

## **SECTION 6.0 PREDICTED ENVIRONMENTAL EFFECTS**

The proposed Project is being implemented by the Partners to provide wastewater service for planned growth and development, and to comply with regulatory mandates issued by the EMC and NC DENR. In accordance with the regulatory mandates, the proposed Project must be operational and discharging effluent to the Cape Fear River by January 1, 2011. The proposed Project is comprised of the facilities listed below, and which are schematically represented on Figure 2-1.

- 1) West Cary Pump Station (PS)
- 2) West Cary Force Main – West Cary PS to Reedy Branch Gravity Sewer
- 3) Reedy Branch Gravity Sewer – West Cary FM to Beaver Creek PS
- 4) Beaver Creek PS at Richardson Road
- 5) Force Main – Beaver Creek PS to Western Wake Water Reclamation Facility (WRF)
- 6) Western Wake WRF
- 7) Effluent Pump Station, Pipeline, and Outfall

This section of the EIS identifies and discusses the direct impacts of the proposed Project on topography, floodplains, soils, land use, wetlands, prime farmlands, public lands, cultural resources, air quality, noise, water resources, forest resources, shellfish and fish, wildlife and natural vegetation, and the introduction of toxic substances. Given the scope and scale of planning, designing, constructing and operating a new WRF, the Partners acknowledge that the proposed Project will have environmental impacts and have thus decided to develop an EIS rather than an Environmental Assessment. The Partners are committed to planning, designing and constructing the proposed Project to avoid and reduce environmental impacts to the greatest extent practicable and in a fiscally responsible manner. Where avoidance of environmental impacts is not feasible, the Partners will implement mitigation measures to eliminate, or reduce, the identified environmental impacts.

The Partners believe that the EIS process will ensure that all interested individuals and groups receive a fair and balanced opportunity to comment on the direct impact analyses and the mitigation measures presented in this section. The identification and

discussion of direct impacts was prepared based on site visits, surveys, literature records and input from federal and state resource agencies during the scoping process. Agency correspondence is included in Appendix I.

NCEPA requires an environmental document to outline the direct impacts (intent of Section 6.0) as well as the indirect (or secondary) and cumulative effects. The Partners have developed SCI Master Mitigation Plans to address the secondary and cumulative indirect impacts for all planned infrastructure. These documents have been approved by NCDENR as meeting the requirements for addressing SCI in environmental documents. A copy of the SCI Master Mitigation Plans and memorandum of agreement with NCDENR are included in Appendix A. These documents outline in detail the planned infrastructure for each town, the existing environmental conditions in each town's planning area, the potential secondary and cumulative impacts as a result of the planned infrastructure, and the measures that mitigate environmental impacts.

The proposed Project requires the construction of an 18 mgd water reclamation facility (WRF), which will be expanded to 30 mgd in the future. The total land area being acquired for the 30 mgd WRF is 235 acres. Of the total 235 acres, approximately 69 acres will be disturbed for construction of new facilities, including an approximately 150 foot wide cleared area for an access road from Shearon Harris Rd, effluent line placement, and any necessary utilities (phone, electric, gas, water, etc.). The areas that will not be disturbed within the 235 acre site include the 200 foot buffer around the perimeter of the site, the areas to be set aside as conservation areas and the pond located on the site.

The 69 acres for the Western Wake WRF was estimated based on several conceptual design layouts and is of sufficient size to accommodate the 30 mgd WRF. The exact footprint of the facilities located at the WRF site will not be known until the completion of final design. To estimate impacts associated with construction activities for the WRF site, a 111 acre potential disturbance area within the WRF site has been identified (Figure 6-1). It is assumed that construction activities for the WRF will occur within the 111 acre area, and for the purpose of this EIS environmental impacts have been based on 69 acres of facility footprint. The design team will lay out structures to minimize environmental impacts while meeting engineering and operational needs. Estimates of impacts included in permitting applications will be based on final design specifications and layouts and thus could change from information presented in this version of the EIS.

The balance of the land being acquired for the WRF site will remain undeveloped and the environmental resources will not be impacted. There will be a 200 ft buffer around the entire boundary of the site and two areas that will be preserved as conservation areas due to the presence of high quality environmental resources located in these areas. The buffer and the conservation areas combine to a total of approximately 95 acres (Figure 6-1).

The 200 ft buffer area around the perimeter of the site has been designed to reduce visual and noise impacts from the site. It is anticipated that these areas will not be developed, except to allow access to the site for roads, utilities and transmission lines. The locations of these areas have been approximated on Figure 6-1. In addition to the transmission lines described in this EIS, the transmission line that will bring treated effluent from Holly-Springs will enter the WRF site on the southeastern boundary and will disturb an area approximately 60 feet wide through the site boundary. The exact location of this transmission line will be determined during the final design process.

The conservation areas on the northern and southern ends of the site identified in Figure 6-1 are not expected to be developed for Phase 1 or 2 construction activities. After final layout of the plant and the location of the pipelines are known, the Partners will consider implementing a conservation easement in those areas.

Impacts at the WRF site have been calculated for the estimated 69 acres needed for the site layout based on a preliminary site plan provided by the design team. Impacts along transmission lines are based on easement width assumptions outlined in Section 5. Detailed information is not available about the construction techniques that will be needed for the outfall structure. Thus, the EIS identifies, and quantifies, the direct impacts associated with construction and operation of the proposed facilities. During final design and permitting, the Partners will work to identify design options and construction techniques that may be implemented to reduce the direct impacts presented in this EIS. For the wastewater and effluent transmission lines, the best estimate of the routes was used to estimate environmental impacts. Estimates for environmental impacts to the preferred routes are summarized in Tables 4-9 and 4-10. Final routes may be slightly modified during final design. For the effluent line corridor described in Section 5, a representative route described in PER TM 27 was used to estimate impacts since using the entire corridor would overestimate environmental impacts. For the 3 routes described in the PER, the difference in disturbed acres varies

by 1.8 acres. Thus, impacts for any given environmental element could vary by up to 1.8 acres if one of the other routes is selected, but variation is likely less than that for any given environmental element.

## **6.1 TOPOGRAPHY**

### **6.1.1 Water Reclamation Facility**

During and after construction the existing topography on site will be altered from land clearing and grading activities associated with development of the WRF. At this time, a grading plan is not available and impacts to topography cannot be quantified, but moderate amounts of soil will be moved to accommodate the WRF. Figure 6-1 illustrates that the proposed 111 acre potential disturbance area avoids floodplains, and to the furthest extent practicable impacts to riparian zones and wetlands.

### **6.1.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure**

The proposed Project requires the construction of an estimated 40,000 linear feet of raw wastewater force main, and an estimated 62,000 linear feet of effluent transmission main. The proposed Project also requires the construction of 28,000 linear feet of gravity sewer that will discharge to the Beaver Creek PS. Easements totaling 156 acres for these transmission lines have been assumed following the methodology in section 5.1.2 of this document.

Construction of the buried wastewater force mains and effluent transmission mains will involve temporary disturbances to topography. However, the existing grade of the topography will be restored after installation of the pipelines. In addition, installation of the pipelines will involve temporary disturbances within FEMA regulated 100-year floodplains, with post-construction grades returned to pre-construction conditions. This area includes 6.7 acres of areas mapped as FEMA floodplains in Wake County. However since FEMA floodplain electronic data does not exist for Chatham County, this area is likely underestimated. Floodplain function will not be permanently impacted by construction and operation of the force mains and gravity sewers. There will be 25 perennial stream crossings for raw wastewater transmission lines, and 4 perennial stream crossings for the effluent transmission main (Table 4-9; Wake County, 2005 and CGIA, 2004). As described in Section 5, perennial streams were assumed where a stream existed within hydric soils. The stream crossings for all pipelines are further described in the water resources section.

The total land area being acquired for the Beaver Creek PS is 31.5 acres. Of the total 31.5 acres, 4.2 acres will be built upon for new facilities, not including the new access road from Richardson Road. The Beaver Creek PS will be located outside all wetland areas and floodplains. A wetland delineation will be completed prior to the permitting, and the site layout for the Beaver Creek PS will be modified during the final design to minimize environmental impacts and avoid any wetland impacts.

The discharge structure and pipeline to the diffuser will require approximately 2.5 acres to be disturbed. This area is primarily located along the banks of the Cape Fear River while the diffuser structure and a small length of pipeline is located in the riverbed. The majority of this disturbance will be temporary during installation of the pipeline with post-construction grades restored to pre-construction conditions. The discharge pipeline will be installed within FEMA regulated 100-year floodplains, with post-construction grades restored to pre-construction conditions. The discharge structure will be located within FEMA regulated 100-year floodplains, and be designed to withstand a 100-year flood event. The discharge structure and related facilities (parking lot) have been estimated to require an area of 0.03 acres, which will cause a permanent change to topography due to grading. A grading plan is not available at this time and therefore impacts cannot be quantified. A wetland delineation will be completed prior to the permitting, and the site layout for the discharge structure will be modified during the final design to minimize environmental impacts and avoid any wetland impacts.

## **6.2 SOILS**

### **6.2.1 Water Reclamation Facility**

Of the total 235 acres being acquired for the WRF, 69 acres will be built upon for new facilities to accommodate projected flows of 30 mgd through 2030, including the new access road from Shearon Harris Road. With the exception of land that must be disturbed for pipeline corridors, the remainder of the land being acquired for the WRF site will remain undeveloped and the environmental resources will not be impacted through Phase 2 of the project.

The clearing and grading for the WRF site will result in soil disturbance. At this time, a grading plan is not available. During grading, soil will be moved; in some areas, it will be removed, while in other areas it will be replaced. Thus, the location of soil types may change. During clearing and grading, some soils will be eroded, but the impacts from this will be minimized by following an approved sedimentation and erosion control plan that conforms to the requirements of the North Carolina Sedimentation Pollution Control

Act of 1973 and mulching and seeding with native grasses after grading is completed. Finally, by using heavy equipment on the Site, soils will be compacted. No contamination of soils is will result from construction activities.

### **6.2.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure**

The proposed Project requires the construction of an estimated 40,000 linear feet of raw wastewater force main, an estimated 28,000 linear feet of gravity sewer, and an estimated 62,000 linear feet of effluent transmission main. Easements totaling 156 acres for these transmission lines have been assumed following the methodology in section 5.1.2 of this document.

It is assumed that all areas in the pipeline easements (156 acres) have the potential for disturbance. In general, all pipelines for the proposed Project will be adjacent to existing public right-of-way (roads) and existing utility corridors (natural gas and electricity). Soils will be disturbed during construction. However, many of the soils were disturbed previously during construction of roadways or the installation of other utilities. Current BMPs, as detailed in the required sediment and erosion control plan, will be used to limit soil loss, erosion, and the possibility of contamination during construction. In addition, disturbed soils will be seeded with native grasses after construction is complete to prevent future erosion. Fescue will not be used. Soil erosion in stream crossings will also be limited by the installation of filter fabric and riprap following pipe installation.

The total land area being acquired for the Beaver Creek PS is 31.5 acres. Of the total 31.5 acres, 4.2 acres will be built upon for new facilities, not including the new access road from Richardson Road. Soils will be disturbed during construction. BMPs for sedimentation and erosion control will be used to limit soil loss and erosion. In addition, disturbed soils will be seeded with native grasses after construction is complete to prevent future erosion. Fescue will not be used. Sedimentation and erosion control will be limited by the installation of a sedimentation/storm water pond.

The discharge structure and pipeline to the diffuser will require approximately 2.5 acres to be disturbed. The majority of this disturbance will be temporary during installation of the pipeline with post-construction grades restored to pre-construction conditions. The discharge structure and related facilities (gravel parking area) have been estimated to require an area of 0.03 acres, which will cause a permanent change to topography due to grading. Soils will be disturbed during construction. BMPs for sedimentation and

erosion control will be used to limit soil loss and erosion. In addition, disturbed soils will be seeded with native grasses after construction is complete to prevent future erosion. Fescue will not be used.

## **6.3 LAND USE**

### **6.3.1 Zoning**

#### **6.3.1.1 Water Reclamation Facility**

The total land area being acquired for the 30 mgd WRF is 235 acres. Of the total 235 acres, 69 acres will be built upon for new facilities, including the new access road from Shearon Harris Road. The balance of the land being acquired for the WRF site will remain undeveloped, and the environmental resources will not be impacted. The WRF site and surrounding areas are currently zoned as an R-30 residential district. Public utilities are exempt from Wake County Zoning regulations (Cooke, 2005) and therefore this area will not be rezoned, nor will it affect the zoning of the surrounding areas.

#### **6.3.1.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure**

The Beaver Creek pump station location is zoned as an R-80W residential watershed district. Since public utilities are exempt from Wake County Zoning regulations, this site will not be rezoned and this activity is allowable. The primary existing zoning along the length of the transmission lines in Wake County is R-40W (41%) and R-80W (28%) with additional zoning areas. Easements for the pipelines will not affect the existing zoning. The Discharge structure and pipeline to the diffuser are located in Chatham County and are located in a very low density residential – agricultural district located along rivers and is an allowable use.

### **6.3.2 Land Cover**

#### **6.3.2.1 Water Reclamation Facility**

The total land area being acquired for the 30 mgd WRF is 235 acres. Of the total 235 acres, 69 acres will be built upon for new facilities, including the new access road from Shearon Harris Road. The balance of the land being acquired for the WRF site will remain undeveloped, and the environmental resources will not be impacted.

Existing land cover will be modified from predominantly forested land to a utility use on the 69 acres that will be developed. The remaining areas of the site including the site boundary buffers and conservation areas, will not be changed from the current land cover of forested, except as needed for pipeline easements.

### 6.3.2.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure

The proposed Project requires the construction of an estimated 40,000 linear feet of raw wastewater force main, an estimated 28,000 linear feet of gravity sewer, and an estimated 62,000 linear feet of effluent transmission main. Easements totaling 156 acres for these transmission lines have been assumed following the methodology in section 5.1.2 of this document.

It is assumed that all areas in the pipeline easements (156 acres) have the potential for disturbance. In general, all pipelines for the proposed Project will be adjacent to existing public right-of-way (roads) and existing utility corridors (natural gas and electricity) which should minimize impacts on land use. Where feasible, the Partners will avoid removing large trees at the edges of construction corridors. Upon completion of pipeline installation, the Partners will require a permanent easement along all pipeline alignments to allow for unobstructed access to the pipelines for routine inspection and maintenance. These easements will be revegetated similar to existing land cover. If existing land cover is forested these areas will be converted to a herbaceous/ shrubland cover. Impacts will not be unusual or significant, and existing land uses on impacted private property will continue to the greatest extent practicable. During clearing activities the contractor will take measures to utilize the merchantable timber removed during construction. Emphasis should be on selling all wood products. However if the wood products cannot be sold, then efforts should be made to haul off the material or turn it into mulch with a tub grinder. Also efforts should be made to avoid skinning of the tree trunk, compacting the soil, adding layers of fill, exposing the root systems, or spilling petroleum or other substances.

The gravity sewer line will be installed within FEMA regulated 100-year floodplains (approximately 28,000 LF) and wetland areas will be temporarily impacted, but will be restored upon construction completion. These land uses will not be changed as a result of construction, and the 100-year floodplain elevation will not have significant negative impacts by the sewer line installation.

The total land area being acquired for the Beaver Creek PS is 31.5 acres. Of the total 31.5 acres, 4.2 acres will be built upon for new facilities. Land cover data shows the existing land use as primarily managed herbaceous cover (58 percent; CGIA, 2004). Based on site visits, the major use of the property is for horse grazing. The site will be modified within the 4.2 acre project area to a utility mixed use. The remainder of the site will continue to be used as grazing land. Currently an easement permanently

protecting grazing rights exists with the NRCS on a portion of the site to be acquired. The Partners have contacted the NRCS and will continue to work with them to allow use of the site for the pump station location.

The effluent transmission main will require approximately 42 acres to be disturbed based on the length of a representative route through the corridor shown on Figure 4-9B. The majority of this disturbance will be temporary during installation of the pipeline with post-construction grades restored to pre-construction conditions. Landcover for this potential route is primarily yellow pine (62%) with some mixed hardwoods and conifers (15%) (CGIA, 2004). Large lengths of this route run parallel to existing roads and powerline rights-of-way, which should minimize disturbance.

The discharge structure and pipeline to the diffuser will require approximately 2.5 acres to be disturbed. The majority of this disturbance will be temporary during installation of the pipeline with post-construction grades restored to pre-construction conditions. The majority of land cover at the discharge structure location is bottomland hardwood forests (CGIA, 2004 and field observations). The discharge structure and related facilities (gravel parking area) have been estimated to require an area of 0.03 acres, that will cause a permanent change of land use from forested to utility mixed use.

Upon completion of pipeline installation, the Partners will require a permanent easement along all pipeline alignments to allow for unobstructed access to the pipelines for routine inspection and maintenance. Where feasible, woody debris and logs from corridor clearing will be used to establish brush piles and downed logs adjacent to the cleared right-of-way to improve habitat for wildlife. Maintenance activities will be scheduled to minimize impacts to wildlife. The Partners will consider mowing outside nesting season (late March to July) and mowing will be done only as often as necessary. The use of herbicides and pesticides will be minimized where possible.

## **6.4 WETLANDS**

### **6.4.1 Water Reclamation Facility**

Wetlands within the Project Area are primarily located within the riparian zones or floodplains of streams and lakes. Wetlands are protected by Sections 401 and 404 of the Clean Water Act (CWA). The CWA requires that wetlands must first be avoided and if avoidance is impractical, minimization of impacts and mitigation are required.

Wetland impacts associated with stream crossings will be avoided or minimized by the use of trenchless technology or proper stream crossing construction techniques. The

use of trenchless technology and stream crossing construction techniques are further discussed in the surface water quality section 6.10.1.

Figure 6-1 shows the locations of wetlands recorded during the USACE jurisdictional wetland delineation (Jurisdictional Determination 10/3/05). Figure 6-1 also displays the size and locations of wetlands on the site as well as the area of potential disturbance and how it excludes a majority of the wetland complexes. Based on a preliminary WRF boundary provided by the WRF design team, there is a total of 0.74 acres of jurisdictional wetlands that will potentially be permanently impacted by construction of the WRF and associated facilities. In addition to these potentially impacted wetlands, 0.13 acres of hydric soils will be impacted by the access road from Shearon Harris to the WRF facility. Construction of the access road will avoid these areas by use of open bottomed culverts and/ or bridges if necessary.

Wetland functions may be decreased if pollutant impacts occur. For example, sediment loading from stormwater runoff may impact hydrology and vegetation within a wetland. Nutrient enrichment and other surface water pollutants may impact aquatic and amphibious organisms inhabiting a wetland. By following an approved stormwater pollution prevention plan and an approved erosion and sediment control plan and properly storing chemicals onsite, impacts to wetlands from stormwater runoff should be minimal. In addition, stormwater facilities that meet DWQ's Phase II stormwater control requirements will be implemented.

The WRF impacted area (Figure 6-1) has been developed to minimize impacts to wetland areas. Large areas of high quality wetlands (as observed during wetlands delineation) that exist on the WRF site will be avoided as a result of the predetermined potential disturbance area (Figure 6-1). The 200 ft buffer area around the perimeter of the site has been designed to reduce visual and noise impacts from the site, but will have added value as protecting environmental resources that occur in these areas. It is anticipated that these areas will not be developed, except to allow access to the site for roads, utilities and transmission lines. The locations of these areas have been approximated on Figure 6-1. In addition to the transmission lines described in this EIS, the transmission line that will bring treated effluent from Holly-Springs will enter the WRF site on the southeastern boundary and impact an area approximately 60 feet wide through the site boundary.

The conservation areas on the northern and southern ends of the site identified in Figure 6-1 are not expected to be developed for Phase 1 or 2 construction activities with

the exception of the area impacted by the Holly Springs effluent line. The exact location of how this transmission line will enter the site will be determined during the final design process and this area will not be included in the conservation area. When these access areas are developed, impacts to wetlands will be minimized through the use of trenchless technology or open bottom culverts as determined in the final design process. After final layout of the plant, lines and utilities are known, these conservation areas can be further defined and potentially protected through a conservation easement or other mechanism.

#### **6.4.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure**

The proposed Project requires the construction of an estimated 40,000 linear feet of raw wastewater force main, and an estimated 62,000 linear feet of effluent transmission main. The proposed Project also requires the construction of 28,000 linear feet of gravity sewer that will discharge to the Beaver Creek PS. Easements totaling 156 acres for these transmission lines have been assumed following the methodology in section 5.1.2 of this document.

In general, all pipelines for the proposed Project will be installed adjacent to existing public ROW (roads) and existing utility corridors (natural gas and electricity). Therefore, minimal impacts to wetland areas are expected as a direct result of constructing raw wastewater force mains and effluent transmission mains for the proposed Project. Impacts to wetlands are summarized in Tables 4-9 and 5-6.

The gravity sewer line will be installed within FEMA regulated 100-year floodplains and wetland areas and there are an estimated 29 perennial stream crossings from the transmission lines. Wetlands will be temporarily impacted at these crossings, but will be restored upon construction completion. An individual permit will be obtained from the USACE for the entire project including impacts to wetlands along the transmission line corridors.

The total land area being acquired for the Beaver Creek PS is 31.5 acres. Of the total 31.5 acres, 4.2 acres will be built upon for new facilities, not including the new access road from Richardson Road. The current Beaver Creek PS layout does not impact any areas mapped as hydric soils (USDA, 1970). Information gathered during site visits indicates that the wetlands generally follow the hydric soils data available. A delineation of wetlands impacts will be completed prior to obtaining applicable permits from the

USACE and DWQ, and the Beaver Creek PS site layout will be modified to avoid wetland areas if practicable.

The discharge structure and pipeline to the diffuser will require approximately 2.5 acres to be disturbed. The majority of this disturbance will be temporary during installation of the pipeline with post-construction grades restored to pre-construction conditions. The discharge structure and related facilities (gravel parking area) have been estimated to require an area of 0.03 acres. The area of wetland impact for this area has been estimated using NWI data to be 1.8 acres (Table 5-6). Field visits have indicated that the only small wetland areas exist near the discharge structure location and wetland impacts will be less than estimated. A delineation of wetlands impacts will be completed prior to obtaining applicable permits from the USACE and DWQ, and the discharge structure layout will be modified to avoid wetland areas if practicable. Construction of the outfall structure will occur within the Cape Fear River, and appropriate 404//401 permits will be obtained as part of this overall project.

## **6.5 PRIME OR UNIQUE AGRICULTURAL LANDS**

### **6.5.1 Water Reclamation Facility**

The total land area being acquired for the 30 mgd WRF is 235 acres. Of the total 235 acres, 69 acres will be built upon for new facilities, including the new access road from Shearon Harris Road. The balance of the land being acquired for WRF site will remain undeveloped and the environmental resources will not be impacted. The WRF site contains 62.6 acres of soils identified as prime farmland. The 69 acre site layout calls for 24.1 acres of these prime farmland soils to be developed. The remaining areas of prime farmland will not be developed.

### **6.5.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure**

The proposed Project requires the construction of an estimated 40,000 linear feet of raw wastewater force main, and an estimated 62,000 linear feet of effluent transmission main. The proposed Project also requires the construction of 28,000 linear feet of gravity sewer that will discharge to the Beaver Creek PS. Easements totaling 156 acres for these transmission lines have been assumed following the methodology in section 5.1.2 of this document. In Wake County the easements contain 38 acres of PFL.

In general, all pipelines for the proposed Project will be installed adjacent to existing public ROW (roads) and existing utility corridors (natural gas and electricity). Therefore,

minimal impacts to PFL and farmland of statewide importance will occur. Construction of the pipelines may temporarily disturb agricultural lands immediately adjacent to the construction corridor to allow for access. Impacts to PFL are summarized in Table 5-2. After construction, agricultural uses can resume.

The total land area being acquired for the Beaver Creek PS is 31.5 acres. Of the total 31.5 acres, 4.2 acres will be built upon for new facilities, not including the new access road from Richardson Road. The Beaver Creek PS site includes land utilized for the grazing of livestock. There are 27.6 acres of PFL and farmlands of statewide importance at the Beaver Creek PS site, and 4.2 acres of farmlands of statewide importance will be developed for the pump station and facilities. Digital soils data do not exist for Chatham County, and impacts to PFL have not been estimated for the effluent pipeline and discharge structure. However, the pipelines will be installed adjacent to existing public right-of-way (roads) and existing utility corridors (natural gas and electricity), which are areas that have already been disturbed.

## **6.6 PUBLIC LANDS AND SCENIC, RECREATIONAL, AND STATE NATURAL AREAS**

### **6.6.1 Water Reclamation Facility**

The access road to the WRF site is located on Wildlife Resources Commission (WRC) gamelands. The WRC gamelands cited for the road placement is owned by Progress Energy, and the Project Partners are in negotiations with Progress Energy to acquire the land. This transaction would result in removing (permanent impacts) 24.6 acres from WRC Gamelands use (Table 6-1 summarizes impacts for all project elements). The Partners are considering swapping the parcel of land south of US 1 with Progress Energy (approximately 17 acres); if this swap occurs, the 17 acre parcel could be converted to gamelands which would offset some of the loss associated with the proposed Progress Energy purchase. No other public or recreational lands will be directly impacted on the WRF site.

TABLE 6-1

Jordan Lake Gameland Impacts (all areas owned by USACE)

Project Element	Temporary Impacts	Permanent Impacts
Raw Wastewater Transmission Lines	3.3	0

Shearon Harris Gamelands (all areas owned by Progress Energy)

Project Element	Temporary Impacts	Permanent Impacts
WRF site	0	24.6
Effluent Transmission lines	28.2	0

Chatham County Gameland Impacts (All areas owned by Progress Energy)

Project Element	Temporary Impacts	Permanent Impacts
Effluent Transmission lines	17.3	0

	Temporary Impacts	Permanent Impacts
<b>Total</b>	<b>48.8</b>	<b>24.6</b>

Source: CGIA, 2004

### 6.6.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure

The proposed Project requires the construction of an estimated 40,000 linear feet of raw wastewater force main, an estimated 28,000 linear feet of gravity sewer, and an estimated 62,000 linear feet of effluent transmission main.

The raw wastewater transmission lines from the West Cary Pump Station to the WRF will cross the American Tobacco Trail (ATT) at two existing roadway crossings within existing NC DOT right-of-way. In addition, the raw wastewater transmission lines will potentially temporarily impact a total of 3.3 acres of game lands (associated with Jordan Lake, Table 6-1). The Project partners will require a permanent easement along all pipeline alignments to allow for unobstructed access to the pipelines for routine inspection and maintenance. After construction game land areas will be restored to their full functionality as a recreational resource. The Project Partners will evaluate using trenchless technology in two separate areas along the raw wastewater transmission route: one area will span approximately 300 ft under the ATT at Wimberly Road and White Oak Creek to minimize impacts to recreational use and the second area will span 1000 ft under USACE property just below the Beaver Creek PS along Richardson Road. The potential use of trenchless technology could reduce the game land impacts to 1.94 acres. The effluent lines potentially impact a total of 45.5 acres of games lands. The Apex transmission lines illustrated in Figure 4-9A on Beaver Creek will be adjacent to public land managed by USACE but will not be located on government property.

Impacts to hunting opportunities will occur during construction and operation of all facilities. Installation of the pipelines will temporarily displace several game species and likely reduce the hunting success in the area surrounding the pipeline easement. However the maintenance of the easement may improve hunting opportunities as species use the clearing along the pipeline easement for movement and forage activities. The WRF is located near WRC gamelands, and noise from construction activities will likely cause temporary displacement of game species. Current WRC regulations should protect workers on the WRF site, and no special measures will need to be enacted (Wilson, 2005). The access road from Shearon Harris Road will cross gamelands owned by Progress Energy. It is anticipated that the Partners will purchase a section of the Progress Energy parcel and convert it to non-gamelands thus removing approximately 24.6 acres of gamelands. The Partners are considering swapping the parcel of land south of US 1 with Progress Energy (approximately 17 acres); if this swap occurs, the 17 acre parcel could be converted to gamelands which would offset some of the loss associated with the proposed Progress Energy purchase. The remaining gamelands should not be impacted by the WRF and its facilities.

The discharge structure will likely not affect recreation near the Cape Fear River due to being located over 1,000 feet from the shoreline. However the diffuser will be located in the river and therefore could impact recreation, most likely boating. The NCWRC leases gamelands from Progress Energy, and have a parking area and recreational access near the outfall. The Partners will not purchase the recreational access and parking areas and they can continue to be used by recreational boaters. The effluent discharge structure will be completely fenced for security reasons. The pipeline and diffuser located within the river will be partially buried in the river bottom with the crown of the pipe and diffuser ports extending approximately 22" above the stream bottom (PER 29). These structures will usually be covered with enough water as to not obstruct movement of boats and other floating objects (debris). However in extremely low flow conditions the pipeline and diffuser ports may extend above the waterline. The pipeline will span approximately 75% of the width of the river, this should allow a channel for boats to pass around the pipeline if exposed. Data on the river bottom taken November 18, 2005 during low flow conditions (271 cfs) suggests that the diffuser structure would be covered by at least one foot of water. Also the diffuser structure would extend approximately 400 feet from the north bank (measured perpendicularly) into the main channel of the river under these low flow conditions. This would leave a channel approximately 100 feet wide with an average depth of approximately 2.5 feet (under low flow conditions) between the end of the diffuser and the south bank. Signs will be posted to alert recreational boaters to the presence of the pipeline so that the

pipeline can be avoided. These signs will be approved by the USACE prior to installation. The pipeline will be designed so that impacts from floating debris is either avoided due to the depth of the pipe, or minimized due to the angle of the pipeline relative to the shoreline. This issue is further discussed in PER 29.

Construction of the outfall structure could also temporarily impact fishing. When final design and permitting are complete, the construction techniques will be defined. The Project Partners will execute the construction in accordance with final permits and in full compliance with federal and state safety requirements. Once construction is completed, recreational fishing should not be impacted.

There is Significant Natural Heritage Areas (SNHA) within a 5 mile radius of all transmission lines as outlined in Section 5.0. The only area where SNHA's will be directly impacted is at the very end of the effluent line and along the discharge pipeline. The easement area necessary for the effluent line will create a direct impact of 0.5 acres to the Cape Fear River/Buckhorn Levees due to the construction of this line. The discharge pipeline easement area will result in the direct impact of 1.9 acres of the Cape Fear River/Buckhorn Levees and 0.6 acres of the Upper Cape Fear Aquatic Habitat natural heritage area.

## **6.7 AREAS OF ARCHAEOLOGICAL OR HISTORIC VALUE**

The Project Partners have consulted with representatives from the North Carolina State Historic Preservation Office (SHPO) to review the location and nature of unique historic and archaeological resources in western Wake County. A map presenting the information and data collected from SHPO is presented in Figures 5-5 and 5-6.

### **6.7.1 Water Reclamation Facility**

No unique historic and archaeological resources were found on the WRF site during an archaeological survey (Jenkins and Pattison, 2005); however, the WRF site is located adjacent to the New Hill Historic District, which is listed on the National Historic Register, as well as three sites listed on the National Register Study list (Figure 5-6). The potential adverse impacts to the New Hill Historic District and other historic properties are visual, odor, noise, traffic and light-spill. To address these impacts the Project Partners will implement the following mitigation measures:

- Noise – The blower building is the loudest area on the site; the equipment in this building will be fitted with sound reduction devices and include sound attenuating features. A person will not be able to hear the blowers from outside the building.

The emergency generators will also produce noise during power failures and during monthly exercise requirements. The emergency generators will be housed in a sound attenuating enclosure or building.

- **Odor:** There are two main areas where odor will occur at the water reclamation facility: (a) the influent headworks structure, and (b) the sludge management facilities. The Project Partners will implement best operations practices and equipment to reduce the generation and migration of nuisance odors at the water reclamation facility.
- **Traffic:** All traffic into, and out of, the WRF site will be directed away from the New Hill Historic District. The Town of Cary will provide all contractors with preferred routes which avoid left turns and railroad crossings. The Partners will work with NCDOT and contractors to ensure that the roads are in good condition. During plant operation, there will be approximately 20 to 25 employees on the site that will likely enter the WRF site via Old US 1. Approximately four of these employees will work the 2<sup>nd</sup> shift, and at any given time, a number of employees will work offsite. A pick-up truck will travel along New Hill Olive Chapel Road to visit the Beaver Creek PS twice a day.
- **Light-Spill:** Two types of lighting will be required on the WRF site. The first type is street lighting which can be spaced apart on access roads. The second type is task lighting. In general task lights will be approximately 20 to 25 feet high, but will be directed toward the task and limited in the span of illumination. These lights will be controlled at key locations so they will not remain on all night. These lights are required so the operator can visit WRF components throughout the night to ensure all WRF elements are operating properly.
- **Visual Impacts:** The tallest structures on the site will be the aeration tanks. These will be approximately 23 feet tall, and can be depressed into the ground approximately five to six feet. The buildings on the site (administration, sludge, blower building, generator room, and effluent pump station) will use architecture that is consistent with the surrounding community. A minimum forested buffer will be maintained around the WRF site that will minimize or eliminate the view of the WRF from all perspectives. In most areas this perimeter buffer will meet or exceed 200 feet. The railroad along the north side of the property has an elevated bed, and this will also help block any noise and visual impacts.

### **6.7.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure**

In general, all pipelines for the proposed Project will be installed within, or adjacent to, existing public ROW (roads) and existing utility corridors (natural gas and electricity). Therefore, minimal impacts to unique historic and archaeological resources will occur. An archaeological survey conducted by Brockington and Associates (Jenkins and Pattison, 2005) indicated no significant archaeological finds in the vicinity of the outfall structure.

No unique historic and archaeological resources were found on the Beaver Creek PS site, but the Callie Lawrence House (National Historic Study List) is within one mile of the western boundary of the Beaver Creek PS site. In addition, within one mile of the Beaver Creek PS there is one other structure the New Ruin Tavern, which is a potential State Study list site. The potential adverse impacts to these structures are visual, odor, noise, traffic and light-spill. To address these impacts the Project Partners will implement the following mitigation measures:

- Noise – Noise levels will temporarily increase during construction. Following construction, noise levels will largely return to existing levels. During power outages, the stand-by power generators at the pump stations will increase noise levels, but these events should occur infrequently.
- Odor: Odor control equipment will be installed for the pump station facility.
- Traffic: Traffic to the Beaver Creek PS is expected to be very light and is not expected to significantly increase the amount of traffic along Richardson Rd.
- Light-Spill: Light standards for the facility will be low-profile, and controlled-dispersion light fixtures will be used to reduce light-spill to the surrounding area.

## **6.8 AIR QUALITY**

### **6.8.1 Water Reclamation Facility**

Air quality may be impacted during construction. During the construction phase of the Project, machinery utilized will increase particulate matter (dust) and produce emissions resulting from the combustion of petroleum products, much like emissions from previous timber harvesting and farming activities. Construction specifications for the Project will require mechanical equipment to meet emissions standards established by the State of North Carolina for the equipment utilized. Burning will not be used to clear the WRF site; the site will be logged. Dust control measures will be employed. Emergency

generators at the WRF will require a permit from the NC DENR Division of Air Quality for a small facility.

Biosolids will be transported offsite for final treatment and disposal; therefore, air quality impacts from biosolids management will be minimized (See PER TM No. 24).

Odor is another potential issue, and the Town of Cary has received odor complaints for its two existing WRFs. The Town implemented operational changes and facility improvements to address the odor, and complaints have been reduced. For the Western Wake WRF, the Project Partners will implement best operations practices and equipment to reduce the generation and migration of nuisance odors at the water reclamation facility.

### **6.8.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure**

No significant direct impacts to air quality will result from construction of the pipelines for the proposed Project. Dust control measures will be employed. Temporary minor impacts to air quality will result from the operation of construction equipment. In addition, no new air pollution sources will be created by this construction.

At the pump stations, temporary negligible increases in particulates may occur when emergency generators are used during power outages and during monthly exercising activities. Odor control facilities will be provided at the Beaver Creek PS. The discharge structure and diffuser should not significantly impact air quality at the discharge site due to treatment processes described in the previous section.

## **6.9 NOISE LEVELS**

### **6.9.1 Water Reclamation Facility**

Noise levels are expected to increase during the construction phase of the proposed Project. Increased noise levels will be as a result of commonly used mechanical equipment that will be utilized to grade the site and construct the WRF and related facilities. Construction is normally limited to daylight hours when loud noises are more tolerable. Every reasonable effort will be made to minimize construction noise and construction and operation of the WRF will comply with all local/county noise ordinances.

Operation of the WRF will generate noise associated with mechanical operations. Although blowers and stand-by-power generators will be part of the WRF equipment,

these items will be equipped with sound reduction devices and located inside insulated enclosures to minimize noise impacts. Potential sources of operational noise will be located a minimum of 300 feet from the property boundary. The property buffer and preserved open space on the property will help reduce this noise to surrounding areas.

### **6.9.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure**

Noise levels will temporarily increase during construction but will comply with local noise ordinances. Following construction, noise levels will largely return to existing levels. When final design and permitting are complete, the construction techniques will be defined. The Project Partners will execute the construction in accordance with final permits and in full compliance with federal and state safety requirements.

Operation of pump stations can generate noise. The Town of Cary has received noise complaints from citizens living near pump stations and to address the issue the Town has installed sound attenuated enclosures for equipment and changed to dB rated equipment. This is now a standard design practice for Town of Cary pumping stations, and noise impacts should not generally occur. During power outages, the stand-by power generators at the pump stations will increase noise levels, but these events should occur infrequently.

## **6.10 WATER RESOURCES**

### **6.10.1 Surface Water**

#### **6.10.1.1 Water Reclamation Facility**

Chemicals will be stored on the WRF site. These chemicals will be stored in covered areas and double-containment structures so as to not impact water quality through stormwater runoff. The WRF site will be required to have a Stormwater Pollution Prevention Plan which will identify inspection schedules and other requirements to minimize contamination of stormwater runoff.

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

Practices must be installed that will control sedimentation from the peak runoff generated by the 10-year storm.

Finally, the riparian and forested buffers that will be maintained on site will serve as an additional sedimentation and erosion control measure. By following the sedimentation and erosion control plan and grading plan, implementing and maintaining BMPs to control sedimentation for the 10-year storm, and protecting the riparian buffers, the impacts to water quality during construction will be minimized and will not be significant. Groundwater resource impacts after construction will be negligible.

#### 6.10.1.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure

Measures will be taken during construction to minimize direct impacts to water quality. The transmission lines will cross each stream at approximately a 90-degree angle to ensure stability of the line and prevent erosion. Stream crossings will be inspected at least every six months. Where practicable, the lines will be installed using trenchless technology. When trenchless technology is not practicable, appropriate BMPs will be in place following guidance from Nationwide Permit 12 on utility line crossings of streams. (Note individual 404 permit being obtained for wetland/stream impacts for overall project).

Trenchless technology is currently being considered at three stream crossings White Oak Creek, Beaver Creek, and Little Beaver Creek. These crossings are all known to be perennial and have high water quality and value for wildlife use. It will be difficult to assess all stream crossings until easements and access agreements are obtained, therefore all stream crossings will be evaluated at that time using the USACE Stream Quality Assessment Worksheet (SQAW). Stream crossings that score a 75 or above (out of a possible 100) will be considered of high quality and crossings will be evaluated for the use of trenchless technology. This evaluation will consist of several factors including, but not limited to, cost, engineering requirements, substrate material, and impacts to instream fauna. It is anticipated that an additional 12 stream crossings (for a total of 15) will be evaluated using trenchless technology. All streams will be crossed following methods outlined in NC DWQ General Certification Conditions GC3374. These efforts include the use of silt fencing and temporary sediment traps. These plans will be detailed in the required Sediment and Erosion Control Plan submitted to NC Division of Land Resources (DLR). Water quality will also be protected at stream locations by the installation of filter fabric beneath any riprap at stream crossings. These impacts will be temporary and are considered insignificant with proper control

techniques. Following construction of stream crossings any wetland soils will be replaced and the areas replanted with native vegetation.

To estimate cumulative direct impacts from crossings, available information for streams and the preferred pipeline route was used to estimate the number of stream crossings. The data on streams came from Wake County GIS (Wake County, 2005) and NCCGIA (2004). Along the length of the preferred raw wastewater transmission line route, Reedy Branch and its tributaries, there are 69 stream crossings by sewer lines. Of these crossings two are on the mainstem and the remaining 67 crossings are on tributaries. The majority of the crossings are in the upper headwaters of Reedy Branch. Many of these headwater areas may be intermittent streams or ephemeral channels.

Along Beaver Creek and its tributaries there are 211 stream crossings of sewer lines. Of these crossings five are on the mainstem and the remaining 206 crossings are on tributaries. Many of these headwater areas may be intermittent streams or ephemeral channels. The proposed Beaver Creek gravity sewer may share existing stream crossings and will be evaluated to determine if a new crossing is necessary.

The cumulative direct impact of these stream crossings will be minimized by following appropriate erosion and sediment control practices. In addition, as described above, trenchless technology will be considered for streams that are highest quality as determined by the USACE Stream Quality Assessment Worksheet.

The pipeline leading from the discharge structure to the Cape Fear River will need to cross a small pond before reaching the Cape Fear River. Currently the use of trenchless technology is being considered for this crossing. The pipeline and diffuser structure that will be located within the river itself will be designed to have few impacts to water quality after construction. Impacts of construction will not be able to be estimated until the type of construction for instream structures is known. Impacts during construction will be managed by following the sedimentation and erosion control plan and implementing and maintaining appropriate BMPs and conditions included in 404/401 permits.

#### 6.10.1.3 Cape Fear River

The proposed discharge to the Cape Fear River could impact instream dissolved oxygen and it will result in increased nutrient loading to the River. In order to assess the impact of the proposed discharge on dissolved oxygen, the Town of Cary in cooperation with the Public Works Commission (PWC) of the City of Fayetteville and DWQ, modified

a QUAL2EU model that had been developed by DWQ. Several scenarios were evaluated in an effort to assess the potential effect on instream DO which may result from either an increase in water supply withdrawal and wastewater discharge by PWC or a new wastewater discharge below Buckhorn Dam. Table 6-2 summarizes the input conditions and predicted DO immediately upstream of the three Lock and Dam structures for model runs with and without phytoplankton productivity. Figure 6-2 illustrates the predicted instream DO for the various modeling scenarios. The model results indicate that summer limits of 5 mg/L BOD<sub>5</sub> and 1 mg/L NH<sub>3</sub>-N will protect instream DO for the proposed discharge with and without phytoplankton activity.

The model runs summarized in Table 6-2 and Figure 6-2 were based on a headwater flow of 600 cfs. The Division of Water Resources (DWR) requested that the model also be run at a headwater flow of 530 cfs. The model was not sensitive to the estimated headwater flow which frequently is predicted when a WRF effluent is highly treated to have low levels of oxygen-consuming waste. Under the scenario which included increased wastewater treatment flows, the DO was approximately the same at L&D #3 (predicted DO was 5.6 mg/l at 600 cfs and 5.7 mg/l at 530 cfs). By protecting the DO standard, the Project will protect the river from fish kills, one indicator of aquatic integrity.

The new WRF will increase nutrient loading to the Cape Fear River. As discussed in Section 5, exceedances of the chlorophyll *a* standard have been observed by DWQ and by the MCFRBA behind L&D #3. However, these data were based on summer data that were not collected in the photic zone as in accordance with procedures recommended by DWQ. The MCFRBA began collecting data in the photic zone in November 2004; these data show no violations of the chlorophyll *a* standard and significantly lower chlorophyll *a* levels overall.

Research by Dr. Whalen at UNC indicates that reducing nutrient loading does not impact predicted productivity; rather light is the limiting factor in productivity behind the L&D structures. His research showed that when nutrient concentrations were reduced by up to 45 percent, there was little change in phytoplankton growth. However, when light was increased above average levels by a factor of 4, nutrient assimilation and phytoplankton productivity increased (Whalen and Dubbs, 2005). Dr. Whalen also noted that management decisions that may increase water clarity should be coupled with reductions in nutrient loading (particularly nitrogen, since it limits growth when there is adequate light).

While it is acknowledged that the new WRF will increase nutrient loads to the Cape Fear River, the QUAL2E model was not developed to predict instream chlorophyll a concentrations. Given the uncertainties in whether the system is actually experiencing high level of chlorophyll a, how nutrient loading impacts productivity, and the lack of a good water quality model to predict instream chlorophyll a levels, the Partners worked with DWQ to develop an interim nutrient management strategy until better data exist to develop a nutrient management strategy. During this interim period, new and expanding dischargers to the Cape Fear River will meet 6 mg/L TN and 2 mg/L TP. DWQ has provided the Partners with speculative limits based on these DO and nutrient loading strategies as included in Appendix D; these limits will protect the Cape Fear River from algal blooms, low DO, and associated fish kills.

TABLE 6-2A

Summary of Input Parameters, Predicted Instream Dissolved Oxygen(DO), and Change in DO for Scenarios Assuming Phytoplankton Productivity

Scenario	Description	Headwater Conditions		Predicted DO			Change in DO Relative to Baseline		
				LD 3	LD 2	LD 1	LD 3	LD 2	LD 1
		Chl a (µg/L)	Q (cfs)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)
1A	Base scenario	20	622	6.50	5.96	6.22	0.00	0.00	0.00
2A	New wastewater discharge (12 mgd) below Buckhorn	20	614	6.47	5.92	6.18	-0.03	-0.04	-0.04
3A	New wastewater discharge (30 mgd) below Buckhorn	20	603	6.41	5.86	6.12	-0.09	-0.1	-0.10
4A	Increase PWC wastewater discharge (53 mgd)	20	622	6.50	5.96	6.22	0.00	0.00	0.00
5A	New wastewater discharge (30 mgd) below Buckhorn and Increase PWC wastewater discharge (53 mgd)	20	603	6.38	5.83	6.09	-0.12	-0.13	-0.13
6A	Increase Fayetteville PWC withdrawal to 80 mgd; WWTP discharge 69 mgd	20	622	6.32	5.76	6.06	-0.18	-0.20	-0.16

TABLE 6-2B

Summary of Input Parameters, Predicted Instream Dissolved Oxygen(DO), and Change in DO for Scenarios Assuming No Phytoplankton Productivity

Scenario	Description	Headwater Conditions		Predicted DO			Change in DO Relative to Baseline		
				LD 3	LD 2	LD 1	LD 3	LD 2	LD 1
		Chl a (µg/L)	Q (cfs)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)	DO (mg/L)
1B	Base scenario	0.00	622	5.76	4.87	5.08	0.00	0.00	0.00
2B	New wastewater discharge (12 mgd) below Buckhorn	0.00	614	5.70	4.82	5.04	-0.06	-0.05	-0.04
3B	New wastewater discharge (30 mgd) below Buckhorn	0.00	603	5.63	4.75	4.97	-0.13	-0.12	-0.11
4B	Increase PWC wastewater discharge (53 mgd)	0.00	622	5.76	4.87	5.10	0.00	0.00	0.02
5B	New wastewater discharge (30 mgd) below Buckhorn and Increase PWC wastewater discharge (53 mgd)	0.00	603	5.60	4.72	4.94	-0.16	-0.15	-0.14
6B	Increase Fayetteville PWC withdrawal to 80 mgd; WWTP discharge 69 mgd	0.00	622	5.57	4.66	4.90	-0.19	-0.21	-0.18

The Cape Fear River's flow is regulated by the operation of B. Everett Jordan Dam. The minimum release required from the Dam is 40 cfs with a target flow of 550-650 cfs at Lillington. The US Geological Survey (USGS) estimates the 7Q10 flow at the gage at Lillington to be 530 cfs since Jordan Lake began operation in 1982 (Weaver and Pope, 2001). Since no major tributaries enter the Cape Fear River between the discharge point and Lillington and the USGS has indicated that there is evidence of a losing reach on the Cape Fear River, the 7Q10 estimate may also apply at the discharge point. In order to provide a more conservative estimate of potential impacts, the drainage area ratio between Buckhorn Dam and Lillington was also used to estimate the 7Q10 at the discharge point. Using this analysis, the 7Q10 flow is 494 cfs. Flows have been lower than 7Q10 during recent drought periods. Thus, a request has been made to USGS to update its 7Q10 estimate at Lillington.

With the combined permitted flow from the proposed Western Wake WRF and from the Holly Springs Utley Creek WRF of 38 mgd, the instream waste concentration (IWC) is 10 percent based on a 7Q10 flow of 530 cfs and 10.7 percent based on a flow of 494 cfs (IWC defined by DWQ as  $(\text{facility design flow})/(\text{7Q10} + \text{facility design flow})$ ). Since the USGS incorporates estimated tributary flows, wastewater flows, and water supply withdrawals to determine the release needed from Jordan Dam to meet the Lillington target, including the facility design flow in the denominator of the equation may not be appropriate. Thus, the IWC was recalculated using by dividing the facility design flow by the 7Q10. In addition, the IWC at a flow of 450 cfs was also included to account for recent drought years; this flow will be updated when the revised 7Q10 estimate is received from USGS. The following IWC's were calculated based on this methodology:

<u>Cape Fear Flow</u>	<u>IWC</u>
530 cfs	11.1%
494 cfs	11.9%
450 cfs	13.1%

This change in flow should not impact instream aquatic habitat. When target flows at Lillington cannot be met because of drought conditions, the WRF will be well below its permitted levels. During these times, instream water quality is closely monitored by regulatory and resource agencies.

During normal operations at Jordan Dam, water quality will be monitored along the Cape Fear River. Figure 5-7 illustrates the location of MCFRBA and DWQ ambient monitoring sites to L&D #3. The site at Lillington is monitored by the MCFRBA biweekly

during the summer and monthly by DWQ. Several of the Project Partners either belong (Holly Springs) or participate in the MCFRBA and are involved in its monitoring program. This monitoring program was developed in coordination with DWQ, and an MOA between the MCFRBA dischargers and NCDWQ was developed. The MOA outlines the sampling parameters, frequency, reporting, and quality procedures to ensure that data are valuable to NCDWQ.

The diffuser could impact river flow patterns; information presented in the PER (TMs 28 and 29) was used to evaluate potential impacts. It should be noted, that during final design bank discharge and diffuser designs will be evaluated using a dilution model as outlined in Section 4. Results from the modeling will be used by DWQ to develop whole effluent toxicity limits. In addition, additional survey and geotechnical data will be obtained and evaluated during design. Thus, impacts could change based on final design. Data on the river bottom taken November 18, 2005 during low flow conditions (271 cfs; see PER Figures 28-8 and 29-2) suggests that the diffuser structure would be covered by at least one foot of water under similar low flow conditions; accurate surveys conducted during final design will better determine the water depth over the diffuser. Also the diffuser structure would extend approximately 400 feet from the north bank (measured perpendicularly) into the main channel of the river under these low flow conditions. This would leave a channel approximately 100 feet wide with an average depth of approximately 2.5 feet (under low flow conditions) between the end of the diffuser and the south bank.

The PER indicates that there is a possibility of dry riverbed under low flow conditions. Under this condition, the discharge will appear as a parabolic jet arcing up and away from the port and then falling to the river bed. A rip-rap apron has been included in the preliminary design to prevent scour to the river.

The use of two barrels will also be reviewed during final design. However, as currently designed, the height of the pipe above the river bed will not be governed by pipe diameter, but by the criterion of keeping the inverts of the discharge ports no less than 1.5 feet above grade to reduce intrusion of sediment. Therefore, the height of two 48-inch pipes above river bed will be no different than the height of a single 6-inch pipe above the river bed (60-inch pipe would be buried further into the river bed).

Finally various construction techniques will be evaluated during the final design of the outfall structure; different techniques will have different impacts on the Cape Fear River. For example, the use of trenchless construction will be evaluated during final design;

trenchless construction would have a lower impact on flow patterns but may be infeasible when further data are obtained. In addition, different installation techniques may have different temporary impacts on the River. One option would use a portable cofferdam system which would require dewatering a portion of the river. Another option would not require dewatering which would involve dredging a trench, floating the diffuser into position with a barge and crane, and completing the installation with divers.

## **6.10.2 Groundwater**

### **6.10.2.1 Water Reclamation Facility**

Measures will be taken during construction to minimize direct impacts to groundwater quality. Groundwater resource impacts after construction will be negligible.

At the plant site, chemicals could be spilled which could impact groundwater quality. These chemicals will be stored in covered areas and double-containment structures so as to not impact groundwater quality through infiltration. Monitoring and control of the chemical storage facilities will occur including ultrasonic liquid level monitoring, float level switches which would indicate a spill, and a flow meter to monitor chemical feed (PER TM No. 21).

The WRF site will be required to have a Stormwater Pollution Prevention Plan which will identify inspection schedules and other requirements to minimize contamination of stormwater runoff.

As water and sewer services are expanded, fewer residents will rely on groundwater as a public water supply source. Also, a number of septic tank/ground absorption systems serving residences may be eliminated. These are positive impacts to the groundwater resources of the Project Area by reducing the demand for groundwater as a source for drinking water and the public health risk of groundwater contamination in the Project Area from leaking or failing septic tanks.

Groundwater withdrawal and recharge impacts which could impact quantity will be limited. The Western Wake WRF will not withdraw groundwater but obtain the required potable water from the Cary/Apex Water Treatment Plant. The Partners formally plan to use the final treated effluent to serve non-potable water demands throughout the site including water hose bibs and water cannons used for basin cleaning, equipment washdown, and HVAC equipment process water. The WRF is being designed to produce the quality of effluent such that a formal reuse program will occur when development in the area makes it feasible. Built-upon area for this site will be below the

typical low density development imperviousness. Despite this overall low density, the NPDES permit will require a Storm Water Pollution Prevention Plan for the facility and may also require implementation of stormwater BMPs. A net positive impact for groundwater recharge may occur due to the proposed landscape irrigation which would increase the potential for recharge; however, there is slow permeability within the subsoil due to the geotechnical conditions of the area.

#### 6.10.2.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure

Impacts to the groundwater resources of the Project Area from groundwater contamination from leaking or failing transmission lines are unlikely. Due to the subsurface conditions, the potential for significant infiltration or exfiltration is reduced. Construction in accordance with regulatory and building code requirements will reduce the potential for the leaking transmission lines. Lines will also be monitored to determine if leaks occur. The monitoring may include pressure testing, closed-circuit television or smoke testing. A series of flow meters will be installed throughout the system in order to perform a flow balance. If the flow balance indicates leaks are occurring, further monitoring will be performed to identify the problem area and repair it.

The Beaver Creek PS will be monitored using programmable logic controllers (PLCs) and be monitored on a real-time basis (PER TM No.33). In order to meet reliability requirements, a standby power source will be installed.

### 6.11 FOREST RESOURCES

#### 6.11.1 Water Reclamation Facility

Existing land use will be modified from forested land to a forested-utility use. The total land area being acquired for the 30 mgd WRF is 235 acres. Of the total 235 acres, 69 acres will be built upon for new facilities, including the new access road from Shearon Harris Road. The balance of the land being acquired for WRF site will remain undeveloped and the environmental resources will not be impacted. Of the 69 acres that are being developed all are forested. However a large portion of the site (150 acres) will remain forested after completion of the WRF.

#### 6.11.2 Force Main, Pump Stations, Gravity Sewer Lines, and Discharge Structure

The proposed Project requires the construction of an estimated 40,000 linear feet of raw wastewater force main, an estimated 28,000 linear feet of gravity sewer, and an estimated 62,000 linear feet of effluent transmission main.

Easements totaling 156 acres for these transmission lines have been assumed following the methodology in section 5.1.2 of this document. The amount of forest resources in these easements totals 143 acres based on available land cover data (CGIA, 2004). In general, all pipelines for the proposed Project will be installed within, or adjacent to, existing public ROW (roads) and existing utility corridors (natural gas and electricity). Upon completion of pipeline installation, the Project Partners will require a permanent easement along all pipeline alignments to allow for unobstructed access to the pipelines for routine inspection and maintenance and forest resources will not be replaced.

The total land area being acquired for the Beaver Creek PS is 31.5 acres. Of the total 31.5 acres, 4.2 acres will be built upon for new facilities, excluding the new access road from Richardson Road. Available GIS data indicates that the forest resource impacts on the Beaver Creek PS site would be 2.1 acres of primarily bottomland hardwoods (CGIA 2004), but site visits have indicated that the majority of the land to be disturbed is currently managed herbaceous cover.

The discharge structure and pipeline will require 1.9 acres of forest to be cleared for construction and pipeline installation.

## **6.12 SHELLFISH OR FISH AND THEIR HABITATS**

### **6.12.1 Water Reclamation Facility**

During construction, erosion will occur at a higher rate than when the land is forested. An erosion and sediment control plan will be developed in accordance with the Sedimentation Pollution Control Act as described in Section 6.10. After construction, a stormwater pollution plan will be followed, and all chemicals will be stored in covered areas and double-containment structures to minimize the impacts from spills. Since impacts to water quality will be minimal, impacts to fish will be minimal.

### **6.12.2 Force Main, Pump Stations, Gravity Sewer Lines, and Discharge Structure**

In order to minimize impacts to fish and other aquatic organisms, the force main and other lines will be installed using trenchless technology where practicable (see Section 6.10.1 for details). Where it is not practicable, temporary disturbance to shellfish, fish and their habitats will occur at each stream crossing during construction. Current USACE and DWQ rules will limit these impacts. Temporary sediment traps will be in place in the stream channels to limit water quality impacts.

### **6.12.3 Cape Fear River**

Construction of the WRF could impact fisheries temporarily. Plans will be devised to minimize the amount of sediment that impacts habitat within the River. Construction may also temporarily displace fish species.

The proposed WRF could impact fisheries by impacting either water quality or water quantity in the Cape Fear River. As described in the water resources section, the proposed WRF will be designed to meet limits that will protect water quality in the Cape Fear River. Advanced treatment technology is proposed, and ultraviolet (UV) disinfection will be used rather than chlorine for all effluent discharged to the Cape Fear River. The use of UV disinfection will minimize any potential toxic impacts to Cape Fear River quality.

The proposed WRF could impact river flow most during low flow events. As described in the water resources section, during 7Q10 conditions, the permitted capacity of the outfall will be approximately 10 percent of the stream. During drought conditions, the high quality of the effluent may help to sustain water quality and habitat conditions as was observed during the drought of record in 2001 and 2002 (DENR, 2005) Also, the peak flows from the facility will correspond with wet weather. During drought conditions, the relative amount of effluent instream will be lower than allowed under permit requirements.

The pipeline and diffuser located within the river will be partially buried in the river bottom with the crown of the pipe and diffuser ports extending approximately 22" above the stream bottom (PER 29). In extremely low flow conditions the pipeline and diffuser ports may extend above the waterline. The pipeline will span approximately 75% of the width of the river; this should allow a channel for fish to pass around the pipeline. Data on the river bottom taken November 18, 2005 during low flow conditions (271 cfs) suggests that the diffuser structure would be covered by at least one foot of water. Also the diffuser structure would extend approximately 400 feet from the north bank (measured perpendicularly) into the main channel of the river under these low flow conditions. This would leave a channel approximately 100 feet wide with an average depth of approximately 2.5 feet (under low flow conditions) between the end of the diffuser and the south bank.

## 6.13 WILDLIFE AND NATURAL VEGETATION

### 6.13.1 Water Reclamation Facility

At the WRF site, portions of the existing vegetation will be removed or modified during construction. The existing land use on these portions (approximately 69 of 235 acres) will change from largely forested to a utility/forest mix. The cleared section of the parcel will result in a permanent loss of habitat. Currently part of the northern portion of the site is used for agriculture. A gas-line ROW exists along the northern boundary of the property. These areas provide limited habitat for terrestrial species as compared to the less disturbed southern area.

To the extent practicable, structures will be clustered to minimize imperviousness and habitat impacts during the final design. Two areas of the WRF site (see Figure 6-1) will be set aside as conservation areas and not be developed. The Project Partners will consider placing some portions of the WRF site into a permanent conservation easement once the final facility plan and pipeline alignments have been reviewed and approved through the EIS and permitting process. The 26 acres shown as conservation areas will be considered along with other areas not needed for construction, operation or management of Phase 2 of the WRF. Other impacts to wildlife will be displacement due to noise during construction activities and operation of the WRF. Noise associated with construction activities will normally be limited to daylight hours and will be a temporary impact. Long term noise impacts to wildlife will be minimized by housing noise producing machinery in insulated enclosures.

For security purposes, the Project Partners will install security fencing around the 69 acres of the site that will contain the major components of the WRF. For property delineation purposes, the Project Partners will install a fencing system that will allow for wildlife movement through the fencing system.

### 6.13.2 Force Main, Pump Stations, Gravity Sewer Lines, and Discharge Structure

Wildlife will not be significantly impacted by construction of the pump stations and transmission lines. As previously discussed in other sections, the ROW where construction is planned currently provides little wildlife habitat due to previous disturbance and maintenance activities. In addition, most wildlife such as birds and small mammals are mobile and can remove themselves from or avoid the construction zone. These conditions provide little unaltered habitat for terrestrial species. At the Beaver Creek PS site there is primarily grazeland which provides limited habitat for terrestrial wildlife. Construction activities will likely temporarily impact wildlife

surrounding the pump station site, but normal operation of the pump station should not significantly increase noise.

Installation of the gravity sewer lines may impact aquatic and terrestrial species. These lines will be kept out of the riparian buffers and wetlands associated with the floodplain to the maximum extent practicable, but will need to be sited in them. Some of these impacts may be minimized using trenchless technology at stream crossings (see section 6.10.1) Large portions of the transmission lines will be located along existing right-of-ways and roadways which will limit the need to place transmission lines in undisturbed areas. The habitat along the proposed transmission lines is fragmented by roads development and existing right-of-ways which should limit the direct impacts to wildlife.

### **6.13.3 Threatened and Endangered Species**

Several Federal Threatened and Endangered species are known to occur or have occurred in Wake County as outlined in Section 5. The proposed project is not anticipated to have any direct effects to these species. A Biological Assessment / Biological Evaluation has been prepared and will be submitted to the USFWS along with this EIS (Appendix H). (It is anticipated that a letter of concurrence will be awarded and included in the appendices of the final draft of this EIS).

The proposed construction activities do not occur near any known nesting sites for the Bald Eagle, and no suitable habitat was observed during site visits.

The proposed construction activities occur far upstream of the historic distribution for the Cape Fear Shiner. Known occurrences of the Cape Fear Shiner occur within a different watershed within the Cape Fear Basin, and thus impacts are unlikely to occur.

The known occurrences of the Dwarf Wedgemussel species occur within the Neuse River Basin. Thus, no direct impacts are expected to occur from construction and operation of the WRF and related infrastructure.

Harperella is not known to exist in Wake County, and thus the proposed construction activities are not likely to affect this species.

The North Carolina Natural Heritage Program (NHP, 2004) has records for Michaux's sumac in Wake County, but not near the proposed activities. Unknown populations of Michaux's sumac might occur in this area and be impacted by direct and indirect effects. If populations are identified during permitting, design and construction activities,

conservation measures (trenchless technology and others) will be used to avoid and minimize direct impacts. This species may also benefit from the maintenance of transmission line right-of-ways since it requires disturbance to preserve open canopy habitats.

The Red-Cockaded Woodpecker has not been observed in the county in over 20 years (NHP, 2004 and CGIA, 2004). Direct impacts to this species are unlikely to result from the proposed action.

## **6.14 INTRODUCTION OF TOXIC SUBSTANCES**

### **6.14.1 Water Reclamation Facility**

Potential sources of toxic substances during construction activities at the WRF site include hydrocarbons from heavy equipment. Refueling will occur in a designated upland area to minimize the impacts to surface water from any spills that may occur. Sediment and erosion controls will aid in the control of the movement of contaminants from the construction site to surface waters.

Throughout the course of operation of the WRF, sodium hypochlorite will be stored on site for the use in the treatment of reuse water. All MSDS sheets will be maintained on site. In addition double containment will be used for the storage of any toxic substance. A spill prevention plan will also be in place in order to prevent and minimize the effects of a spill. In addition, a stormwater pollution prevention plan will be required by the NPDES permit.

### **6.14.2 Force Main, Gravity Sewers, Pump Stations, Effluent Transmission Mains, and Discharge Structure**

Similar to the WRF site, the main toxic substances that may be of concern are hydrocarbons from fueling operations for heavy equipment used during construction. Another potential concern is toxic substances that could be present in the raw wastewater conveyed to the water reclamation facility. The mitigation measures for toxic substance release are addressed by the Project Partners in three areas:

- 1) NPDES Permit
- 2) Industrial Pretreatment Program Requirements
- 3) System-Wide Wastewater Collection System Permit

## **NPDES Permit**

The NPDES permit for the new water reclamation facility will include chemical-specific water quality monitoring of influent and effluent characteristics, as well as chemical-specific toxic limits to protect water quality standards. In addition, the NPDES Permit will include whole effluent toxicity standards to ensure that the treated effluent is not toxic to aquatic species.

## **Industrial Pretreatment Program Requirements**

To eliminate the introduction of toxic substances into the wastewater conveyance system, the Town of Cary and the Town of Apex maintain industrial pretreatment programs in accordance with the National Pretreatment Program requirements. The National Pretreatment Program, established by EPA, requires local governments to apply and enforce discharge standards, issue permits to industrial wastewater dischargers and inspect and monitor the characteristics of raw wastewater and industrial wastewater discharges on a regularly-scheduled basis. The objectives of the National Pretreatment Program are to:

- Prevent the introduction of pollutants into water reclamation facilities which will interfere with the performance and operation of the water reclamation facility
- Prevent the introduction of pollutants into water reclamation which will pass through the treatment facility, or otherwise be incompatible with the treatment facility
- Prevent the introduction of pollutants so as to improve opportunities to recycle and reclaim wastewater sludge and treated effluent for beneficial purposes
- Prevent the introduction of pollutants so as to protect the structural and hydraulic integrity and capacity of the wastewater collection system

## **System-Wide Wastewater Collection System Permit**

Sanitary sewer overflows (SSOs) are discharges of untreated sewage from wastewater collection systems. Sanitary sewer overflows can result from a variety of causes including, but not limited to, excessive infiltration and inflow, pumping station failures, insufficient system capacity, and hydraulic restrictions caused by tree roots, debris accumulation, collapsed pipes, and excessive grease.

In July 1999, the North Carolina General Assembly ratified House Bill 1160 (1999 N.C. Session Law 329) Section 11.2 of Part XI which required NC DENR to develop and implement a permit program for municipal and domestic wastewater collection systems on a system-wide basis beginning July 2000. NC DENR initiated the System-Wide Wastewater Collection System Permit program (15A NCAC 2H .0227) and the Town of Cary (Lead Agency for the Project Partners) has been issued a system-wide wastewater collection permit which defines requirements for system performance standards; design and construction criteria; capital improvements planning; inspection, operations and maintenance requirements, and annual reporting requirements.

In accordance with the System-Wide Wastewater Collection System Permit, the Town of Cary will be required to inspect high-priority pipelines at least every 6 months and pumping stations will need to be inspected at least weekly. In addition, the Town is required to have a Spill Response Action Plan. The Spill Response Action Plan is available for review upon request.

### **Additional Measures**

Adverse environmental impacts from leaking or failing transmission lines are unlikely. Due to the subsurface conditions, the potential for significant infiltration or exfiltration is reduced. Construction in accordance with regulatory and building code requirements will reduce the potential for the leaking transmission lines. Lines will also be monitored to determine if leaks occur. The monitoring may include pressure testing, closed-circuit television or smoke testing. A series of flow meters will be installed throughout the system in order to perform a flow balance. If the flow balance indicates leaks are occurring, further monitoring will be performed to identify the problem area and repair it.

## **6.15 RELATED ACTIVITIES**

There is a public concern for the environmental impact of construction activities that will occur as a direct result of the construction of this Project. The Town of Holly Springs plans to expand its Utley Creek WWTP and subsequently connect an effluent line to the pipeline from the WRF to the Cape Fear. The expansion of the WWTP will be confined within the existing site, subsequently minimizing environmental impacts that will occur due to this construction activity. The connector line will run from the Utley Creek WWTP to the Project effluent line. This line will be installed to avoid wetland and stream impacts. All unavoidable environmental impacts as a result of the Holly Spring WWTP expansion will be documented in a separate Environmental Assessment (EA).

There are utilities that will need to be run to the WRF for operational purposes: electricity and water. The Town of Apex plans to run a waterline to the WRF; this line will be run along road right-of-ways (ROW) or close as feasibly possible to the ROW. Impacts as a result of the waterline installation will be minimized due to the fact that the pipeline will be installed in areas that have already been previously disturbed. Power lines also will be run to the WRF for operational purposes. There are 2 power line options being considered: 1 from the Town of Apex and 1 from Progress Energy. Each option would construct above ground power lines; the Town of Apex would also need to construct a substation. Overhead lines will reduce the environmental impact as they can be placed in such a manner to avoid impacts and the substation would be small enough that its placement could be done in such a way to avoid or practically minimize environmental disturbances.

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