

PREPARED FOR: Western Wake Partners
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Subject: Western Wake Regional Wastewater Management Facilities
Raw Wastewater Pumping and Conveyance Facilities
PER Technical Memorandum No. 30 –Site Development and Utilities

INTRODUCTION

This Technical Memorandum (TM) is one in a series of TMs prepared for the Preliminary Engineering Report for the Western Wake Regional Wastewater Management Facilities project. The purpose of this Technical Memorandum is to present the preliminary overall site characteristics and layout of the proposed Western Wake Water Reclamation Facility. Topics such as site utilities, access, and environmental impacts are also discussed. Figure 30-1 shows the overall site with a proposed layout of Phase 1 facilities. The proposed site layout easily accommodates expansion for Phase 2. Figure 30-2 is a larger scale drawing showing the proposed facility layout with existing topographic features.

EXISTING FACILITIES AND SITE CONDITIONS

The proposed Western Wake Water Reclamation Facility site is located near the southwest corner of Wake County and comprises an area of approximately 229 acres. The main portion of the site is bounded on the south by US 1. The parcel north of US 1 comprises approximately 211 acres, while the southern portion of the site below US 1 accounts for the remaining 18 acres. The proposed facility will be located entirely on the parcel located north of US 1.

The property is further bounded on the north by Old US 1 and a line of the CSX Transportation (Railroad), to the east by residential property along New Hill-Holleman Road (SR 1135), and to the west by Shearon Harris Road (SR 1134). A propane gas pipeline easement owned by Dixie Pipeline Company runs to the south of, and parallel to, the CSX Railroad right-of-way.

The site has two sets of existing structures, consisting of single-family houses and associated out-buildings, near the northern edge of the property. One of the houses, near the existing site access gate, is in disrepair and apparently abandoned, while the other is occupied. Both of these structures would likely be demolished as part of this project.

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The site contains two ponds, both of which are near the northern boundary of the site, with one pond considerably larger than the other. The smaller pond, with a surface area of less than 10,000 ft², is located between the two groups of existing structures. The second, larger pond is a farm pond of the type typical to the area with an earthen dike approximately 14-feet high and a surface area of approximately 2.0 acres.

The plant site is crossed by two major drainage features, one roughly parallel to the east boundary and the other roughly parallel to the west, which traverse the site in a generally north-south direction. Each of these drainage features has numerous tributaries draining the area comprising the site. These features join to become known as Little White Oak Creek just north of US 1 before crossing under the highway in a box culvert.

Various wetland features have been identified on the site and are primarily associated with the streams. None of the wetlands present on site are of a high quality, primarily due to the disturbed conditions from past farming and logging of the property. Nonetheless, wetlands and stream impacts by roadways and facilities will be limited to the extent practical during the design and construction of the project.

The site is primarily wooded, with the only cleared areas being near the two houses on the northern edge of the property. The cleared areas comprise less than approximately 30 acres of the total 211 acres of the northern parcel. As is typical of this area, the property appears to have been farmed and logged in the past, resulting in wooded areas primarily consisting of relatively young pine. Hardwoods are also found on the site, and are mainly located along drainage features. These areas are difficult to log, and consequently these areas are often comprised of hardwood trees older than those on the remainder of the site.

ACCESS AND SECURITY ISSUES

The main access to the facility will be from Shearon Harris Road (SR 1134), which is located west of the property. An easement will be required from Progress Energy for construction and use of the access road across Progress Energy owned land. It is not anticipated this new intersection will require signalization. The distance of the proposed entrance to the intersection of SR 1134 and Old US 1 and the CSX Railroad crossing will be required to meet traffic queuing requirements, however, as well as any other roadway improvements, such as turning and acceleration/deceleration lanes, required by North Carolina Department of Transportation (NCDOT) regulations.

The main entrance/exit to the site will be gated, with access allowed through means of a card reader and an intercom system. Video surveillance would also be employed at the entrance for visual

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inspection of all incoming traffic. This entrance would be the only regularly used access point to the site. All traffic entering the site would be routed past the Operations/Maintenance Building before entering the process area of the facility. The access roadway would then loop around the process area, with a one-way pattern, and intersect the incoming access road. A second actuated gate, with exit-only operation, located at this intersection would allow traffic to exit the site by way of the entrance/exit on SR 1134.

OVERALL FACILITY LAYOUT

The liquid treatment facilities are sited along the most prominent ridge running north–south through the site. The facilities are sited such that the plant hydraulic profile follows the general slope of the ridge to the south. Even so, extensive grading will be required to “flatten” the top of the ridge for construction of the new facilities. Future expansion of the liquid treatment facilities would be primarily to the east side of the Phase 1 facilities to minimize disturbance of plant operations.

The solids treatment facilities are located on a parallel ridge to the west of the liquid treatment facilities. The upper reach of the drainage feature that separates the liquid and solids treatment facilities will be filled to allow for construction of chemical storage and feed facilities at a centralized location and to provide easy access across the plant site.

The operations and maintenance facilities are located at the north end of the site adjacent to the large pond. As stated above, all incoming traffic will be routed by the Operation/Maintenance Building prior to entering the site. Because most heavy truck traffic will be concentrated in the area of the solids facilities and the chemical facilities, a looped road alignment is provided in this area to provide flexibility to allow truck traffic to be directed away from the Operation/Maintenance Building.

EXCAVATION STOCKPILING/DISPOSAL

Significant quantities of soil will be excavated during construction of the treatment facilities and the associated access roadway, yard piping, etc. Stockpile areas will be designated on the site for use by the Contractor as temporary disposal of spoil material, if necessary. It is anticipated the Contractor should only stockpile the excavated material required for on-site fill operations as construction progresses. All other excavated materials will be hauled off-site and properly disposed. Any on-site soil stockpiles will have to be maintained with regard to stability and erosion control considerations. In particular, soil stockpiles will have appropriate erosion control measures installed at the perimeter of the stockpile, and temporary or permanent seeding/stabilization measure employed throughout the construction period. These measures will be regularly inspected and maintained per the requirements of the erosion control and stormwater construction permits issued for the project and in accordance with good construction practices.

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All off-site soil hauling activities will be performed in accordance with applicable State and local ordinances and laws for the transportation of materials on public roadways.

SITE UTILITIES

The proposed Western Wake Water Reclamation Facility site is located in a sparsely developed portion of Wake County, and, as such, public utilities are not generally available. The only services known to exist on the site are the electrical and telephone connections to the one inhabited house located on the northern portion of the site. These services come from the Old US 1 right-of-way. The house uses a well and septic system.

Electricity and telephone are available on all roadways adjacent to the site. In addition, a high-tension power line crosses the southern portion of the site south of US 1.

As noted earlier, a Dixie Pipeline Company propane gas transmission line is located along the northern property line, just south of the CSX Railroad right-of-way.

The nearest existing public water supply line is approximately 4.5 miles northeast of the site along the Old US 1. The nearest existing public sanitary sewer is located in the same general vicinity.

The Town of Apex has proposed to construct a water supply line to the facility on a schedule concurrent with facility construction. Domestic wastewater collected throughout the facility will be added to the influent stream of the plant for treatment.

Wastewater coming to the facility from its service area would come by way of a proposed force main to be constructed concurrently with the project.

STORMWATER FACILITIES

Stormwater facilities will be designed based on guidelines and procedures as set forth by the North Carolina Division of Water Quality. In this case, the site would be subject to the requirements of the General NPDES Phase II Stormwater Permit of the State of North Carolina Department of Environment And Natural Resources, Division of Water Quality, General Permit No. NCS230000, To Discharge Stormwater In The Eighty Non-Coastal Counties Under The National Pollutant Discharge Elimination System. The total built-upon area of this site is less than 5%, which is well below the low density development threshold of 24% impervious surface set by this permit. This site will therefore be considered low density development for purposed of permit compliance.

This site is located in the Cape Fear River Basin. As previously discussed, the site contains two ponds, and is bisected by two major drainage features which traverse the site in a generally north-

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south direction. The features are located to the east and west of the proposed facilities and intercept surface flows from the east and west of the site. Each of these drainage features has numerous tributaries draining the area comprising the site, and ultimately both major features join just north of US Route 1 before crossing under the highway in a box culvert. Once the two major tributaries join, the drainage feature is known as Little White Oak Creek and is classified as Class C waters by the North Carolina Division of Water Quality.

Class C waters are protected for secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, agriculture and other uses suitable for Class C waters. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner. Class C waters have no restrictions on watershed development or types of discharges.

As no specific State or local buffers rules apply to this site, 50-foot buffers from either side of stream centerlines were assumed for the site layout, and, with the exception of the proposed site entrance roadway, these buffers will not be disturbed. The site entrance road will cross the western tributary to Little White Oak Creek in two locations. Wetlands will be avoided by these two crossings and linear stream impacts will be limited to the extent practical during design and construction.

Off-site flows are not generally of concern for the stormwater design of this facility due to the proposed facility layout. Off-site flows lead to the two tributaries, and thus are intercepted before they reach the facility proper. These off-site flows will therefore be allowed to bypass the facility drainage system and are not affected by its design.

The bulk of the facility development occurs along the ridge line between these two tributaries to Little White Oak Creek, and therefore surface water drains away to both the east and west to be collected in the tributaries and ultimately leaves the site to the south by way of the culvert under US 1.

Stormwater will be collected from developed portions of the site by way of a combination of grassed roadside drainage swales, stormwater inlets, where appropriate, and stormwater piping. All stormwater collected in this manner will be conveyed to stormwater management Best Management Practices (BMPs) which will provide the required levels of stormwater quantity and quality control.

The BMPs will be designed, at a minimum, to limit post-developed peak stormwater flows to a level less than or equal to pre-developed peaks for the 2-year through 100-year return period stormwater event. All stormwater outlets will be designed to limit exit velocities to below erosive levels, and to provide sheet flow where practical at all discharge points upstream of buffer areas.

It is anticipated neither of the two existing ponds will be used for stormwater control, although efforts would be made to insure the larger of the two ponds continues to receive an adequate flow of surface water after development.

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EROSION CONTROL

Erosion control measures for the facility will be subject to the jurisdiction of the North Carolina Land Quality Section and follow the guidelines and procedures outlined in the North Carolina “Erosion and Sediment Control Planning and Design Manual.”

Erosion and sedimentation control measures will be used throughout the facility construction to limit the amount of erosion from the exposed soils and to keep sediment from being transported beyond the limits of construction. Erosion is the wearing away of the land surface by water, wind, gravity, ice or any combination thereof. Sedimentation is the process by which sediment resulting from erosion has been or is being transported by water, air, gravity, or ice from its site of origin. Both temporary and permanent types of erosion and sedimentation control measures will be used during construction.

Temporary erosion control measures include the use of temporary seeding and mulching, tracking of freshly graded cut or fill slopes, construction road stabilization, temporary rolled erosion control matting, and the use of soil stabilizers which prevent soil from being washed away during rainfall events. Temporary sedimentation control measures consist of commonly used devices such as silt fence, check dams, temporary sediment traps, and storm drain inlet protection.

Permanent erosion control measures include the establishment of permanent seeding and vegetative measures; permanent turf reinforcement matting to reinforce vegetated swales, channels and slopes; and structural measures such as the benching of cut and fill slopes to reduce water velocity. Permanent sedimentation control measures include permanent stormwater detention/retention basins, which also serve to limit sediment transport, and diversion channels or berms to limit and divert sediment to collection points.

A Storm Water Pollution Prevention Plan (SWPPP), including an approved Erosion and Sedimentation Control Plan, will be prepared for the facility construction and will be employed throughout construction to minimize erosion and sedimentation of down-gradient wetlands and streams. The erosion control plan will be submitted to the North Carolina Land Quality Section for approval. Submittal of the plan to Land Quality serves as the applicant’s Notice of Intent (NOI) for coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit no. NCG010000, “General Permit to Discharge Stormwater.” Approval of the erosion control plan means the applicant is automatically covered by, and is subject to, the requirements of the General Permit. Final acceptance of the site as stabilized at the end of the construction period by Land Quality serves as the Notice of Termination (NOT) for coverage under the NPDES program.

The erosion and sedimentation control plan for the facility will address any and all of these measures, as appropriate, during construction and operation of the facility. In addition to managing

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stormwater runoff and erosion, proper implementation of the SWPPP by the Contractor will help to ensure that precautionary measures are taken to prevent accidental releases of fuels, lubricating fluids, or other hazardous material present on construction sites. The SWPPP will be kept on-site at all time, and updated as necessary as conditions change, and all appropriate record-keeping practices will be followed as outlined in the plan.

GEOTECHNICAL INFORMATION

The site is located in southeastern Wake County, which is located in the east-central part of North Carolina. Wake County is primarily located in the Piedmont physiographic province, though a small area in the southern part is in the Coastal Plain province. This site is located in the Piedmont.

The areas of Wake County south and east of Raleigh – the area this site is located - are characterized by gently sloping to rolling and contain drainage ways that are bordered by moderately steep slopes.

Creedmoor sandy loams make up the majority of the soils on site, and primarily cover the central and eastern portions of the property. There are also significant areas of White Shore sandy loams, which are primarily located on the western portions of the property. Finally, the soils along and adjacent to the numerous drainage features on site are primarily made up of Wehadkee and Bibb soils.

The Creedmoor series of soils consist of gently sloping to moderately steep, moderately well drained soils of Piedmont uplands in the western part of Wake County. These soils have generally have formed under forest in material that weathered from Sandstone, mudstone, and shale of Triassic age. The water table usually remains below the solum. Because of the slow permeability of the subsoil, however, there is a perched water table during wet seasons.

The White Shore series of soils consist of gently sloping to moderately steep, moderately deep, moderately well drained soils on Piedmont uplands in the western part of Wake County. These soils have generally have formed under forest in material that weathered from Sandstone, mudstone, and shale of Triassic age. The water table usually remains below the solum. Because of the slow permeability of the subsoil, however, there is a perched water table during wet seasons.

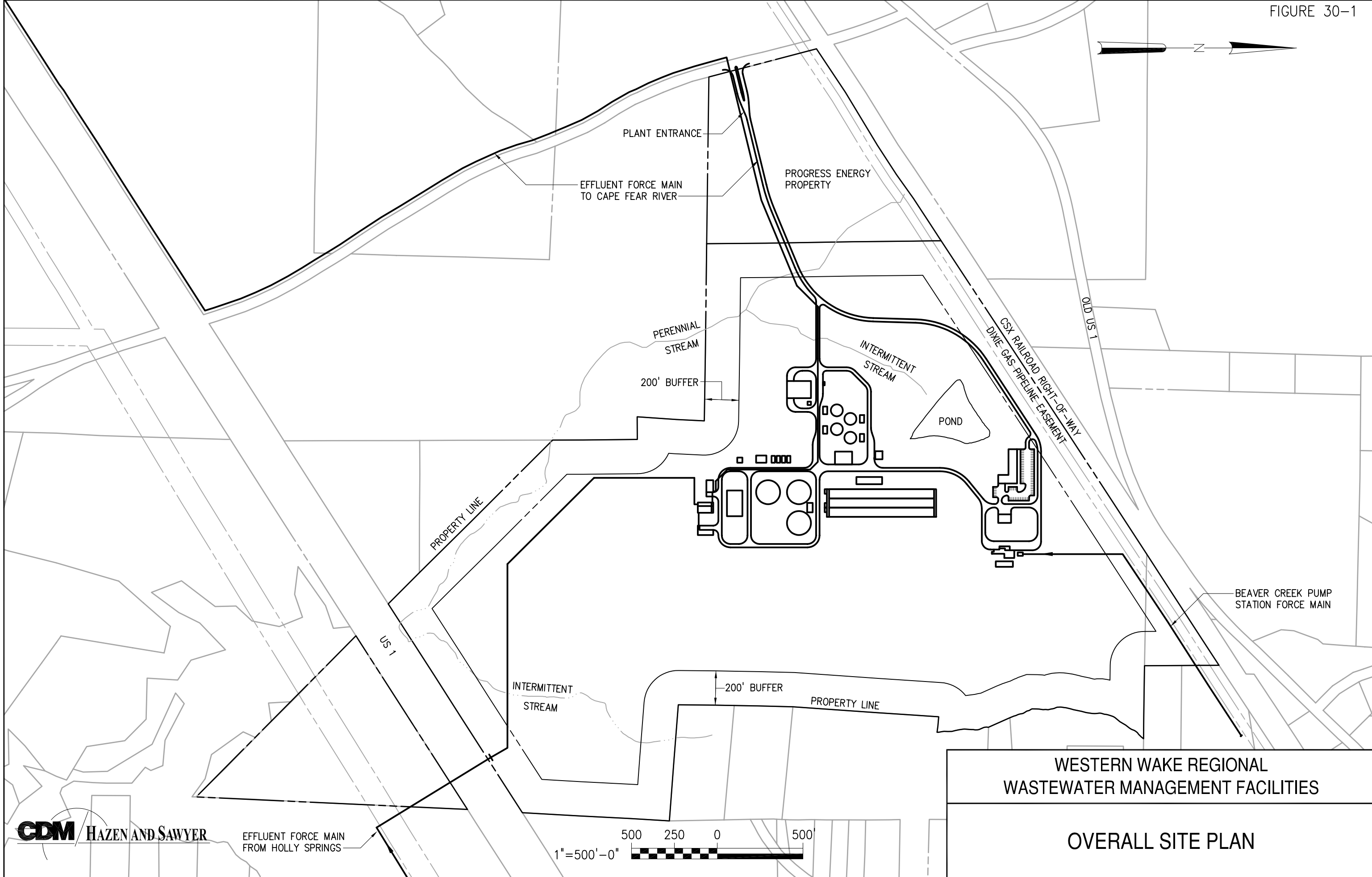
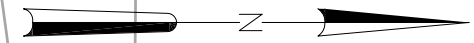
Finally, the Wedhakee - Bibb series of soils consist of nearly level or gently sloping (for the Bibb series), poorly drained soils on the flood plains of most streams and in depressions and draws in the uplands (again for the Bibb series) of Wake County. These soils have formed in fine loamy alluvial material. They have seasonal high water tables approximately at the surface.

ESTIMATED CAPITAL COST

Costs for the proposed facilities are included in Table 30-1 below:

TABLE 30-1
ESTIMATED CAPITAL COST FOR SITE DEVELOPMENT AND UTILITIES

Item	Cost (\$)
Clearing & Grubbing	\$140,000
Earthwork	
Cut	\$500,000
Fill	\$750,000
Paving	\$950,000
Sidewalk	\$50,000
Stream Crossings	\$250,000
Stormwater Piping	\$100,000
Stormwater Structures	\$110,000
Stormwater Ponds	\$40,000
Seed and Mulch	\$100,000
Erosion Control	\$50,000
Subtotal	\$3,040,000
Construction Contingencies (15%)	\$456,000
Engineering and Construction Services (10%)	\$349,600
Legal and Financial (5%)	\$192,300
Total	\$4,037,900



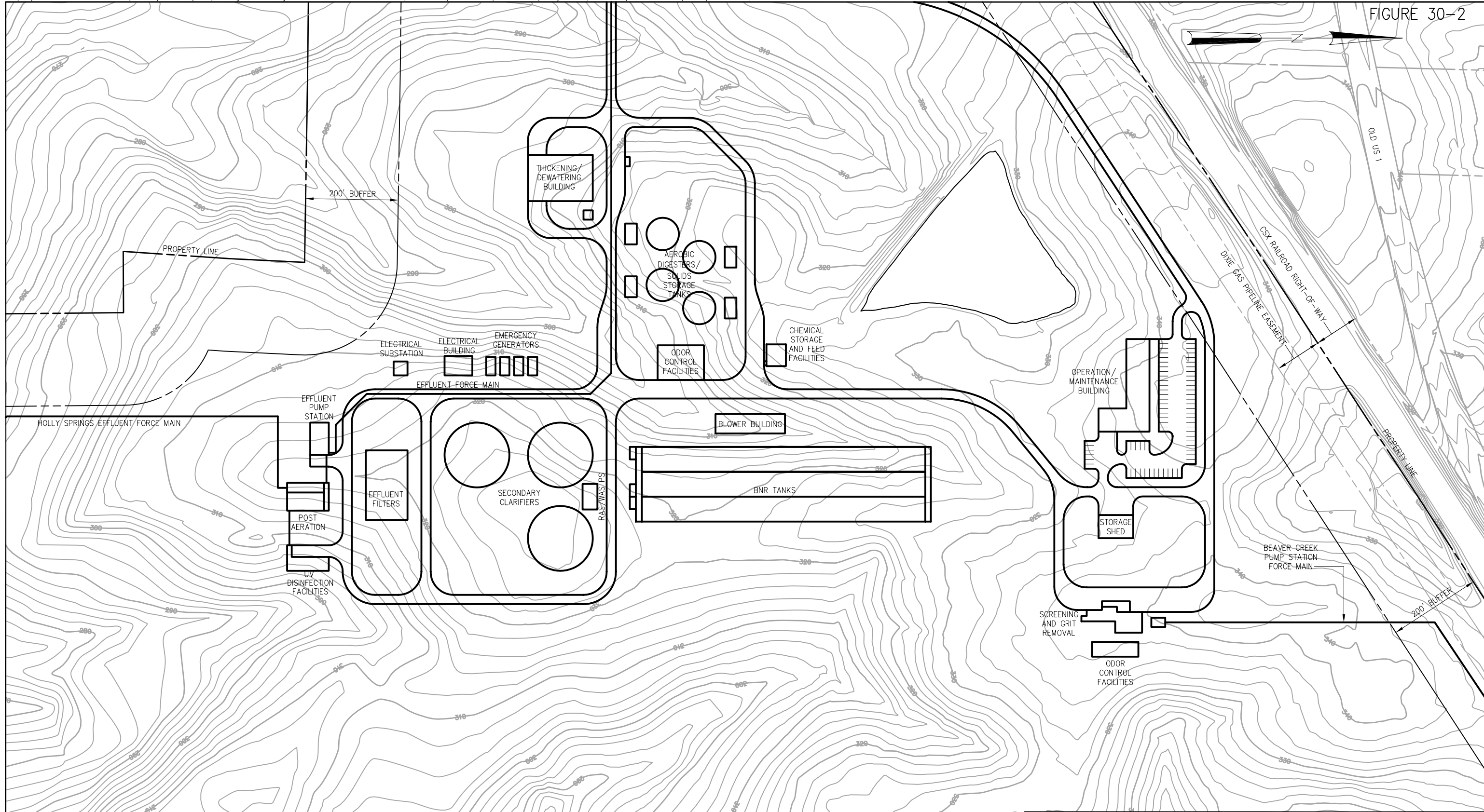
CDM HAZEN AND SAWYER

EFFLUENT FORCE MAIN FROM HOLLY SPRINGS

500 250 0 500
1"=500'-0"

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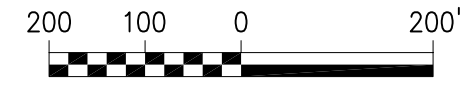
OVERALL SITE PLAN



LEGEND

 PROPOSED PHASE 1 FACILITIES

1"=200'-0"



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PARTIAL SITE PLAN