

CONTENTS

1.0	FRONT MATTER	
	Acronyms and Abbreviation.....	vii
2.0	SUMMARY AND PROPOSED PURPOSE	2-1
2.1	Summary	2-1
2.2	Project History and Background	2-3
2.2.1	Interbasin Transfer	2-3
2.2.2	Holly Springs WWTP Discharge to Utley Creek	2-4
2.2.3	Western Wake County Regional Wastewater Treatment Studies Project.....	2-4
2.3	Description of Proposed Project	
2.3.1	Discharge Location and Speculative Discharge Limits.....	2-8
2.3.2	Description of Project Components	2-9
2.4	Regulatory Review and Approval Requirements	2-13
2.5	Schedule and Phasing.....	2-14
2.6	Project Financing	2-15
3.0	PURPOSE AND NEED	3-0
3.1	Summary	3-1
3.2	Existing Collection Systems.....	3-2
3.3.1	Town of Apex	3-2
3.3.2	Town of Cary	3-2
3.3.3	Town of Holly Springs.....	3-2
3.3.4	Town of Morrisville	3-3
3.3	Existing Treatment Systems	3-3
3.3.1	Town of Apex	3-3
3.3.2	Town of Cary	3-5
3.3.3	Town of Holly Springs.....	3-8
3.3.4	Town of Morrisville	3-10
3.4	Historical Wastewater Flows and I/I Analysis.....	3-10
3.4.1	Town of Apex	3-10
3.4.2	Town of Cary	3-11
3.4.3	Town of Holly Springs.....	3-12
3.4.4	Town of Morrisville	3-13
3.5	Population Projections	3-13
3.5.1	Town of Apex	3-13
3.5.2	Town of Cary and Morrisville	3-14
3.5.3	Town of Holly Springs.....	3-17
3.6	Wastewater Flow Projections.....	3-17
3.6.1	Town of Apex	3-17
3.6.2	Town of Cary	3-19
3.6.3	Town of Holly Springs.....	3-23
3.6.4	Town of Morrisville	3-24
3.6.5	Western Wake WRF	3-26

3.7	References	3-27
4.0	EVALUATION ALTERNATIVES.....	4-1
4.1	General	4-1
4.2	Alternative Wastewater Discharge Locations.....	4-1
4.2.1	Cape Fear River below Buckhorn Dam	4-2
4.2.2	New Hope Arm of Jordan Lake (above Jordan Lake Dam and below U.S. 64).....	4-2
4.2.3	Cape Fear River/Haw River above Buckhorn Dam	4-4
4.2.4	Harris Lake/Utley Creek	4-4
4.3	Alternative Wastewater Management Options.....	4-4
4.3.1	The Proposed Project - Regional System with Cape Fear River Discharge	4-15
4.3.2	Alternative A - Regional System with Jordan Lake Discharge.....	4-20
4.3.3	Alternative B - Independent Systems	4-21
4.3.4	Alternative C - Purchasing Capacity from Other Systems	4-26
4.3.5	Alternative D - No Actions	4-31
4.3.6	Alternative E - Optimum Operation of Existing Facilities	4-32
4.3.7	Alternative F - Land Application.....	4-33
4.3.8	Alternative G - Water Reuse System.....	4-34
4.4	Alternative Water Reclamation Facility Sites	4-38
4.4.1	WRF Site Selection Process Overview.....	4-38
4.4.2	Phase II WRF Site Selection Process	4-39
4.4.3	Phase III WRF Site Selection Process	4-41
4.4.4	Recommendation	4-42
4.4.5	Investigation of Additional Site 30	4-42
4.5	Transmission Line Alignments	4-43
4.5.1	Alternative Pipeline Alignments	4-43
4.5.2	Alternative Analysis	4-44
4.5.3	Recommendation	4-50
4.6	Alternative Pump Station Locations	4-52
4.7	Alternative Wastewater Discharge Options.....	4-54
4.8	References	4-57
5.0	EXISTING ENVIRONMENTAL CHARACTERISTICS OF PROJECT AREA....	5-1
5.1	Topography.....	5-1
5.1.1	Water Reclamation Facility.....	5-1
5.1.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-1
5.2	Soils	5-3
5.2.1	Water Reclamation Facility.....	5-3
5.2.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-4
5.3	Land Use	5-11
5.3.1	Zoning	5-11
5.3.2	Land Cover.....	5-13
5.4	Wetlands.....	5-15
5.4.1	Water Reclamation Facility.....	5-16

5.4.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-16
5.5	Prime or Unique Agricultural Lands	5-17
5.5.1	Water Reclamation Facility	5-17
5.5.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-18
5.6	Public Lands and Scenic, Recreational, and State Natural Ares	5-18
5.6.1	Water Reclamation Facility	5-18
5.6.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-19
5.7	Areas of Archaeological or Historic Value	5-19
5.7.1	Water Reclamation Facility	5-20
5.7.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-20
5.8	Air Quality	5-20
5.9	Noise Levels	5-21
5.9.1	Water Reclamation Facility	5-21
5.9.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-21
5.10	Surface Water and Groundwater Resources	5-22
5.10.1	Surface Water	
5.10.2	Groundwater	
5.11	Forest Resources	5-27
5.11.1	Water Reclamation Facility	5-27
5.11.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-28
5.12	Shellfish or Fish and their Habitats	5-35
5.12.1	Water Reclamation Facility	5-35
5.12.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-36
5.12.3	Cape Fear River	
5.13	Wildlife and Natural Vegetation	5-37
5.13.1	Water Reclamation Facility	5-37
5.13.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-38
5.13.3	Threatened and Endangered Species	5-38
5.14	Introduction of Toxic Substances	5-41
5.14.1	Water Reclamation Facility	5-41
5.14.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	5-41
5.15	References	5-42
6.0	PREDICTED ENVIRONMENTAL EFFECTS	6.1
6.1	Topography	6-4
6.1.1	Water Reclamation Facility	6-4
6.1.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	6-4

6.2	Soils	6-5
6.2.1	Water Reclamation Facility	6-5
6.2.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	6-6
6.3	Land Use	6-7
6.3.1	Zoning	6-7
6.3.2	Land Cover	6-7
6.4	Wetlands	6-9
6.4.1	Water Reclamation Facility	6-9
6.4.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	6-11
6.5	Prime or Unique Agricultural Lands	6-12
6.5.1	Water Reclamation Facility	6-12
6.5.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	6-12
6.6	Public Lands and Scenic, Recreational, and State Natural Areas	6-13
6.6.1	Water Reclamation Facility	6-13
6.6.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	6-14
6.7	Areas of Archaeological or Historic Value	6-16
6.7.1	Water Reclamation Facility	6-16
6.7.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	6-18
6.8	Air Quality	6-18
6.8.1	Water Reclamation Facility	6-18
6.8.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	6-19
6.9	Noise Levels	6-19
6.9.1	Water Reclamation Facility	6-19
6.9.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure	6-20
6.10	Water Resources	6-20
6.10.1	Surface Water	6-20
6.10.2	Groundwater	6-28
6.11	Forest Resources	6-29
6.11.1	Water Reclamation Facility	6-29
6.11.2	Force Main, Pump Stations, Gravity Sewer Lines, and Discharge Structure	6-29
6.12	Shellfish or Fish and their Habitats	6-30
6.12.1	Water Reclamation Facility	6-30
6.12.2	Force Main, Pump Stations, Gravity Sewer Lines, and Discharge Structure	6-30
6.12.3	Cape Fear River	6-31
6.13	Wildlife and Natural Vegetation	6-32
6.13.1	Water Reclamation Facility	6-32

6.13.2	Force Main, Pump Stations, Gravity Sewer Liens, and Discharge Structure.....	6-32
6.13.3	Threatened and Endangered Species.....	6-33
6.14	Introduction of Toxic Substances.....	6-34
6.14.1	Water Reclamation Facility.....	6-34
6.14.2	Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure.....	6-34
6.15	Related Activities.....	6-36
6.16	References.....	6-37
7.0	LIST OF PREPARERS.....	7-1
7.1	CDM Team Members.....	7-1
7.2	CH2M HILL Team Members.....	7-3
7.3	Hazen & Sawyer Team Members.....	7-4

LIST OF TABLES

Table 2.1	Estimated Impact of Program on Residential Customers.....	2-17
Table 3-1	Middle Creek WWTP Effluent Limits.....	3-4
Table 3-2	North Cary WRF Effluent Limits.....	3-5
Table 3-3	South Cary WRF Effluent Limits.....	3-6
Table 3-4	Utley Creek WWTP Effluent Limits.....	3-9
Table 3-5	Apex Wastewater Service Area Fiscal Year 2003 Wastewater Flows.....	3-11
Table 3-6	Cary Fiscal Year 2003 Wastewater Flows.....	3-12
Table 3-7	Holly Springs Fiscal Year 2003 Wastewater Flows.....	3-12
Table 3-8	Town of Apex Population Projections.....	3-14
Table 3-9	Historical Population Data.....	3-15
Table 3-10	Projected Wastewater Service Area Populations for Cary and Morrisville.....	3-16
Table 3-11	Town of Holly Springs Population Estimates and Projections.....	3-17
Table 3-12	Apex Middle Creek WWTP Wastewater Flow Projections.....	3-18
Table 3-13	Western Apex Service Area Wastewater Flow Projections.....	3-18
Table 3-14	Town of Cary Average Daily Wastewater Flow Projections.....	3-20
Table 3-15	Total Cary System Wastewater Flow Projections.....	3-20
Table 3-16	North Cary WRF Wastewater Flow Projections.....	3-21
Table 3-17	South Cary WRF Wastewater Flow Projections.....	3-22
Table 3-18	Cary Service Area Portion of the Western Wake WRF Wastewater Flow Projections ⁽¹⁾	3-22

Table 3-19	Holly Springs Wastewater Flow Projections	3-24
Table 3-20	Morrisville Neuse Basin Wastewater Flow Projections	3-25
Table 3-21	Morrisville Haw Basin Wastewater Flow Projections	3-26
Table 3-22	Western Wake WRF Wastewater Flow Projections (Maximum North Flows)	3-27
Table 4-1A	Summary of Direct Environmental Effects of Project Alternatives.....	4-5
Table 4-1B	Direct Environmental Effects of Project Alternatives	4-7
Table 4-1C	Summary of Direct Environmental Impacts of Project Alternatives.....	4-14
Table 4-2	Present Worth Costs for Proposed Project.....	4-18
Table 4-3	Present Worth Costs for Alternative A - Discharge to Jordan Lake.....	4-23
Table 4-4	Present Worth Costs for Alternative B.....	4-27
Table 4-5	Present Worth Costs for Alternative F - Land Application.....	4-36
Table 4-6	Weighted Technical Scores and Ranking for Phase II Site Selection.....	4-39
Table 4-7	WRF Site Weighing Factors, Weighted Scores and Ranks	4-42
Table 4-8	Present Worth Costs for Alternative WRF Sites in Millions of Dollars (2005 Dollars).....	4-42
Table 4-9	Environmental Impacts of Transmission Line Alternatives	4-46
Table 4-10	Environmental Impacts of Transmission Line Segments	4-51
Table 4-11	Environmental Impacts for the Beaver Creek PS at the Olive Chapel Road Location	4-53
Table 4-12	Qualitative Comparison of Environmental Impacts of a Bank Discharge Option versus In-Stream Diffuser Option.....	4-56
Table 5-1	Soil Types on the WRF Project Sites.....	5-4
Table 5-2A	Soil Types along Transmission Line from West Cary PS to Beaver Creek Pump Station	5-6
Table 5-2B	Soil Types at Beaver Creek Pump Station	5-7
Table 5-2C	Soil Types along Transmission Line from Beaver Creek Pump Station to WRF	5-8
Table 5-2D	Soil Types along Transmission Line from WRF through Pipeline Route Corridor.....	5-9
Table 5-2E	Soil Types along Transmission Line from Pipeline Route Corridor to Discharge Structure.....	5-10
Table 5-3	Zoning along Transmission Lines.....	5-12
Table 5-4	Land Cover at WRF Site.....	5-13
Table 5-5	Land Cover at Beaver Creek PS and along Transmission Lines.....	5-14
Table 5-6	Existing Wetlands along Transmission Line Routes	5-17
Table 5-7	Public Parks within a 5-mile Radius of the Projected Area	5-19
Table 5-8	NCFRBA DO Data Summaries at Lillington and L&D #3.....	5-24
Table 5-9	Summary of Chlorophyll A Data Collected at L&D #3 in 2005 by MCFRBA	5-26

Table 5-10	Tree and shrub species observed at the WRF Site	5-28
Table 5-11	Forest Productivity for Soil Types on the WRF Project Site.....	5-29
Table 5-12A	Forest Productivity for Soil Types along Transmission Line from West Cary PS to Beaver Creek Pump Station.....	5-31
Table 5-12B	Forest Productivity for Soil Types at Beaver Creek Pump Station	5-32
Table 5-12C	Forest Productivity for Soil Types along Transmission Line from Beaver Creek Pump Station to WRF	5-33
Table 5-12D	Forest Productivity for Soil Types along Transmission Line from WRF through Pipeline Route Corridor	5-34
Table 5-12E	Forest Productivity for Soil Types along Transmission Line from Pipeline Route Corridor to Discharge Structure.....	5-35
Table 5-13	Fish Species Found in Greatest Abundance on Cape Fear River Tributaries	5-37
Table 5-14	Rare Species with a 5-mile Radius of the WRF Site	5-39
Table 6-1	Jordan Lake Gameland Impacts (all areas owned by USACE	6-14
Table 6-2A	Summary of Input Parameters, Predicted Instream Dissolved Oxygen (DO), and Change in DO for Scenarios Assuming Phytoplankton Productivity	6-25
Table 6-2B	Summary of Input Parameters, Predicted Instream Dissolved Oxygen (DO), and Change in DO for Scenarios Assuming No Phytoplankton Productivity.....	6-25

LIST OF FIGURES - LOCATED AT THE END OF SECTION

Figure 2-1	Western Wake Regional Wastewater Management Facilities
Figure 2-2	2001 Water Movement
Figure 2-3	Western Wake Regional Wastewater Management Facilities - Phase 1 Implementation Schedule
Figure 2-4	Western Wake Regional Wastewater Management Facilities Service Area
Figure 2-5	Western Wake Regional Wastewater Management Facilities
Figure 3-1	Town of Apex Existing Wastewater Collection System
Figure 3-2	Town of Cary Existing Wastewater Collection System
Figure 3-3	Town of Holly Springs Existing Wastewater Collection System
Figure 3-4	Town of Morrisville Existing Collection System
Figure 3-5	Middle Creek Wastewater Treatment Plant Existing Facilities Process Flow Schematic
Figure 3-6	North Cary Water Reclamation Facility Existing Facilities Site Plan
Figure 3-7	North Cary Water Reclamation Facility Existing Facilities Process Flow Schematic
Figure 3-8	South Cary Water Reclamation Facility Existing Facilities Site Plan
Figure 3-9	South Cary Water Reclamation Facility Existing Facilities Process Flow Schematic

Figure 3-10	Utley Creek Wastewater Treatment Plant Existing Facilities Process Flow Schematic
Figure 3-11	Western Wake 2030 Wastewater Flow Distributions
Figure 4-1	The Proposed Project - Regional System with Cape Fear River Discharge
Figure 4-2	Aerial Photo of Western Wake WRF Site
Figure 4-3	The Proposed Project - Regional System with Jordan Lake Discharge
Figure 4-4	Alternative B - Independent Systems
Figure 4-5	Western Wake Regional Wastewater Management Facilities
Figure 4-6	Western Wake Regional Wastewater Management Facilities Site 8
Figure 4-7	Western Wake Regional Wastewater Management Facilities Site 11/12
Figure 4-8	Western Wake Regional Wastewater Management Facilities Site 14
Figure 4-9A	Transmission Routes Evaluated
Figure 4-9B	Transmission Routes Evaluated
Figure 4-10	Transmission Route Segment Eliminated
Figure 5-1	Western Wake Aerial Photo of Western Wake WRF Site
Figure 5-2	Western Wake Floodplains, Hydric Soils, and National Wetland Inventory Sites along Transmission Routes
Figure 5-3	Western Wake Land Cover at Western Wake WRF Site
Figure 5-4	Western Wake Recreational and Significant Natural Heritage Areas and Rare Species with 5 miles of WRF Project Site
Figure 5-5	Western Wake Cultural and Historic Resources within 1 mile of Proposed Wastewater Infrastructure
Figure 5-6	Western Wake Cultural and Historic Resources within 1 mile of Proposed Wastewater Infrastructure
Figure 5-7	Western Wake Water Quality Sampling Sites Near Project Area
Figure 5-8	Dissolved Oxygen in the Cape Fear River
Figure 6-1	Western Wake Aerial Photo of Western Wake WRF Site
Figure 6-2	Predicted Dissolved Oxygen in Cape Fear River

Appendices

A	Secondary and Cumulative Impacts Master Mitigation Plans
B	Preliminary Engineering Report
C	Interbasin Transfer Certificate
D	NPDES Permit Information
E	WRF and Collection System Descriptions
F	Population and Wastewater Projections
G	Environmental Justice Assessment
H	Endangered Species Information

- I Public Participation**
 - * **Scoping Document**
 - * **Summary of Comments Received on Scoping Document**
 - * **Scoping Document Comments**
 - * **Summary of Comments Received on August 2005 Draft EIS**
 - * **August 2005 Draft EIS Comments**
 - * **Summary of Comments Received on January 2006 Draft EIS**
 - * **January 2006 Draft EIS Comments**
- J User Charge Analysis**
- K Request to USACE for Categorical Exclusion for Use of Federal Lands**

This page left intentionally blank.

ACRONYMS AND ABBREVIATIONS

7Q10	Lowest average 7 consecutive Days flow with average recurrence frequency of once every 10 years
ACs	activity centers
ADFs	annual average daily flows
AQI	air quality index
ATT	American Tobacco Trail
BCPS	Beaver Creek Pump Station
BNR	biological nutrient removal
CACs	community activity centers
CAMPO	Capital Area Metropolitan Planning Organization
CGIA	North Carolina Center for Geographic Information and Analysis
CO	carbon monoxide
DAQ	North Carolina Division of Air Quality
D/CH/C/MPO	Durham/Chapel Hill/Carrboro Metropolitan Planning Organization
DLR	North Carolina Division of Land Resources
DMR	daily monitoring report
DO	dissolved oxygen
DWQ	North Carolina Division of Water Quality
EIS	Environmental Impact Statement
EMC	Environmental Management Commission
EPA	U.S. Environmental Protection Agency
EPS	Effluent Pump Station
ESA	Endangered Species Act
ETJs	extraterritorial jurisdictions
FEMA	Federal Emergency Management Agency
FM	Force Main
FSC	Federal species of concern
GBT	gravity belt thickeners
GIS	Geographic Information System
gpcd	gallons per capita per day
gpm	gallons per minute
HVAC	Heating, Ventilation, and Air Conditioning
I/I	infiltration/inflow
IBT	interbasin transfer
lb/yr	pounds per year
L&D	Lock and Dam
MCFRBA	Middle Cape Fear River Basin Association
mgd	million gallons per day

mg/L	milligram per liter
MMF	maximum month average flow
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standard
NACs	Neighborhood Activity Centers
NC DENR	North Carolina Department of Environment and Natural Resources
NCEPA	North Carolina Environmental Policy Act
NCGIA	North Carolina Center for Geographic Information and Analysis
NCIBI	North Carolina Index of Biological Integrity
NCWRC	North Carolina Wildlife Resources Commission
NHEO	Natural Heritage Element Occurrence
NHP	North Carolina Natural Heritage Program
NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRCY	nitrified recycle
NRHP	National Registry of Historic Places
NSW	nutrient sensitive waters
NWI	National Wetlands Inventory
O&M	operations and maintenance
PER	Preliminary Engineering Report
PF	peak flow
PFL	prime farm land
PLCs	programmable logic controllers
ppm	parts per million
PS	Pump Station
PUDs	Planned Unit Developments
PWC	Public Works Commission
RACs	Regional Activity Centers
RAS	return activated sludge
RDU	Raleigh-Durham
RDU	residential dwelling unit
ROW	right-of-way
RTF	Research Triangle Foundation
RTP	Research Triangle Park
SCADA	Supervisory Control and Data Acquisition
SCI	Secondary and Cumulative Impacts
SHPO	State Historic Preservation Office
SNHA	significant natural heritage areas
SOC	Special Order by Consent
SOUR	specific oxygen uptake rate
SRF	State Revolving Fund
SSO	sanitary sewer overflow
TAZ	Traffic Analysis Zone

TM	Technical Memorandum
TMDL	Total Maximum Daily Load
µg/L	microgram per liter
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UV	ultraviolet
VOCs	volatile organic compounds
VSS	volatile suspended solids
WRF	Water Reclamation Facility
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

This page intentionally left blank.