75 days, resulting in a drawdown of approximately 19 ft. Refill operations would have taken 34 days. During the 2007 event (Figure 5.2-5), Make-Up Pond C would have been used for supplemental water for 57 days, resulting in a drawdown of approximately 13 ft. Refill operations would have taken approximately 28 days. The remaining hypothetical event for Make-Up Pond C is shown graphically in Figure 5.2-6. Beginning in June 2008, Make-Up Pond C would have provided supplemental water for 52 days, which would have resulted in a drawdown of approximately 13 ft. Due to fluctuations in Broad River flows the refill operations would have taken 112 days (Table 5.2-4). Table 5.2-6 provides the relationship between water surface elevation, area, and volume in Make-Up Pond B, and Make-Up Pond C.

The overall water balance objective during normal operations is to maintain Lee Nuclear Station operations, while at the same time keeping all three make-up ponds at or near full-pond elevation. Figure 4.2-2 provides the locations of Make-Up Ponds A, B, and C with the proposed layout of the piping connections between them and the Broad River.

Subsection 5.2.1.2, Water Sources, page 5.2-2, last paragraph:

An 8183-year period of record (1926–20062008) for the Broad River at the Gaffney Station was used to determine the average annual flow of the Broad River (2538approximately 2,500 cfs) (Subsection 2.3.1.2.1.3). Duke Energy estimated a long-term 7Q10 of 479439 cfs using this same database (Subsection 2.3.1.2.1.3).

Subsection 5.2.1.3, Plant Withdrawals and Returns, page 5.2-3, 1st paragraph:

At normal river flow conditions, water is pumped from the Broad River into the Make-Up Pond A. The total water withdrawn is 78 cfs (35,030 gpm) which includes the intake screen backwash (2,000 gpm), and demineralized water treatment (300 gpm). The net water withdrawal rate from the river for two AP1000 reactors, associated with cooling systems is approximately 73 cfs (32,729 gpm) during normal operations with a maximum rate of 126 cfs (56,421 gpm) (Figure 3.3-1). This rate is within the limits of 316(b) requirements discussed in Subsection 5.2.1.8. The remaining water withdrawn is used for plant systems. Raw water from the Make-Up Pond A is pumped from the Make-Up Pond A intake structure directly into the Units 1 and 2 cooling tower basins as make-up water for the CWSCirculating Water System. Raw water is also pumped from the Make-Up Pond A to an on-site clarification / filtration system to treat make-up water prior to use in the Service Water System and in the demineralized water system as well as for other miscellaneous clarified water uses. None of this water will be used as a potable water supply for the station.

Subsection 5.2.1.3, Plant Withdrawals and Returns, page 5.2-4, 3rd paragraph:

Periods of low flow can occur on the Broad River between July and November. Downstream flow impacts are typically controlled by the minimum flow limit of the Ninety-Nine Islands Hydroelectric Station (July through November) of 483 cfs contained in its FERC issued license. During periods when the Broad River flow is at near or below a flowrate of 483 cfs (Subsection 5.2.2.2.1), make-up water is supplied by the on-site Make-Up Pond A, Make-Up Pond B, and off-site Make-Up Pond C. Full power operations can be supported from Make-Up Ponds B and C for an extended period and there is sufficient reserve water in Make-Up Pond A to shutdown the plant and maintain safe in shutdown conditions.

Additional information about water withdrawal, consumption, and returns, including operational and shutdown modes, is presented in Section 3.4 and Table 3.4-2.

Subsection 5.2.1.3, Plant Withdrawals and Returns, page 5.2-4, INSERT NEW TEXT after 3rd paragraph.

Make-Up Pond C does not have an impact on the normal plant withdrawal and return requirements. However, Make-Up Pond C occasionally requires some pumping from the Broad River to make up for evaporative losses as described in Subsection 5.2.1. In addition, Make-Up Pond C requires additional pumping from the Broad River to recover from more significant drawdown events associated with supplying supplemental cooling water needs during prolonged drought conditions as described in Subsection 5.2.1.

Subsection 5.2.1.5, Hydrological Alterations Affecting Groundwater, page 5.2-5, 2nd paragraph:

Groundwater flow from the Lee Nuclear Station is generally towards the Broad River (northerly), the Make-Up Pond A (easterly), and the Make-Up Pond B (westerly) (Subsections 2.3.1.5.7 and 2.3.1.5.9). During low flow periods make-up water is supplied by the ~~onsite ponds~~ on-site Make-Up Pond B and off-site Make-Up Pond C (Subsections 5.2.1.3 and 5.2.2.1.1). Dewatering the ~~onsite ponds~~ on-site Make-Up Pond B during low flow conditions would result in significantly increased groundwater gradients toward this pond. ~~these ponds.~~ The slow rate of groundwater movement through the low permeability media would result in a relatively slow process to fill the reservoir, and groundwater gradients would only be affected locally. Water is returned to the on-site Make-Up Pond B and off-site Make-Up Pond C ~~ponds~~ from the Broad River as soon as practicable after low flow conditions have passed. Because the effects are both local and relatively short term, the hydrological impact to groundwater is SMALL.

Subsection 5.2.1.5, Hydrological Alterations Affecting Groundwater, page 5.2-5, INSERT NEW TEXT at end of section.

The filling of Make-Up Pond C increases groundwater levels in the immediate vicinity of the pond. The pond is kept full (elevation 650 ft msl) for the purpose of providing a supplemental source of water to Lee Nuclear Station during periods of prolonged low flow in the Broad River. Minor variations to the Make-Up Pond C operating level result in minor variations of the surrounding groundwater level. But, future relatively steady-state conditions are comprised of precipitation recharging groundwater in the London Creek watershed, and groundwater discharging at or near the perimeter operating level of Make-Up Pond C. Consequently, the elevated groundwater level around Make-Up Pond C will become the normal groundwater level. Make-Up Pond C will rarely experience significant drawdown events (refer to Subsection 5.2.1).

As noted in Subsection 2.3.2.2.1, the one well located within the Make-Up Pond C inundation area is properly decommissioned and closed according to the SCDHEC regulations (Reference 18). Legacy wells discovered during the course of construction of Make-Up Pond C will also be properly decommissioned. Other wells in the Make-Up Pond C study area are located outside the watershed boundary and are not affected by drawdown events.

Subsection 5.2.1.6, Operational Activities Causing Hydrologic Alterations, page 5.2-5, 3rd paragraph:

Periodic dredging is also expected for the Make-Up Pond A to ensure that this basin functions as intended during operation to remove the majority of suspended sediments from the Broad River water before use in the power plant water systems. ~~There are no plans for operational maintenance dredging of the Make-Up Pond B, nor the Hold-Up Pond A located onsite.~~ Dredge spoils will be disposed of either in an approved county landfill or the proposed on-site dredge spoil disposal area. Due to the infrequency of the dredging activity and the quick dissipation of disturbed sediment, hydrological impacts from dredging are SMALL.

Subsection 5.2.1.6, Operational Activities Causing Hydrologic Alterations, page 5.2-5, INSERT NEW TEXT after 3rd paragraph of section:

Make-Up Ponds B and C require occasional withdrawals from the Broad River to replace evaporative losses and to recover from significant drawdown events. Because the Make-Up Ponds B and C are infrequently used, and subsequently infrequently refilled (Figure 5.2-1), sediment deposition is not expected to be significant.

Subsection 5.2.1.7, Surface Water and Groundwater Users Affected by Hydrologic Alterations, page 5.2-6, 2nd paragraph:

As discussed in the previous **Subsection** 5.2.1.6, turbidity from periodic dredging of the Broad River and the Make-Up Pond A is expected to be localized and to dissipate quickly. The ~~onsite~~ make-up ponds are expected to be utilized during low flow conditions (see **Subsection** 5.2.2.2.1). The most extreme low flow river conditions will be no lower with the operation of the Lee Nuclear Station; therefore, the minimum river flow required by the FERC license for the Ninety-Nine Islands Hydroelectric Station can be maintained.

Subsection 5.2.1.7, Surface Water and Groundwater Users Affected by Hydrologic Alterations, page 5.2-7, INSERT NEW TEXT after 1st paragraph:

Impacts to surface water users are minimal as a result of the operation of Make-Up Pond C. These impacts are primarily related to additional pumping from the Broad River to make-up for evaporative losses in Make-Up Ponds C and B, and to refill the reservoirs after significant drawdown events, as described above in **Subsection** 5.2.1. This occasional additional pumping does not impact downstream surface water users because any additional withdrawals will still be subject to CWA and FERC flow limits as described above in **Subsection** 5.2.1.

As described in **Subsection 4.2.3.3**, potable water wells north of Whites Road near Grace Road and along Old McKowns Farm Road and Fawn Trail may experience an increase in water level during initial filling of Make-Up Pond C. The increase in water level is caused by an increased regolith storage and/or hydraulic communication between fractures intercepted by the wells and Make-Up Pond C. During the increase in groundwater levels some private wells may experience a temporary increase in turbidity, which should dissipate after a new equilibrium levels are reached. For these same reasons, wells that experience an increase in water level during filling will also experience a decrease in water level during Make-Up Pond C drawdown events. These drawdown events are expected to be rare. However, water levels will not decrease to a level lower than pre-construction conditions, especially since the maximum expected drawdown of Make-Up Pond C is 45 ft.

Subsection 5.2.1.7, Surface Water and Groundwater Users Affected by Hydrologic Alterations, page 5.2-7, 2nd paragraph:

Two downstream municipalities have intakes on the Broad River for their public water supplies (**Table** 2.3-13). Both of these municipalities are 20–30 mi. below Ninety-Nine Islands Hydroelectric Station and below the confluence of the Pacolet River with the Broad River. USGS Gauging Station No. 02156500 near Carlisle, South Carolina, is located nearest these municipalities. The average annual flow of the Broad River at this station is around 3,880 cfs (**Section** 2.3). The consumptive use at Lee Nuclear Station is a very small percentage of the river contribution at these points of water withdrawal. Also any additional concentration of TDS as a result of the cooling tower blowdown would have a nearly 95 percent dilution in the Broad River flow before reaching these municipal water intake structures. Because Ninety-Nine Islands Hydroelectric Station is required to maintain minimum flow as part of its FERC license, impacts from Lee Nuclear Station operations to these downstream water users are SMALL. Additional information about municipality use and industrial use is provided in **Subsection** 2.3.2. To facilitate Ninety-Nine Islands Hydroelectric Station minimum flow requirements, makeup water for the Lee Nuclear Station circulating water and service water systems is withdrawn from the make-up ~~onsite~~ ponds during periods of low flow (483 cfs) for the Broad River. Based upon this provision for low flow conditions and the expected minimal hydrologic alterations, impacts to surface-water and groundwater users are considered to be SMALL. Detailed discussions of possible intake and discharge processes that could alter the aquatic ecosystem near the Lee Nuclear Site are presented in **Subsections** 5.3.1.2 and 5.3.2.2.

5.2.2 Water-Use Impacts

Subsection 5.2.2.1, Plant Operational Activities Potentially Impacting Water Use, page 5.2-8, INSERT NEW TEXT after 1st paragraph:

Make-up water withdrawals from the Broad River and consumptive use are discussed in Subsection 5.2.2.1.1. Cooling tower blowdown discharges to the Broad River are discussed in Subsection 5.3.2.

Radioactive process water discharges to the Broad River are discussed in Subsection 5.4. Nonradioactive process water discharges are discussed in Subsection 5.5.1.1.

Subsection 5.2.2.1.1, Make-Up Water Withdrawal and Consumptive Use, page 5.2-8, 2nd, 3rd and 4th paragraph:

Based on an average annual flow of ~~2538~~approximately 2,500 cfs at the Lee Nuclear Site, approximately 3 percent of the mean annual river flow past the Lee Nuclear Site is expected to be withdrawn for plant use (Table 2.3-14). The plant will return 1 percent of the mean annual river flow as discharge of cooling tower blowdown and treated wastewater. Approximately 2 percent of the mean annual flow of the Broad River will be consumed by the plant.

Consumptive losses of this magnitude are expected to be barely discernible under normal circumstances (typical flows). The proposed river water intake structure is located north of the site on the Broad River and parallel to the river flow. An intake-hydrodynamic description is presented in Subsection 5.3.1.1.1. At normal flow, water is pumped from the river into the Make-Up Pond A. During low-flow periods ~~(483 cfs)~~, make-up water for the circulating water system and the service water system is withdrawn from ~~the~~ Make-Up Pond B or Make-Up Pond C and pumped into the Make-Up Pond A. As discussed further in Subsection 5.3.1.1.3, using the ~~onsite~~ ponds for make-up water helps preserve the minimum pass through requirements of the Ninety-Nine Islands Hydroelectric Station FERC license. There is sufficient water in the ~~onsite~~ ponds for the station to operate at full power for ~~approximately four weeks~~ extended periods during low flow conditions. This mitigates water availability impacts the Lee Nuclear Station might otherwise have on downstream water users.

River-level reduction associated with consumptive water losses resulting from two-unit operations is not expected to affect recreational canoeing and fishing in summer, when river use is at its highest even during low-flow conditions. This is because water extracted for the 2–3 percent consumptive use of Lee Nuclear Station is taken at a point which is at the upstream side of the Ninety-Nine Islands impoundment. Maximum water consumption of 64 cfs from the Broad River during summer only reduces the water elevation by 0.01 ft. or less than 0.2 in. These withdrawals will therefore not reduce the depth of water for boat or fishing upstream of the dam as the impoundment elevation is controlled by the FERC license for the hydroelectric development. The withdrawal of water for use at the Lee Nuclear Station has minimal impact on boating and fishing downstream of the dam except when drought conditions force the hydroelectric unit to operate at run-of-river minimum flow conditions. However, during these low flow conditions Lee Nuclear Station will align to the ~~onsite reservoirs~~ make-up ponds allowing proportioned withdrawals from the river or ~~onsite~~ make-up ponds, and consequently, previously established minimum flows (FERC license) will be maintained. Therefore potential impacts from consumptive water uses are expected to be SMALL.

Subsection 5.2.2.2.1, Downstream Water Availability Impacts (Future Water Use), page 5.2-9, 4th and 5th paragraph:

As discussed in Subsection 2.3.1.2.1.3, since 1900, severe droughts have occurred statewide in 1925, 1933, 1954, 1956, 1977, 1983, 1986, 1990, 1993, ~~and~~ 1998, 2002, 2007, and 2008. Duke Energy investigated the potential impact this drought pattern might have on Lee Nuclear Station operations.

Subsection 5.2.2.2.1, Downstream Water Availability Impacts (Future Water Use), page 5.2-10, 1st, 2nd, and 3rd paragraphs:

A minimum continuous flow of 483 cfs was established for the Ninety-Nine Islands Hydroelectric Station for the months of July through November when low river flow is most likely (Subsection 5.2.1.2). This was established during the FERC relicensing effort in 1996. Using the FERC-established 483 cfs minimum flow through the Ninety-Nine Islands Dam, it was determined that off-channel storage would be necessary to supplement consumptive water use needs at the Lee Nuclear Station when the daily average flow rate in the Broad River drops below ~~588~~ 538 cfs (483 cfs + 55 cfs average consumptive use at the Lee Nuclear Station ~~+ 23 cfs future North Carolina withdrawal + 17 cfs Cliffside Steam Station additional consumptive use + 10 cfs city of Shelby, North Carolina, future withdrawal) (Subsection 5.2.2.2.1)~~. Duke Energy has planned for this additional need with the use of Make-Up Ponds A, B, and C ~~two make-up ponds~~ that can supplement the water needs of the plant if flows approach the 483 cfs~~,~~ minimum release for the Ninety-Nine Islands Hydroelectric Station ~~cut-off~~ established by FERC. The Lee Nuclear Station ~~is expecting to~~ withdraws an average ~~total~~ of 78 cfs from the river for operation and discharges approximately 23 cfs back into the river (18 cfs from the blowdown, 4 cfs from the intake backwash, and 1 cfs from the demineralization processes). This withdrawal is only a small fraction of the normal flow seen in the Broad River. As flow approaches the 483 cfs minimum flow, ~~cut-off,~~ demand on the river from the Lee Nuclear Station is expected ~~expecting~~ to diminish as water from the make-up ponds is used to augment the river diversion to complete the 78 cfs requirement. If river flow drops below 483 cfs, all consumptive cooling water would be drawn from the make-up ponds ~~while still discharging approximately 23 cfs~~.

~~The results of the Log Pearson Type III (LPIII) distribution indicate that the Lee Nuclear Station may have to completely align to Make-Up Pond B for a 7-day period every 1.3 years. The Lee Nuclear Station would have to completely align to Make-Up Pond B for 1 month every 8.5 years. The Lee Nuclear Station would have to completely align to Make-Up Pond B for 90 consecutive days every 16.6 years. This indicates that for the combination of projected operations and historical low flow conditions, the capacity of the Broad River and Make-Up Pond B might be exceeded once every 16.6 years. Station operations would potentially have to be curtailed at this frequency.~~

Additional evaluation indicated that had a hypothetical Lee Nuclear Station operated during the ~~81-year~~ 83-year period of record, ~~operations would have been curtailed only once. During the 1998 – 2002~~

~~drought,~~ operations would not have been curtailed ~~for 48 days during June – September 2002, which was the worst year of the drought~~.

Subsection 5.2.2.2.1, Downstream Water Availability Impacts (Future Water Use), page 5.2-10, 5th paragraph:

Additional information related to future water use in the Upper Broad River basin is presented in Subsection 2.3.2.1.4. Because the Lee Nuclear Station uses ~~design has incorporated into the design a~~ Make-Up Ponds B and C ~~to be utilized~~ when the river flows drop below 538 cfs (sum of 483 cfs FERC minimum release and 55 cfs Lee Nuclear average consumption) (see Subsection 5.2.2.1), the impact of Lee Nuclear Station operations during low-flow conditions on downstream future water availability is considered SMALL. ~~the most extreme low flow river conditions will be no lower with the operation of the Lee Nuclear Station and impact to downstream future water availability is considered SMALL.~~

Subsection 5.2.2.2.1, Downstream Water Availability Impacts (Future Water Use), page 5.2-10, INSERT NEW TEXT after 5th paragraph:

Downstream water availability impacts as a result of Make-Up Pond C operations can be separated into two areas: evaporation and refilling. Evaporative losses are expected to range from 1.1 cfs to 4.2 cfs depending on seasonal effects as described above in **Subsection** 5.2.1.3. Under no circumstance are flows withdrawn from the Broad River to replenish evaporative losses or refill Make-Up Pond C that would cause flows to drop below the FERC minimum flow of 483 cfs at Ninety-Nine Islands Hydroelectric Station as described in **Subsection** 5.2.1. Therefore, downstream water availability impacts due to the operation of Make-Up Pond C are SMALL.

5.2.3 Water Quality Impacts

Subsection 5.2.3.1, Thermal Impacts, page 5.2-12, INSERT NEW TEXT at end of section:

Thermal Impacts to the Make-Up Ponds B and C

In addition to the thermal impacts of cooling tower blowdown discharge on the Broad River, there are some operational impacts on Make-Up Ponds B and C. For the vast majority of the time when station cooling water is not being withdrawn from Make-Up Ponds B or C, the thermal structure of the ponds is expected to be similar to the measurements in Make-Up Pond B (**Subsection** 2.3.3.1.2 and **Figure** 2.3-22, Sheet 3 of 16). Make-Up Pond C is in the same general location as Make-Up Pond B and is subject to the same hydrologic and meteorological conditions. Although Make-Up Pond C has a larger surface acreage than Make-Up Pond B (approximately 620 ac versus approximately 150 ac) and is deeper than Make-Up Pond B (116 ft versus 60 ft), from a thermal stratification perspective, they are similar. They are both well-mixed during the winter and have similar temperatures going into the spring. The surface heating during the summer results in similar thermocline conditions.

When Make-Up Pond C is refilled, water is pumped from the Broad River either directly or through Make-Up Pond B. Make-Up Pond B will be refilled from the Broad River or through Make-Up Pond A. An alternate path is to refill directly from the river. Refill of the ponds generally occurs during the high flow periods in the winter, when the ponds are isothermal.

When Make-Up Ponds B and C are used to supply cooling water to Lee Nuclear Station, as described in Subsection 5.2.1, water is withdrawn from the bottom of the pond. This withdrawal lowers the water surface elevation of the pond, but does not significantly alter the thermal stratification of the pond. However, when Make-Up Ponds B and C are refilled after a significant drawdown event, water pumped into the bottom of the pond alters the thermal stratification of the pond by a small amount since the ponds are generally refilled in the winter when they are isothermal. Overall, the impact of operations on thermal stratification is SMALL.

Subsection 5.2.3.2, Cooling Tower Blowdown Discharge, page 5.2-12, 2nd paragraph:

Details related to water quality of the Broad River are presented in **Subsection** 2.3.3. As previously noted in **Subsection** 2.3.3, most of the mean and maximum trace metals concentrations are below the SCDHEC criterion maximum concentration (CMCs) for fresh water aquatic life except for copper and iron; both naturally high in the region. **Table** 5.2-2 presents ambient water quality data in the vicinity of the Lee Nuclear Station intake, estimated discharge concentrations based on a four cycles of concentration through the cooling tower and estimated mixed concentrations in the vicinity of the discharge.~~the water quality of the anticipated discharge from plant operations at the Lee Nuclear Station, based on a four-fold concentration of the ambient waters of the Broad River.~~

5.2.4 References

Subsection 5.2.4, References, page 5.2-16, INSERT NEW TEXT at end of section:

14. National Oceanic and Atmospheric Administration. 1982a. Technical Report NWS 33, Evaporation Atlas for the Contiguous 48 United States.

15. National Oceanic and Atmospheric Administration. Technical Report NWS 34. 1982b. Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States.

16. U.S. Fish and Wildlife Service. 1978. Hydraulic Simulation in Instream Flow Studies: Theory and Techniques. Instream Flow Information Paper No. 5. FWS/OBS-78/33. June.

17. U.S. Geological Survey, Daily Stream Flow Conditions, North Carolina. http://waterdata.usgs.gov/nc/nwis/rt/

18. South Carolina Individual Residential Well and Irrigation Well Permitting. South Carolina Code of Regulation 61-44

TABLE 5.2-2
~~WATER QUALITY OF COOLING TOWER BLOWDOWN~~ BROAD RIVER WATER QUALITY

Category	Aluminum mg/L	Arsenic µg/L	Barium µg/L	Boron mg/L	Cadmium µg/L	Chromium µg/L	Copper µg/L	Iron mg/L	Lead µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Sulfate mg/L	Zinc µg/L
South Carolina PQLs[(a)]	0.05	~~5~~ 5.00	~~50~~ 50.0	0.05	~~0.1~~ 0.10	~~5~~ 5.00	~~10~~ 10.0	0.02	~~2~~ 2.00	0.05	~~10~~ 10.0	0.0005	~~10~~ 10.0	~~5~~ 5.00	~~5~~ 5.00	~~5~~ 5.00	~~10~~ 10.0
South Carolina CMCs for Freshwater Aquatic Life[(a)]	-	340	-	-	0.53	-	3.8	~~1~~ -	14.0	-	-	~~1.6~~ 1.60	150	-	0.37	-	37.0
~~South Carolina MCLs[(a)]~~	~~-~~	~~10~~	~~2000~~	~~-~~	~~5~~	~~100~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~2.00~~	~~-~~	~~50~~	~~-~~	~~-~~	~~-~~
Mean and Maximum values calculated from quarterly monitoring																	
Mean	0.163	0.36	19.2	<0.1	<0.5	0.827	1.31	0.855	<2	1.67	47.7	<0.087	0.128	<2	<0.5	6.26	5.44
Max	0.268	2.18	22.4	<0.1	<0.5	1.68	4.97	1.11	<2	1.88	61.9	<0.1	2.95	<2	<0.5	9.77	12.6
4-Cycle Concentration at Point of Discharge[(b)]																	
Mean concentration	0.654	1.43	76.8	NA	NA	3.31	5.24	3.42	NA	6.68	191	NA	0.513	NA	NA	25.0	21.8
Max concentration	1.07	8.72	89.4	NA	NA	6.72	19.90	4.42	NA	7.50	247	NA	11.8	NA	NA	39.1	50.2
Diluted Effluent at River's 7Q10 Flow: ~~479~~ 439 cfs (~~214,990~~ 197,036 gpm)[(c)]																	
Mean concentration	0.187	0.41	22.0	NA	NA	0.949	~~1.503~~ 1.50	~~0.981~~ 0.980	NA	~~1.92~~ 1.91	~~54.7~~ 54.6	NA	0.147	NA	NA	~~7.18~~ 7.21	~~6.24~~ 6.27
Max concentration	0.307	2.50	25.7	NA	NA	1.93	5.70	1.27	NA	2.15	~~71.0~~ 70.9	NA	3.38	NA	NA	~~11.2~~ 11.3	~~14.4~~ 14.5
Diluted Effluent at River's Approximate Annual Mean Flow: ~~2538~~ 2,500 cfs (~~1,122,134~~ 1,122,077 gpm)[(c)]																	
Mean concentration	0.168	~~0.37~~ 0.69	19.8	NA	NA	0.851	~~1.348~~ 1.35	~~0.879~~ 0.880	NA	1.72	49.00	NA	0.13	NA	NA	6.44	5.60
Max concentration	0.276	2.24	23.0	NA	NA	1.73	5.11	1.14	NA	1.93	~~63.6~~ 63.7	NA	~~3.03~~ 3.036	NA	NA	~~10.0~~ 10.1	12.9

cfs = cubic feet per second
Operational Discharge Rate (DR) = 8,216 gallons per minute (gpm)
~~MCL - Maximum Concentration level~~
CMC = Criterion Maximum Concentration
mg/L = milligrams per liter
µg/L = micrograms per liter
~~meq/L - Milliquivalents Per Liter~~
PQL = Practical Quantitation Limit

Notes:

(a) South Carolina Department of Health (SCDHEC) Water Classifications and Standards Regulations 61-68 (~~June 25, 2004~~April 25, 2008) established maximum concentrations for freshwater aquatic life (CMCs) ~~and drinking water (MCLs)~~. SCDHEC Practical Quantitation Limits (PQLs) establish expected laboratory detection limits for NPDES monitoring (from SCDHEC ~~Fact Sheet and Permit Rationale for New Industrial Facilities, July 2008)~~ Practical Quantitation Limits (PQLs) and Approved Test Methods, May 26, 2009.

(b) The Mean or Maximum analyte concentration is increased by a factor of 4.

(c) See ER Subsection ~~2.3.1.2.1.3~~ 2.3 for discussion of the ~~Broad River 7Q10~~ FERC Low Flow (2.3.1.3.1), 7Q10 (2.3.1.2.1.3) and Annual Mean Flows (2.3.1.2.1.3, referred to as average annual flow).

Mean and Max Concentrations - calculated from quarterly monitoring (February, May, August, and November 2006) at Stations 101, 102, 105, 107, and 109 within the main channel of the Broad River (see Figure 2.3-21). No calculations were performed if all samples were below the laboratory detection limit (boron, cadmium, lead, mercury, selenium, and silver).

Equation for Effluent Concentrations:

Effluent Concentration = [(4-cycle Mean/Max concentration x DR)/DR + River Flow)] + Mean/Max Concentration

NA = no effluent concentration calculations were conducted for non-detected compounds.

~~**HIGHLIGHTED ANALYTES EXCEED THE CORRESPONDING REGULATORY LEVEL**~~

SHADED VALUES EXCEED THE SCDHEC CMCs.

ROUNDING MAY HAVE PRODUCED MINOR DISCREPANCIES IN THE MEAN AND MAX CONCENTRATION VALUES.

TABLE 5.2-3
MAKE-UP POND B DRAWDOWN OCCURRENCES (JANUARY 1926–APRIL 2009) [a]

Histogram Breakouts	Magnitude of Drawdown Event (ft)	# Days to Lowest Elevation Reaches[c]	# Days at Lowest Elevation	# Days to Refill Pond B from Lowest Elevation Reached[d]	Total # Days in Drawdown Event	Start Date	End Date
0–0.5 ft[b]	0.5	1	1	1	2	12/31/2001	1/1/2002
0.5–1 ft[b]	1.0	2	1	1	3	9/4/1954	9/6/1954
1–2 ft[b]	2.0	3	1	1	4	10/11/1930	10/14/1930
2–3 ft[b]	3.0	5	1	1	6	7/8/2000	7/13/2000
3–4 ft[b]	3.5	8	1	2	10	8/31/1999	9/9/1999
4–5 ft[b]	4.8	7	1	2	9	9/4/2008	9/12/2008
5–6 ft[b]	5.3	19	1	8	27	10/29/2001	11/24/2001
6–20 ft[b]	17.3	49	1	13	62	10/13/2008	12/13/2008
20–30 ft	20.4	21	1	6	27	8/12/2000	9/7/2000
20–30 ft	21.4	22	1	17	39	7/6/1986	8/13/1986
20–30 ft	30.0	33	3	27	62	7/31/1956	9/30/1956
20–30 ft[e]	30.1	33	13	28	73	9/8/1954	11/19/1954
20–30 ft[e]	30.1	30	10	53	92	6/2/2008	9/1/2008
20–30 ft[e]	30.2	68	28	44	139	7/21/2007	12/6/2007
20–30 ft[e]	30.8	29	69	15	112	6/11/2002	9/30/2002

Notes:

a Provisional USGS data (12/23/2008 – 4/30/2009) was used in this analysis.
b Only the largest drawdown event in Figure 5.2-2 is shown.
c Number of days to lowest pond elevation includes the first day at the lowest elevation which results in this day being counted twice. As a result, the # days to lowest elevation reached + # days at the lowest elevation + # days to refill Pond B do not equal the total # of days in the drawdown event (i.e., off by one day).
d Number of days to refill Pond B from lowest elevation begins on the first day that water can be pumped from the Broad River (1 to 225 cfs) into Pond B until the full pond elevation (570 ft msl) is reached.
e Magnitude of drawdown event exceeds 30 ft due to evaporation losses during periods when Pond B had no usable storage.
ft = feet
ft msl = feet above mean sea level

TABLE 5.2-4
MAKE-UP POND C DRAWDOWN OCCURRENCES (JANUARY 1926-APRIL 2009) [a]

Drawdown Event	Magnitude of Drawdown Event (ft)	# Days of Evaporation Loss Prior to Lee Nuclear Station Alignment to Pond C[c]	# Days Lee Nuclear Station Aligned to Pond C[d]	# Days at Lowest Elevation	# Days to Refill Pond C from Lowest Elevation Reached[e]	Total # Days in Drawdown Event	Start Date	End Date
2001[b, f]	0.4	36	0	1	1	37	8/18/2001	9/23/2001
1986[f]	0.5	38	0	1	2	40	7/6/1986	8/14/1986
1954	4.7	31	25	1	7	78	9/9/1954	11/25/1954
1956	5.0	32	21	1	8	69	7/31/1956	10/7/1956
2007	12.5	67	57	1	28	165	7/21/2007	1/1/2008
2008	12.9	29	52	1	112	203	6/2/2008	12/21/2008
2002	19.2	28	75	1	34	145	6/11/2002	11/2/2002

Notes:

a Provisional USGS data (12/23/2008 – 4/30/2009) was used in analysis.

b Only the largest drawdown event in Figure 5.2-2 is shown.

c Period when Lee Nuclear Station would have withdrawn supplemental cooling water from Pond B and flows in the Broad River are below pumping threshold.

d Number of days that Lee Nuclear Station aligned to Pond C are not necessarily consecutive days because Lee Nuclear Station pumped from Broad River as flow was available. As a result, the # days of evaporation loss prior to Lee Nuclear Station alignment to Pond C + # days Lee Nuclear Station aligned to Pond C + # days at the lowest elevation + # days to refill Pond C do not equal the total # of days in the drawdown event.

e Number of days to refill Pond C from the lowest elevation begins on the first day that water can be pumped from the Broad River (1 to 225 cfs) into Pond C until the full pond elevation (650 ft msl) is reached.

f These events are not drawdowns to supply make-up water; Make-Up Pond C was drawn down from evaporative losses.

TABLE 5.2-5
AVERAGE RATES OF DECLINE FOR MAKE-UP PONDS B AND C

Drawdown Range (ft)	Pond B		Pond C	
	Avg Rate of Decline (ft/day)	Elevation Range (ft msl)	Avg Rate of Decline (ft/day)	Elevation Range (ft msl)
0-10	0.94	570-560	0.24	650-640
10-20	1.21	560-550	0.29	640-630
20-30	1.65	550-540	0.36	630-620
30-40	N/A	N/A*	0.44	620-610
40-45	N/A	N/A*	0.57	610-605

*Pond B has a maximum depth of approximately 60 feet, but has a drawdown limit of 30 feet.
ft/day = feet per day
ft msl = feet above mean sea level

TABLE 5.2-6
STAGE STORAGE INFORMATION FOR MAKE-UP POND B AND MAKE-UP POND C

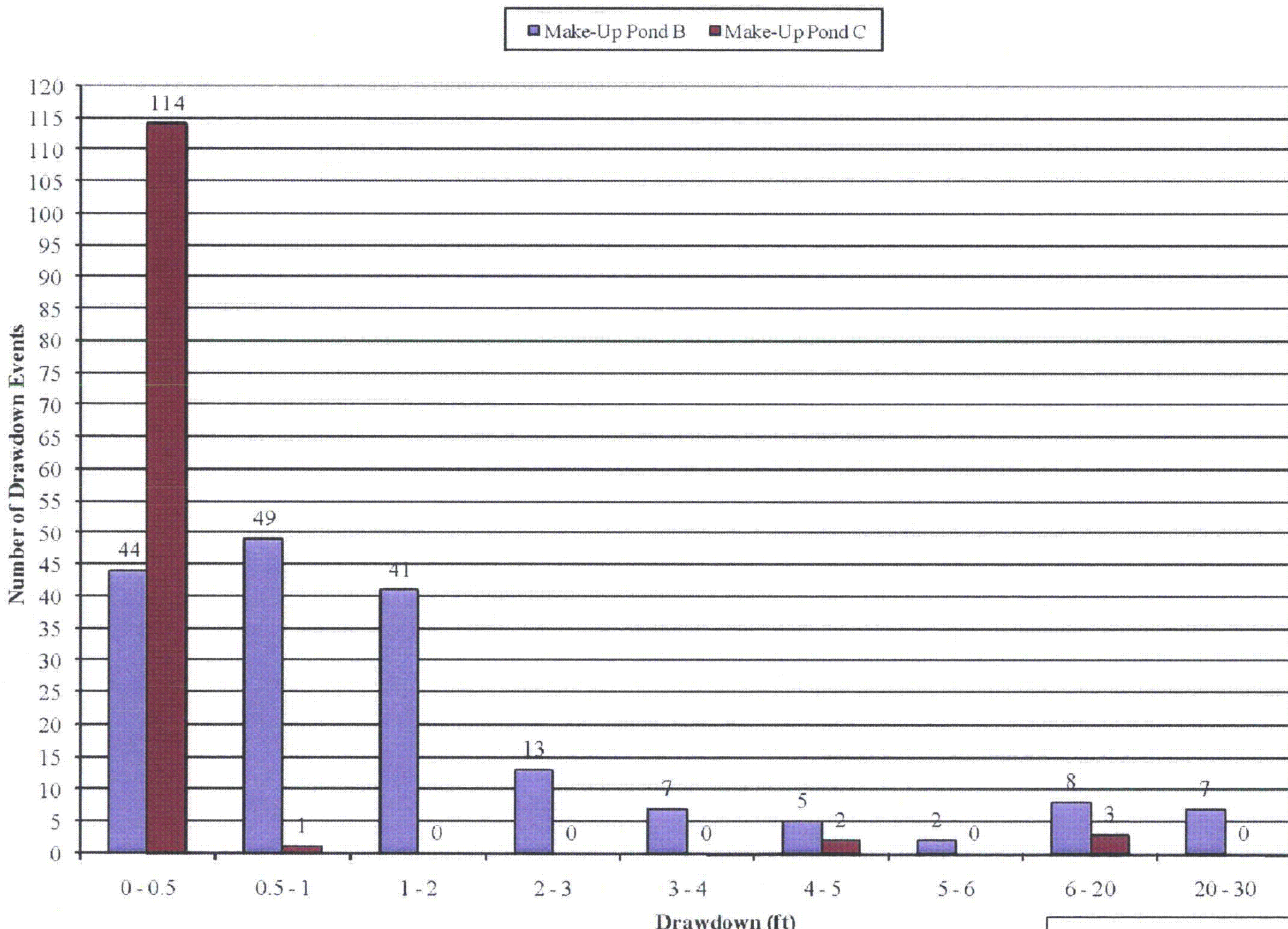
Pond Stage/Area/ Volume Information	Make-Up Pond B	Make-Up Pond C
Maximum Pond Elevation	570 ft msl	650 ft msl
Maximum Pond Surface Area	152 ac	618 ac
Maximum Pond Volume	3,991 ac-ft	22,023 ac-ft
Minimum Pond Elevation*	540 ft msl	605 ft msl
Minimum Pond Surface Area	63 ac	201 ac
Minimum Pond Volume (Dead Storage)	835 ac-ft	4,530 ac-ft
Usable Pond Volume	3,156 ac-ft	17,493 ac-ft

* Elevations are based on maximum drawdowns.
ft msl = feet above mean sea level
ac = acres
ac-ft = acre-feet

TABLE 5.2-7
MAKE-UP POND C CALCULATED AVERAGE EVAPORATION RATES

Month	Monthly Evaporation Rates (ft/month)	Daily Evaporation Rates (ft/day)
January	0.11	0.0035
February	0.15	0.0054
March	0.24	0.0077
April	0.33	0.0110
May	0.37	0.0119
June	0.40	0.0133
July	0.41	0.0132
August	0.37	0.0119
September	0.28	0.0093
October	0.22	0.0071
November	0.15	0.0050
December	0.11	0.0035

MAKE-UP PONDS B AND C DRAWDOWN OCCURRENCES (JANUARY 1926 – APRIL 2009; 83-YEAR RECORD)



a) All Make-Up Pond C drawndown events less than 1 foot (ft) were due to evaporative losses.

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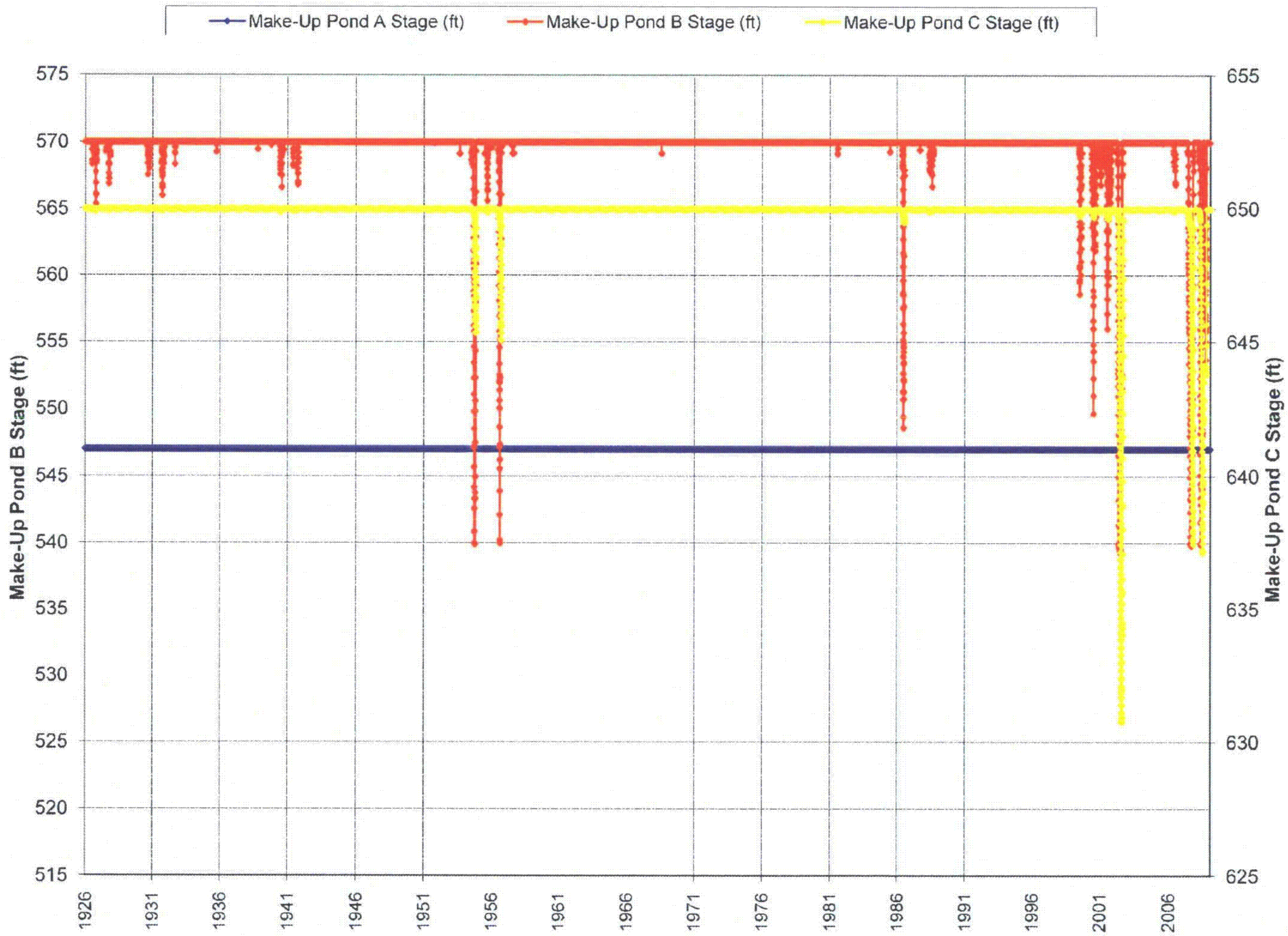
Make-Up Ponds B and C
Drawdown Occurrences

FIGURE 5.2-1 Rev 0



Make-Up Pond A normal water level = 547 ft
Make-Up Pond B normal water level = 570 ft; Max drawdown = 30 ft
Make-Up Pond C normal water level = 650 ft; Max drawdown = 45 ft

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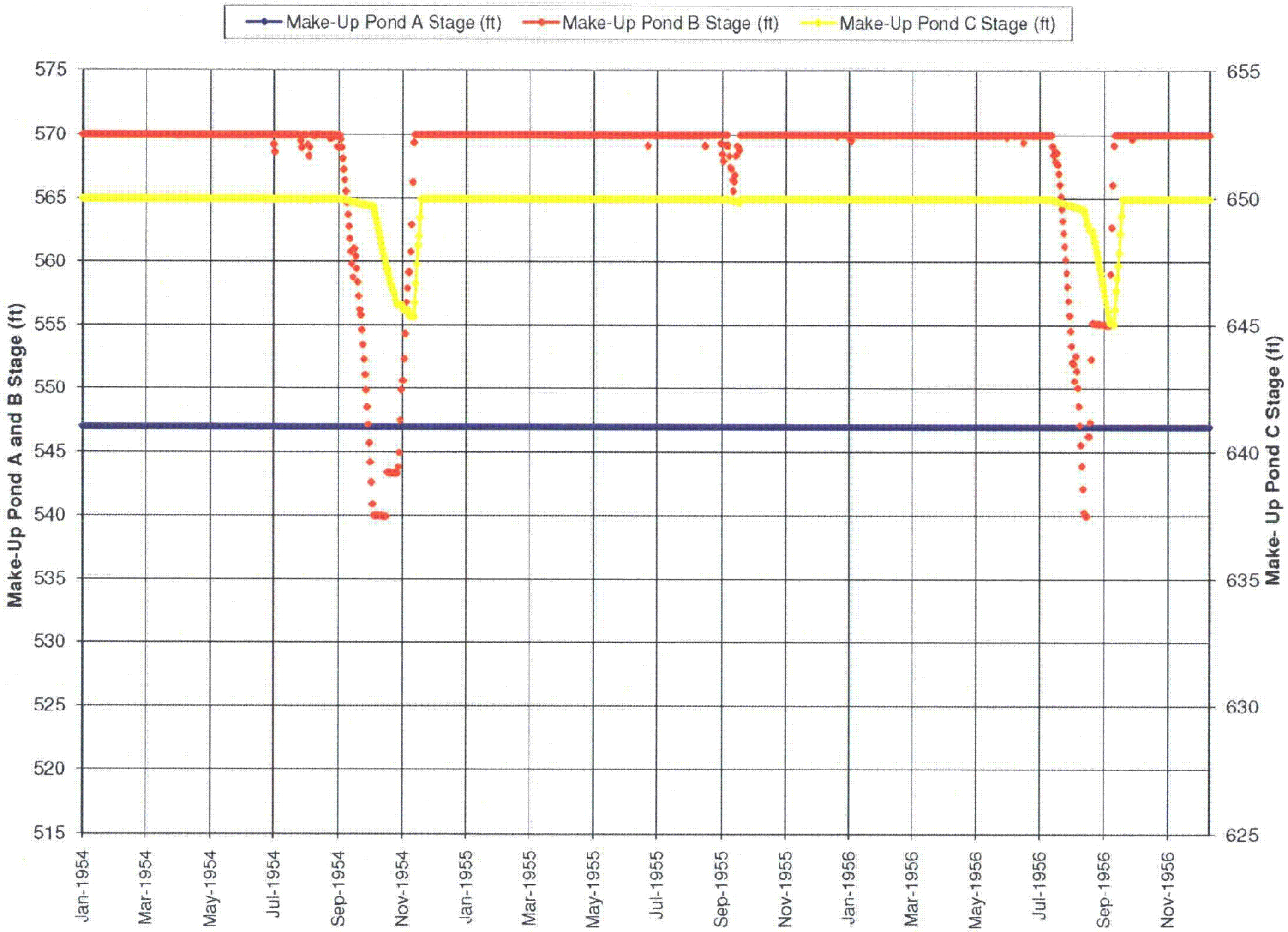
Make-Up Ponds A, B, and C
Modeled Pond Elevations
Over 83-Year Period of Record

FIGURE 5.2-2 Rev 0



Make-Up Pond A normal water level = 547 ft
Make-Up Pond B normal water level = 570 ft; Max drawdown = 30 ft
Make-Up Pond C normal water level = 650 ft; Max drawdown = 45 ft

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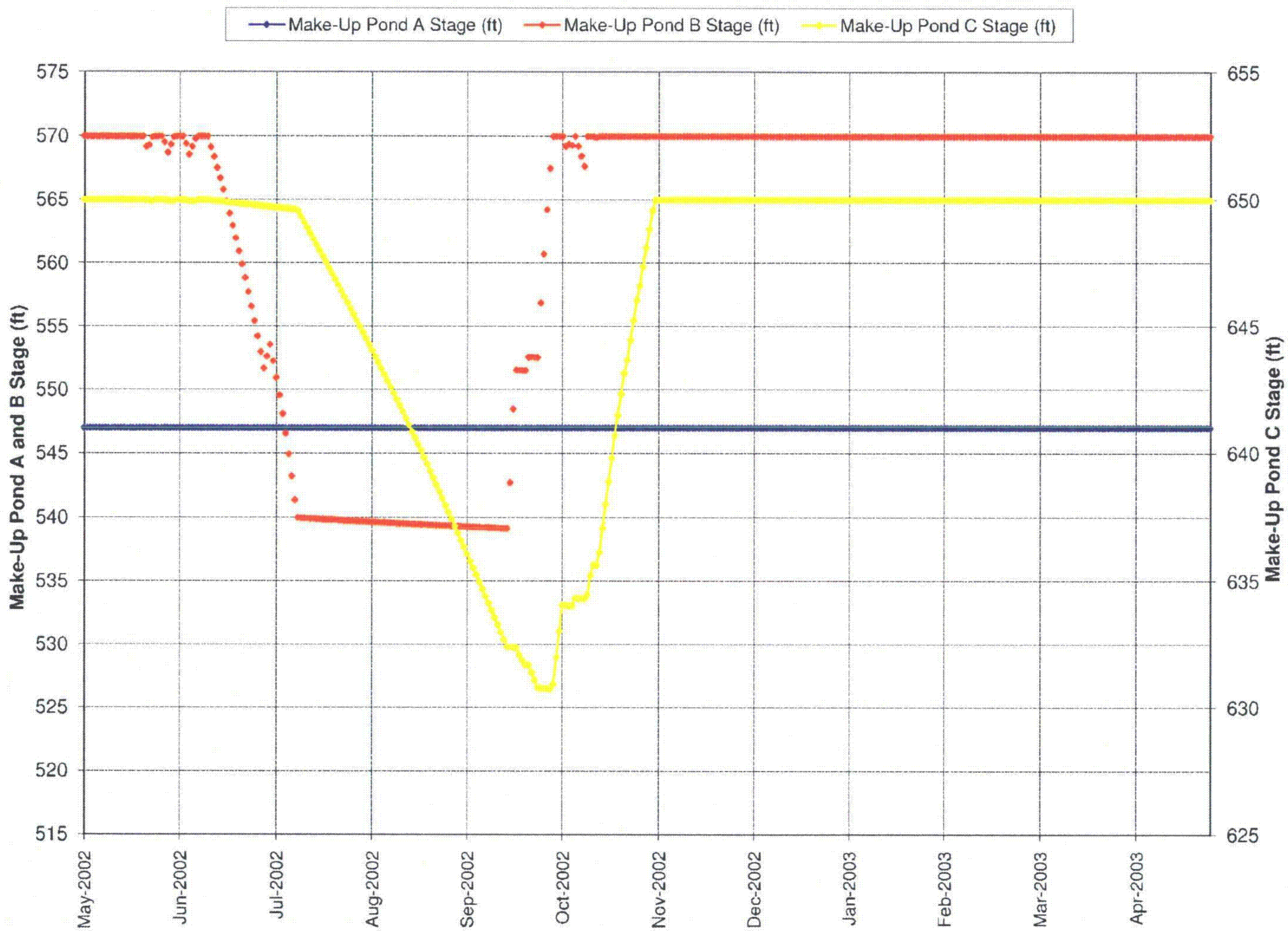
NUCLEAR STATION UNITS 1 & 2

Make-Up Ponds A, B, and C
Modeled Pond Elevations for 1954-1956

FIGURE 5.2-3 Rev 0



* Make-Up Pond B drops below maximum drawdown elevation due to evaporative losses.

Make-Up Pond A normal water level = 547 ft
Make-Up Pond B normal water level = 570 ft; Max drawdown = 30 ft
Make-Up Pond C normal water level = 650 ft; Max drawdown = 45 ft

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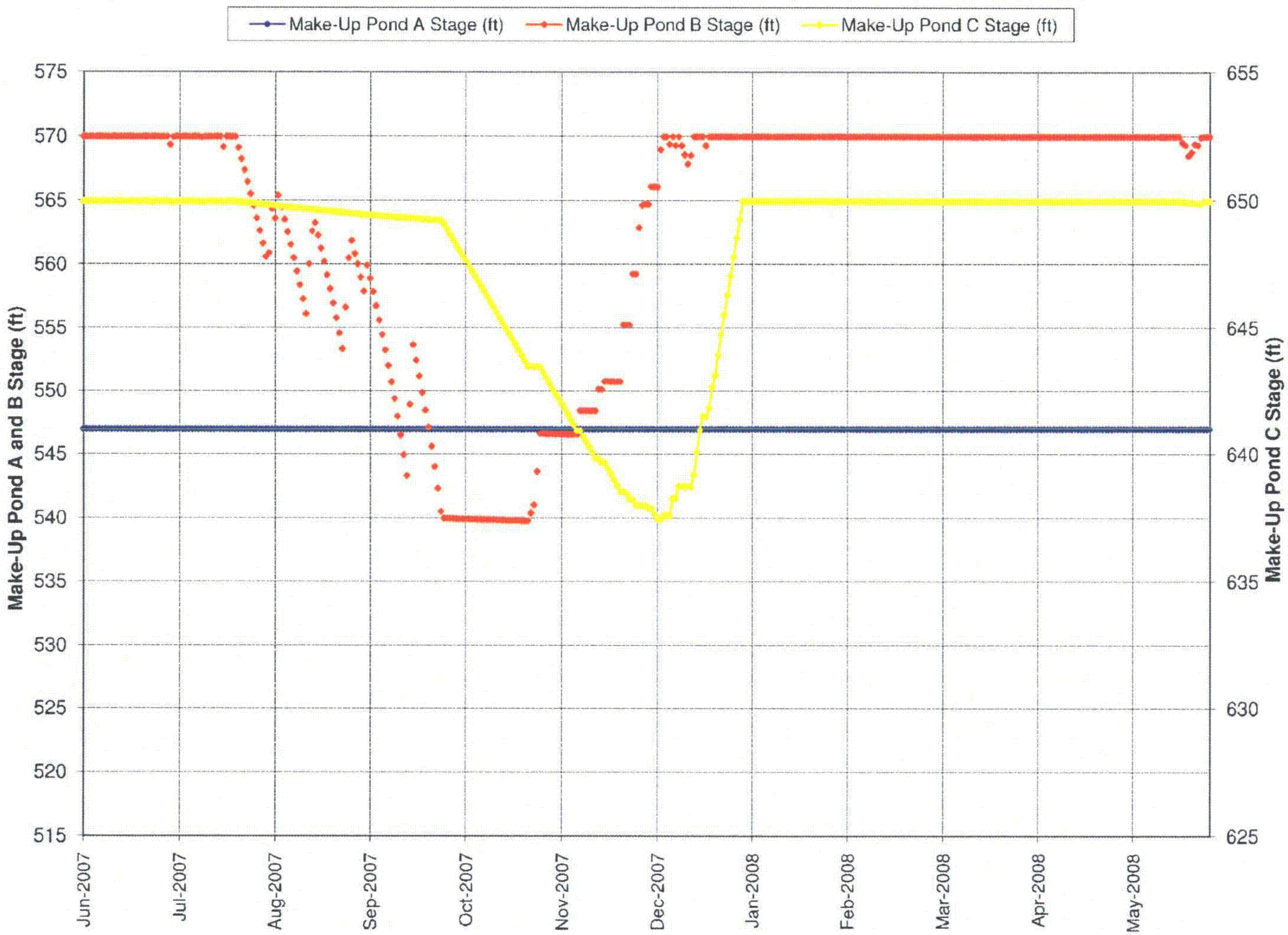
Make-Up Ponds A, B, and C
Modeled Pond Elevations for 2002-2003

FIGURE 5.2-4 Rev 0



Make-Up Pond A normal water level = 547 ft
Make-Up Pond B normal water level = 570 ft; Max drawdown = 30 ft
Make-Up Pond C normal water level = 650 ft; Max drawdown = 45 ft

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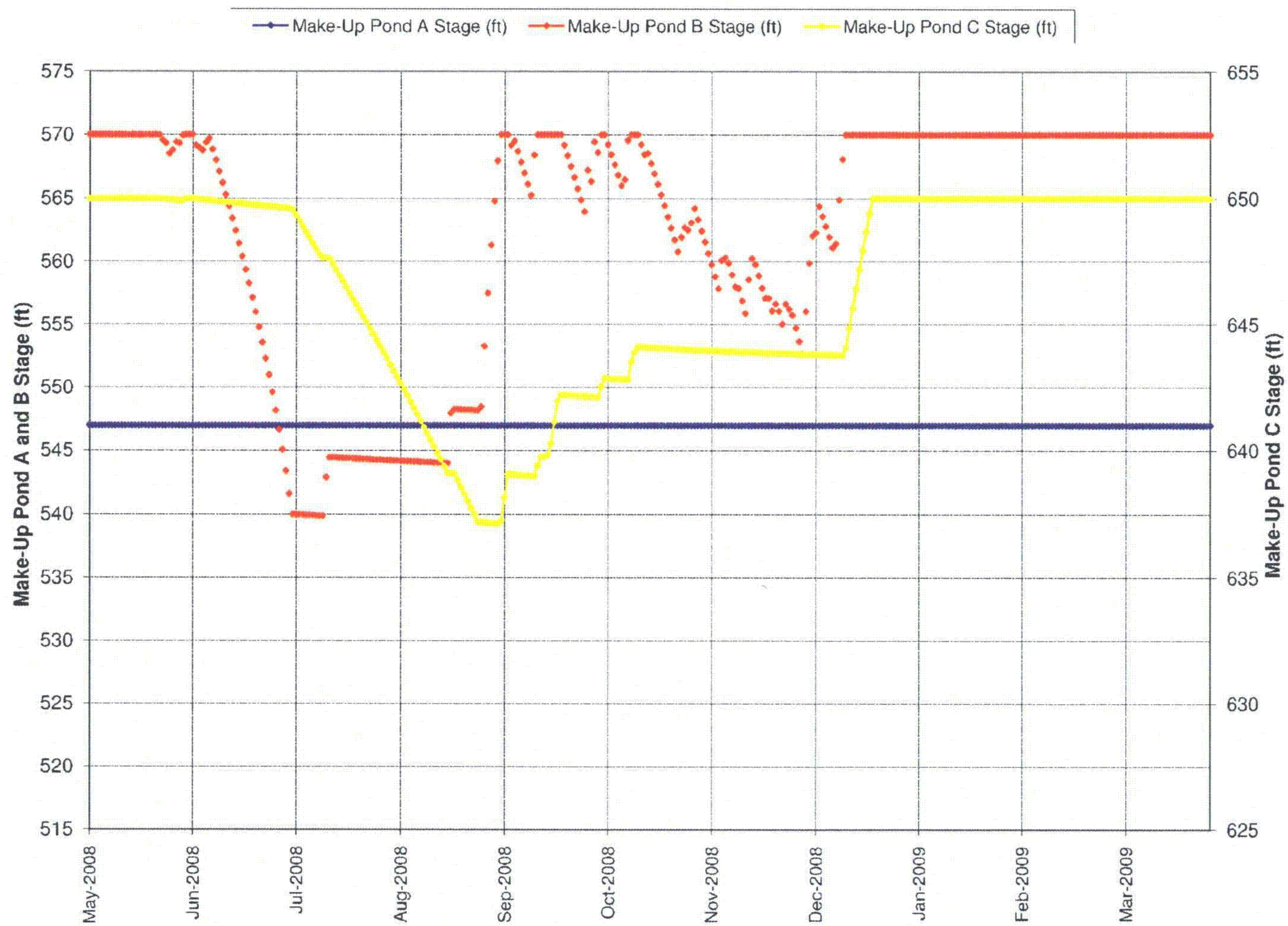
NUCLEAR STATION UNITS 1 & 2

Make-Up Ponds A, B, and C
Modeled Pond Elevations for 2007-2008

FIGURE 5.2-5 Rev 0



Make-Up Pond A normal water level = 547 ft
Make-Up Pond B normal water level = 570 ft; Max drawdown = 30 ft
Make-Up Pond C normal water level = 650 ft; Max drawdown = 45 ft

WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Ponds A, B, and C
Modeled Pond Elevations for 2008-2009

FIGURE 5.2-6 Rev 0

5.3 COOLING SYSTEM IMPACTS

5.3.1 Intake System

Subsection 5.3.1, Intake System, page 5.3-1, 1st and 2nd paragraph:

This subsection describes the impact of the intake system on the aquatic ecology and the physical impacts — such as scouring, silt build-up, and shore-line erosion — caused by the flow field induced by the intake system during station operation. The site plan and station layout, showing the intake and discharge locations, are provided in Figure 3.1-1.

The river intake structure provides make-up water to both the CWS and SWS cooling towers in order to make-up for cooling tower losses due to evaporation, drift, and blowdown, ~~and~~ provides intake screen-washing flow and strainer backwash flow and provides water for the refilling of Make-Up Pond B and Make-Up Pond C after periods of low flow operation. Subsection 5.3.1.1 examines site hydrodynamics alterations as a result of operating a functional nuclear power plant. Subsection 5.3.1.2 explores possible impacts to aquatic life that could be affected by subsequent habitat modification.

Subsection 5.3.1.1.1, Intake-Hydrodynamic Description, page 5.3-1, 1st paragraph:

The proposed river intake structure is located north of the site on the Broad River and is situated parallel to river flow. The intake water flow direction is perpendicular to the river flow direction. The intake, which will be constructed flush with the bank of the river, will draw an average of less than 5 percent of the Broad River annual mean flow. That withdrawal will be through an intake which has a low approach velocity, less than 0.5 foot per second (fps) through the screens on the intake structure. This location on the bank combined with the low intake velocity is unlikely to lead to scouring of the river channel or alterations in the general flow path of the river. At normal river flow conditions, water is pumped from the river into the Make-Up Pond A and into Make-Up Ponds B and C, as needed and flow allows. Water then is withdrawn from the Make-Up Pond A into the CWS. During low flow, water is pumped directly from the Make-Up Pond B into the Make-Up Pond A. Make-Up Pond B is drawn down a maximum of 30 ft, as needed. If additional water is needed, Make-Up Pond C is drawn down a maximum of 45 ft, as necessary. Water is again pumped from the Make-Up Pond A into the circulating water system. The Lee Nuclear Station ~~also has the ability to~~ pumps water from the Make-Up Pond A to the Make-Up Pond B ~~in order~~ to refill the Make-Up Pond B after use, or directly from the Broad River to Make-Up Pond B and Make-Up Pond C.

Subsection 5.3.1.1.1, Intake-Hydrodynamic Description, page 5.3-2, 3rd and 4th paragraphs:

As discussed in Section 3.4, intake water taken from the Broad River passes through bar screens and traveling screens designed to minimize uptake of aquatic biota and debris (Figure 5.3-1). Each traveling screen has fish collection and return capability. The screens are sized for a maximum through-screen velocity of less than 0.5 fps (Reference 1). The 3/8-in. mesh screens are equipped with Ristroph fish lifting buckets, a low pressure fish return spray wash and a high pressure debris wash. All of the wash water and impinged fish are returned to a location downstream of the intake. The pump intake structures in Make-Up Pond A, the Make-Up Pond B, and Make-Up Pond CA contain Make-Up Pond B Pumps, Raw Water Pumps, and also bar screens as illustrated in Figures 5.3-2 and 5.3-15 are illustrated on Figures 5.3-3, 5.3-2, and 5.3-5, respectively.

At normal river flow conditions, water is pumped from the Broad River into the Make-Up Pond A. The total water withdrawn is 78 cfs (35,030 gpm) which includes the backwash (2000 gpm). The net water withdrawal rate from the river for two AP1000 reactors, associated with cooling systems is approximately 73 cfs (32,729 gpm) during normal operations with a maximum rate of 126 cfs (56,421 gpm) (Figure 3.3-1). This rate is within the limits of 316(b) requirements.

Subsection 5.3.1.1.1, Intake-Hydrodynamic Description, page 5.3-2, 6th paragraph:

During low-flow conditions in the river, raw water is pumped from the Make-Up Pond B intake structure to the Make-Up Pond A. Water can also be pumped from Make-Up Pond C to Make-Up Pond B and, subsequently, to Make-Up Pond A.

Subsection 5.3.1.1.3, Operations During Low Flow Conditions, page 5.3-3 and page 5.3-4, 1st through 6th paragraphs:

As discussed in **Section** 2.3, since 1900, severe droughts have occurred statewide in 1925, 1933, 1954, 1956, 1977, 1983, 1986, 1990, 1993, and 1998, 2002, 2007, and 2008. Duke Energy investigated the potential impact this drought pattern might have on the Lee Nuclear Station operations.

As discussed in **Subsection** 5.2.2.2.15.2.2.1.1, the mean annual flow for the Broad River is 2538approximately 2,500 cfs and a minimum continuous flow of 483 cfs was established for the Ninety-Nine Islands Hydroelectric Plant for the months of July through November when low river flow is most likely (**Subsection** 5.2.1.25.2.1.3). The Lee Nuclear Station is expecting to withdraw a total of 78 cfs from the river and discharge approximately 23 cfs back into the river (18 cfs from the blowdown, 4 cfs from the intake backwash, and 1 cfs from the demineralization processes). Withdrawal is only a small fraction of the normal flow seen in the Broad River. As flow approaches the 483 cfs cut-off, demand on the river from the Lee Nuclear Station is expected to diminish as water from the make-up ponds is used to augment the river diversion to complete the 78 cfs requirement. If river flow drops below 483 cfs, all evaporative cooling water would be drawn from the make-up ponds while still discharging approximately 23 cfs.

As described previously, Duke Energy plans to use Make-Up Ponds B and C to supplement river flows during low-flow conditions. To estimate how often this would occur, the LPIII method was also used to calculate recurrence intervals based on the FERC required minimum continuous flow of 483 cfs established for the Ninety-Nine Islands Hydroelectric Plant.

~~Using the 81-year daily average flow record for the Gaffney gauge, 7-day, 30-day, and 90-day rolling averages were plotted using a logarithmic scale. A polynomial trend line was fitted to the 7-day rolling average data and a LPIII distribution was fitted to the 30-day and 90-day rolling average data. Using logarithmic interpolation, the recurrence interval was identified for flows in the Broad River below the pumping thresholds based on minimum continuous flows at the Ninety-Nine Islands Hydroelectric Plant. Seven-day rolling average flows were analyzed to determine the frequency that the Lee Nuclear Station would be required to align to Make-Up Pond B for a consecutive 7-day period. The 30-day rolling average flows were selected based on the volume of existing Make-Up Pond B. The 90-day rolling average flows were analyzed to determine the frequency that the Lee Nuclear Station would exceed the capacity of Make-Up Pond B.~~

~~The results of the Log-Pearson Type III (LPIII) distribution indicate that the Lee Nuclear Station may have to completely align to the Make-Up Pond B for a 7-day period every 1.3 years. The Lee Nuclear Station would have to completely align to Make-Up Pond B for 1 month every 8.5 years. The Lee Nuclear Station would have to completely align to Make-Up Pond B for 90 consecutive days every 16.6 years. This indicates that for the combination of projected operations and historical low-flow conditions, the capacity of the Broad River and Make-Up Pond B might be exceeded once every 16.6 years. Station operations would potentially have to be curtailed at this frequency.~~

~~The LPIII distribution does not consider the ability to refill the Make-Up Pond B between low-flow conditions. To consider this aspect,~~ Duke Energy modeled hypothetical operations over an~~the actual~~ 83~~80~~-year flow history (1926–2008). The spreadsheet model used water from the Broad River as long as flow exceeded the low-flow trigger of 483 cfs. When river flows fell below the trigger, the model ~~begins~~began to withdraw water proportionally from the Make-Up Pond B. The model draws down Make-Up Pond B up to 30 ft as necessary. When the available volume of Make-Up Pond B is exhausted, the model draws down Make-Up Pond C up to 45 ft, as necessary. When flows move above the trigger the model uses excess flow to refill the Make-Up Pond B. Once Make-Up Pond B is full, the model uses the excess flow to refill Make-Up Pond C.

The results of this model indicate that had ~~a hypothetical~~ Lee Nuclear Station operated during the 83-year ~~81-year~~ period of record, operations would not have been curtailed. ~~only once. During the 1998 – 2002 drought, operations would have been curtailed for 48 days during June – September 2002, which was the worst year of the drought. Part of this outage would have coincided with the summer peak power demand.~~

Subsection 5.3.1.1.3, Operations During Low Flow Conditions, page 5.3-5, 2nd and 3rd paragraphs:

This model allows evaluation of the impact of increased consumption on the Broad River and consideration of various mitigation scenarios. The model helps form the basis of a comprehensive water management plan for the Broad River. ~~Duke Energy is also evaluating other sources of supplemental water.~~

Drawdowns ~~on~~of the ~~supply~~make-up ponds were also considered relative to the potential effect on the biotic community in those ponds. For Make-Up Pond B, there ~~There~~would have hypothetically been 176~~111~~ predicted drawdown events from 1926 to ~~2007~~April 2009. ~~Sixty-four~~ Fifty-three percent of the events would have been less than 1 ~~foot (ft.)~~ in magnitude. In contrast, ~~four~~ five of the events ~~(4 percent)~~ would have been ~~50-ft.~~ 30-ft drawdowns of ~~that completely emptied~~ Make-Up Pond B. The most severe drawdown event would have lasted a total of ~~204~~ 139 days. It would have taken approximately ~~62~~ 68 days to ~~empty~~ reach the maximum drawdown of Make-Up Pond B. ~~During this event, Make-Up Pond B would have been empty for 100 consecutive days.~~ Once the Broad River flows increased to the point where pumping from the river could resume, ~~42~~ 44 days would have been required for Make-Up Pond B to refill. During the five events when Make-Up Pond B would have been at maximum drawdown, Make-Up Pond C would have been drawn down 5 ft (1954), 5 ft (1956), 19 ft (2002), 13 ft (2007), and 13 ft (2008), respectively. The duration of each of these drawdowns for Make-Up Pond C would have been 78 days, 69 days, 145 days, 165 days, and 203 days. Table 5.2-3 and Table 5.2-4 provide additional information on the hypothetical drawdown occurrences and durations of Make-Up Pond B and Make-Up Pond C.

Subsection 5.3.1.1.3, Operations During Low Flow Conditions, page 5.3-5, 4th and 5th paragraphs:

~~Emptying Make-Up Pond B for any significant amount of time would have an obvious adverse impact on the fish and other taxa that inhabit the pond. Organisms would experience dissolved oxygen depletion, increased water temperature, and other undesirable limnological effects. Non-mobile aquatic organisms such as mussels that are unable to follow the declining water level would be exposed to desiccation and probable mortality. Generally, overall water quality would degrade to a level less capable of sustaining the life of most of the aquatic organisms now living there.~~

~~Most aquatic organisms that inhabit the area of the Lee Nuclear Site are adapted to cope with periodic drought conditions. Repopulation of drought-stricken wetlands is a necessary adaptation for survival by aquatic organisms. Small pools and impoundments such as the cove created by the small earthen dam southwest of Make-Up Pond B, as well as McKowns Creek would potentially serve as refuges for mobile aquatic taxa. Most aquatic amphibians and reptiles are quite mobile and would seek out areas of refuge during dry conditions. These same organisms would repopulate the Make-Up Pond from the Broad River and other tributaries such as McKowns Creek when conditions improved. Aestivation (seasonal dormancy) brought on by severe drought conditions may also play a role in repopulating a species. During severe environmental conditions many species become dormant until conditions improve.~~

Subsection 5.3.1.1.3, Operations During Low Flow Conditions, page 5.3-5, 7th paragraph:

~~Complete~~Maximum drawdowns of Make-Up Pond B (30 ft) and/or Make-Up Pond C (45 ft) will likely have significant short term effects to the aquatic biota inhabiting them. However, wetlands and the resident biota are understood to be sensitive to hydrologic alterations but are usually adapted to periodic drying. Most wetland plant species rely on a "seed bank" in the soils in and around the wetland to re-establish the species after seasonal dry periods. The response of wetland plant and animal species to the frequency and severity of drought conditions is likely species-specific and may also vary regionally within the range of each species, but all wetland species are understood to have developed mechanisms to re-establish populations after periodic dry periods.

Subsection 5.3.1.1.3, Operations During Low Flow Conditions, page 5.3-6, 2nd paragraph:

As discussed previously, ~~complete~~maximum drawdowns of ~~the~~ Make-Up Pond B~~-would~~ were predicted to only occur ~~four~~ five times in the 83 ~~81~~ years data~~-has~~ have been collected. ~~Complete~~Maximum drawdowns of ~~the~~ Make-Up Pond B would likely have MODERATE short term impacts but SMALL long term impacts because of the ability for aquatic organisms to re-establish populations after severe drought conditions. Drawdowns of ~~the~~-Make-Up Pond B that are less than complete would have SMALL effects on the biota of the ponds and wetlands.

Subsection 5.3.1.2, Aquatic Ecosystems, page 5.3-6, 3rd paragraph:

The Broad River near the intake is fairly unpredictable and fluctuation from a monthly rate of 8,764 cfs (3,933,283 gpm) to 242 cfs (108,610 gpm) has been measured (see Table 2.3-3). Based on review of literature and operational monitoring reports, **Table** 2.3-3 indicates approximately 3 percent of the average annual Broad River water is expected to be removed under average flow conditions. When flow in the Broad River drops below 538 cfs (241,471 gpm) trigger, pumping of water from the Broad River proportionally decreases in favor of using the make-up ~~onsite~~ ponds as a water source. Because flow through this river is highly variable (Table 2.3-3), removing this relatively small volume of water for a new facility at the Lee Nuclear Site when river flow is above 538 cfs would have minimal impact on the resident population of fish and habitat in this region of the Broad River.

Subsection 5.3.1.2, Aquatic Ecosystems, page 5.3-6, 4th paragraph:

Intake structures are also located in ~~the~~-Make-Up Pond A, Make-Up Pond B, and ~~as well as in the Make-Up Pond B~~-Make-Up Pond C. Currently turbidity in ~~these reservoirs~~ existing Make-Up Ponds A and B is very low, primarily due to low flow rates consistent with a small reservoir environment. Operational water intake increases flow and turbidity throughout these reservoirs. Predominant fish species in these environments are from family Centrarchidae~~-centrarchidae~~, which are commonly found in turbid environments. Any ichthyoplankton passing through intake pumps are assumed to have a 100 percent mortality rate. However, egg characteristics of many fish species are such that they would not be entrained. Some Catostomidae species lay demersal eggs in open water, which sink to the bottom leaving them less vulnerable to current patterns (**Reference** 14). Species from families Catostomidae, Clupeidae, Cyprinidae and Ictaluridae lay eggs with adhesive properties that stick to substrate, such as logs or emergent vegetation, and are not susceptible to directional flow (**References** 14 **and** 16). Some species of families Centrarchidae, Ictaluridae, and Cyprinidae (dominant families within Ninety-Nine Islands Reservoir), lay eggs in nests built in quiet back water areas and guard them until they hatch (**References 8, 15 and 16**).

Subsection 5.3.1.2, Aquatic Ecosystems, page 5.3-7, 3rd paragraph:

Intake screens on the river intake structure are sized to ensure water velocity through the screens during operational mode is below 0.5 fps which meets requirements of Section 316(b) of the Clean Water Act. However, impingement and entrainment of organisms within the Broad River is not likely to be excessive~~a problem~~ due to minimal water use, low intake velocities, and use of ~~the~~ Make-Up Ponds B and C under low-flow conditions. Intake structures also exist in ~~the~~ Make-Up Ponds A, ~~and Make-Up Pond~~ B and C. ~~Prior to plant operation, fish currently residing in these reservoirs are expected to be removed to prevent impingement or entrainment by intake structures of smaller reservoirs.~~

Subsection 5.3.1.2, Aquatic Ecosystems, page 5.3-7, INSERT NEW TEXT after paragraph 3:

Based on cooling water operations during low flow conditions and associated water withdrawals and drawdown scenarios for Make-Up Ponds B and C (**Subsection** 5.3.1.1.3), potential effects of drawdowns are also considered for aquatic biota in these ponds. Relatively minor, short-term drawdowns are expected to have little to no effect on aquatic biota, as native species in the region are relatively adapted to periodic changes in water levels. Therefore, such drawdowns are considered to have negligible to SMALL effects on aquatic biota. More extensive drawdowns, such as the maximum 30-ft drawdown of Pond B and the maximum 45-ft drawdown of Pond C during severe drought conditions can expose significant areas of the pond bottom and reduce or eliminate the availability of shoreline habitats, such as emergent vegetation, shoreline brush, and overhanging plants. As a consequence of the reduced habitat availability, there would likely be some short-term impact on fish and less mobile wildlife species closely associated with pond and shoreline habitats, such as amphibians and small reptiles. The scarcity of littoral habitats that occur with low water levels can reduce the reproductive success and recruitment of young into the population if the drawdowns occur during or shortly after reproductive periods (e.g. spring and early summer). Some mobile organisms are likely to emigrate between ponds, the Broad River, and various creeks and wetlands depending on where water and/or wet conditions are available. In addition, low water levels can expose both young and adult organisms to predation, often resulting in weak year classes, although predatory and scavenging species would likely benefit during such conditions. Conversely, if the drawdown events are prolonged and shoreline or terrestrial vegetation colonizes within the flood pool, reproduction and recruitment can be enhanced upon re-inundation of these areas due to the increase in littoral habitat and ecosystem productivity. The improved conditions generally persist until the vegetation decomposes or water levels recede with subsequent drawdowns. With improved habitat conditions, it is likely that aquatic organisms would return to the areas experiencing prior drawdown, through local migration, recruitment, and reproduction. The overall effects of these infrequent drawdowns on aquatic biota are considered to be MODERATE in the short-term and SMALL over the long-term.

Subsection 5.3.1.2, Aquatic Ecosystems, page 5.3-8, 5th paragraph:

The Broad River, downstream of Ninety-Nine Islands Dam, is considered an outstanding river of regional significance in the industrial, recreational fishing, timber management, and wildlife habitat categories (see Subsection 2.4.2). Current recreational uses of the Broad Scenic River Corridor include fishing, boating, rafting, tubing, swimming, nature study, photography, and bird watching. Hunting and trapping are also common outdoor activities along the river (Subsection 2.4.2). Using ~~the~~ Make-Up Pond B and Make-Up Pond C to provide make up water during low-flow conditions ~~is imperative to maintaining~~will maintain the ecological and recreational integrity of the Broad River. Alterations to aquatic ecology associated with removing 3 percent of the river water under average water flow conditions are not expected to affect fish and shellfish populations within the Broad River. Therefore impacts to aquatic biota associated with the intake system would be SMALL.

Subsection 5.3.1.2, Aquatic Ecosystems, page 5.3-8, INSERT NEW TEXT at end of section:

Upon completion of the Make-Up Pond C dam and water pipeline, routine maintenance of the rights-of-way, dam slopes, and other areas surrounding the facilities periodically disturb wildlife in the immediate area, particularly small mammals and nesting birds. However, this activity has no effect on species such as raccoons, opossums, and the numerous birds that quickly adapt to disturbed or developed areas. Prior use of the property included recreational hunting, which caused periodic human-influenced disturbances. In addition, much of the OFM is currently managed for hay production or used as livestock pasture, which involves routine anthropogenic and domestic livestock disturbances. Thus, periodic maintenance at Make-Up Pond C basically constitutes a continuation of similar, perhaps somewhat more intensive conditions with respect to disturbing wildlife that inhabit the site. The creation of Make-Up Pond C may attract certain wildlife, particularly waterfowl and other avian species that forage in or near lentic environments that do not currently reside in the area.

5.3.2 Discharge System

Section 5.3.2.2, Aquatic Ecosystems, page 5.3-10, 3rd paragraph:

Because the average annual flow is approximately 2,500~~2538~~ cfs, the normal (blowdown only) discharge of 18 cfs is less than 1 percent of the average annual flow (18 divided by 2,500~~2538~~ cfs); therefore, the discharge is expected to have a SMALL impact on aquatic biota. Even during low-flow conditions (FERC minimum 483 cfs), the discharge of 18 cfs is not expected to have a measurable impact on aquatic biota.

5.3.3 Heat-Discharge System

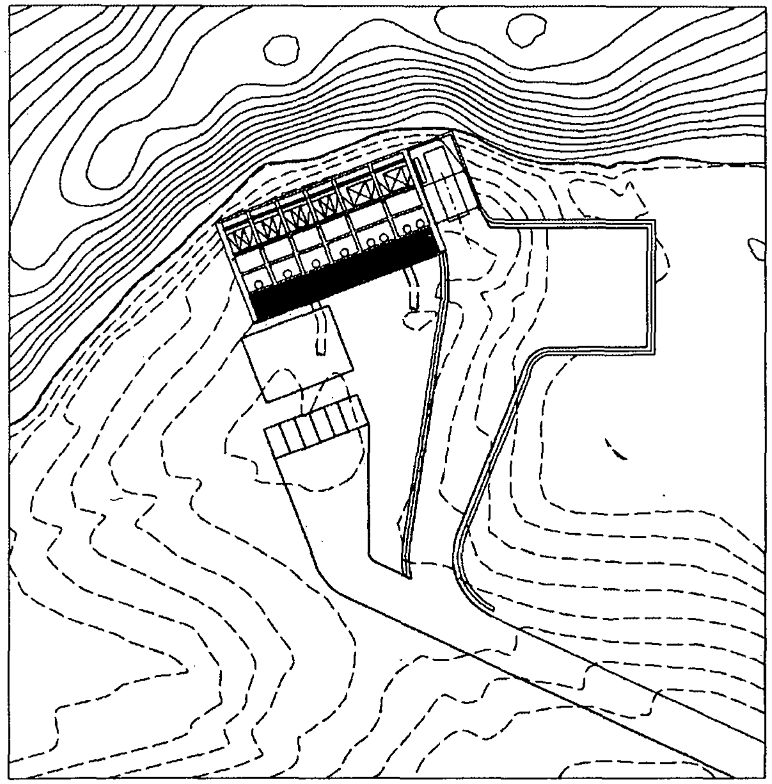
There are no revisions associated with Make-Up Pond C in this section.

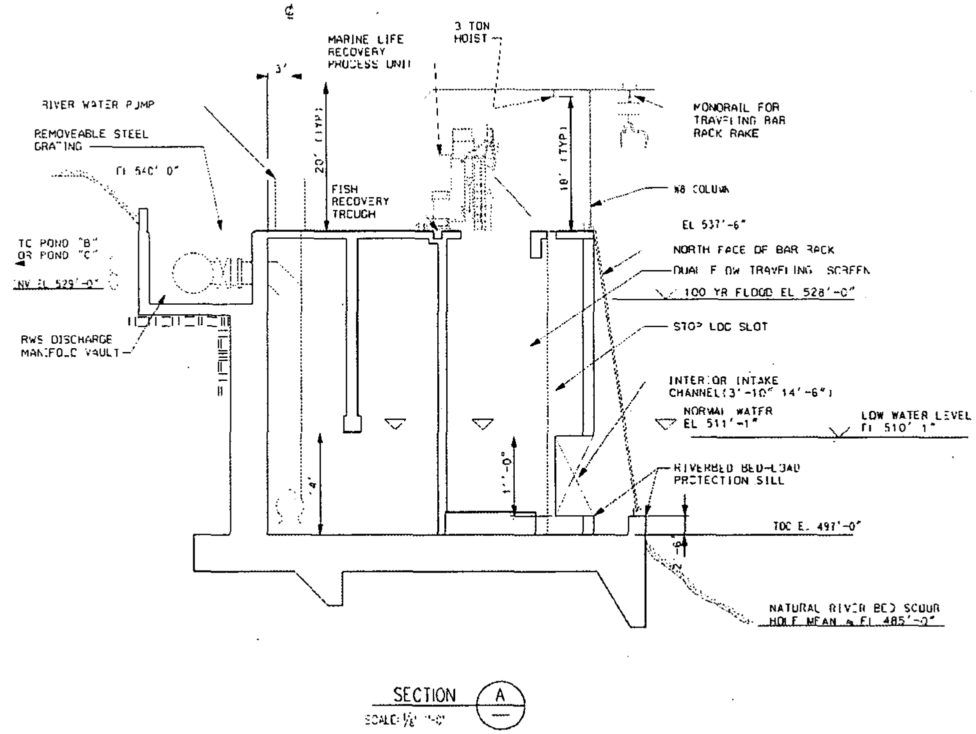
5.3.4 Impacts to Members of the Public

There are no revisions associated with Make-Up Pond C in this section.

5.3.5 References

There are no revisions associated with Make-Up Pond C in this section.

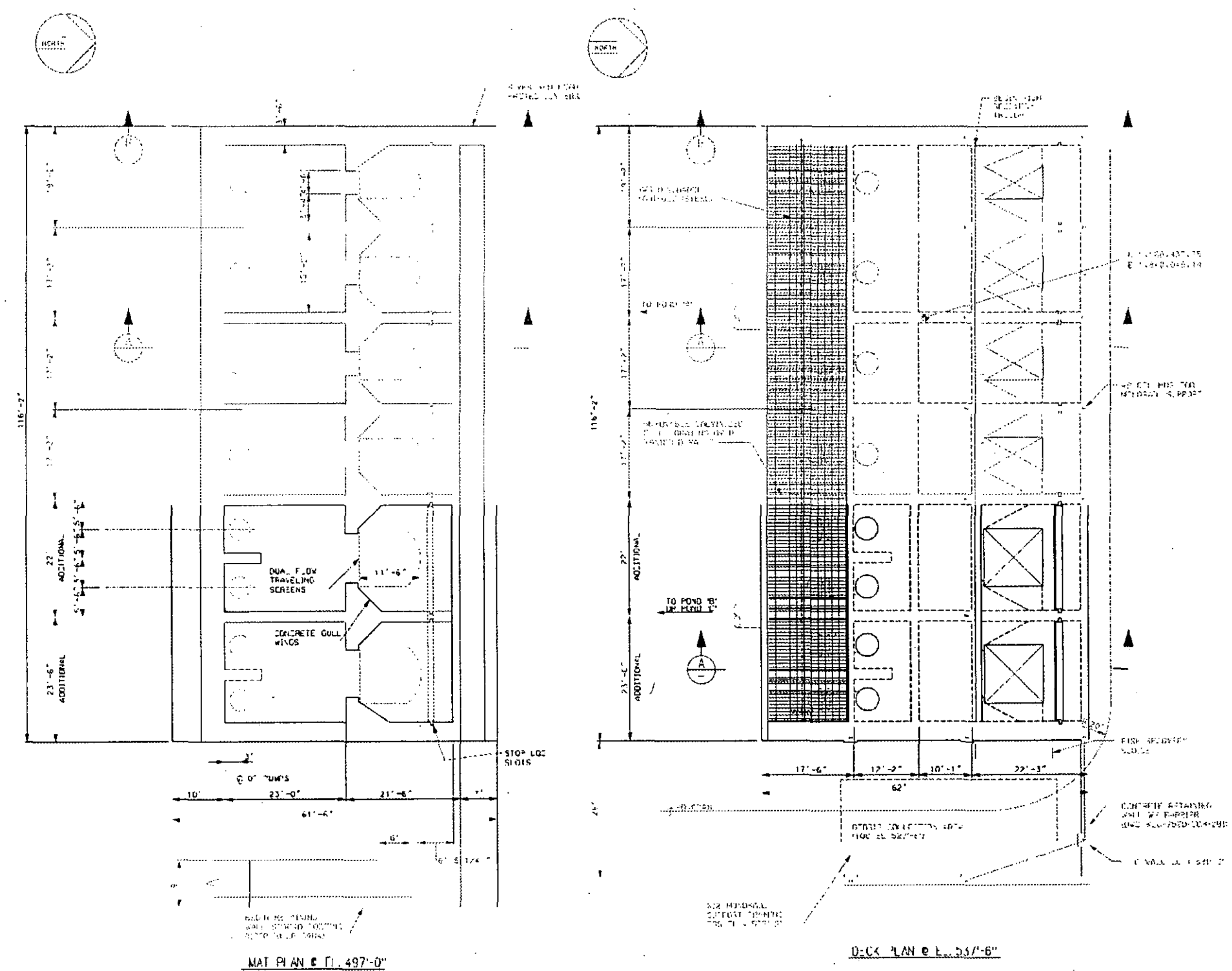




WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

River Water Intake Structure

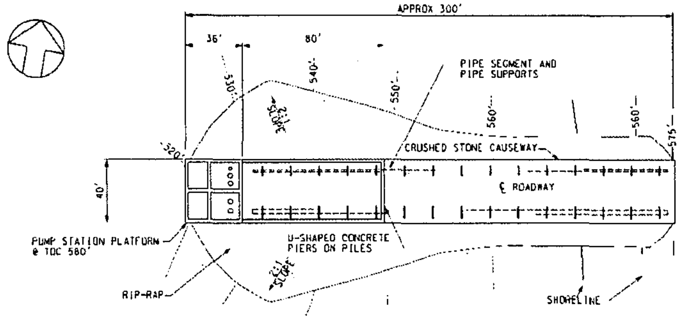
FIGURE 5.3-1 - Sheet 1 of 2 Rev 1



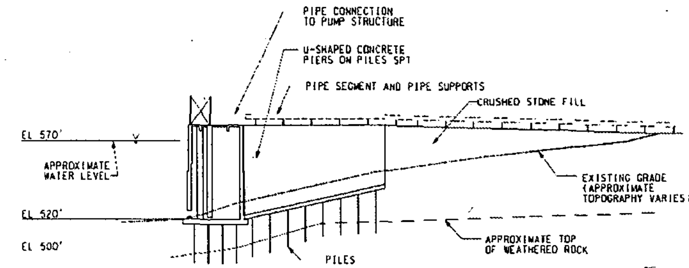
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

River Water Intake Structure

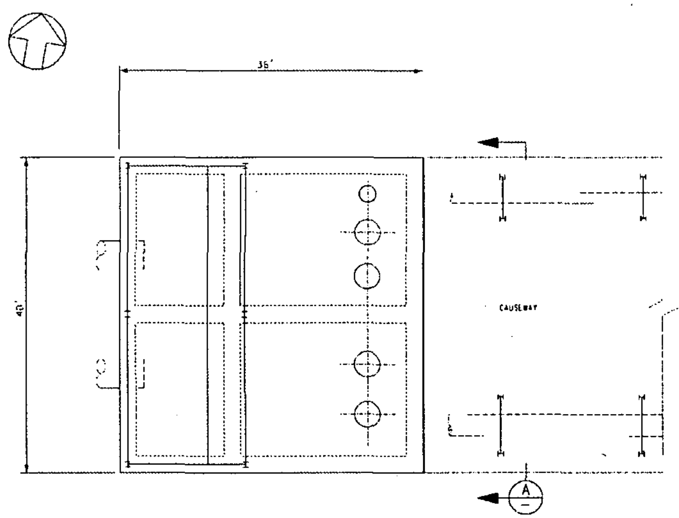
FIGURE 5.3-1 - Sheet 2 of 2 Rev 1



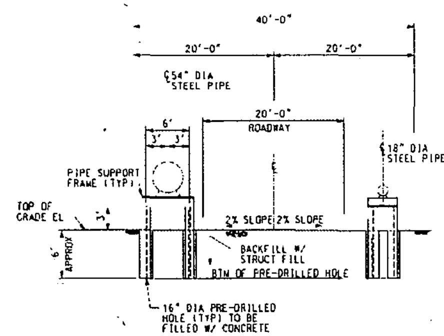
PLAN OF MAKE-UP POND B PIER AND INTAKE PUMP STRUCTURE



LONGITUDINAL ELEVATION OF MAKE-UP POND B PIER INTAKE PUMP STRUCTURE



PLAN PUMP STATION PLATFORM

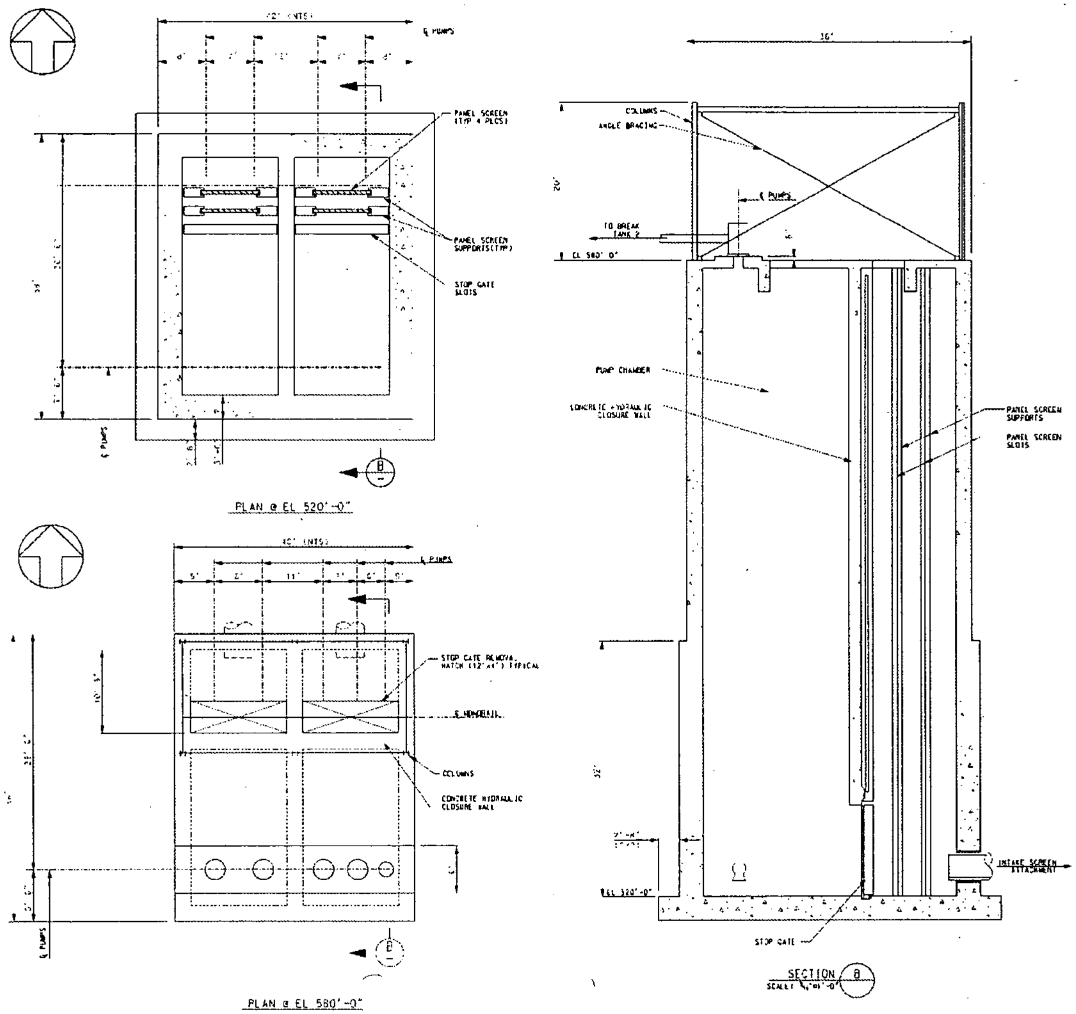


SECTION A-A @ CAUSEWAY

WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond B Causeway, Intake/Discharge Structure, Outlet Structure, and Pipe Bridge

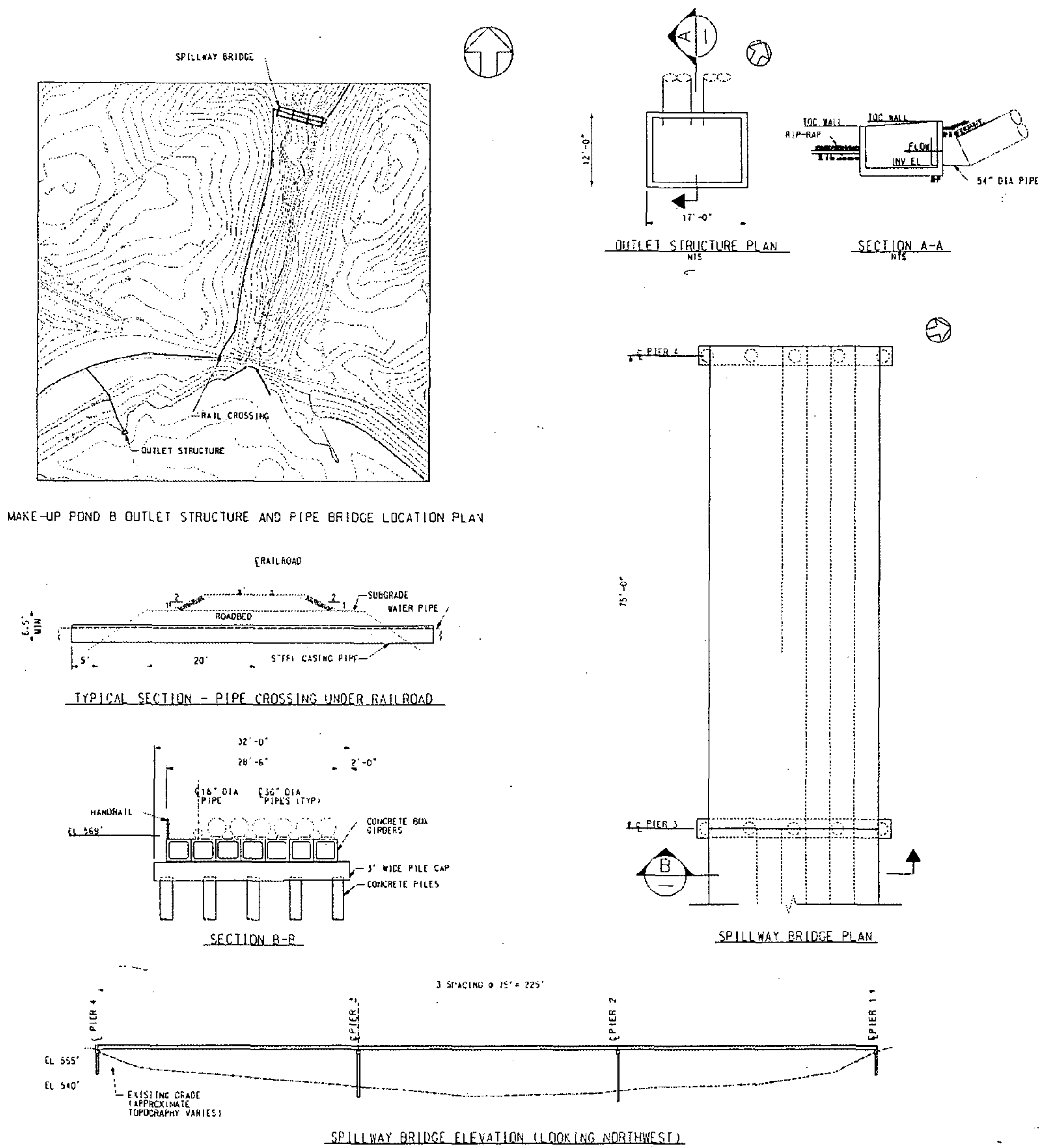
FIGURE 5.3-2 - Sheet 1 of 3 Rev 1



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond B Causeway, Intake/Discharge Structure, Outlet Structure, and Pipe Bridge

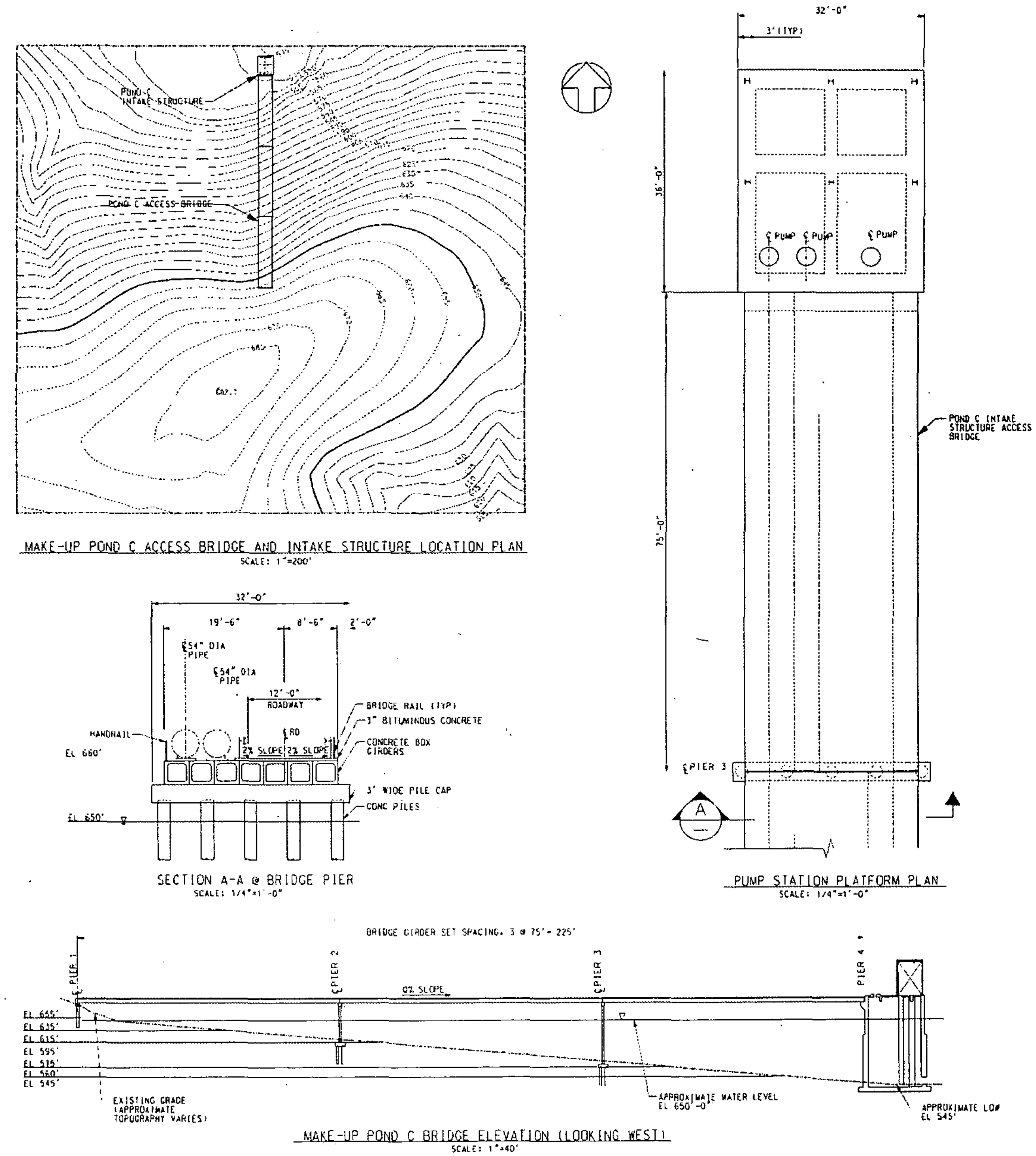
FIGURE 5.3-2 - Sheet 2 of 3 Rev 1



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond B Causeway, Intake/Discharge Structure, Outlet Structure, and Pipe Bridge

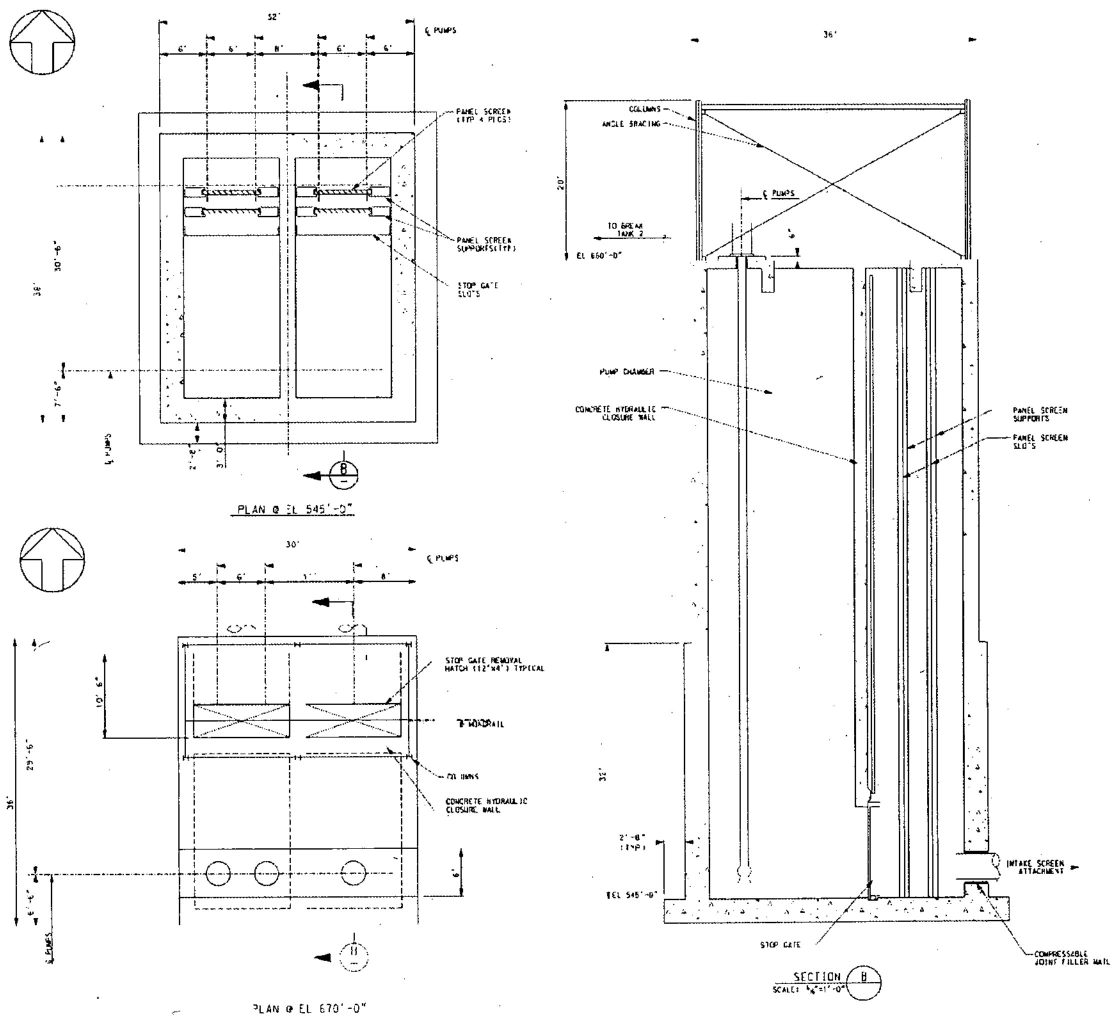
FIGURE 5.3-2 - Sheet 3 of 3 Rev 1



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C Intake/Discharge Structure, Access Bridge, and Pump Platform

FIGURE 5.3-5 - Sheet 1 of 2 Rev 0



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Make-Up Pond C Intake/Discharge Structure, Access Bridge, and Pump Platform

FIGURE 5.3-5 - Sheet 2 of 2 Rev 0

5.4 RADIOLOGICAL IMPACTS OF NORMAL OPERATION

There are no revisions associated with Make-Up Pond C in this section.

5.5 ENVIRONMENTAL IMPACTS OF WASTE

There are no revisions associated with Make-Up Pond C in this section.

5.6 TRANSMISSION SYSTEM IMPACTS

There are no revisions associated with Make-Up Pond C in this section.

5.7 URANIUM FUEL CYCLE IMPACTS

There are no revisions associated with Make-Up Pond C in this section.

5.8 SOCIOECONOMIC IMPACTS

Section 5.8, Socioeconomic Impacts, page 5.8-1, 1st paragraph of section

The following subsections describe the potential impacts from operating a new facility at the Lee Nuclear Site and impacts associated with the operation of Make-Up Pond C. Subsection 5.8.1 describes physical impacts of station and off-site facility operations to the site and vicinity. Subsection 5.8.2 describes social and economic impacts on the region. Subsection 5.8.3 describes environmental justice impacts as a result of station and off-site facility operations.

5.8.1 Physical Impacts of Station Operation

Subsection 5.8.1.4, Aesthetics, page 5.8-3, INSERT NEW TEXT at end of section

The addition of Make-Up Pond C would be beneficial to aesthetics because lake views are considered pleasing. However, the drawdown of Make-Up Pond C would be a potential adverse impact. Because drawdown activities for Make-Up Pond C are expected to occur infrequently, this impact is SMALL.

5.8.2 Social and Economic Impacts of Station Operation

There are no revisions associated with Make-Up Pond C in this section.

5.8.3 Environmental Justice Impacts

There are no revisions associated with Make-Up Pond C in this section.

5.8.4 References

There are no revisions associated with Make-Up Pond C in this section.

5.9 DECOMMISSIONING

There are no revisions associated with Make-Up Pond C in this section.

5.10 MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING OPERATION

Section 5.10, Measures And Controls To Limit Adverse Impacts During Operation, page 5.10-1, 7th paragraph:

Based on a review of the operational impacts described in this chapter, the principal measures and controls for reducing adverse impacts at the Lee Nuclear Station Units 1 and 2 and Make-Up Pond C are described in Table 5.10-1 and include:~~, Units 1 and 2 include:~~

5.10.1 References

There are no revisions associated with Make-Up Pond C in this section.

TABLE 5.10-1 (Sheet 1 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.1 Land-Use Effects															
5.1.1 The Site and Vicinity		S			S	S		S		S	S			1. Maintenance of the plant during operations may necessitate continued removal or disturbance of vegetation. 2. Impacts to forest, grassland, pastureland and farmland in the site and vicinity are limited because the areas of proposed construction have already been disturbed. 3. Cooling tower plumes resemble cumulus clouds at a distance.	(1) Limit continued disturbance of vegetation to the area within the site designated for construction. No additional mitigation is required.
5.1.2 Transmission Corridors and Off Site Areas					S	S		S		S	S			For impacts to Lee Nuclear Station, refer to impacts listed for 5.6.	
5.1.3 Historic Properties														1. Potential of adverse cultural resources impact to any areas cleared or excavated. 2. No substantial impacts beyond those associated with construction activities.	(1) Pursuant to the Protection of Historic Properties Act (Reference 6) and Guidelines for Local Surveys: A Basis for Preservation Planning (Reference 7), a cultural resources survey is prepared prior to any new construction activities. (1) A review of the National Register of Historic Places (Reference 5) is performed before commencing any activities that might affect cultural resources. (1) Work is halted and the State Historic Preservation Office (SHPO) is notified if any cultural resources are discovered. No additional mitigation is required.

TABLE 5.10-1 (Sheet 2 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.2 Water Related Effects															
5.2.1 Hydrologic Alterations and Plant Water Supply						S	S				S			1. Water loss primarily as a result of "consumptive" loses of make-up water for the operations. This volume could adversely affect the Broad River under low-flow conditions. 2. Storm water contaminated discharges to the Broad River. 3. The cooling water system may have a minor localized influence on river hydraulics. 4. Erosion of banks near intake structure. 5. Water loss to Make-Up Ponds B and C from evaporation and drawdown. 6. Increase in groundwater levels in immediate vicinity of Make-Up Pond C, and minor variations from drawdown. 7. Sediment deposition from refill of Make-Up Ponds B and C from Broad River.	(1) ~~Makeup water is primarily be supplied by Broad River.~~ Under low flow conditions, supplemental water can be transferred from Make-Up Pond B to Make-Up Pond A, or from Make-Up Pond C to Pond B to Pond A. (1) Lee Nuclear Station will operate within the minimum release constraints of the Ninety-Nine Islands Hydroelectric Station License (FERC). (2) Prepare and maintain a storm water pollution prevention plan and NPDES permit to minimize releases. (3) Install multi-port diffuser pipe to maximize thermal and chemical dissolution. (4) Install rip-rap, stemwalls, or other erosional control devices to stabilize the banks. (5) Make-Up Ponds B and C can be refilled from the Broad River during non low-flow conditions. (6) Significant drawdown events of Make-Up Pond C are rare. (7) Infrequent use/refill minimizes sediment deposition. No additional mitigation is required.
5.2.2 Water Use Impacts		S				S			S		S	S		1. Approximately 2-3 percent of the average annual river flow is expected to be lost to water withdrawal and evaporation from the proposed Units 1 and 2 cooling tower operations. This volume could adversely affect the Broad River under low flow conditions. 2. Effluent discharges of small concentrations of residual chemicals, priority pollutants, and thermal pollution into Broad River.	(1) Lee Nuclear Station will operate within the minimum release constraints of the Ninety-Nine Islands Hydroelectric Station License (FERC). (1) Make-Up water is supplied by ~~on-site~~ Make-Up Pond B and Make-Up Pond C when the Broad River flow is below 483 cfs. (2) Dilution of blowdown with receiving water. (2) Planned effluent discharges are limited and in compliance with a NPDES permit. (**Reference** 3) No additional mitigation is required.

TABLE 5.10-1 (Sheet 3 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.2.3 Water Quality Impacts					S	S	S				S			1. Small thermal discharge into the Broad River. 2. Discharge of small quantities of water treatment chemicals into the Broad River.	(1) Lee Nuclear Station Spill Prevention and Countermeasures Control Plan (SPCC). (1-2) Prepare and maintain a storm water pollution prevention plan and NPDES permit to minimize releases. (2) Install multi-port diffuser to maximize thermal and chemical mixing. (2) Planned effluent discharges are limited and in compliance with Clean Water Act regulations (40 CFR 100 and 400-501), Federal Water Pollution Control Act (FWPCA), and National Pollution Discharge Elimination System (NPDES) permit specifications. (2) Water discharges are monitored. No additional mitigation is required.
5.3 Cooling-System Impacts															
5.3.1 Intake System															
5.3.1.1 Hydrodynamic Descriptions and Physical Impacts	S	S				S					S			1. Erosion of Broad River banks, bottom scouring and induced turbidity near intake structure. 2. Buildup of sediment deposits and littoral debris.	(1) Stabilize banks of the embayment and shoreline with concrete mats, riprap, or other appropriate means. (2) Periodically dredge intake as required. No additional mitigation is required.
5.3.1.2 Aquatic Ecosystems						S			S		S			1. Impingement and entrainment may kill some aquatic species. 2. Minor aquatic impact resulting from consumption of water from Broad River during low-flow conditions. 3. Impacts to aquatic ecosystems from drawdown of Make-Up Ponds B and C.	(1) Utilization of closed cycle technology and cooling towers, sizing river intake structures to ensure maximum water velocity across screens <0.5 fps and utilization of a return system to deposit impinged fish downstream of the intake. (2) Make-up water is supplied by the Make-Up Pond B and Make-Up Pond C during low flow conditions. (3) Maximum drawdown events are rare; most drawdown events are less than 1 ft. No additional mitigation is required.

TABLE 5.10-1 (Sheet 4 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.3.2 Discharge System															
5.3.2.2 Aquatic Ecosystems		S			S	S					S		S	1. Thermal discharge effects include cold shock, effects on movement and distribution of aquatic biota, premature emergence of aquatic insects, stimulation of nuisance organisms, losses from predation, parasitism and disease, ~~gas super saturation of low dissolved oxygen in the discharge,~~ and accumulation of contaminants in sediments or biota. 2. Potential for minor erosion or sedimentation near the discharge point. 3. Planned blowdown discharges of water containing concentrated salts and minerals. 4. Thermal plume has a minor impact on aquatic organisms.	(1-4) The use of a diffuser is mitigation for thermal impacts. (2) To the extent practical, equipment is employed and positioned so as to reduce erosion or sedimentation effects. (3) Effluents are treated according to NPDES permit specifications. (4) The reactors utilize cooling towers and a closed-loop cooling cycle that significantly reduces the thermal plume effects on aquatic organisms. No additional mitigation is required.
5.4.2 Radiation Doses to Members of the Public			S		S	S		S	S	S			S	Refer to impacts listed for 5.4.1.	Refer to mitigations listed for 5.4.1.
5.4.3 Impacts to Members of the Public			S		S	S		S		S	S	S	S	Refer to impacts listed for 5.4.1.	Refer to mitigations listed for 5.4.1.
5.4.4 Impacts to Biota Other than Members of the Public			S		S		S			S	S		S	1. Potential doses to biota originate from liquid and gaseous effluents. 2. Biota can receive radioactive doses via contact with contaminated water or soil and through ingestion.	(1-2) Calculated doses are within regulatory limits of 40 CFR 190. (Reference 4). No mitigation is required. No additional mitigation is required.
5.4.5 Occupational Radiation Doses													S	1. Impacts to workers from radiation exposure.	Adhere to 10 CFR Part 20 requirements.

TABLE 5.10-1 (Sheet 5 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.5 Environmental Impact of Waste															
5.5.1 Non-radioactive Waste System Impacts			S		S	S		S			S	S		1. As part of routine operations, non-radioactive emissions and effluents are discharged to the air, Broad River, and soil. 2. Chemicals and other pollutants in discharge. 3. Sanitary waste generated. 4. Hazardous non-radioactive waste is generated and disposed of in licensed hazardous waste landfills. 5. Nonhazardous waste is generated and disposed of in licensed landfills.	(1-2) All emissions and discharges comply with SC DHEC regulations and applicable air and water quality standards. (3) Sanitary waste is treated at an off site municipal sewage treatment plant. (4) Hazardous waste is carefully monitored and transferred to approved transporters and disposers. (5) Nonhazardous non-radioactive waste is disposed of according to applicable local, state, and federal regulations. No additional mitigation is required.
5.5.2 Mixed Waste Impacts			S		S					S			S	1. Potential generation of mixed waste.	(1) Limit mixed waste generation through source reduction, recycling, and treatment options. (1) Mixed waste inventory is managed in accordance with applicable NRC and EPA regulations. (1) The inventory of mixed waste is maintained in a designated storage area and monitored prior to offsite disposal.
5.5.3 Waste Minimization					S			S							Develop a hazardous waste minimization plan to address hazardous waste management, equipment maintenance, recycling and reuse, segregation, treatment, work planning, waste tracking, and awareness training. No additional mitigation is required.

TABLE 5.10-1 (Sheet 6 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.6 Transmission System Impacts															
5.6.1 Terrestrial Ecosystems	S	S	S	S	S	S		S		S				1. Continued maintenance involving clearing of vegetation along the corridor may impact terrestrial ecology. 2. Exhaust and nuisance noise from aerial and ground inspections and maintenance of transmission corridors. 3. Potential for spills of hazardous materials during maintenance. 4. Application of herbicides.	(1) Employees are trained on how to perform work in a manner that reduces adverse environmental impacts. (1-4) Minimize potential impacts through compliance with permitting requirements and best management practices. (1) To the extent feasible, avoid any additional disturbances on critical or sensitive terrestrial habitats/species. (2) As practical, vehicles/machinery use, noise suppression/mufflers, and vehicles are maintained to reduce emissions. (3) Readily available spill response materials and personnel trained to respond to, clean up and report spills. (3) Employees are trained in hazardous materials/waste procedures to minimize the risk of spills. (4) Herbicides are applied by trained employees licensed to apply herbicides. No additional mitigation is required.

TABLE 5.10-1 (Sheet 7 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.6.2 Aquatic Ecosystems		S			S	S		S			S			1. Continued maintenance involving clearing of vegetation along the corridor near water bodies may impact aquatic biota. 2. Potential for some erosion and subsequent runoff into water bodies. 3. Herbicides can migrate into water bodies. 4. Potential for spills of hazardous materials/ wastes that pollute the aquatic ecosystem. 5. Unauthorized encroachment.	(1-4) Minimize potential impacts through compliance with permitting requirements and best management practices. (1) To the extent feasible, avoid any additional disturbances on critical or sensitive aquatic habitats/species. (2) As practical, cleared areas are reseeded to limit erosion. (2) Apply appropriate erosion controls (grassed or wooded buffer strips, board roads, and removable mats). Obtain a permit before dredge or fill activities. (3) Herbicides are applied by using proper management practices by trained employees who possess a herbicide application permit. (4) Employees are trained in hazardous materials/waste procedures to minimize risk of spills. (5) Perform routine over flights. No additional mitigation is required.
5.6.3 Impacts to Members of the Public	S		S	S	S	S		S	S	S	S			1. Potential for electrocution. 2. Exposure to electromagnetic fields. 3. Noise from high voltage transmission lines. 4. Radio and television interference. 5. Visual effects of transmission lines by the public. 6. Aviation routes.	(1-3) Build lines to specifications minimizing electrocution (high enough to comply with 5 milliamp standard away from existing buildings). (5) Natural vegetation is retained at road and river crossings during construction to help minimize ground-level visual impacts unless engineering requirements dictate otherwise. (5) Important view sheds are avoided. (6) No towers along the new transmission lines are expected to exceed 200 ft. in height, nor are there any airports, airstrips, or heliports within 20,000 ft. of the transmission line corridors currently under review by Duke Energy. No additional mitigation is required.

TABLE 5.10-1 (Sheet 8 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.7 Uranium Fuel Cycle Effects															
5.7 Uranium Fuel Cycle Impacts	S							S				S	S	1. Open pit, underground mining or leaching of uranium ore.	This impact is external to Duke Energy.
5.7.1 Land Use	S							S				S	S	1. Commitment of land for uranium processing facilities.	This impact is external to Duke Energy.
5.7.2 Water Use					S	S			S		S			1. Water consumption and thermal loading to address waste heat from generating electricity.	This impact is external to Duke Energy.
5.7.3 Fossil Fuel Effects			S											1. Natural gas consumption to generate electricity. 2. Air emissions from fossil fuel plants supplying the gaseous diffusion plant.	This impact is external to Duke Energy.
5.7.4 Chemical Effects					S	S								1. Chemical, gaseous, and particulate effluents from fuel enrichment and fabrication. 2. Generation of tailings solutions and solids during the milling process.	This impact is external to Duke Energy.
5.7.5 Radioactive Effects			S		S								S	1. Impacts of radioactive effluent releases to the environment from waste activities. 2. Impacts of radioactive gaseous effluents during reactor operation. 3. Impacts of liquid radioactive effluent from sources other that operation.	(1-3) Effluents comply with 10 CFR Part 20.
5.7.6 Radioactive Wastes					S			S					S	1. Generation of radioactive waste from operations, decontamination, and decommissioning.	(1) Prepare a detailed contamination and decommissioning plan. (1) Waste is placed in permanent offsite repositories. No additional mitigation is required.

TABLE 5.10-1 (Sheet 9 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.7.7 Occupational Dose													S	1. Impact of radiation exposure to workers.	1. Occupational doses would be maintained to meet the dose limits in 10 CFR Part 20. No additional mitigation is required.
5.7.8 Transportation				S									S	1. Transportation dose to workers and the public is expected to be 0.067 person-Sv/yr (6.7 person-rem/yr).	No additional mitigation is required. This impact is external to Duke Energy.
5.8 Socioeconomic Impacts															
5.8.1 Physical Impacts of Station Operation	S		S	S-M	S	S		S	S	S		S		1. Increased transportation and traffic on two-lane state highways, county highways, local roads, especially McKowns Mountain Road and the feeder highways. 2. Potential episodic and limited noise impacts to workers. 3. Potential episodic and limited noise impacts to nearby residents. 4. Potential exhaust emissions during operation.	(2) Follow 1910.95, OSHA noise standard. (3) Air emissions conform to SC DHEC permit limitations. No additional mitigation is required.
5.8.2 Social and Economic Impacts				S-L				S				S-L		1. Increased burden on public services accompanying in-migration of new workers and their families. 2. Effects on terrestrial and aquatic ecosystems can affect hunting, fishing, and recreation. 3. Increased population leads to more housing and building construction. 4. Increased population could spur further development that may affect the ecosystem. 5. Consumption of water for cooling and increased workers may have minor socioeconomic implications. 6. Worker safety and accidents.	(1) Increased property and worker-related taxes can help offset some of the problems related to increased population such as community facilities and infrastructure, police, fire protection, and schools. (2) Refer to mitigations listed for Section 5.3. (3) Based on vacancy data from the 2000 Census, sufficient housing units are available. (5) Lee Nuclear Station will operate within the minimum release constraints of the Ninety-Nine Islands Hydroelectric Station license (FERC). (6) Comply with OSHA regulations for worker safety and health. No additional mitigation is required.

TABLE 5.10-1 (Sheet 10 of 10)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE EFFECTS DURING OPERATIONS

	Potential Environmental Impacts														
Environmental Resources	Noise	Erosion	Air Disturbances / Emissions	Traffic	Effluents and Wastes	Surface Water Impacts	Groundwater Impacts	Land Use Protection / Restoration	Water Use Consumption	Terrestrial Ecosystems Impacts	Aquatic Ecosystems Impacts	Socioeconomic Impacts	Radiation Exposure to Workforce	Effect Description or Activity	Specific Measures and Controls
5.8.3 Environmental Justice	S		S	S	S			S	S			S	S	1. No disproportionately high impacts on minority or low-income populations resulting from operation of the proposed new units.	(1) No mitigation required beyond those listed above.
5.9 Decommissioning															
5.9 Decommissioning														1. Decommissioning methods have not been chosen. Impacts from decommission activities are expected to be SMALL based on Duke's intended compliance with NRC decommissioning and license termination requirements and NRC GEIS analysis of decommissioning of nuclear power reactors.	(1) No mitigation measures or controls are proposed at this time.

6 ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

6.0 ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

Section 6.0, Environmental Measurements and Monitoring Programs, page 6.0-1, 1st paragraph:

This chapter describes the environmental measurements (e.g., data collection) and monitoring programs in place or expected to be implemented at the Lee Nuclear Site and for the Make-Up Pond C. These measurements and monitoring programs are addressed, where applicable, within the context of the following four project phases: (1) preapplication, (2) site preparation and construction, (3) preoperational, and (4) operational.

6.1 THERMAL MONITORING

There are no revisions associated with Make-Up Pond C in this section.

6.2 RADIOLOGICAL MONITORING

There are no revisions associated with Make-Up Pond C in this section.

6.3 HYDROLOGICAL MONITORING

6.3.1 Preapplication Monitoring

Subsection 6.3.1.2, Groundwater Hydrologic Monitoring, page 6.3-3, INSERT NEW TEXT at end of section:

During January and February 2009, 12 soil test borings were drilled and 12 groundwater monitoring wells were installed within or in proximity to Make-Up Pond C, an off-site man-made impoundment, distributed along the pond's length both south and north of London Creek (Figure 2.3-36). Additional information is provided in Subsection 2.3.1.5.7.2.

6.3.2 Site Preparation and Construction Monitoring

Subsection 6.3.2, Site Preparation and Construction Monitoring, page 6.3-3:

Hydrological monitoring to observe the effects from site preparation and construction includes preapplication monitoring to establish a baseline for assessing the effects of site preparation and construction activities. Although no adverse effects are expected to occur during construction, a minimal amount of hydrological monitoring is planned during site preparation and on-site/off-site construction to confirm the baseline obtained during the preapplication monitoring.

Subsection 6.3.2.1, Surface Water Hydrologic Monitoring, page 6.3-3, 1st paragraph:

Construction impacts to surface water are avoided or mitigated by development and implementation of an SCDHEC-required, site-specific construction storm water pollution prevention plan, which includes regular inspections for erosion control measures and visual inspections for discharges, especially after rain events, which may be detrimental to water quality. SCDHEC does not generally require any specific receiving water monitoring as a condition of the storm water permit. Water quality sampling and flow measurements are anticipated to be conducted in the Broad River and on-site, as well as off-site impoundments to monitor the effectiveness of erosion control measures implemented as part of the storm water permit.

6.3.3 Preoperational Monitoring

There are no revisions associated with Make-Up Pond C in this section.

6.3.4 Operational Monitoring

There are no revisions associated with Make-Up Pond C in this section.

6.3.5 References

There are no revisions associated with Make-Up Pond C in this section.

6.4 METEOROLOGICAL MONITORING

There are no revisions associated with Make-Up Pond C in this section.

6.5 ECOLOGICAL MONITORING

Section 6.5, Ecological Monitoring, page 6.5-1:

Historical information, augmented by site reconnaissance and field surveys in support of the combined license application, provides the basis for the ecological descriptions presented in **Subsections** 2.4.1 and 2.4.2. This section discusses ecological monitoring for the Lee Nuclear Site and for the Make-Up Pond C study area.

6.5.1 Terrestrial Ecology and Land Use

Subsection 6.5.1, Terrestrial Ecology and Land Use, page 6.5-2, INSERT NEW TEXT at end of section:

As described in Subsection 2.4.1, ecological field surveys and records reviews were conducted for the Make-Up Pond C study area in 2008 and 2009. Construction of Make-Up Pond C is expected to impact terrestrial habitats and potentially state-listed species. Duke Energy will coordinate and comply with the appropriate state and federal agencies to determine what operational monitoring is appropriate.

6.5.2 Aquatic Ecology

Subsection 6.5.2, Aquatic Ecology, page 6.5-2, INSERT NEW TEXT at end of section:

As described in Subsection 2.4.2, aquatic surveys and records reviews were conducted for the Make-Up Pond C study area in 2008 and 2009. Construction of Make-Up Pond C is expected to impact aquatic habitats. Duke Energy will coordinate and comply with the appropriate state and federal agencies to determine what operational monitoring is appropriate.

6.6 CHEMICAL MONITORING

There are no revisions associated with Make-Up Pond C in this section.

6.7 SUMMARY OF MONITORING ACTIVITIES

6.7.1 Preapplication Monitoring

There are no revisions associated with Make-Up Pond C in this section.

6.7.2 Site Preparation and Construction Monitoring

There are no revisions associated with Make-Up Pond C in this section.

6.7.3 Preoperational Monitoring

There are no revisions associated with Make-Up Pond C in this section.

6.7.4 Operational Monitoring

Subsection 6.7.4, Operational Monitoring, page 6.7-3, level 1 bullet:

No Terrestrial or Aquatic monitoring is proposed unless specifically required by permit or through coordination with state and federal agencies in regards to Make-Up Pond C.

7 ENVIRONMENTAL IMPACTS OF POSTULATED ACCIDENTS INVOLVING RADIOACTIVE MATERIALS

There are no revisions associated with Make-Up Pond C in this section.

8 NEED FOR POWER

There are no revisions associated with Make-Up Pond C in this section.

9 ALTERNATIVES TO THE PROPOSED ACTION

9.0 ALTERNATIVES TO THE PROPOSED ACTION

There are no revisions associated with Make-Up Pond C in this section.

9.1. NO-ACTION ALTERNATIVE

There are no revisions associated with Make-Up Pond C in this section.

9.2 ALTERNATIVE ENERGY SOURCES

There are no revisions associated with Make-Up Pond C in this section.

9.3 ALTERNATIVE SITES

9.3.1 Site Selection Process

There are no revisions associated with Make-Up Pond C in this section.

9.3.2 Candidate Sites Comparison

Subsection 9.3.2.1, Land Use Impacts, page 9.3-8, 1st through 5th paragraphs:

The objective of this criterion was to evaluate the suitability of the four candidate sites with respect to potential conflicts in existing land uses at each site. Impacts include the amount of clearing and grading necessary to place the proposed AP1000 standard plant on the site, including any supporting infrastructure. Impacts also considered the amount of land required to support supplemental water ponds as discussed in Subsection 9.3.2.2. Information sources include USGS topographic maps and first-hand observations from helicopter over-flights.

Lee Site

The Lee Site was previously owned by Duke Energy and was available for purchase at the time of the site selection study. Duke Energy has subsequently purchased the site. The site was developed as an industrial site (the former Cherokee Nuclear Site) and extensive rough grading, including the construction of two reservoirs, was completed in the 1970s. The surrounding land is rural and sparsely populated. The Lee Site will require a 620-ac supplemental water pond (Subsection 9.3.2.2). An existing 8-mile rail spur to the site will need a small re-route (approximately 1,800 ft) and the rail bed will need vegetation cleared, new ballast, rail ties and rails added to become operational for transporting materials and equipment to the site. Land use impacts would be MODERATE~~SMALL~~.

Keowee Site

The Keowee site is owned by Duke Energy and is located adjacent to the Oconee Nuclear Station. The site is a wooded greenfield site, requiring extensive rough grading that would include the construction of a 1,300 ac supplemental water reservoir (Subsection 9.3.2.2). Residential development is absent on the site, but the surrounding area has a low level of development. There is a high level of residential development at the area where a water intake structure would be constructed. A 5.4-mile rail spur would be constructed to the site to transport materials and equipment to the site. Land use impacts would be LARGE. ~~MODERATE.~~

Perkins Site

Duke Energy currently owns the Perkins Site that was originally characterized for the Perkins Nuclear Station in the 1970s. The site remains a wooded greenfield site and is managed as a wildlife management area by the NC Fish and Wildlife Service under an agreement with Duke Energy. The site would require extensive rough grading. There is no residential development on the site but the surrounding area is undergoing a moderate amount of residential development particularly in the area proposed for ~~a~~ three supplemental water reservoirs totaling 1,450 ac (Subsection 9.3.2.2). A 5.6-mile rail spur would be constructed to the site to transport materials and equipment to the site. Land use impacts would be LARGE ~~MODERATE~~.

Middleton Shoals Site

This site is currently owned by Duke Energy. The site is a wooded greenfield site requiring extensive rough grading that would include the construction of a 2,200 ac supplemental water reservoir (Subsection 9.3.2.2). There is no residential development on the site and sparse residential development in the vicinity of the site. A 14-mile rail spur would be constructed to the site to transport materials and equipment to the site. Land use impacts would be LARGE ~~MODERATE~~.

Subsection 9.3.2.2, Hydrology and Water Quality Impacts, starting pg 9.3-9 3rd paragraph, through the end of the Subsection:

Each site was also evaluated assuming augmentation as needed to yield an equivalent amount of cooling water during assumed low flow conditions. The evaluation also included requirements for any supplemental make-up water to remain operating during the 2007–2008 drought. In each case, the amount of augmentation and reason for the assumed augmentation is provided below, in order to provide a basis for comparison. Impacts of such augmentation is comparable for all four sites. However, as a result of the inherent attributes of the AP1000 reactor design, offsite cooling water is not required for safe operation, and curtailment of operations is an equally viable option; relative impacts on water supply are considered under scenarios involving both normal flow and curtailed operation during low flow conditions.

Lee Nuclear Site

The Lee Nuclear Site is located on the Broad River. All the water needed to support plant needs at the Lee Nuclear Site during normal operations would be withdrawn from the Broad River. The closest USGS gauging station is at Gaffney, just above the Lee Nuclear Site, but this gauge ceased operation in 1991. Consequently, other gauges in North and South Carolina along the Broad River were used to augment the data after 1991. The average flow is calculated to be 2538approximately 2,500 cfs (1926–20062008), and the FERC regulatory low-flow release at the Ninety-Nine Islands Hydroelectric Station is required to be 483 cfs. The Broad River has adequate flow under average flow conditions to support the requirements of a closed cycle cooling water system. Low-flow conditions (e.g., drought) could require supplemental water storage or curtailment of operations. Supplemental water storage for low-flow periods is estimated to be 11,0007301 ac.-ft. in addition to the capacity of existing ponds on the site. This would require a 620-ac supplemental water reservoir. A withdrawal of 55 cfs for average consumptive water use under normal flow conditions would be SMALL since this represents 2 percent of the Broad River average mean flow. Under low-flow conditions, the impact to the Broad River should still be SMALL since consumptive withdrawal from the Broad River would be curtailed. because consumptive withdrawal would be curtailed.

Keowee Site

All the water needed to support plant needs at the Keowee Site will be withdrawn from Lake Keowee. The Lake Keowee-Lake Jocassee storage would be sufficient to supply the additional cooling requirements of a second nuclear station near Oconee Nuclear Station if agreements could be reached with the U.S. Army Corps of Engineers (USACE) to reduce the amount of water that is required to be released from Lake Keowee during low flow events. However, successful negotiation of such an agreement is not guaranteed. Therefore, a supplemental water storage reservoir for low-flow periods with an estimated volume of 80,000 4,800 ac-ft is assumed for comparison. This will require a 1,300 ac supplemental water reservoir. A withdrawal of 55 cfs for average consumptive water use under normal flow conditions will be SMALL. Under low flow conditions, the impact to Lake Keowee should still be SMALL even without the supplemental since consumptive withdrawal from Lake Keowee would be curtailedreservoir if withdrawal is agreed to, or as a result of curtailed consumptive use.

Perkins Site

The Perkins Site is located on the Yadkin River. All the water required to support plant needs at the Perkins Site will be withdrawn from the Yadkin River. The closest USGS gauging station is at Yadkin College, 3 miles upstream of the Perkins Site. Flow data for the Yadkin River at this station shows an average flow of approximately 2,950 cfs 3,031 cfs and a 7Q10 flow of 595 cfs for the period of August 1928–April 2009. 1963–2003. The Yadkin River has adequate flow under average flow conditions to support the requirements of a closed cycle cooling water system. Low flow conditions (e.g., drought) could require supplemental water storage or curtailment of operations. A supplemental reservoir, if used for low-flow periods, is estimated to be 34,000 ~~8,635~~ ac-ft. This will require three supplemental water reservoirs totaling 1,450 ac. A withdrawal of 55 cfs for average consumptive water use under normal flow conditions will be SMALL since this represents <2 percent of the average mean flow. Under low flow conditions, the impact to the Yadkin River should still be SMALL since consumptive withdrawal from the Yadkin River would be curtailed.

Middleton Shoals Site

The Middleton Shoals Site is located on the Savannah River/Russell Reservoir, just downstream of Hartwell Dam. All the water needed to support plant needs at the Middleton Shoals site will be withdrawn from Russell Reservoir. The USACE controls the water supply and flow in the Russell Reservoir at Middleton Shoals. Russell Reservoir should have an adequate supply, although an agreement would be needed with the USACE to allow continued use of the reservoir under low flow conditions. However, successful negotiation of such an agreement is not guaranteed. Therefore, a 57,000 ~~4,800~~ ac-ft supplemental reservoir would be constructed for low flow events. This reservoir would cover 2,200 ac. A withdrawal of 55 cfs average for consumptive water use under normal flow conditions will be SMALL. Under low flow conditions, the impact to the Savannah River/Russell Reservoir should still be SMALL since consumptive withdrawal from the Savannah River/Russell Reservoir would be curtailed~~even without the supplemental reservoir~~.

Subsection 9.3.2.3,Terrestrial Ecology Resources, page 9.3-11, 1st and 2nd paragraphs:

The objective of this criterion is to evaluate the candidate sites with respect to potential construction and operation related impacts on important terrestrial species and ecology. Data were obtained from the South Carolina Rare, Threatened & Endangered Species Inventory (Reference 1) and North Carolina Natural Heritage Program (Reference 2), listing of rare plant and animal species. Wetland information was obtained from the National Wetlands Inventory (NWI) maps published by U.S. Fish and Wildlife Service, U.S. Geological Survey Hydrological Database, NRCS soils data, and aerial photographs of the sites or other existing environmental documentation for the candidate sites.

~~In addition to the above, aerial photographs were obtained for the Lee Nuclear Site and the Perkins, Keowee, and Middleton Shoals candidate sites.~~ The aerial photographs were subjected to image interpretation to identify cover or habitat types within a core area of the central portion of each site. This core area is described by a circle with a radius of 2,500 ft. centered on the coordinates for the proposed reactor units. A circle with a radius of 2,500 ft. defines an area of about 450 ac. (Table 9.3-4).

Subsection 9.3.2.3,Terrestrial Ecology Resources, starting page 9.3-12 5th paragraph, through the end of the Subsection:

Lee Nuclear Site

NWI maps, USGS hydrologic data, soils data, and aerial photographs ~~did not reveal significant wetland acreage on the Lee Nuclear Site, although, wetlands~~ identified ~~through interpretation of aerial photographs total~~ about 11 ~~[TBD] 35~~ ac~~.~~ of wetlands and 28 ac of open water on the site and approximately 3 ac of wetlands and approximately 5 ac of open water on the associated reservoir area (Table 9.3-4). ~~Only about 2.5 ac. of these wetlands are under the regulatory jurisdiction of the U.S. Army Corps of Engineers.~~ The Lee Nuclear site is already partially cleared. It was determined that impacting 14 ~~[TBD] using 65~~ ac~~.~~ of wetlands (for comparison purposes, a conservative assumption that all acres of wetlands would be impacted was made) and 60,000 LF of streams ~~high quality habitat~~ (Table 9.3-4) for plant facilities ~~in the 450 ac. core area of the site~~ would have MODERATE ~~minimal~~ impacts on terrestrial ecosystems. Information presented in this section reflects desktop analysis conducted for all alternative sites; and may differ from information presented in other sections of this Environmental Report that reflect more detailed surveys of the preferred alternative.

In NUREG 1437, NRC concludes potential adverse impacts due to drift from cooling towers to surrounding plants, primarily trees in this case, is minor. This potential impact can be minimized with the use of drift eliminators on the cooling towers.

Impacts to terrestrial ecology resources at the Lee Nuclear Site are estimated to be MODERATE~~SMALL~~.

Keowee Site

There are no documented RTE species on the Keowee site. The federally listed endangered peregrine falcon (*Falco peregrinus*) has been occasionally sighted near the Oconee Nuclear Station (which is located next to the Keowee site). There are four state-listed plant species (species of concern) in the vicinity of Lake Keowee: *Nestronia umbellula* (Indian Olive), *Viola tripartita* (three-parted violet), *Carex laxiflora* (loose-flowered sedge), and *Carex prasina* (drooping sedge). The NWI maps, USGS hydrologic data, soils data, and aerial photograph interpretation ~~did not~~ revealed ~~significant~~ 3.5 ac of wetlands and 10 ac of open water ~~acreage~~ on the Keowee site and 19 ac of wetlands and approximately 2 ac of open water associated with the supplemental water reservoir. Construction at the Keowee site and reservoir would affect 147,000 LF feet of streams. The site is mostly wooded. Using 450 ac~~.~~ in the core area of the site for the plant facilities would require removal of 297 ac of high quality wooded habitat (Table 9.3-4).

In NUREG 1437, NRC concludes potential adverse impacts due to drift from cooling towers to surrounding plants, primarily trees in this case, is minor. This potential impact can be minimized with the use of drift eliminators on the cooling towers.

Impacts to terrestrial ecology resources at the Keowee site are estimated to be LARGE ~~MODERATE~~.

Perkins Site

There are no documented RTE species at the Perkins site. There are no documented occurrences of RTE species in the vicinity of the site. NWI maps, USGS hydrologic data, soils data, and aerial photo interpretation ~~did not~~ revealed ~~significant~~ 0.5 ac of wetlands and 0.0 ac of open water ~~acreage~~ on the Perkins site and 92 ac of wetlands and approximately 2 ac of open water associated with supplemental water reservoirs. Construction at the Perkins site and reservoirs would affect 124,000 LF of streams. The site is mostly wooded. Using 450 ac. for the plant facilities in the core area of the site would require removal of 288 ac. of high quality wooded habitat (Table 9.3-4).

In NUREG 1437, NRC concludes potential adverse impacts due to drift from cooling towers to surrounding plants, primarily trees in this case, is minor. This potential impact can be minimized with the use of drift eliminators on the cooling towers.

Impacts to terrestrial ecology at the Perkins site are estimated to be LARGE ~~SMALL to MODERATE~~.

Middleton Shoals Site

There are no documented RTE species on the Middleton Shoals site. There are no documented occurrences of RTE species in the vicinity of the site. NWI maps, USGS hydrologic maps, soil maps, and aerial photograph interpretation ~~did not~~ revealed ~~significant~~ 1.2 ac of wetlands and 7 ac of open water ~~acreage~~ on the Middleton Shoals site and 117 ac of wetlands and 20 ac of open water associated with the supplemental reservoir. Construction at the Middleton Shoals site and reservoir would affect 212,000 LF of streams. The site is mostly wooded. Using 450 ac. in the core area of the site for the plant facilities would require removal of 265 ac. of high quality wooded habitat (Table 9.3-4).

In NUREG 1437, NRC concludes potential adverse impacts due to drift from cooling towers to surrounding plants, primarily trees in this case, is minor. This potential impact can be minimized with the use of drift eliminators on the cooling towers.

Impacts to terrestrial ecology at the Middleton Shoals site are estimated to be LARGE ~~SMALL to MODERATE~~.

Subsection 9.3.2.4, Aquatic Ecology Resources, page 9.3-14, 1st paragraph through the end of the Subsection:

The objective of this evaluation is to compare the candidate sites with respect to impacts to aquatic ecology resources from construction of supplemental water reservoirs, thermal discharges, entrainment and impingement. Data were obtained from the South Carolina Rare, Threatened & Endangered Species Inventory (Reference 1) and North Carolina Natural Heritage Program (Reference 2), listing of rare plant and animal species. Previous NRC evaluations of aquatic ecology impacts at operating power plants from

NUREG-1437 were coupled with observations from helicopter flyovers of the sites and plant design considerations.

Lee Site

There are no documented occurrences of aquatic RTE species in the vicinity of the Lee Site. The construction of supplemental cooling reservoir will convert 60,000 LF of stream from a lotic to lentic ecosystem. Lotic organisms will be replaced by lentic organisms. The Lee Site is located on a river which would likely provide sufficient heat rejection capacity for the proposed plant, using a closed cooling water system, without having significant thermal impacts to aquatic ecology. No information was discovered during the evaluation which revealed any concerns with significant thermal impacts at the site.

The proposed plant will include cooling towers that will reduce the amount of cooling water withdrawal required for plant operation. In NUREG 1437, NRC concluded that, with cooling towers and appropriate intake design, potential adverse impacts due to entrainment or impingement of aquatic organisms are minor and do not significantly disrupt existing populations. Assuming a two unit closed-cycle plant at the site, and 100 percent of the local plankton passing through the plant, it appears that there would be no discernible effect on the plankton population in the existing water source. This is due to the very small volume of water used by the plant relative to the total volume available from the water source. Because of the low flow velocities of a closed cycle plant at the site, impingement of adult fish would be expected to be minimal.

Impacts to aquatic ecology resources were estimated to be SMALL–MODERATE.

Keowee Site

There are no documented occurrences of aquatic RTE species in the vicinity of the Keowee Site. The construction of supplemental cooling reservoir will convert 147,000 LF of stream from a lotic to lentic ecosystem. Lotic organisms will be replaced by lentic organisms. The Keowee Site is located on a reservoir which would likely provide sufficient heat rejection capacity for the proposed plant, using a closed cooling water system, without having significant thermal impacts to aquatic ecology. No information was discovered during the evaluation which revealed any concerns with significant thermal impacts at the site.

The proposed plant will include cooling towers that will reduce the amount of cooling water withdrawal required for plant operation. In NUREG 1437, NRC concluded that, with cooling towers and appropriate intake design, potential adverse impacts due to entrainment or impingement of aquatic organisms are minor and do not significantly disrupt existing populations. Assuming a two unit closed-cycle plant at the site, and 100 percent of the local plankton passing through the plant, it appears that there would be no discernible effect on the plankton population in the existing water source. This is due to the very small volume of water used by the plant relative to the total volume available from the water source. Because of the low flow velocities of a closed cycle plant at the site, impingement of adult fish would be expected to be minimal.

Impacts to aquatic ecology resources were estimated to be MODERATE–LARGE~~SMALL~~.

Perkins Site

There are no documented occurrences of aquatic RTE species in the vicinity of the Perkins Site. The construction of supplemental cooling reservoir will convert 124,000 LF of stream from a lotic to lentic ecosystem. Lotic organisms will vanish and be replaced by lentic organisms. The Perkins Site is located on a river which would likely provide sufficient heat rejection capacity for the proposed plant, using a closed cooling water system, without having significant thermal impacts to aquatic ecology. No information was discovered during the evaluation which revealed any concerns with significant thermal impacts at the site.

The proposed plant will include cooling towers that will reduce the amount of cooling water withdrawal required for plant operation. In NUREG 1437, NRC concluded that, with cooling towers and appropriate intake design, potential adverse impacts due to entrainment or impingement of aquatic organisms are minor and do not significantly disrupt existing populations. Assuming a two unit closed-cycle plant at the site, and 100 percent of the local plankton passing through the plant, it appears that there would be no discernible effect on the plankton population in the existing water source. This is due to the very small volume of water used by the plant relative to the total volume available from the water source. Because of the low flow velocities of a closed cycle plant at the site, impingement of adult fish would be expected to be minimal.

Impacts to aquatic ecology resources were estimated to be MODERATE–LARGE~~SMALL~~.

Middleton Shoals Site

There are no documented occurrences of aquatic RTE species in the vicinity of the Middleton Shoals Site. The construction of supplemental cooling reservoir will convert 212,000 LF of stream from a lotic to lentic ecosystem. Lotic organisms will be replaced by lentic organisms. The Middleton Shoals Site is located on a reservoir which would likely provide sufficient heat rejection capacity for the proposed plant, using a closed cooling water system, without having significant thermal impacts to aquatic ecology. No information was discovered during the evaluation which revealed any concerns with significant thermal impacts at the site.

The proposed plant will include cooling towers that will reduce the amount of cooling water withdrawal required for plant operation. In NUREG 1437, NRC concluded that, with cooling towers and appropriate intake design, potential adverse impacts due to entrainment or impingement of aquatic organisms are minor and do not significantly disrupt existing populations. Assuming a two unit closed-cycle plant at the site, and 100 percent of the local plankton passing through the plant, it appears that there would be no discernible effect on the plankton population in the existing water source. This is due to the very small volume of water used by the plant relative to the total volume available from the water source. Because of the low flow velocities of a closed cycle plant at the site, impingement of adult fish would be expected to be minimal.

Impacts to aquatic ecology resources were estimated to be MODERATE–LARGE ~~SMALL~~.

TABLE 9.3-3
SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS AT CANDIDATE SITES

Potential Environmental Impact Area	Lee Site	Keowee Site	Perkins Site	Middleton Shoals Site
Land Use	~~SMALL~~ MODERATE	~~MODERATE~~ LARGE	~~MODERATE~~ LARGE	~~MODERATE~~ LARGE
Hydrology and Water Quality	SMALL	SMALL	SMALL	SMALL
Terrestrial Ecology Resources	~~SMALL~~ MODERATE	~~MODERATE~~ LARGE	~~SMALL – MODERATE~~ LARGE	~~SMALL – MODERATE~~ LARGE
Aquatic Ecology Resources	SMALL – MODERATE	~~SMALL~~ MODERATE – LARGE	~~SMALL~~ MODERATE – LARGE	~~SMALL~~ MODERATE – LARGE
Socioeconomics	SMALL	SMALL	SMALL	SMALL
Environmental Justice	SMALL	SMALL	SMALL	SMALL
Historic and Cultural Resources	SMALL	SMALL	SMALL	SMALL
Air Quality	SMALL	SMALL – MODERATE	SMALL – MODERATE	SMALL – MODERATE
Human Health	SMALL	SMALL – MODERATE	SMALL	SMALL – MODERATE
Accidents	SMALL – MODERATE	SMALL	SMALL	SMALL
Transmission Corridors	SMALL	SMALL	MODERATE	MODERATE

TABLE 9.3-4 (Sheet 1 of 2)
COVER (HABITAT) TYPES PRESENT ON THE PERKINS, KEOWEE, MIDDLETON SHOALS, AND LEE NUCLEAR CANDIDATE SITES[a]

	Name of Candidate Site							
	Perkins		Keowee		Middleton Shoals		Lee Nuclear Site	
Cover or Habitat Type[a]	Acres	%	Acres	%	Acres	%	Acres	%
Mixed Hardwood (MH) - Stands dominated by mixed hardwoods with little or no pine in the canopy.	0	0.0	212	47.0	99	22.1	38	8.6
Mixed Hardwood Pine (MHP) - Stands dominated by mixed hardwood with pine in the canopy.	177	39.3	46	10.2	21	4.7	12	2.6
Pine Mixed Hardwood (PMH) - Stands dominated by pine with mixed hardwood in the canopy and understory.	111	24.7	39	8.7	144	31.9	14	3.2
Pine - Young to mid-aged pine stands or plantations with no hardwoods in canopy.	3	0.7	122	27.1	58	13.0	0	0.0
Upland Scrub (USC) - Partially forested early successional, scrubby areas.	79	17.6	0	0.0	104	23.1	29	6.3
Open/Field/Meadow (OFM) - Non-forested areas dominated by grasses, herbs, or bare soil maintained by cattle grazing and/or mowing.	80	17.7	13	2.9	13	2.8	280	62.3

(a) Based on cover type analysis within a circle with a radius of 2,500 ft centered on the coordinates of the proposed reactor units.

~~TABLE 9.3-4 (Sheet 2 of 2)~~

~~COVER (HABITAT) TYPES PRESENT ON THE PERKINS, KEOWEE, MIDDLETON SHOALS, AND LEE NUCLEAR CANDIDATE SITES[a]~~

NOTE: SHEET 2 OF 2 OF THIS TABLE IS REPLACED IN ITS ENTIRETY WITH THE FOLLOWING TABLE

TABLE 9.3-4 (Sheet 2 of 2)

COVER (HABITAT) TYPES PRESENT ON THE PERKINS, KEOWEE, MIDDLETON SHOALS, AND LEE NUCLEAR CANDIDATE SITES

	Name of Candidate Site							
	Perkins		Keowee		Middleton Shoals		Lee Nuclear Site	
	Site	Reservoirs[b]	Site	Reservoirs[b]	Site	Reservoirs[b]	Site	Reservoirs[b]
Wetlands (ac)	0.5	92	3.5	19	1.2	117	11	3.2
Stream Length (LF)	20,000	104,000	17,000	130,000	16,000	196,000	3,000	57,000
Open Water (ac)	0	1.9	10	2.3	7.0	20	28	5.3
Land (ac)	450	1,450	450	1,300	450	2,200	450	620

(b) Acreage and location of proposed reservoirs were estimated based on supplemental water needs and USGS topographic maps.

9.4 ALTERNATIVE PLANT AND TRANSMISSION SYSTEMS

9.4.1 Heat Dissipation Systems

Subsection 9.4.1.2.3, Dry Cooling Towers, page 9.4-5, 2nd paragraph:

Incorporation of the ACC technology would require large-scale changes to the standardized design (Reference 5). The ACC is not compatible with the condenser and turbine design described in the certified design and would require extensive revision to fundamental design elements of the main steam, feedwater and heater drains systems. Essential elements of the turbine building foundation, structure and turbine missile evaluation would require revision.

9.4.2 Circulating Water Systems

Subsection 9.4.2.2.4, Alternatives to the Selected Water Supply, page 9.4-20, 1st, 2nd, and 3rd paragraphs:

The selected water supply for the heat dissipation system at the Lee Nuclear Station is the Broad River. No alternative sources of water supply are available. This selected water supply system is designed so that the bottom of the intake channel is at sufficient depth to ensure direct flow from the main river channel to the water intake. ~~As described in Section 5.3, the maximum amount of water introduced into the system from the Broad River is approximately 60,000 gpm for the two operating units.~~ The mean annual ~~mean~~ flow at the Broad River is ~~2538~~ approximately 2,500 ~~cubic feet per second (~~cfs~~)~~. Normal average intake flow of 78 cfs (Table 2.3-14) represents approximately 3 percent of the mean annual flow of the Broad River. ~~Based on the anticipated maximum intake flow of 60,000 gpm or both operating units, the intake withdraws approximately 5 percent of the annual mean river flow.~~ During low-flow conditions in the river, raw water is pumped from either ~~the~~ Make-Up Pond B or Make-Up Pond C (through Make-Up Pond B)~~intake structure~~ to ~~the~~ Make-Up Pond A and subsequently to the CWS. For further discussion of the use of Make-Up Pond B and ~~the~~ Make-Up Pond C ~~A~~, see Section ~~5.3~~5.2.

Groundwater was evaluated and not considered a viable alternative water source because the groundwater would not be able to support the large component cooling make-up water requirement ~~of 60,000 gpm~~ for both units. Heath (Reference 6) notes that groundwater discharge rates in the Inner Piedmont Geologic Belt average 600,000 gallons per day per square mile (0.93 cfs/mi). Heath further suggests that the best sites for larger groundwater supplies in the Piedmont are perennial stream valleys characterized by highly fractured bedrock. Approximately 84 square miles (53,760 ac) would be required to supply the Lee Nuclear Station make-up water needs with groundwater.

The environmental impact of using the Broad River water supply during times of normal flow is SMALL. However, low river flow may not supply enough water to the CWS, and therefore, during low-flow conditions in the river, raw water is pumped from the make-up ponds. ~~Make-Up Pond B intake structure~~

~~to the Make-Up Pond A.~~ No environmentally equivalent or superior alternative raw water source is identified. Environmental impacts are SMALL, and no mitigation is needed.

RENUMBER 9.4.2.2.5, Alternatives to the Selected Water Treatment System, page 9.4-21 to 9.4.2.2.6 (TEXT UNCHANGED).

NEW SUBSECTION 9.4.2.2.5, Supplemental Water Alternatives, page 9.4-21 INSERT NEW TEXT:

Duke Energy determined that the supply of supplemental water in Make-Up Pond B would be insufficient to support operations during extended drought conditions without interrupting plant operation. The Lee Nuclear Station would need an additional supplemental water supply of 11,000 ac-ft. Several alternatives for obtaining this additional supplemental water were evaluated and are discussed below.

The alternative selected would need to meet the following requirements:

1. Provide 11,000 ac-ft of supplemental water on demand;
2. Allow control by Duke Energy over the resource; and
3. Optimize the balance between feasibility of construction, operation and environmental impacts.

9.4.2.2.5.1 Use Groundwater for Supplemental Water

As discussed in Subsection 9.4.2.2.4 groundwater yields in the vicinity of the Lee Nuclear Station are insufficient to provide make-up water supply. Even if supply was restricted to supplemental water, it would require wells over 84 square miles (53,760 ac) to supply make-up water when Broad River water is not available. This alternative would not supply sufficient water and the site is not large enough to support that many groundwater wells and therefore was judged to be infeasible.

9.4.2.2.5.2 Use Treated Wastewater for Supplemental Water

The use of treated wastewater to supplement water requirements during periods of drought was investigated. This is a water source increasingly looked at by EPA. As detailed in Table 2.5-19, two public wastewater treatment facilities are located in Cherokee County within the Lee Nuclear Station area, but the combined utilization rates from the Clary and Broad River plants (4.6 MGD) is insufficient to meet the Lee Nuclear Station consumptive water requirement of 55 cfs (35.3 MGD). Consequently, this alternative was judged to not meet the requirements stated above.

9.4.2.2.5.3 Increase the Size of Make-Up Pond B

This alternative includes dredging out several arms of Make-Up Pond B that were filled in during the original construction activities; dredging out remnants of a cofferdam that was used during construction of the main Make-Up Pond B dam; dredging out the entire bottom of Make-Up Pond B by 5 ft, 10 ft, and 15 ft; and increasing the height of the dam 10 ft and 15 ft.

During construction of the earthen dam, virtually all available material from the impounded area was used as fill material in the dam. Therefore, in order to increase the usable volume in the Make-Up Pond B, the pond would need to be dewatered and then a combination of excavation/ripping and blasting would be required. Increasing the Make-Up Pond B dam height would provide additional capacity but also invalidate the probable maximum flood (PMF) calculation for the Lee Nuclear Station and jeopardize the safety of the Lee Nuclear Station during the PMF. Even if these obstacles could be overcome, this alternative only increases the available supplemental water to 8,800 ac-ft which is 2,200 ac-ft less than the supplemental water requirement.

Consequently, this alternative was rejected as not meeting the need for supplemental water.

9.4.2.2.5.4 Release of Water From Upstream Reservoirs

There are five reservoirs with storage capacity on the Broad River and its tributaries: Lake Summit and Lake Adger on the Green River; and Lake Lure, Gaston Shoals, and Cherokee Falls on the Broad River. In addition, the Cleveland County Sanitary District is proposing to construct a water supply dam and reservoir on the First Broad River. Lake Lure is a private reservoir and dam with a small hydroelectric plant at the dam. The area around the lake is densely developed and the operating range is less than 1 ft. This lake is operated for recreation and is not drawn down except for emergencies and dam maintenance. The hydroelectric project is operated to pass inflow; therefore, no hydroelectric operations are expected during an extended drought, and no storage calculations have been developed. Cherokee Falls is located directly upstream from Duke's Ninety-Nine Islands Hydroelectric Station and the Lee Nuclear Station site. The dam is less than 20 ft high and there is no usable storage in this impoundment. The total dependable storage in Lake Summit, Lake Adger, and Gaston Shoals is approximately 4,900 ac-ft, assuming all reservoirs are full at the start of the drought with zero inflow and no evaporation losses. For these reasons, use of these upstream reservoirs for make-up water during an extended drought is considered a high-risk alternative that does not provide sufficient water to meet supplemental water needs.

The proposed Cleveland County Reservoir has a projected usable water storage of 21,165 ac-ft and is located approximately 47 river miles upstream of the Lee Nuclear Station. There are approximately 31 miles of the First Broad River between the proposed reservoir site where the flow releases would be made to the confluence with the Broad River and an additional 7 miles to the Duke Energy owned Gaston Shoals Hydroelectric Station project. Because of the distance involved, it would take several days for the released water to travel from the proposed reservoir site to Gaston Shoals. Coordination of the releases could be difficult and would require additional stream flow gauging be installed to monitor the releases and travel time of the flow. Additionally, there is currently no state-wide water supply plan or limit on installed water intakes and there is currently no "Water Rights" law similar to what is exercised in western states. Therefore, even if Duke Energy established water capacity/release agreement with Cleveland County, there is no guarantee that the water would reach the Lee Nuclear Station.

This alternative was rejected as not meeting the need for supplemental water.

9.4.2.2.5.5 Creation of a Supplemental Water Impoundment

Duke Energy evaluated the creation of an additional impoundment to provide supplemental water. As noted previously in this section, EPA regulations [40 CFR 125.84(b)(3)] limit the use of the complete volume of any impoundment. Consequently, the creation of any supplemental water impoundment will require sufficient volume to meet the supplemental water needs and implement the EPA 316(b) regulations limiting withdrawal of cooling water from an impoundment.[1]

Duke Energy determined there were three opportunities for construction of a supplemental water impoundment in the vicinity of the Lee Nuclear Station. These included:

1. Creating an impoundment in the Kings Creek watershed northeast of the Lee Nuclear Station.
2. Creating an impoundment in the London Creek watershed west of the Lee Nuclear Station; and,
3. Raising the Ninety-Nine Islands Dam to increase the size of the existing Ninety-Nine Islands Reservoir.

Figure 9.4-9 illustrates each of these options. All three options were considered viable and were evaluated for environmental impacts. The alternatives and impacts are discussed in the following sections and compared in **Table 9.4-7**.

9.4.2.2.5.5.1 Increasing Ninety-Nine Islands Storage

As noted in **Subsection** 2.3.1.3.1.1, Ninety-Nine Islands Reservoir is a 433 ac reservoir impounded in 1910 by the Ninety-Nine Islands Dam and Hydroelectric Station. The reservoir has a full-pond elevation of 511 ft above msl. The storage volume listed in the U.S. Army Corps of Engineers National Inventory of Dams is 2,300 ac-ft. Sediment buildup has reduced that volume to between 1,400 ac-ft and 1,700 ac-ft.

Storage can be added by increasing the dam height to 530 ft msl. This would impound an additional 777 ac increasing the aerial extent of Ninety-Nine Islands reservoir to 1,210 ac. Creating a 300 ft protective buffer around the impoundment would affect an additional 698 ac for a total project area of 1,908 ac. Impacts to land use would be removal of 41 occupied buildings including 35 residences and two churches and four commercial buildings. Property acquisition would involve 94 parcels with 80 individual owners. Additionally, six cultural resources sites, including a cemetery and 38 ac of Cherokee

[1] "... for lakes or reservoirs, intake flow may not disrupt natural thermal stratification or turnover pattern (where present) of the source water except in cases where the disruption is determined to be beneficial to the management of fisheries for fish and shellfish by any fishery management agency(ies) . . . " (66FR65260)

Falls, a historic district potentially eligible for the NRHP, would be impacted by the impoundment and 300-ft buffer.

Sixty-six acres of alluvial wetlands and 639 ac of forested land would be impounded by this alternative. Approximately 3 miles of perennial and intermittent streams would also be impounded by this alternative. Although potential habitat likely exists within the study area, there are no recorded occurrences of rare, threatened or endangered species in the area affected by the proposed alternative.

Since Ninety-Nine Islands Reservoir is a Federal Energy Regulatory Commission licensed project, some restrictions may exist on the ability to drawdown the reservoir during low-flow periods. Such restrictions reduce the ability of this alternative to meet the supplemental water needs. Additionally, the process to amend the existing hydroelectric facility license could be a protracted process and may not meet the schedule needs for the Lee Nuclear Station project.

9.4.2.2.5.5.2 Creating an Impoundment on London Creek

Evaluation of alternatives was performed prior to selecting the preferred alternative. Consequently, data presented in the comparison of the alternatives may differ from the data presented in other sections of this Environmental Report for the preferred alternative as a result of more intensive survey of the preferred alternative.

Duke Energy investigated creating an impoundment on London Creek. In order to obtain sufficient usable storage and meet the thermal regime provisions of 40 CFR 125.84(b)(3)(ii), a 21,726 ac-ft impoundment is necessary. This will inundate approximately 620 ac plus 458 ac associated with a 300 ft protective buffer around the impoundment. Total area impacted would be 1,078 ac. One family cemetery would have to be relocated. Land acquisition would involve approximately 1,900 ac.

Approximately 16 ac of wetlands/pond will be impounded by this alternative. Additionally, 527 ac of forested land would be impounded. Approximately 6 miles of perennial and intermittent streams would be impounded by this alternative. Although potential habitat likely exists within the study area, there are no recorded occurrences of rare, threatened or endangered species in the area affected by the proposed alternative.

Since this impoundment would not be subject to FERC license requirements, it is likely that Duke Energy would have more control over the operation and drawdown for this alternative. This alternative would have minimal impact on the schedule.

9.4.2.2.5.5.3 Creating an Impoundment on Kings Creek

Duke Energy investigated creating an impoundment on Kings Creek. This impoundment will inundate 2,430 ac plus 1,854 ac associated with a 300-ft protective buffer around the impoundment. Total area impacted would be 4,284 ac. Impacts to land use would include the removal of 54 occupied buildings, including two churches and two industrial buildings, as part of the inundated area and 300 ft buffer. Land acquisition would involve 196 parcels with 170 individual owners. The impoundment would impact one archaeological site listed on the National Register of Historic Places.

The impoundment would inundate approximately 115 ac of wetlands and a three ac pond. Twenty-seven miles of perennial and intermittent streams would be inundated by the impoundment. Approximately 1,854 ac of forested land would be impounded by this alternative. Although potential habitat likely exists within the study area, there are no recorded occurrences of rare, threatened or endangered species in the area affected by the proposed alternative.

Since this impoundment would not be subject to FERC license requirements, it is likely that Duke Energy would have more control over the operation and drawdown for this alternative. This alternative would have minimal impact on the schedule.

9.4.2.2.5.5.4 Conclusions

As shown in **Tables 9.4-7** and **9.4-8**, the alternative of constructing a supplemental water pond in the London Creek watershed best meets the three requirements listed in **Subsection 9.4.2.2.5** above. An impoundment in the London Creek watershed provides sufficient storage, provides Duke Energy complete control of the water availability, minimizes impacts on schedules, and minimizes environmental impacts better than the two other alternatives evaluated. An impoundment in London Creek also minimizes the acreage of wetlands that will be inundated.

9.4.3 Transmission Systems

There are no revisions associated with Make-Up Pond C in this section.

9.4.4 References

Subsection 9.4.4, References, page 9.4-27, INSERT NEW TEXT at end of section:

5. Cuchens, J. 2009. Feasibility of Air-Cooled Condenser Cooling System for the Standardized AP1000 Plant, Southern Company Generation Engineering and Construction Services, US Nuclear Regulatory Commission, Atomic and Safety Licensing Board, Docket 05200011, Exhibit SNCR00024-00-BD01, March 17, 2009.

6. Heath, Ralph C. 1994. "Groundwater Recharge in North Carolina." Prepared for the Groundwater Section Division of Environmental Management North Carolina Department of Environment, Health, and Natural Resources. March. http://h2o.enr.state.nc.us/aps/gpu/documents/Heath-gwrechargeinNC.pdf.

TABLE 9.4-7 (Sheet 1 of 2)
ENVIRONMENTAL ANALYSIS COMPARISON
W.S. LEE III COOLING WATER OPTIONS

			Kings Creek Cooling Water Option			London Creek Cooling Water Option			Ninety-Nine Islands Cooling Water Option		
Affected Wetlands	Impoundment Weight	Buffer Weight	Acres in the Impoundment	Acres in the 300' Buffer	Score	Acres in the Impoundment	Acres in the 300' Buffer	Score	Acres in the Impoundment	Acres in the 300' Buffer	Score
Lacustrine Unconsolidated Bottom	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	384.1	9.0	1920.5
Lacustrine Unconsolidated Shore	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.2	0.0	159.0
Palustrine Emergent	10.0	0.0	1.6	0.0	16.0	0.0	0.0	0.0	2.7	0.1	27.0
Palustrine Forested	10.0	0.0	13.3	0.4	133.0	0.0	0.0	0.0	38.7	0.3	387.0
Palustrine Scrub/Shrub	10.0	0.0	0.3	0.0	3.0	0.0	0.0	0.0	11.2	0.0	112.0
Palustrine Unconsolidated Bottom	5.0	0.0	0.2	3.4	1.0	4.2	0.7	21.0	37.2	5.9	186.0
Palustrine Unconsolidated Shore	7.5	0.0	1.1	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0
Riverine Streambed	10.0	0.0	11.4	0.5	114.0	0.0	0.0	0.0	0.0	0.0	0.0
Riverine Unconsolidated Bottom	10.0	0.0	84.8	1.6	848.0	9.8	2.3	98.0	0.0	3.5	0.0
Unclassified Lake/Pond	5.0	0.0	2.9	0.1	14.5	1.7	3.4	8.5	0.2	0.0	1.0
Total Weighted Score					**1137.8**			**127.5**			**2792.5**
Rank					**2**			**1**			**3**

Affected Streams	Impoundment Weight	Buffer Weight	Miles in the Impoundment	Miles in the 300' Buffer	Score	Miles in the Impoundment	Miles in the 300' Buffer	Score	Miles in the Impoundment	Miles in the 300' Buffer	Score
Stream - Perennial	10.0	0.0	20.1	0.7	201.0	2.5	0.6	25.0	2.4	0.4	24.0
Stream - Intermittent	10.0	0.0	6.6	1.0	66.0	3.5	0.3	35.0	0.7	0.4	7.0
Total Weighted Score					**267.0**			**60.0**			**31.0**
Rank					**3**			**2**			**1**

Land Cover	Impoundment Weight	Buffer Weight	Acres in the Impoundment	Acres in the 300' Buffer	Score	Acres in the Impoundment	Acres in the 300' Buffer	Score	Acres in the Impoundment	Acres in the 300' Buffer	Score
Alluvial Wetland	10.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	66.0	2.8	660.0
Non-Alluvial Wetland	10.0	0.0	4.6	0.0	46.0	4.6	0.0	46.0	1.6	0.0	16.0
Mixed Hardwood	5.0	0.0	530.9	247.4	2654.5	306.5	149.4	1532.5	170.2	141.7	851.0
Mixed Hardwood - Pine	5.0	0.0	926.6	909.7	4633.0	102.9	88.5	514.5	244.0	201.7	1220.0
Open / Field / Meadow	5.0	0.0	436.2	189.3	2181.0	86.8	78.0	434.0	38.5	99.0	192.5
Open Pine / Mixed Hardwood	5.0	0.0	45.8	32.9	229.0	0.0	0.0	0.0	27.9	0.0	139.5
Open Water	5.0	0.0	3.6	2.5	18.0	6.0	3.5	30.0	407.4	20.6	2037.0
Pine	5.0	0.0	289.2	395.2	1446.0	107.8	123.0	539.0	31.3	89.5	156.5
Pine - Mixed Hardwood	5.0	0.0	61.8	32.3	309.0	10.1	34.7	50.5	165.9	86.7	829.5
Stream Buffer	5.0	0.0	62.0	0.3	310.0	0.0	0.0	0.0	4.9	0.6	24.5
Upland Scrub	5.0	0.0	69.1	44.7	345.5	1.2	4.8	6.0	52.6	55.3	263.0
Total Weighted Score					**12172.0**			**3152.5**			**6389.5**
Rank					**3**			**1**			**2**

Noteworthy Soils	Impoundment Weight	Buffer Weight	Acres in the Impoundment	Acres in the 300' Buffer	Score	Acres in the Impoundment	Acres in the 300' Buffer	Score	Acres in the Impoundment	Acres in the 300' Buffer	Score
Prime Farmland Soils	7.5	0.0	21.4	12.7	160.5	0.0	0.0	0.0	15.8	0.9	118.5
Farmland of Statewide Importance	7.5	0.0	204.0	69.6	1530.0	20.1	14.1	150.8	8.1	13.6	60.8
Prime Farmland Soils If Protected From Flooding	5.0	0.0	126.3	3.7	631.5	0.0	0.0	0.0	72.8	0.1	364.0
Total Weighted Score					**2322.0**			**150.8**			**543.3**
Rank					**3**			**1**			**2**

Protected Species	Impoundment Weight	Buffer Weight	Number in the Impoundment	Number in the 300' Buffer	Score	Number in the Impoundment	Number in the 300' Buffer	Score	Number in the Impoundment	Number in the 300' Buffer	Score
Southern Enchanter's Nightshade	7.5	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Southern Adder's Tongue Fern	7.5	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Single-Flowered Cancer Root	7.5	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Total Weighted Score					**0.0**			**0.0**			**0.0**
Rank					**1**			**1**			**1**

TABLE 9.4-7 (Sheet 2 of 2)
ENVIRONMENTAL ANALYSIS COMPARISON
W.S. LEE III COOLING WATER OPTIONS

			Kings Creek Cooling Water Option			London Creek Cooling Water Option			Ninety-Nine Islands Cooling Water Option		
Occupied Buildings	Impoundment Weight	Buffer Weight	Number in the Impoundment	Number in the 300' Buffer	Score	Number in the Impoundment	Number in the 300' Buffer	Score	Number in the Impoundment	Number in the 300' Buffer	Score
Place of Worship	7.5	7.5	0	2	15.0	0	0	0.0	0	2	15.0
Commercial	7.5	7.5	0	0	0.0	0	1	7.5	0	4	30.0
Industrial	10.0	10.0	0	2	20.0	0	0	0.0	0	0	0.0
Single-Family Residence	10.0	10.0	7	42	490.0	12	28	400.0	5	30	350.0
Single-Family Residence (Unverified)	10.0	10.0	1	0	10.0	0	0	0.0	0	0	0.0
Total Weighted Score					**535.0**			**407.5**			**395.0**
Rank					**3**			**2**			**1**

			Kings Creek Cooling Water Option			London Creek Cooling Water Option			Ninety-Nine Islands Cooling Water Option		
Existing Land Use	Impoundment Weight	Buffer Weight	Acres in the Impoundment	Acres in the 300' Buffer	Score	Acres in the Impoundment	Acres in the 300' Buffer	Score	Acres in the Impoundment	Acres in the 300' Buffer	Score
Athletic Field	7.5	7.5	0.0	0.0	0.0	0.0	0.0	0.0	7.2	0.1	54.8
Boat Launch	7.5	7.5	0.0	0.0	0.0	0.0	0.0	0.0	3.4	2.9	47.3
Cemetery	7.5	7.5	0.0	0.2	1.5	0.0	0.0	0.0	0.0	0.4	3.0
Industrial	7.5	7.5	40.3	25.1	490.5	0.0	0.0	0.0	6.0	8.4	108.0
Mining	7.5	7.5	12.2	38.6	381.0	0.0	0.0	0.0	0.0	0.0	0.0
Park	7.5	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	26.3
Place of Worship	7.5	7.5	0.0	2.4	18.0	0.0	0.0	0.0	0.1	2.8	21.8
Power Facility (Generation)	10.0	0.0	9.3	21.9	93.0	0.0	0.0	0.0	341.0	202.1	3410.0
Power Facility (Right-of-Way Developed)	7.5	0.0	37.8	31.3	283.5	6.3	4.4	47.3	2.1	4.4	15.8
Recreation	7.5	7.5	0.0	0.0	0.0	3.3	9.6	96.8	0.0	0.0	0.0
Residential Low Density	7.5	7.5	0.6	3.3	29.3	0.2	0.7	6.8	0.8	0.8	12.0
Residential Medium Density	7.5	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	14.3
Residential Rural	7.5	7.5	5.8	12.0	133.5	6.7	15.9	169.5	2.4	6.0	63.0
Sand and Gravel Pit	7.5	7.5	0.0	0.0	0.0	0.0	0.0	0.0	12.9	2.7	117.0
Sewage Treatment Facility	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.0
Tree Farm	7.5	7.5	198.4	154.7	2648.3	114.6	117.1	1737.8	7.6	34.6	316.5
Unclassified	5.0	0.0	2082.0	1516.3	10410.0	487.5	323.3	2437.5	410.4	403.1	2052.0
Total Weighted Score					**14488.5**			**4495.5**			**6262.5**
Rank					**3**			**1**			**2**

			Kings Creek Cooling Water Option			London Creek Cooling Water Option			Ninety-Nine Islands Cooling Water Option		
Transportation Corridors	Impoundment Weight	Buffer Weight	Miles in the Impoundment	Miles in the 300' Buffer	Score	Miles in the Impoundment	Miles in the 300' Buffer	Score	Miles in the Impoundment	Miles in the 300' Buffer	Score
Public Road Right-of-Way	7.5	0.0	4.3	5.8	32.3	0.5	1.3	3.8	0.7	3.8	5.3
Railroad Right-of-Way	7.5	0.0	0.2	0.4	1.5	0.0	0.0	0.0	0.2	0.2	1.5
Total Weighted Score					**33.8**			**3.8**			**6.8**
Rank					**3**			**1**			**2**

			Kings Creek Cooling Water Option			London Creek Cooling Water Option			Ninety-Nine Islands Cooling Water Option		
Cultural Resources: Recorded Archaeological Sites	Impoundment Weight	Buffer Weight	Number in the Impoundment	Number in the 300' Buffer	Score	Number in the Impoundment	Number in the 300' Buffer	Score	Number in the Impoundment	Number in the 300' Buffer	Score
Archaeological Site - Listed on the National Register of Historic Places	10.0	0.0	1	0	10.0	0	0	0.0	0	0	0.0
Archaeological Site - Potentially Eligible for the National Register of Historic Places	10.0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Archaeological Site - Eligibility for the National Register of Historic Places Undetermined	10.0	0.0	0	0	0.0	0	0	0.0	2	0	20.0
Archaeological Site - Ineligible for the National Register of Historic Places	5.0	0.0	1	0	5.0	0	0	0.0	0	0	0.0
Historic Cemetery - Eligibility for the National Register of Historic Places Undetermined	10.0	0.0	0	0	0.0	0	0	0.0	1	0	10.0
Total Weighted Score					**15.0**			**0.0**			**30.0**
Rank					**2**			**1**			**3**

			Kings Creek Cooling Water Option			London Creek Cooling Water Option			Ninety-Nine Islands Cooling Water Option		
Cultural Resources: Recorded Historic Sites	Impoundment Weight	Buffer Weight	Number in the Impoundment	Number in the 300' Buffer	Score	Number in the Impoundment	Number in the 300' Buffer	Score	Number in the Impoundment	Number in the 300' Buffer	Score
Historic Site - Listed on the National Register of Historic Places	10.0	5.0	0	0	0.0	0	0	0.0	0	0	0.0
Historic Site - National Landmark	10.0	5.0	0	0	0.0	0	0	0.0	0	0	0.0
Historic Site - Potentially Eligible for the National Register of Historic Places	10.0	5.0	0	0	0.0	0	0	0.0	0	0	0.0
Historic Site - Eligible for the National Register of Historic Places	10.0	5.0	0	0	0.0	0	0	0.0	2	0	20.0
Historic Site - Ineligible for the National Register of Historic Places	7.5	5.0	0	0	0.0	0	0	0.0	0	0	0.0
Historic Site - Ineligible for the National Register of Historic Places (Destroyed)	0.0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Historic Cemetery - Ineligible for the National Register of Historic Places (But Protected)	10.0	10.0	0	0	0.0	0	0	0.0	0	0	0.0
Total Weighted Score					**0.0**			**0.0**			**20.0**
Rank					**1**			**1**			**3**

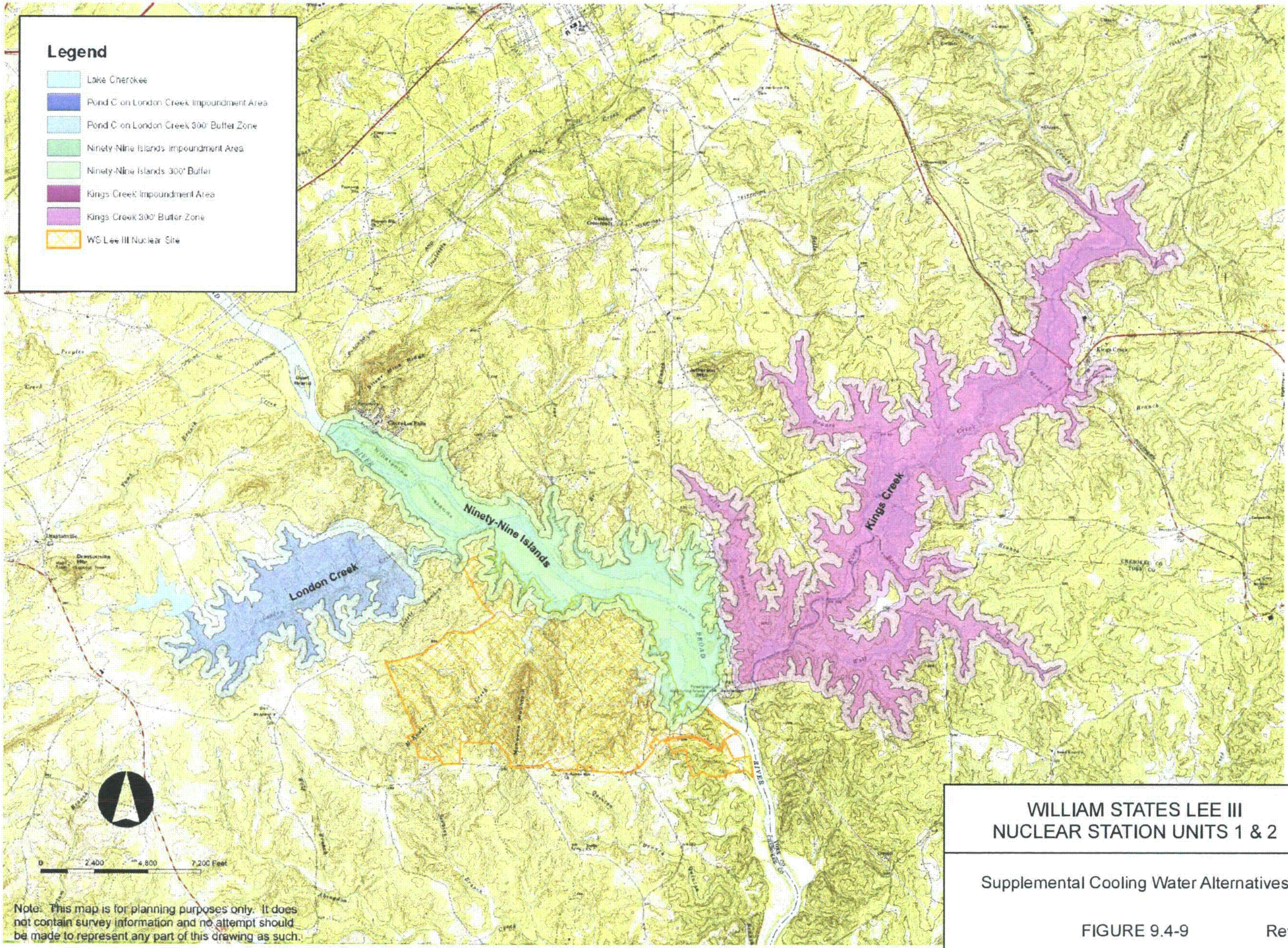
Average Category Rank					**2.4**			**1.2**			**2**
Rank					**3**			**1**			**2**

TABLE 9.4-8
ENVIRONMENTAL ANALYSIS COMPARISON SUMMARY
W.S. LEE III COOLING WATER OPTIONS

	Kings Creek Cooling Water Option	London Creek Cooling Water Option	Ninety-Nine Islands Cooling Water Option
	Category Rank/Weighted Score	Category Rank/Weighted Score	Category Rank/Weighted Score
Affected Wetlands	2 1137.8	1 127.5	3 2792.5
Affected Streams	3 267.0	2 60.0	1 31.0
Land Cover	3 12172.0	1 3152.5	2 6389.5
Noteworthy Soils	3 2322.0	1 150.8	2 543.3
Protected Species	1 0.0	1 0.0	1 0.0
Occupied Buildings	3 535.0	2 407.5	1 395.0
Existing Land Use	3 14488.5	1 4495.5	2 6262.5
Transportation Corridors	3 33.8	1 3.8	2 6.8
Cultural Resources: Recorded Archaeological Sites	2 15.0	1 0.0	3 30.0
Cultural Resources: Recorded Historic Sites	1 0.0	1 0.0	3 20.0
Average Rank Score	**2.4**	**1.2**	**2.0**
Overall Rank	**3**	**1**	**2**

Legend

1 Weighted Score	**Least Impacted Option**
2 Weighted Score	**Second Most Impacted Option**
3 Weighted Score	**Most Impacted Option**



WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2

Supplemental Cooling Water Alternatives

FIGURE 9.4-9 Rev 0

10 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

10.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

10.0, Environmental Consequences of the Proposed Action, page 10.0-1:

This chapter presents the potential environmental consequences of constructing and operating two reactor units on the Lee Nuclear Site, as well as constructing and operating Make-Up Pond C. The environmental consequences are evaluated in the following four sections:

10.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Section 10.1, Unavoidable Adverse Environmental Impacts, page 10.1-1:

Unavoidable adverse ~~impacts are predicted adverse~~ environmental impacts are predicted that cannot be avoided and for which there are no practical means of mitigation. This section considers unavoidable adverse impacts from construction and operation of the Lee Nuclear Station on the Lee Nuclear Site, the railroad spur, ~~and~~ the transmission lines in the two transmission line corridors, and the construction of Make-Up Pond C and associated facilities (pipeline corridor, transmission line corridor).

10.1.1 Unavoidable Adverse Environmental Impacts of Construction

Subsection 10.1.1, Unavoidable Adverse Environmental Impacts of Construction, page 10.1-1, 2nd paragraph:

Unavoidable adverse impacts from construction of the new units at the Lee Nuclear Site and Make-Up Pond C include the following:

- Land use impacts – loss of previously undeveloped land, which includes a small amount of prime farmland, and potential impacts on historic and cultural resources (including relocation of a cemetery in Make-Up Pond C study area).
- Hydrological and water use impacts – ~~temporarily increased~~ temporary increase in turbidity and sediment deposition in the Broad River; permanent impoundment of London Creek for creation of Make-Up Pond C.
- Ecological impacts – loss of 270 ~~acres (~~ac~~)~~ from Lee Nuclear Site and loss of approximately 620 ac from Make-Up Pond C of wildlife habitat and temporary degradation of aquatic habitat.
- Socioeconomic impacts – displacement of residences in/surrounding Make-Up Pond C study area, impacts to traffic (including re-alignment of SC 329 from Make-Up Pond C), increased debris to existing landfills, increase in non-recyclable refuse, a potential short-term housing shortage, and school overcrowding.

Nearly all of these impacts, other than socioeconomic, from construction of the station, railroad, and associated transmission lines are SMALL. The moderate or large socioeconomic impacts are reduced through mitigation (Table 10.1-1). The influx of construction workers has the potential to lead to a short-term housing shortage and short-term capacity concerns in local schools. The impact of a short-term housing shortage due to the influx of workers would likely generate additional temporary rentals and trailer parks, thus mitigating this short-term impact. Also, increased construction traffic has the potential to affect existing traffic patterns and levels of service in the vicinity of the Lee Nuclear Station. However, increased income tax revenues from the influx of construction workers during new unit construction funds additional teachers and needed school resources. Duke Energy intends to implement traffic mitigation programs such as carpooling or staggered shifts, signage, and turn lanes to alleviate traffic concerns.

Moderate impacts identified from the construction of Make-Up Pond C include hydrologic alterations, and ecological impacts (to terrestrial ecosystems and aquatic ecosystems). A cemetery within the Make-Up Pond C study area will be impacted from creation of the pond. This cemetery will be relocated in accordance with South Carolina and Cherokee County regulations applicable to cemeteries. Hydrologic alterations will occur from impoundment of London Creek, draining/inundating associated wetlands, construction of a dam, and filling the pond with water (supplied directly from Broad River or indirectly from Pond B). Impacts from these activities will be mitigated through compliance with the Section 404/401 permit, and through implementation of the Mitigation Action Plan developed as part of the 404 permit process. Ecological impacts would occur to both terrestrial ecosystems and aquatic ecosystems. These impacts would be minimized through compliance with the Section 404/401 permit and implementation of the Mitigation Action Plan. The impact of relocation of residents in the Make-Up Pond C area is minimized through compensation paid to the property owners, including a period during which upon closing, residents may remain rent-free while identifying a replacement residence.

10.1.2 Unavoidable Adverse Environmental Impacts of Operations

Subsection 10.1.2, Unavoidable Adverse Environmental Impacts of Operations, page 10.1-1:

Operational impacts from the Lee Nuclear Station (including Make-Up Pond C) are discussed in Chapter 5. **Table** 5.10-1 briefly describes these impacts and identifies measures and controls that are implemented to reduce or eliminate them. The expected impacts and the mitigation measures that are available to reduce these impacts are summarized in **Table** 10.1-2.

Unavoidable adverse impacts from operation of the Lee Nuclear Station (including Make-Up Pond C) include the following:

- Land use impacts – maintenance of the station may necessitate continued removal of vegetation, dedication of land for uranium mining and facilities, and dedication of land for waste disposal.

- Hydrological, water quality, and water use impacts – 55 cubic feet per second (cfs) of water is removed from the Broad River for consumptive use, and there will be a small thermal discharge back to Broad River.
- Ecological impacts – a small amount of land is removed from use for transmission tower bases, periodic disturbance to vegetation and wildlife associated with plant and transmission corridor maintenance, impacts to aquatic biota at water intake, and impacts to the aquatic ecosystem due to water consumption via drawdown of Make-Up Ponds B and C.
- Socioeconomic impacts – impacts on radio and television signals from transmission lines and consumption of natural gas and water.
- Atmospheric impacts – increase in air pollutants from standby diesel testing.

The levels of unavoidable adverse impacts from operation of the station are expected to be SMALL when appropriate mitigation measures are implemented.

TABLE 10.1-1 (Sheet 1 of 3)
CONSTRUCTION-RELATED UNAVOIDABLE ADVERSE IMPACTS

Impact Category	Adverse Impacts Based on Duke Energy's Proposal	Actions to Mitigate Impacts	Unavoidable Adverse Impacts
Land Use	Approximately 270 ac. of previously disturbed land is altered and converted during construction of the Lee Site, and approximately 620 ac. are altered from construction of Make-Up Pond C, with the potential for erosion. A small amount of previously undeveloped, undisturbed land would not be available for other uses.	Limit ground disturbances to the smallest area necessary to construct and maintain the plant. Ground disturbing activities are performed in accordance with South Carolina Department of Health and Environmental Control (SCDHEC) stormwater permit requirements. Use erosion control and stabilization measurements to minimize impacts. Limit vegetation removal to area designated for construction activities. Minimize potential spills of hazardous wastes/materials through training and rigorous compliance with applicable regulations. Restrict soil stockpiling and reuse to designated areas on the Lee Nuclear Site.	270 ac. of previously disturbed habitat is temporarily or permanently altered by the construction of the Lee Nuclear Station. Two acres of prime farmland is occupied on a long-term basis by the nuclear power plant and associated infrastructure. Approximately 620 ac. of land are altered from impoundment of Make-Up Pond C. Approximately 60 ac. of prime farmland are isolated and not available for farmland.
	Construction of transmission line in new corridors.	Site new corridors to avoid critical or sensitive habitat or species and avoid wetlands. Limit vegetation removal and construction to defined corridors during fall and winter to avoid nesting activities. Minimize potential impacts via avoidance and compliance with permitting requirements and best management practices.	Land use on some land is changed to open scrub or grassland beneath the two corridors.
	Potential to disturb ~~historic properties and~~ cultural resources due to ground disturbing activities.	Conduct cultural resource surveys, including subsurface sampling prior to initiating ground disturbing activities to identify buried historic, cultural, or paleontological resources. Consult with State Historic Preservation Office-if a cultural resource is discovered. Establish Duke Energy procedures to halt work if a potential historic, cultural, or paleontological resource is discovered.	Potential for destruction of unanticipated historic, cultural, or paleontological resources.

TABLE 10.1-1 (Sheet 2 of 3)
CONSTRUCTION-RELATED UNAVOIDABLE ADVERSE IMPACTS

Impact Category	Adverse Impacts Based on Duke Energy's Proposal	Actions to Mitigate Impacts	Unavoidable Adverse Impacts
Hydrological and water use	Dredging for the construction of the raw water intake is anticipated to result in temporary increases in turbidity in Broad River. Construction of Make-Up Pond C will result in impacts to hydrology, water use, and water quality from impounding London Creek, draining/inundating wetlands, and fill/drawdown of Make-Up Pond C.	Installation of rip rap, stemwalls, etc., to stabilize banks. Conduct construction and dredging activities in compliance with U.S. Army Corps of Engineers (USACE) requirements. Implement Mitigation Action Plan developed as part of 404 permit process.	Increased turbidity in Broad River is a temporary unavoidable adverse impact. Alteration of hydrologic regime of London Creek and loss of wetlands from inundation of Make-Up Pond C.
Ecological			
• Terrestrial	Habitat loss due to clearing and grading would kill or displace animals. The majority of the wildlife habitat is considered to be low quality. Clearing and impoundment of Make-Up Pond C will cause permanent loss of approximately 620 ac. of bottomland and upland habitat.	Perform land clearing/grading and excavation in compliance with regulations, permits, and best management practices. Perform revegetation/landscaping with fertilization. If possible, conduct construction activities to occur outside avian breeding/nesting periods. Implement Mitigation Action Plan developed as part of 404 permit process.	Loss of 270 ac. of habitat for wildlife species from Lee Nuclear Station. Loss of approximately 620 ac. of habitat from Make-Up Pond C.
• Aquatic	Temporarily degraded aquatic habitat due to construction near the Broad River or wetlands. Site preparation and construction activities associated with Make-Up Pond C will impact aquatic habitat and species (e.g., benthic macroinvertebrates and fish).	Install appropriate barriers and use best management practices to protect river prior to construction. Implement Mitigation Action Plan developed as part of 404 permit process.	Minor, temporary degradation of aquatic habitat during dredging and construction in and near Broad River.
Socioeconomic	Increase debris to existing landfills.	Establish procedures to ensure that all waste is disposed of according to applicable regulations such as the Resource Conservation and Recovery Act (RCRA).	Some land is dedicated to permitted landfills or licensed disposal facilities and is not available for other uses.
	Potential short-term housing shortage.	Temporarily house employees in hotels, rental properties, and park facilities.	In the short-term, there could be a housing shortage.
	Potential short-term school overcrowding.	Increase revenues to offset additional school resources, police, and fire protection.	In the short-term, there could be school crowding.
	Displacement of residents from Construction of Make-Up Pond C.	Compensation for property; allocation of rent-free period (upon closing) to identify relocation property	Adjacent property owners will be displaced from current residence.

TABLE 10.1-1 (Sheet 3 of 3)
CONSTRUCTION-RELATED UNAVOIDABLE ADVERSE IMPACTS

Impact Category	Adverse Impacts Based on Duke Energy's Proposal	Actions to Mitigate Impacts	Unavoidable Adverse Impacts
	Potential for increased traffic accidents due to increased construction traffic.	Post signs near construction entrances and exits to make the public aware of potentially high construction traffic areas. Develop traffic control mitigation plan.	Potential for increased traffic accidents due to construction traffic.
	Disruption in traffic flow from realignment of Highway 329 over London Creek.	Construction will occur such that interruption to traffic flow is minimized; the new alignment would be constructed while traffic continued on existing alignment, then would shift over to new alignment once completed.	There could still be minor interruptions in traffic flow from construction.
	Potential impacts to existing traffic in amount and flow due to construction traffic.	Stagger shifts, encourage car pooling; time deliveries to avoid shift change or commute times. Erect signs alerting drivers of construction and increased traffic.	Increased traffic on local roads during the construction period.

TABLE 10.1-2 (Sheet 1 of 2)
OPERATIONS-RELATED UNAVOIDABLE ADVERSE IMPACTS

Impact Category	Adverse Impacts Based on Duke Energy's Proposal	Actions to Mitigate Impacts	Unavoidable Adverse Impacts
Land Use	The uranium fuel cycle requires a commitment of land for uranium processing facilities.	This impact is external to Duke Energy. Some uranium may be imported.	The commitment of land for uranium processing facilities is an unavoidable adverse impact.
	Hazardous nonradioactive waste is generated and disposed in a licensed hazardous waste landfill.	Hazardous waste is carefully monitored and transferred to approved transporters and disposers. Develop a waste minimization plan to address waste management, equipment maintenance, recycling and reuse, segregation, treatment, work planning, waste tracking, and awareness training.	Some land is dedicated to disposal of wastes and not available for other uses.
	Nonhazardous waste is disposed of in licensed landfills.	Dispose of nonhazardous, nonradioactive waste according to applicable local, state, and federal requirements.	Some land is dedicated to disposal of wastes and not available for other uses.
	Generation of radioactive waste from operations, decontamination, and decommissioning.	Waste is placed in permanent off-site repositories. Prepare a detailed contamination and decommissioning plan prior to decommissioning.	Some land is dedicated to the storage of radioactive waste and is not available for other uses.
	Potential generation of mixed waste.	Limit mixed waste generation through source reduction, recycling, and treatment options. Mixed waste inventory is managed in accordance with applicable NRC and EPA regulations. The inventory of mixed waste is maintained in a designated storage area and monitored prior to offsite disposal.	Some land is dedicated to the disposal of wastes and is not available for other uses.
Hydrological impacts and water use	Water loss primarily as a result of "consumptive" losses results in consumption of 24,638 gpm make-up water for the two-unit operations. Approximately 2 percent of the monthly average river flow is expected to be lost to water withdrawal and evaporation from the proposed Units 1 and 2 cooling tower operations. This volume could adversely affect the hydrologic conditions of the Broad River under low- flow conditions.	Make-up water is supplied primarily by Broad River. Lee Nuclear Station will operate within the minimum release constraints of the Ninety-Nine Islands Hydroelectric Station FERC license. Make-up water is supplied by ~~on-site~~ Make-Up Pond B and Make-Up Pond C when the Broad River flow is below the FERC minimum release. (a)	Water withdrawn from the Broad River causes minor alteration to the river's hydrologic regime and is thus considered an unavoidable adverse impact. Water withdrawn is also not available for other uses.

TABLE 10.1-2 (Sheet 2 of 2)
OPERATIONS-RELATED UNAVOIDABLE ADVERSE IMPACTS

Impact Category	Adverse Impacts Based on Duke Energy's Proposal	Actions to Mitigate Impacts	Unavoidable Adverse Impacts
Ecological			
• Terrestrial	The continued maintenance of the transmission corridors, involving clearing of vegetation, may affect terrestrial ecology.	Employees are trained on how to perform work in a manner that reduces adverse environmental impacts. Minimize potential impacts through compliance with permitting requirements and best management practices. To the extent feasible, avoid any additional disturbances on critical or sensitive terrestrial habitats/species.	Managing vegetation within utility corridors may result in unavoidable adverse impacts to some wildlife and plants.
• Aquatic	Water intake may result in impingement / entrainment and may kill some aquatic species.	Utilization of closed cycle technology and cooling towers at intake, sizing river intake structures to ensure maximum water velocity across screens <0.5 fps and utilization of a return system to deposit impinged fish downstream of the intake.	Potential impacts to aquatic species near intake structures are unavoidable adverse impacts.
	Minor aquatic impacts resulting from consumption of water from the Broad River during low-flow conditions.	Make-up water is supplied by the Make-Up Pond B and Make-Up Pond C during low-flow conditions in Broad River.	Though minor, water withdrawn from the Broad River results in an unavoidable adverse impact to the aquatic ecosystem.
Socioeconomic	Increased transportation and traffic on two-lane state highways, county highways, local roads, especially McKowns Mountain Road and the feeder highways.	Possible mitigation measures include: staggering shifts, encouraging carpools, widening McKowns Mountain Road, establishing a centralized parking area away from the site, and creating an additional entrance to the site.	Minor traffic congestion on local roads.
	Increased burden on public services accompanying in-migration of new workers and families.	Increased property and worker-related taxes can help offset some of the problems related to increased populations such as community facilities and infrastructure, police, fire protection and schools.	Minor increased burden on public services.

a) The Ninety-Nine Islands Dam FERC license minimum flow requirement of 483 cfs for July through November (**Subsection 2.3.1.3.1**) was used as a constraint in evaluating operation during low flow conditions.

10.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Section 10.2, Irreversible and Irretrievable Commitments of Resources, page 10.2-1:

This section describes the expected irreversible and irretrievable environmental resource commitments to construction and operation of the Lee Nuclear Station (including Make-Up Pond C). The term "irreversible commitments of resources" describes environmental resources that would be potentially changed by construction or operation of the station and that could not be restored at some later time to their respective states prior to construction or operations. Irretrievable resources are generally materials that are expected to be used for the station in such a way that they could not, by practical means, be recycled or restored for other uses. These irreversible and irretrievable commitments of resources are summarized in Table 10.2-1.

10.2.1 Irreversible and Irretrievable Commitments of Environmental Resources

Subsection 10.2.1, Irreversible and Irretrievable Commitments of Environmental Resources, page 10.2-1:

Irreversible and irretrievable environmental commitments resulting from construction and operation of the Lee Nuclear Station (including Make-Up Pond C), in addition to the materials used for the nuclear fuel, include the following:

- Land Use
- Hydrological and Water Use
- Ecological

Subsection 10.2.1.1, Land Use, page 10.2-1:

Land committed to the disposal of radioactive and nonradioactive wastes is committed to that use, and it cannot be used for other purposes. Once the reactor units cease operations and the station is decommissioned in accordance with U.S. Nuclear Regulatory Commission requirements, the land that supports the station could be returned to other industrial or nonindustrial uses. However, the commitment of 2 ac ~~acres~~ of prime farmland at the Lee Nuclear Site, and 60 ac of farmland at the Make-Up Pond C is considered an irreversible commitment of that resource as it is unlikely that the current soil productivity could be restored to its present state in a reasonable time frame.

Subsection 10.2.1.2, Hydrological and Water Use , page 10.2-1:

Surface water is expected to be used for operation of the Lee Nuclear Station. Approximately 33,030 gpm of water are planned for use during plant operations, the majority of which would be used for the cooling towers, which would be mostly converted to vapor (24,638 gpm). This amount of water is considered an irretrievable committed resource. Conversion of London Creek to Make-Up Pond C will alter the hydrologic regime of London Creek and its watershed. However, the hydrologic regime of London Creek could potentially be restored by drawing down the pond, removing the dam, and restoring the flow of London Creek; therefore, this is not considered an irretrievable resource commitment.

Subsection 10.2.1.3 Ecological, page 10.2-1

Construction would temporarily and adversely affect the abundance and distribution of local flora and fauna on the Lee Nuclear Site and the Make-Up Pond C impact area. Similar effects would occur within the new transmission corridors. These effects would result in the irretrievable commitment of these resources (as individual organisms); however, once construction is complete, the local floral and faunal populations would recover in areas that are not affected by operations. Because construction and operation of the Lee Nuclear Station (including Make-Up Pond C) is not predicted to result in the extirpation or extinction of any species, no overall irreversible or irretrievable commitment of ecological resources is likely to occur.

10.2.2 Irreversible and Irretrievable Commitments of Material Resources

Subsection 10.2.2, Irreversible and Irretrievable Commitments of Material Resources, page 10.2-2, 1st paragraph:

The irreversible and irretrievable commitment of material resources during construction of the Lee Nuclear Station (including Make-Up Pond C) would be generally similar to that of any major construction project. These materials and the quantities that would be irretrievably committed are listed in Table 10.2-1. While the required amounts of these materials are large, they are not atypical of hydroelectric and coal-fired power plants that are constructed throughout the United States. Use of construction materials in the quantities expected for a nuclear power plant, while irretrievable unless they are recycled at decommissioning, would have a SMALL effect with respect to the availability of such resources.

10.2.3 References

There are no revisions associated with Make-Up Pond C in this section.

TABLE 10.2-1
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES FOR CONSTRUCTION AND OPERATION OF THE LEE NUCLEAR STATION

Resource	Irretrievable Commitments	Irreversible Commitments	Notes
Environmental Resources			
Land	Waste disposal space		Total area of land required for disposal of radioactive and nonradioactive waste is unknown.
Prime farmland		2 ac. for Lee Nuclear Site; 60 ac. for Make-Up Pond C	This area of soil on the Lee Nuclear Site or Make-Up Pond C would likely not be restorable to its current agricultural productivity potential.
Surface water	33,030 gpm		Most of this water would be used for the cooling towers (converted to water vapor at 24,638 gpm).
Flora and fauna	Loss and displacement of individual organisms		This would be temporary in construction areas, but floral and faunal populations would recover afterwards in areas not affected by operations. No extirpation or extinction of species is predicted.
Material Resources [(a)]			
Concrete	460,000 cu. yd.		Assumes no recycling upon decommissioning.
Reinforcing steel and imbedded parts	46,000 T.		Assumes no recycling upon decommissioning.
Structural steel, miscellaneous steel, and decking	25,000 T.		Assumes no recycling upon decommissioning.
Large-bore pipe	26,000 ft.		Assumes no recycling upon decommissioning.
Small-bore pipe	43,000 ft.		Assumes no recycling upon decommissioning.
Cable tray	220,000 ft.		Assumes no recycling upon decommissioning.
Conduit	1.2 million ft.		Assumes no recycling upon decommissioning.
Uranium fuel	169 MTU		Combined initial core loading for two AP1000 reactors. This is roughly 0.004 percent of the worldwide supply and 0.25 percent of worldwide annual usage.
	24.4 MTU/yr		Combined annual average fuel loading for two AP1000 reactors. This is 0.0005 percent of the current worldwide supply and 0.07 percent of current worldwide annual usage.
Other materials	Unknown		Materials used for normal industrial operations that could not be recovered or recycled or that would be consumed or reduced to unrecoverable forms, including elemental materials that would become radioactive.

a) The listed quantities of bulk materials are for the average modern nuclear power plant and are based upon the following four current reactor designs: AP1000, European Pressurized Reactor, Advanced Boiling Water Reactor, and Economic Simplified Boiling Water Reactor.

ac	acres
cu. yd.	cubic yard
ft.	feet
gpm	gallons per minute
in.	inches
MTU	metric tons of uranium
T.	tons
yr	year

10.3 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY OF THE HUMAN ENVIRONMENT

There are no revisions associated with Make-Up Pond C in this section.

10.4 BENEFIT-COST BALANCE

Section 10.4, Benefit-Cost Balance, page 10.4-1:

This section provides the benefit-cost analysis for construction and operation of the Lee Nuclear Station (including Make-Up Pond C) ~~two AP1000 advanced passive pressurized water reactor units at the Lee Nuclear Site~~. The benefits and costs associated with the construction and operation of Make-Up Pond C are negligible when compared with the overall Lee Nuclear Station; therefore, they are inherently included in the following sections. The benefits are analyzed in **Subsection 10.4.1**, and the costs are analyzed in **Subsection 10.4.2**. These analyses are supported by the information and data provided in **Tables 10.4-1** through **10.4-4**. **Subsection 10.4.3** summarizes the overall benefit-cost analysis.

Appendix A (Revised)

Common and Scientific Names of Plants and Animals

Appendix A
Common and Scientific Names of Plants and Animals

Taxa	Common Name (Alphabetical Order)	Scientific Name
Plants	Adder's tongue fern	*Ophioglossum vulgatum*
	Alder	*Alnus serrulata*
	American beech	*Fagus grandifolia*
	American elm	*Ulmus americana*
	American ginseng	*Panax quinquefolius*
	American hepatica	*Hepatica americana*
	American holly	*Ilex opaca*
	Arrow-arrum	*Peltandra virginica*
	Ashy hydrangea	*Hydrangea cinerea*
	Asters	*Aster* spp.
	Beech	*Fagus* spp.
	Biltmore greenbrier	*Smilax biltmoreana*
	Bitternut hickory	*Carya cordiformis*
	Black cohosh	*Cimicifuga* spp.
	Black oak	*Quercus velutina*
	Black walnut	*Juglans nigra*
	Black willow	*Salix nigra*
	Blackberry	*Rubus* spp.
	Black-edged sedge	*Carex nigromarginata*
	Blue grass	*Poa alsodes*
	Broomsedge	*Andropogon virginicus*
	Box elder	*Acer negundo*
	Bulrushes	*Scirpus* spp.
	Buttonbush	*Cephalanthus occidentalis*
	Canada horsebalm	*Collinsonia canadensis*
	Canada lily	*Lilium canadense*
	Canada moonseed	*Menispermum canadense*
	Cane	*Arundinaria gigantean*
	Chaffseed (Yellow crownbeard)	*Verbesina occidentalis*
	Chalk maple	*Acer leucoderme*
	Chestnut oak	*Quercus montana*
	Christmas fern	*Polystichum acrostichoides*
	Coastal plain sedge	*Carex crebriflora*
	Common needlerush	*Juncus effuses*
	Common or Creeping spikerush	*Eleocharis palustris*
	Cottonwood	*Populus deltoids*
	Creel's azalea	*Rhododendron eastmanii*
	Cucumber magnolia	*Magnolia acuminate*
	Culver's-root	*Veronicastrum virginicum*
	Deer-tongue laurel	*Rhododendron minus*
	Dogwood	*Cornus florida*
	Drooping sedge	*Carex prasina*

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Dwarf bulrush	*Lipocarpha micrantha*
	Dwarf skullcap	*Scutellaria parvula*
	Dwarf-flowered heartleaf	*Hexastylis naniflora*
	Ear-leaved foxglove	*Agalinis auriculata*
	Early buttercup	*Ranunculus fascicularis*
	Eastern red cedar	*Juniperus virginiana*
	Elderberry	*Sambucus ~~C~~canadensis*
	False indigo	*Baptisia alba*
	False nettle	*Boehmeria cylindrical*
	False Solomon's seal	*Smilacina racemosa*
	Fescue	*Festuca* spp.
	Flameleaf sumac	*Rhus copallina*
	Fringed sedge	*Carex crinita*
	Georgia aster	*Aster georgianus*
	Georgia rush	*Juncus georgianus*
	Goldenrod	*Solidago* spp.
	Granite-loving flatsedge	*Cyperus granitophilus*
	~~*Gravel elimia*~~	~~*Elimia catenaria*~~
	Gray-headed prairie coneflower	*Ratiba pinnata*
	Great laurel	*Rhododendron maximum*
	Green ash	*Fraxinus pennsylvanica*
	Heart-leaved foamflower	*Tiarella cordifolia* var. *cordifolia*
	Hickories	*Carya* spp.
	Ironweed	*Vernonia noveboracensis*
	Ironwood	*Carpinus caroliniana*
	Jack-in-the-Pulpit	*Arisaema triphyllum*
	Japanese honeysuckle	*Lonicera japonica*
	Lespedeza	*Lespedeza cuneata*
	Little bluestem	*Schizachyrium scoparium*
	Loblolly pine	*Pinus taeda*
	Longhair sedge	*Carex comosa*
	Longleaf pine	*Pinus palustris*
	Mayapple	*Podophyllum peltatum*
	Mountain laurel	*Kalmia latifolia*
	Mullein foxglove	*Dasistoma macrophylla*
	Narrow-leaved vervain	*Verbena simplex*
	Needlerush	*Juncus effusus*
	Nodding onion	*Allium cernuum*
	Oglethorpe oak	*Quercus oglethorpensis*
	One-flowered stichwort	*Minuartia uniflora*
	Pale manna grass	*Torreyochloa pallida*
	Partridgeberry	*Mitchella repens*
	Pawpaw	*Asimina triloba*

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Piedmont aster	*Aster patens*
	Piedmont heartleaf	*Hexastylis minor*
	Piedmont quillwort	*Isoetes piedmontana*
	Piedmont rhododendron	*Rhododendron minus*
	Pignut hickory	*Carya glabra*
	Pipsissewa	*Chimaphila maculate*
	Plantains	*Plantago* spp.
	Pool sprite	*Amphianthus pusillus*
	Post oak	*Quercus stellata*
	Prairie birdsfoot-trefoil	*Lotus purshianus* var. *helleri*
	Prairie goldenrod	*Solidago ptarmicoides*
	Prairie rosinweed	*Silphium terebinthinaceum*
	Purpletop	*Tridens flavus*
	Rattlesnake fern	*Botrychium virginianum*
	Rattlesnake plantain	*Goodyera pubescens*
	Red maple	*Acer rubrum*
	Red oak	*Quercus rubra*
	Redbud	*Cercis canadensis*
	Reflexed sedge	*Carex retroflexa*
	Rigid prairie goldenrod	*Solidago rigida*
	River oats	*Uniola latifolia*
	Riverbank wild-rye	*Elymus riparius*
	Rough sedge	*Carex scabrata*
	Schweinitz's sunflower	*Helianthus schweinitzii*
	Sedge	*Carex* spp.
	Sessile-leaved bellwort	*Uvularia sessilifolia*
	Shallow sedge	*Carex lurida*
	Shoals spider-lily	*Hymenocallis coronaria*
	Shortleaf pine	*Pinus echinata*
	Shumard oak	*Quercus shumardii*
	Silverbell	*Halesia ~~C~~carolina*
	Single-flowered cancer root	*Orobanche uniflora*
	Skullcapp	*Scutellaria* spp.
	Slender naiad	*Najas flexilis*
	Smooth blue aster	*Aster laevis*
	Smooth sumac	*Rhus glabra*
	Smooth sunflower	*Helianthus laevigatus*
	Soft grooveburr	*Agrimonia pubescens*
	Soft-haired thermopsis	*Thermopsis mollis*
	Solomon's seal	*Polygonum biflorum*
	Sourwood	*Oxydendrum arboretum*
	Southern adder's tongue fern	*Ophioglossum vulgatum*

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Southern beardtounge	*Penstemon australis*
	Southern enchanter's-nightshade	*Circacaea lutetiana* ssp. *canadensis*
	Southern lady fern	*Athyrium felix-femina*
	Southern nodding trillium	*Trillium rugelii*
	Strawberry bush	*Eunymus* spp.
	Sugarberry	*Celtis laevigata*
	Sumac	*Rhus* spp.
	Sun-facing coneflower	*Rudbeckia heliopsidis*
	Sunflowers	*Helianthus* spp.
	Swamp dogwood	*Cornus amomum*
	Swamp white oak	*Quercus bicolor*
	Sweet gum	*Liquidambar styraciflua*
	Sycamore	*Platanus occidentalis*
	Tulip poplar	*Liriodendron tulipifera*
	Turkey-beard	*Xerophyllum asphodeloides*
	Uraguayan primrose	*Ludwigia uraguayensis*
	Vasey's dogfennel	*Eupatorium sessilifolium* var. *vaseyi*
	Violet wood sorrel	*Oxalis violacea*
	Virginia bunchflower	*Melanthium virginicum*
	Virginia pine	*Pinus virginiana*
	Whip nutrush	*Scleria triglomerata*
	White ash	*Fraxinus Americana*
	White oak	*Quercus alba*
	White walnut	*Juglans cinerea*
	White-edged sedge	*Carex debilis*
	Wild azalea	*Rhododendron nudiflorum*
	Wild hyacinth	*Camassia scilloides*
Mammals	American mink	*Mustella vision*
	Beaver	*Castor ~~C~~canadensis*
	Big brown bat	*Eptesicus fuscus*
	Brazilian free-tailed bat	Tadarida brasiliensis
	American ~~B~~black bear	*Ursus americanus*
	Bobcat	*Lynx rufus*
	Common gray fox	*Urocyon cinereoargenteus*
	Coyote	*Canis latrans*
	Eastern ~~C~~cougar	*Puma concolor couguar*
	Eastern cottontail ~~rabbit~~	*Sylvilagus floridanus*
	Eastern fox squirrel	*Sciurus niger*
	Eastern gray squirrel	*Sciurus carolinensis*
	Eastern harvest mouse	*Reithrodontomys humulis*
	Eastern mole	*Scalopus aquaticus*
	Eastern pipistrelle	*Perimyotis subflavus*
	Eastern red bat	*Lasiurus borealis*

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Eastern woodrat	*Neotoma floridana floridana*
	Evening bat	*Nycticeius humeralis*
	Golden mouse	*Ochrotomys nattalli*
	Hipsid cotton rat	*Sigmodon hispidus*
	Hoary bat	*Lasiurus cinereus*
	House mouse	*Mus musculus*
	Least shrew	*Cyrptotis parva*
	Little brown myotis	*Myotis lucifugus*
	Long-tailed weasel	*Mustela frenata*
	Meadow vole	*Microtus pennsylvanicus*
	~~Mink~~	~~*Mustela vison*~~
	Muskrat	*Ondatra zibethicus*
	Nine-banded armadillo	*Dasypus novemcinctus*
	Northern long-eared myotis	*Myotis septentrionalis*
	~~*Opossum*~~	~~*Didelphis marsupialis*~~
	Raccoon	*Procyon lotor*
	Red fox	*Vulpes vulpes*
	Rice rat	*Oryzomys palustris*
	River otter	*L~~u~~ontra Canadensis*
	Seminole bat	*Lasiurus seminolus*
	Shorttailed shrew	*Blarina brevicauda*
	Silver-haired bat	*Lasionycteris noctivagans*
	Southeastern flying squirrel	*Glaucomys volans*
	Southeastern myotis ~~*bat*~~	*Myotis austroriparius*
	Southeastern shrew	*Sorex carolinensis*
	Southern short-tailed shrew	*Blarina carolinensis*
	Virginia opossum	*Didelphis virginiana*
	Weasel	*Mustela* spp.
	White-footed mouse	*Peromyscus leucopus*
	White-tailed deer	*Odocoileus virginianus*
	Woodland vole	*Microtus pinetorum*
Birds	Acadian flycatcher	*Empidonax virescens*
	American coot	*Fulica ~~A~~americana*
	American crow	*Corvus brachyrhynchos*
	American goldfinch	*Carduelis tristis*
	American kestrel ~~*(formerly known as sparrow hawk)*~~	*Falco sparverius*
	American robin	*Turdus migratorius*
	American woodcock	~~*Phylohela*~~ *Scolopax minor*
	Bachman's sparrow	*Aimophila aestivalis*
	Bald eagle	*Haliaeetus leucocephalus*
	Barn owl	*Tyto alba*
	Barn swallow	*Hirundo rustica*

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Belted kingfisher	*Megacyrle alcyon*
	Black-and-white warbler	*Mniotilta varia*
	Black-throated blue warbler	*Dendroica caerulescens*
	Black-throated green warbler	*Dendroica virens*
	Black vulture	*Coragyps atratus*
	Blue grosbeak	*Passerina caerulea*
	Blue-gray gnatcatcher	*Polioptila caerulea*
	Blue-headed vireo	*Vireo solitarius*
	Blue jay	*Cyanocitta cristata*
	~~*Bobwhite quail*~~	~~*Colinus virginianus*~~
	Broad-winged hawk	*Buteo platypterus*
	Brown-headed cowbird	*Molothrus ater*
	Brown-headed nuthatch	*Sitta pusilla*
	Brown thrasher	*Toxostoma rufum*
	Canada goose	*Branta ~~C~~canadensis*
	~~*Cardinal*~~	~~*Cardinalis cardinalis*~~
	Carolina chickadee	*~~Parus~~ Poecile carolinensis*
	Carolina wren	*Thryothorus ludovicianus*
	Cedar waxwing	*Bombycilla cedrorum*
	Chestnut-sided warbler	*Dendroica pensylvanica*
	Chimney swift	*Chaetura pelagica*
	Chipping sparrow	*Spizella passerina*
	Chuck-will's-widow	*Caprimulgus carolinensis*
	~~*Common flicker*~~	~~*Colaptes auratus*~~
	Common grackle	*Quiscalus quiscula*
	Common snipe	*Capella gallinago*
	Common yellowthroat	*Geothylpis trichas*
	Cooper's hawk	*Accipiter cooperii*
	Double-crested cormorant	*Phalacrocorax auritus*
	Downy woodpecker	*~~Dendrocopos~~ Picoides pubescens*
	Eastern bluebird	*Sialia sialis*
	Eastern kingbird	*Tyrannus tyrannus*
	Eastern meadowlark	*Sturnella magna*
	Eastern phoebe	*Sayornis phoebe*
	Eastern screech-owl	*Megascops asio*
	Eastern towhee	*Pipilo erythrophthalmus*
	Eastern wood-pewee	*Contopus virens*
	European starling	*Sternus vulgaris*
	Field sparrow	*Spizella pusilla*
	Fish crow	*Corvus ossifragus*
	Golden-crowned kinglet	*Regulus satrapa*
	Grasshopper sparrow	*Ammodramus savannarum*
	Gray catbird	*Dumtella carolinensis*

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Great blue heron	*Ardea ~~H~~herodias*
	Great crested flycatcher	*Myiarchus crinitus*
	Great horned owl	*Bubo virginianus*
	Green heron	*Buteroides virescens*
	Hairy woodpecker	~~*Dendrocopos*~~ *Picoides villosus*
	Hermit thrush	*Catharus guttatus*
	Herring gull	*Larus argentatus*
	Hooded warbler	*Wilsonia citrina*
	Horned lark	*Eremophila alpestris*
	House finch	*Carpodacus mexicanus*
	House sparrow	*Passer domesticus.*
	House wren	*Troglodytes aedon*
	Indigo bunting	*Passerina cyanea*
	Kentucky warbler	*Oporomis formosus*
	Killdeer	*Charadrius vociferous*
	Little blue heron	~~*Florida*~~*Egretta cerulea*~~*n*~~
	Loggerhead shrike	*Lanius ludovicianus*
	Louisiana waterthrush	*Seiurus motacilla*
	Magnolia warbler	*Dendroica magnolia*
	Mallard duck	*Anas platyrhynchos*
	~~Mockingbird~~	~~*Mimus polyglottos*~~
	Mourning dove	*Zenaida macroura*
	Northern bobwhite	*Colinus virginianus*
	Northern cardinal	*Cardinalis cardinalis*
	Northern flicker	*Colaptes auratus*
	Northern mockingbird	*Mimus polyglottos*
	Northern parula	*Parula americana*
	Orchard oriole	*Icterus spurius*
	Osprey	*Pandion haliaetus*
	Ovenbird	*Seirus aurocapilla*
	Pied-billed grebe	*Podilymbus podiceps*
	Pileated woodpecker	*Dryocopus pileatus*
	Pine warbler	*Dendroica pinus*
	Prairie warbler	*Dendroica discolor*
	Prothonotary warbler	*Protonotaria citrea*
	Purple finch	*Carpodacus purpureus*
	Purple martin	*Progne subis*
	Red-bellied woodpecker	~~*Centurus*~~ *Melanerpes carolinus*
	Red-cockaded woodpecker	~~*Dendrocopos*~~ *Picoides borealis*
	Red-eyed vireo	*Vireo olivaceus*
	Red-shouldered hawk	*Buteo lineatus*
	Red-tailed hawk	*Buteo jamaicensis*
	Red-winged blackbird	*Agelaius phoeniceus*

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Ring-billed gull	*Larus delawarensis*
	Rock pigeon	*Columba livia*
	Rose-breasted grosbeak	*Pheucticus ludovicianus*
	Ruby-crowned kinglet	*Regulus calendula*
	Ruby-throated hummingbird	*Archilochus colubris*
	Ruffed grouse	*Bonasa umbellus*
	Scarlet tanager	*Piranga olivacea*
	Song sparrow	*Melospiza melodia*
	Spotted sandpiper	*Actilis macularia*
	Summer tanager	*Piranga rubra*
	Swamp sparrow	*Melospiza georgiana*
	Tufted titmouse	~~*Parus*~~ *Baeolophus bicolor*
	Turkey vulture	*Cathartes aura*
	White-breasted nuthatch	*Sitta carolinensis*
	White-eyed vireo	*Vireo griseus*
	White-throated sparrow	*Zonotrichia albicollis*
	Whip-poor-will	*Caprimulgus vociferus*
	Wild turkey	*Meleagris gallopavo*
	Wood duck	*Aix sponsa*
	Wood thrush	*Hylocichla mustelina*
	Worm-eating warbler	*Helmitheros vermivorum*
	Yellow warbler	*Dendroica petechia*
	Yellow-billed cuckoo	*Coccyzus americanus*
	Yellow-breasted chat	*Icteria virens*
	Yellow-rumped warbler	*Dendroica coronata*
	Yellow-throated vireo	*Vireo flavifrons*
	Yellow-throated warbler	*Dendroica dominica*
Turtles	Common musk turtle	*Sternotherus odoratus*
	Common snapping turtle	*Chelydra serpentina*
	Eastern ~~bog~~ box turtle	*Terrapene carolina*
	Eastern mud turtle	*Kinosternon subrubrum*
	Eastern river cooter	*Pseudemys concinna*
	Painted turtle	*Chrysemys picta*
	Spiny softshell turtle	*Apalone spinifera*
	Yellow-bellied slider	*Trachemys scripta*
Lizards	Broadhead skink	*Eumeces laticeps*
	Five-lined skink	*Eumeces fasciatus*
	Green anole	*Anolis carolinensis*
	Ground skink	*Scincella lateralis*
	Northern fence lizard	*Sceloporus undulatus hyacinthinus*
	Six-lined racerunner	*Aspidoscelis sexlineata*
	Slender glass lizard	*Ophisaurus attenuatus*
	Southeastern five-lined skink	*Eumeces inexpectatus*

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
Snakes	Brown Snake	*Storeria dekayi*
	Black rat snake	*Elaphe obsoleta*
	Canebrake rattlesnake	*Crotalus horridus*
	Copperhead	*Agkistrodon contortrix*
	Corn snake	*Elaphe guttata*
	Eastern coachwhip	*Masticophis flagellum*
	Eastern hognose snake	*Heterodon platirhinos*
	Eastern kingsnake	*Lampropeltis getulus*
	Garter snake	*Thamnophis sirtalis*
	Milksnake	*Lampropeltis triangulum triangulum*
	Mole king snake	*Lampropeltis calligaster rhombomaculata*
	Northern water snake	*Nerodia sipedon*
	Northern black racer	*Coluber constrictor*
	Pigmy rattlesnake	*Sistrurus miliarius*
	Pine snake	*Pituophis melanoleucus*
	Queen snake	*Regina septemvittata*
	Redbelly snake	*Storeria occipitomaculata*
	Ribbon snake	*Thamnophis sauritus*
	Ringneck snake	*Diadophis punctatus*
	Rough earth snake	*Virginia striatula*
	Rough green snake	*Opheodrys aestivus*
	Scarlet kingsnake	*Lampropeltis triangulum elapsoides*
	Scarlet snake	*Cemophora coccinea*
	Smooth earth snake	*Virginia valeriae*
	Southeastern crowned snake	*Tantilla coronata*
	Wormsnake	*Carphophis amoenus*
Salamanders	Atlantic Coast Slimy Salamander	*Plethodon chlorobryonis*
	Four-toed salamander	*Hemidactylium scutatum*
	Marbled salamander	*Ambystoma opacum*
	Northern dusky salamander	*Desmognathus fuscus*
	Mud salamander	*Pseudotriton montanus*
	Red salamander	*Pseudotriton ruber*
	Southern two-lined salamander	*Eurycea cirrigera*
	Spotted salamander	*Ambystoma maculatum*
	Spring salamander	*Gyrinophilus porphyriticus*
	Three-lined salamander	*Eurycea guttolineata*
	Red-spotted newt	*Notophthalmus viridescens*
	Slimy salamander	*Plethodon glutinosus*
Frogs and Toads	American toad	*Bufo americanus*
	Bullfrog	*Rana catesbeiana*
	Cope's gray treefrog	*Hyla chrysoscelis*
	Eastern narrowmouth toad	*Gastrophryne carolinensis*

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Eastern spadefoot toad	*Scaphiopus holbrookii*
	Gray treefrog	*Hyla versicolor*
	Green frog	*Rana clamitans*
	Fowler's toad	*Bufo woodhousei fowleri*
	Northern cricket frog	*Acris crepitans crepitans*
	Northern spring peeper	*Pseudacris crucifer*
	Pickerel frog	*Rana palustris*
	Southern leopard frog	*Rana sphenocephala*
	Upland chorus frog	*Pseudacris ~~triseriata~~ feriarum*
Fish	Bluegill	*Lepomis macrochirus*
	Bluehead chub	*Nocomis leptocephalus*
	Brassy jumprock	*Moxostoma* sp.
	Brown bullhead	*Ictalurus rebulosus*
	Carolina darter	*Etheosoma collis*
	Channel catfish	*Ictalurus punctatus*
	Common carp	*Cyprinus carpio*
	Creek chub	*Semotilus atromaculatus*
	Creek chubsucker	*Erimyzon oblongus*
	Eastern mosquitofish	*Gambusia holbrooki*
	Fantail darter	*Etheostoma flabellare*
	Fieryblack shiner	*Cyprinella pyrrhomelas*
	Flat bullhead	*Ameiurus playtcephalus*
	Gizzard shad	*Dorosoma cepedianum*
	Golden shiner	*Notemigonus crysoleucas*
	Greenfin shiner	*Cyprinella chloristia*
	Green sunfish	*Lepomis cyanellus*
	Greenhead shiner	*Notropis chlorocephalus*
	Highfin carpsucker	*Carpoides velifer*
	Highfin shiner	*Notropis altipinnis*
	Highback chub	*Hybopsis hypsinotus*
	Largemouth bass	*Micropterus salmoides*
	Margined madtom	*Noturus insignis*
	~~Mosquito fish~~	~~*Gambusia affinis*~~
	Northern hogsucker	*Hypentelium nigricans*
	Notchlip redhorse	*Moxostoma collapsum*
	Piedmont darter	*Percina crassa*
	Pumpkinseed	*Lepomis gibbosus*
	Quillback (carpsucker)	*Carpoides cyprinus*
	Redbreast sunfish	*Lepomis auritus*
	Redear sunfish	*Lepomis microlophus*
	Robust redhorse	*Moxostoma robustum*
	Sandbar shiner	*Notropis scepticus*
	Rosyside dace	*Clinostomus funduloides*

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Santee chub	*Cyprinella zanema*
	Sandbar shiner	*Notropis scepticus*
	Seagreen darter	*Etheostoma thalassinum*
	Shorthead redhorse	*Moxostoma macrolepidotum*
	Silvery minnow	*Hybognathus regius*
	Silver redhorse	*Moxostoma anisurum*
	Smallfin redhorse	*Moxostoma robustum*
	Smallmouth bass	*Micropterus dolomieu*
	Smallmouth buffalo	*Ictiobus bubalus*
	Snail bullhead	*Ameiurus brunneus*
	Spottail shiner	*Notropis hudsonius*
	Striped bass	*Morone saxatilis*
	Striped jumprock	*Moxostoma rupiscartes*
	Suckermouth redhorse	*Moxostoma pappillosum*
	Sunfish hybrid	*Lepomis hybrid*
	Swallowtail shiner	*Notropis procne*
	Tessellated darter	*Etheostoma olmstedi*
	Thicklip chub	*Cyprinella labrosa*
	Threadfin shad	*Dorosoma petenense*
	V-lip redhorse	*Moxostoma pappillosum*
	Warmouth	*Lepomis gulosus*
	White bass	*Morone chrysops*
	White catfish	*Ameiurus catus*
	White crappie	*Pomoxis annularis*
	White sucker	*Catostomus commersoni*
	Whitefin shiner	*Cyprinella nivea*
	Yellow perch	*Perca flavescens*
	Yellowfin shiner	*Notropis lutipinnis*
Invertebrates (crustaceans)		
	A crayfish	*Cambarus acuminatus*
	An amphipod	*Hyalella azteca*
	White river crayfish	*Procambarus acutus*
Invertebrates (insects)	A midge	*Ablabesmyia mallochi*
	A midge	*Ablabesmyia spp.*
	A common stonefly	*Acroneuria abnormis*
	A small winter stonefly	*Allocapnia spp.*
	A mayfly	*Ameletus lineatus*
	A toe-winged beetle	*Anchytarsus bicolor*
	A riffle beetle	*Ancyronyx variegates*
	A dancer	*Argia spp.*
	A mayfly	*Baetis flavistriga*
	A mayfly	*Baetis intercalaris*
	Springtime darner	*Basiaeschna janata*

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
	Fawn darner	*Boyeria vinosa*
	A mayfly	*Caenis* spp.
	A broad-winged damselfly	*Calopteryx* spp.
	A mayfly	*Centroptilum* spp.
	A dobsonfly	*Chauliodes rastricornis*
	A midge	*Chaetocladius* spp.
	A net-spinning caddisfly	*Cheumatopsyche* spp.
	A finger-net caddisfly	*Chimarra* spp.
	A midge	*Chironomus* spp.
	A midge	*Cladotanytarsus* spp
	A midge	*Clinotanypus* spp.
	A perlodid stonefly	*Clioperla clio*
	A midge	*Coelotanypus* spp.
	A midge	*Conchapelopia* gp.
	Twin-spotted spiketail	*Cordulegaster maculata*
	A dobsonfly	*Corydalus cornutus*
	A midge	*Corynoneura* spp.
	A midge	*Cricotopus bicinctus*
	A midge	*Cricotopus vierriensis*
	Southern pine bark beetle	*Dendroctonus frontalis*
	A midge	*Dicrotendipes neomodestus*
	A whirligig beetle	*Dineutus* spp.
	A net-spinning caddisfly	*Diplectrona modesta*
	A midge	*Diplocladius cultriger*
	A dixid midge	*Dixella* spp.
	A riffle beetle	*Dubiraphia vittata*
	A common stonefly	*Eccoptura* xanthenes
	A water penny beetle	*Ectopria* nervosa
	A midge	*Eukiefferiella* spp.
	A mayfly	*Eurylophella versimilis*
	A midge	*Glyptotendipes* spp.
	A clubtail	*Gomphus* spp.
	A whirligig beetle	*Gyrinus* spp.
	Dragonhunter	*Hagenius brevistylus*
	A long-toe water beetle	*Helichus* spp.
	Uhler's sundragon	*Helocordulia uhleri*
	A crane fly	*Hexatoma* spp.
	A net-spinning caddisfly	*Hydropsyche betteni*
	A northern caddisfly	*Ironoquia punctatissima*
	A northern caddisfly	*Ironoquia* spp.
	A forktail	*Ischnura* spp.
	A perlodid stonefly	*Isoperla bilineata*
	A midge	*Labrundinia* spp.

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
	A clubtail	*Lanthus* spp.
	A mayfly	*Leptophlebia* spp.
	A net tube caddisfly	*Lype diversa*
	A mayfly	*Maccaffertium modestum*
	A mayfly	*Maccaffertium terminatum*
	A riffle beetle	*Macronychus glabratus*
	A midge	*Microtendipes* spp
	A midge	*Nanocladius* spp.
	A midge	*Natarsia* spp.
	A stonecase caddisfly	*Neophylax oligius*
	A predacious diving beetle	*Neoporus* spp.
	A dobsonfly	*Nigronia fasciatus*
	A dobsonfly	*Nigronia serricornis*
	A midge	*Nilothauma* spp.
	A riffle beetle	*Optioservus* spp.
	A midge	*Orthocladius doranus*
	A midge	*Orthocladius lignicola*
	A midge	*Orthocladius nigritus*
	A midge	*Orthocladius robacki*
	A biting midge	Palpomyia-Bezzia complex
	A midge	*Parakiefferiella* spp.
	A midge	*Parametriocnemus* spp.
	A midge	*Paratendipes* spp.
	A crawling water beetle	*Peltodytes* spp.
	A common stonefly	*Perlesta* spp.
	A midge	*Phaenopsectra* spp.
	Common whitetail	*Plathemis lydia*
	A mayfly	*Plauditus dubius* gp.
	A midge	*Polypedilum aviceps*
	A midge	*Polypedilum fallax*
	A midge	*Polypedilum flavum*
	A midge	*Polypedilum illinoense*
	A midge	*Polypedilum scalaenum*
	A midge	*Potthastia* spp.
	A midge	*Procladius* spp.
	A black fly	*Prosimulium mixtum*
	A midge	*Psectrocladius* spp.
	A water penny beetle	*Psephenus herricki*
	A mayfly	*Pseudocloeon* spp.
	A mortarjoint casemaker	*Psilotreta frontalis*
	A net tube caddisfly	*Psychomyia flavida*
	A large caddisfly	*Ptilostomis* spp.
	A northern caddisfly	*Pycnopsyche* spp.

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
	A midge	*Rheotanytarsus* spp.
	A mayfly	*Serratella deficiens*
	An alderfly	*Sialis* spp.
	A water boatman	*Sigara* spp.
	Whitestockinged black fly	*Simulium venustum*
	An emerald dragonfly	*Somatochlora* spp.
	A hydrophilid beetle	*Sperchopsis tessellates*
	A midge	*Stempellina* spp.
	A mayfly	*Stenacron interpunctatum*
	A riffle beetle	*Stenelmis* spp.
	A midge	*Stenochironomus* spp.
	A mayfly	*Stenonema femoratum*
	A winter stonefly	*Strophopteryx* spp.
	Eastern least clubtail	*Stylogomphus albistylus*
	A deer fly	*Tabanus* spp.
	A winter stonefly	*Taeniopteryx* spp.
	A roachlike stonefly	*Tallaperla* spp.
	A midge	*Stempellina* spp.
	A midge	*Stenochironomus* spp.
	An emerald dragonfly	*Tetragoneuria* spp.
	A midge	*Thienemanniella xena*
	A crane fly	*Tipula* spp.
	A midge	*Zalutschia* spp.
	A midge	*Zavrelimyia* gp.
Invertebrates (mussels)	Asiatic clam	*Corbicula fluminea*
	Carolina lance	*Elliptio angustata*
	Eastern elliptio	*Elliptio complanata*
	Eastern floater	*Pyganodon cataracta*
	Paper pondshell	*Utterbackia imbecillis*
	Swamp fingernail clam	*Musculum partumeium*
	Yellow lance	~~*E.*~~*Eliptio lanceolata*
Invertebrates (snails)	A physa	*Physella* spp.
	Gravel elimia	*Elimia catenaria*
	Sprite elimia	*Elimia proxima*
	Two-ridge rams-horn	*Helisoma anceps*
Invertebrates (worms)	Oligochaetes	Branchiobdellidae
	Potworms	Enchytraeidae
	An oligochaete	*Lumbriculus* spp.
	Oligochaetes	Naididae
	An oligochaete	*Nais communis*
	An oligochaete	*Nais variabilis*
	An oligochaete	*Pristina sima*
	An oligochaete	*Pristinella osborni*

Appendix A, cont'd

Taxa	Common Name (Alphabetical Order)	Scientific Name
	An oligochaete	*Stephensoniana tandyi*
	Oligochaetes	Tubificidae
	An oligochaete	*Telmatodrilus vejdovskyi*

Catawba Indian Nation
Tribal Historic Preservation Office
1536 Tom Steven Road
Rock Hill, South Carolina 29730

Office 803-328-2427
Fax 803-328-5791

16 February 2009

Attention: Theodore J. Bowling
Duke Energy
EC09D/ P.O. Box 1006
Charlotte, NC 28201-1006

Re. THPO # TCNS # Project Description

Dear Ms. Bevin,

We presently know of no cultural resources of interest to the Catawba THPO in this area of the proposed new cooling pond.

If you have questions please contact Beckee Garris at 803-328-2427 ext. 232, or e-mail beckeeg@ccppcrafts.com.

Sincerely,
Caitlin Haire for
Wenonah G. Haire
Tribal Historic Preservation Officer

Duke Energy®

526 S. Church Street
Charlotte, NC 28202

Mailing Address:
EC09D/ P.O. Box 1006
Charlotte, NC 28201-1006
704382-5917

March 26, 2009

Mr. Tyler Howe
Eastern Band of Cherokee Indians
Tribal Historic Preservation Office
Post Office Box 455
Cherokee, North Carolina 28719

Dear Mr. Howe,

Subject: William S. Lee III Nuclear Station
Supplemental Water Source

On February 6, 2009, I wrote to inform you of Duke Energy's plan to construct a supplemental water source to be used during drought conditions for the W.S. Lee III Nuclear Station. We are investigating an area adjacent to the project site for this new industrial pond. In accordance with your previous requests, I am enclosing a copy of our study plan for this new aspect of the Lee Nuclear Station development for your review and comment.

If you have any questions please call me at 704-382-5917.

Theodore J. Bowling
Nuclear Plant Development
Environmental Project Manager

Enclosure:

Cultural Resources Survey of the Proposed London Creek Reservoir (Make-up Pond C), Water Pipeline, and Transmission Line Cherokee County, South Carolina, Study Plan

cc. (without enclosure)
Ms. C. Wilson (SC Dept. of Archives and History)

Duke Energy®

526 S. Church Street
Charlotte, NC 28202

Mailing Address:
EC09D / P.O. Box 1006
Charlotte, NC 28201-1006

704382-5917

March 26, 2009

Ms. Caroline Dover Wilson
South Carolina Department of Archives and History
State Historic Preservation Office
8301 Parklane Road
Columbia, SC 29223

Subject: Duke Energy, William S. Lee III Nuclear Station
Supplemental Water Pond

Dear Ms. Wilson,

We recently met with staff from the SC Department of Archives and History, State Historic Preservation Office to discuss the addition of a facility for the proposed W.S. Lee III Nuclear Station. As we explained to the staff, recent droughts have prompted Duke Energy to propose construction of a new pond to provide supplemental make-up water during droughts. We also explained that Duke Energy was in the process of acquiring property for this new pond. Consequently, we are proposing to conduct the cultural resources investigation in two phases.

The enclosed study plan provides our approach to conducting this survey. We are submitting this study plan for your review and approval. We are also submitting a copy of the study plan to Mr. Tyler Howe, Tribal Historic Preservation Office, Eastern Band Cherokee Indians for comment in accordance with previous agreements with him.

Please call me if you have any questions.

Sincerely,

Theodore Bowling

Theodore Bowling
Environmental Project Manager
Nuclear Plant Development

Enclosure:

Cultural Resources Survey of the Proposed London Creek Reservoir (Make-up Pond C), Water Pipeline, and Transmission Line Cherokee County, South Carolina, Study Plan

cc. Mr. C. Cantley

bc. Mr. R. Bailey

File WL 4000.35-05

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE

TRIBAL HISTORIC
PRESERVATION OFFICE

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM

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CLEWISTON, FL 33440

PHONE: (863) 983-6549
FAX: (863) 902-1117

TRIBAL HISTORIC PRESERVATION OFFICE

Theodore J. Bowling
Environmental Project Manager
EC09D/ P.O. Box 1006
Charlotte, NC 28201-1006

Wednesday, April 08, 2009

Subject: Duke Energy plan for supplemental water source for the Lee Nuclear Station, Cherokee County, SC

Dear Mr. Henderson,

The Seminole Tribe of Florida Tribal Historic Preservation Office (STOF-THPO) has reviewed the Duke Energy plan notification for the aforementioned project. Due to the fact that the proposed project is potentially ground disturbing, the STOF-THPO will await copies of associated archaeological reports and/or cultural resources surveys for review prior to making any further comment.

We thank you for notification of these proposed projects. Please reference ***THPO-003046*** in any future documentation about this project.

Sincerely,

FOR

Willard Steele, Tribal Historic Preservation Officer
Seminole Tribe of Florida

Direct routine inquiries to:

Dawn Hutchins
Compliance Review Supervisor
Seminole Tribe of Florida

JLP:dh

The South Carolina Archives & History Center
History & Heritage For All Generations

April 21, 2009

Theodore Bowling
Duke Energy – EC09D
PO Box 1006
Charlotte, NC 28201-1006

Re: Study Plan for Make-up Pond C, Water Pipeline, and Transmission Line
Lee Nuclear Plant, Cherokee and Union County, SC
SHPO #: 09CW0091

Dear Mr Bowling:

Thank you for your letter of March 26, which we received on March 27, regarding the above referenced project. We also received the study plan as supporting documentation for this undertaking. The State Historic Preservation Office is providing comments to the Federal Energy Regulatory Commission pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR 800.

We have reviewed the plan by Brockington & Associates, and have no concerns or comments about the proposed methodology.

If you have any questions, please contact me at (803) 896-6169 or cwilson@scdah.state.sc.us.

Sincerely,

Caroline Dover Wilson

Caroline Dover Wilson
Review and Compliance Coordinator
State Historic Preservation Office