BRIAR CHAPEL DEVELOPMENT PROJECT WATER RECLAMATION FACILITY EXPLANATION REPORT

Prepared By:

W. Lee Fleming, Jr. Engineering
503 Oberlin Road, Suite 204
Raleigh, N.C. 27605
Phone: 919/833-1234 FAX: 919/833-1105

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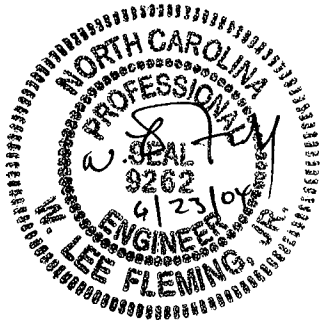


BRIAR CHAPEL DEVELOPMENT PROJECT
WATER RECLAMATION SYSTEM EXPLANATION REPORT

I. INTRODUCTION

The Briar Chapel Project is planned to be a compact community development in Chatham County, North Carolina. The development will consist of single family residences, commercial property, schools, and on-site recreational activities. It is anticipated that these activities will generate domestic wastewater with a strength of 200 mg/l BOD5, 200 mg/l Total Suspended Solids, 25 mg/l Ammonia, and 100,000/100 ml Fecal Coliform. These levels are typical for conventional domestic wastewater. If any of these facilities are expected to discharge wastewater into the collection system above these levels, then pretreatment in the form of grease traps or other facilities will be required.

According to the developer, about 2,389 units could be served by this wastewater system. The residential flow is expected to be 586,246 gallons per day, the recreational and social facilities may contribute an additional 52,000 gallons per day, the commercial and restaurants facilities may add about 51,120 gallons per day, the office facilities may add about 28,200 gpd, and finally schools may add 19,500 gallons per day. The total flow into the reclamation facility is expected to be approximately 737,066 gallons per day.

There are no known public wastewater systems in Chatham County which could provide the service needed for the development. Even if a hybrid system were considered, which would treat the raw sewerage at the development site and deliver partially treated effluent to a central facility, none was believed to existing which could accommodate the projected flow of 737,066 gallons per day. Next, the alternative of applying for an National Pollutant Discharge Elimination System (NPDES) permit was considered. With current State regulations, the developer must first show that there are no alternatives to the discharge before the Division of Water Quality (DWQ) would even consider this option. Knowing that a spray irrigation system might be possible, and also knowing that there is currently a great deal of concern about the discharge of nutrients into the tributaries of Jordan Lake, the option of an NPDES permit was eliminated.

After a review of the various alternatives, an investigation was undertaken to determine if the use of a spray irrigation system was a viable alternative. Based on preliminary studies by S&EC, Inc., Eagle Resources, and Soil Water & Environment Group, it appears that the property contains sufficient open lands and common lands such as road rights-of-ways, planted areas, and grassy and tree covered areas which might be used for the final disposal locations for the reclaimed water. These preliminary reports find that the application of this effluent should meet the requirements of the Environmental Management Commission's regulations governing reclaimed water irrigation systems.

After reviewing the design requirements, development needs, and operational requirements of the reclamation facility, it was determined that the facility should be installed in phases. The first 250,000 gpd plant will be installed as phase I. This phase I plant will be constructed with dual aeration chambers, clarifiers, and tertiary filters to provide for better reliability. Once the sewerage flow into the first phase plant reaches 80% to 90% of its design flow, the construction on the second 250,000 gpd plant will begin Then, at 80% to 90% of the second plant's capacity, the construction of the third

250,000 gpd plant will begin. After reviewing the reclamation facility and irrigation needs of the project, it appears that other portions of the system should also be installed in phases. The following chart illustrates these phased portions of the process:

Installation, Part A

1. Install the first 250,000 gpd reclamation facility.
2. Construct the full project's 5 day upset pond and return pump station.
3. Construct the first phase inclement weather storage pond
4. Construct the force mains from the plant to the first phase inclement weather storage ponds and 5 day upset pond.
5. Install the irrigation system as defined as phase I.

Installation, Part B

1. Install the second 250,000 gpd reclamation facility.
2. Install the irrigation system, storage ponds, pumps and pipes as defined as phase II.

Installation, Part C

1. Install the third 250,000 gpd reclamation facility.
2. Install the irrigation system, storage ponds, pumps and pipes as defined as phase III.

II. SUBMITTAL DOCUMENTS

To support the spray irrigation plan, a series of documents will prepared. The following list outlines these documents which will accompany a permit application to the DWQ:

Reclamation facility:
- WT-1 Facility site plan
- WT-2 Phased 750,000 gpd facility plan (250,000 gpd increments)
- WT-3 250,000 gpd sections & details
- WT-4 Details & pump station
- WT-5 Force main route & storage pond layout
- WT-6 Details of construction

Specifications - Phased 750,000 GPD facility
Soils Investigation
Hydrogeologic Investigation
Agronomic Investigation
Irrigation Design
- Irrigation Land Layout W\ Spray Area
- Irrigation Land Layout W\ Spray Irrigation

Development
- Phased Development Plan

III. EXPLANATION OF THE RECLAMATION FACILITY PROCESS

The reclamation facility will utilize DWQ required components to achieve a level of treatment necessary for "reclaimed water system" spray irrigation. The following treatment levels will be required based on current State Regulations:

	Daily Maximum	Monthly Average
BOD5	15 mg/l	10 mg/l
Total Suspended Solids	10 mg/l	5 mg/l
Ammonia	6 mg/l	4 mg/l
Fecal Coliform	25/100 ml	14/100 ml (Geometric mean)
Turbidity	10 NTU	

As required by 15A NCAC 2H.0200, the facility will produce a tertiary effluent. It will consist of an equalization chamber with a capacity at least 25 percent of the design average daily flow, aeration chambers, clarification tanks, filtration units, and disinfection units with ultraviolet and chlorine systems. Each of these systems will be sized using the State's criteria for tertiary treatment.

Wastewater will flow from the development's collection system and enter the facility through a bar screen for the removal of rough material such as rags and sticks. For the first phase conventional treatment facility, and subsequent phases, the incoming flow will be "feed" into the plant and then equally divided between identical treatment trains for aeration, clarification, and filtration. The purpose of the installation of two (2) identical treatment trains for the first phase plant is to provide an increased reliability in the reclamation facility and to satisfy the need for dual trains as required by the EMC for irrigation on reclaimed water projects. The incoming sewerage will be discharged into an equalization chamber where a constant delivery of flow will be sent into the plant. This chamber uses pumps and a control box to "feed" the aeration chambers with a constant flow rate. The aeration chambers will aerate the sewerage to reduce the strength of the wastewater by biological activity. After aeration, a majority of the solids will be removed by settling in the clarifiers. These chambers will collect the settled solids and return the sludge to either the sludge holding chamber or the aeration chambers. Once the larger solids are removed in the clarifiers, the wastes will be exposed to chlorine disinfection for the first of two process for the removal of fecal coliform. Next, the wastewater will be processed through a tertiary filter for the removal virtually all of the remaining suspended solids. Finally, the treated wastes will be disinfected using an ultra-violet disinfection system for the final reduction of fecal coliform. In addition to the aforementioned units, the plant will also be equipped with an on-site standby generator to serve as a power backup if primary power is lost. Also, the facility will be served by a sludge hauling contractor who will remove the accumulated sludge from the aerated sludge holding chamber and apply the stabilized sludge to approved disposal sites. A local sludge contractor has been contacted and a letter has received which indicated their willingness to add this facility to their permit once the plant is constructed. A copy of this letter is attached to this report.

Finally, the treated reclaimed water will be delivered to two types of ponds for spray and storage. These ponds are capable of holding 5 days and 110 days of storage respectively. Using these ponds, the plant operator will be able to control the application rate to the irrigation areas. The 5 day pond is to be used to contain any upset of the plant and the 110 day ponds is available for storage during wet, freezing,

windy, or wet ground conditions. Normally, the 110 day ponds will be almost empty in the fall of each year so that the storage volume will be available when needed.

A sketch of the reclamation facility process and relationship of the facility to the storage ponds is attached to this report. The sketch labels the facility components being proposed and shows the connections from the facility to the two types of ponds.

As indicated previously, this reclamation facility contains many redundant units to allow continued operation in the case of equipment or power failure. The following items are examples of these redundant or backup systems:

1. The aeration, clarification, and filtration systems are provided in parallel trains; each with the ability to treat 50% of the incoming wastewater.
2. All pumps and aeration devices will be provided with a backup unit. As an example, the pumps in the equalization chamber will be sized to pump the desired rate and if one of the pumps fail to operate, then the second pump will be able to pump the incoming wastewater at the desire rate. There will be a lag pump on float which will turn this pump on if the first pump fails to activate.
3. There will be a spare floating aerator available on the plant site to act as a replacement unit should one of the active units fail to activate as required.
4. The mud well pumps will be provide a backup system similar to the equalization chamber pumping system.
5. The facility will be provided with backup power supply by of a pad mounted generator. Further, to ensure that the generator will provide the required power, even if there are no personnel on the site, there will be an automatic transfer switch which will activate the generator in the case of a power loss.
6. The facility will be provided with a separate pond to be used as an upset pond if problems are found with the plant's effluent. This pond will be sized to contain 5 full days of effluent at the design rate. All partially treated effluent will be routed to this pond for future treatment once the problems are resolved with the treatment process. More information is offered on this pond later in this report.
7. Night lighting will be provided for the facility site to allow the operator to have proper access to the treatment units in the dark. Further, ground faulted electrical receptacles will be provided at all control panels for operation of hand held equipment.

In addition to the conventional treatment components, the Briar Chapel reclamation facility will be designed to achieve reduction of phosphorus in the effluent. Phosphorus reduction is being utilized to ensure that the phosphorus loading to the irrigated areas is consistent with the agronomic needs of the vegetative cover and to minimize the potential for impacts to adjoining surface waters. In order to reduce the phosphorus level in the effluent, a chemical precipitation system will be installed. This system will consist of a chemical storage tank with spill containment, dual chemical feed pumps, delivery pipe, and liquid discharge pipe into the equalization chamber. Using this type of system, a greater quantity of sludge will be generated compared to the amount normally generated from domestic treatment plants. The plant's sludge storage chamber will be sized to accommodate this larger sludge volume.

Finally, the proposed location of the reclamation facility was selected to be as central to the project development as possible. It is located adjacent to the major powerline easement and the adjacent property is currently undeveloped. Once the plant is constructed, there will be two primary sources of odor. The incoming pipes will discharge the wastewater from long force mains. These pipes may release odor due to the long length of retention of the wastewater. In this case, the odor can be reduced by the injection or input of chemicals at the pump stations. This injection has proven successful in the past in reduction of odors from pipeline wastes.

Next, there is a potential for odor to be generated when the stored sludge is stabilized prior to removal by a sludge contractor. There are several operation actions which might be incorporated to reduce or eliminate this odor generation if it becomes a problem. First, the sludge could be dewatered on site or taken to a dewatering contractor. This sludge could then be made into a composted material. This process would prevent the need to stabilize the sludge on the plant site. Next, the stored sludge might be stabilized at night. Another odor reduction method might be to stabilize the sludge in an off-site storage vessel which would be operated by the sludge hauler if he adds such a service. Finally, if on-site odor persists, then a liquid or solid fragrance might be used to reduce the sludge odor during stabilization.

IV. RECLAMATION FACILITY MONITORING

The reclamation facility must be monitored on a regular basis. The monitoring tests will be conducted by a Certified Laboratory and the results will be reported to the DWQ by the plant operator. The monitoring requirements will be stated in the issued non-discharge permit. In past permits, the monitoring of the facility included sampling for BOD5, Total Suspended Solids, Ammonia, Turbidity, Fecal Coliform, Dissolved Oxygen, pH, and Flow. In addition, the self-monitoring forms require the operator to confirm the dates that they are on the facility site and the time of day which the visits occurs. Finally, for the non-discharge permits issued for irrigation, the permits require self-monitoring data to be submitted which relate to the amount and location of irrigation. This data is provided on a daily basis and reports the irrigation amounts and irrigation rates applied, the daily rainfall, the levels of the storage ponds, and other information relating to the storage and irrigation of the treated effluent.

In addition to the monthly monitoring of the reclamation facility effluent, the plant will be equipped with a meter which will provided constant monitoring of the plant's turbidity. If, during the operation of the facility, the turbidity lever reaches 6 NTU, an auto dialer will activate and call the plant operator. With this notice, the operator can travel to the facility, make all necessary corrections, and if the turbidity level remains below the State's maximum level of 10 NTU, then no water will need to be diverted to the upset pond. If, on the other hand, the level of turbidity reaches 10 NTU, the operator will redirect the effluent from the storage pond to the 5 day upset pond. Only after the turbidity level goes below 10 NTU will the operator again allow the effluent to be transferred to the irrigation ponds.

Also, DWQ will require that the reclamation facility and irrigation system be operated by certified operators. The operators must be on 24 hour call, visit the plant on a regular basis, and must be available to direct irrigation operations as needed and required by the issued permit and operator certification.

VI. ATTACHMENT D DISCUSSIONS

In accordance with the instructions associated with the Chatham County Wastewater Management Guidelines For Compact Communities in Chatham County, the following items are offered:

Encouraged: Tie into an off-site public wastewater treatment system, if available, to handle the wastewater from the compact community.

Response: There is no known off-site public wastewater treatment system in Chatham County, in the area of the Briar Chapel Community, that could handle the projected 750,000 gallons per day of wastewater flow to be generated.

Encouraged: If wastewater treatment is provided within the compact community, size the treatment plant to help meet current and/or future wastewater needs in surrounding parcels outside the compact community.

Response: The wastewater facility for the Briar Chapel Development will be sized to provide wastewater service to the development. If, in the future, the projected flows from the development units are found not be as high as projected, then there may be some capacity available for use outside the development. Also, if additional irrigation lands are found, and the treatment plant and storage ponds are expanded, then the system may be able to be expanded.

Strongly Encouraged: If a spray irrigation system is used as part of the wastewater treatment system, design and operate the wastewater spray field so that an unsprayed buffer of at least twenty-five (25) feet in width is maintained between the compact community and all adjacent properties.

Response: The Briar Chapel Development's spray irrigation system will be designed with a fifty (50) foot buffer from the wetted area to the property owners adjacent to the external development property boundary.

VII. CONCLUSION

This report has discussed the wastewater disposal system proposed for the Briar Chapel project in Chatham County, North Carolina. The supporting information includes favorable determinations that the soils will be satisfactory for the application of reclaimed water the average rates specified. DWQ must review the submitted information and determine if a non-discharge permit can be issued. This process will involve a detailed review of the technical documents, reports, and other submitted information. If the DWQ review indicates that the system will perform as stated, a non-discharge permit is expected to be issued for a period of approximately 5 years. Further, this permit will recognize that the project's reclamation facility and irrigation systems will be constructed in phases. With satisfactory operation and maintenance, the Briar Chapel wastewater system should provide the development with reliable sewer service.

SLUDGE DISPOSAL LETTER

GRANVILLE FARMS, INC.
P. O. BOX 58477
RALEIGH, N.C. 27658

"Specializing in residual land application management"

March 18, 2004

To: Mitch Barron
Newland Communities
P. O. Box 1486
Pittsboro, N. C.

From: J. Bryan Smith
Granville Farms, Inc.

Subject: To add Briar Chapel (Chatham Co.) Proposed Project WWTP to Granville Farms, Inc. permit for biosolids land application.

Reference: Permit Number: WQ00000838
Biosolids will be land applied to package plants sites.

Granville Farms, Inc. will make application to the Division of Water Quality to add the above project to GFI permit. Data needed will be discussed with your Engineer after completion of plant construction. We look forward to working with you and you may contact me at the following numbers.

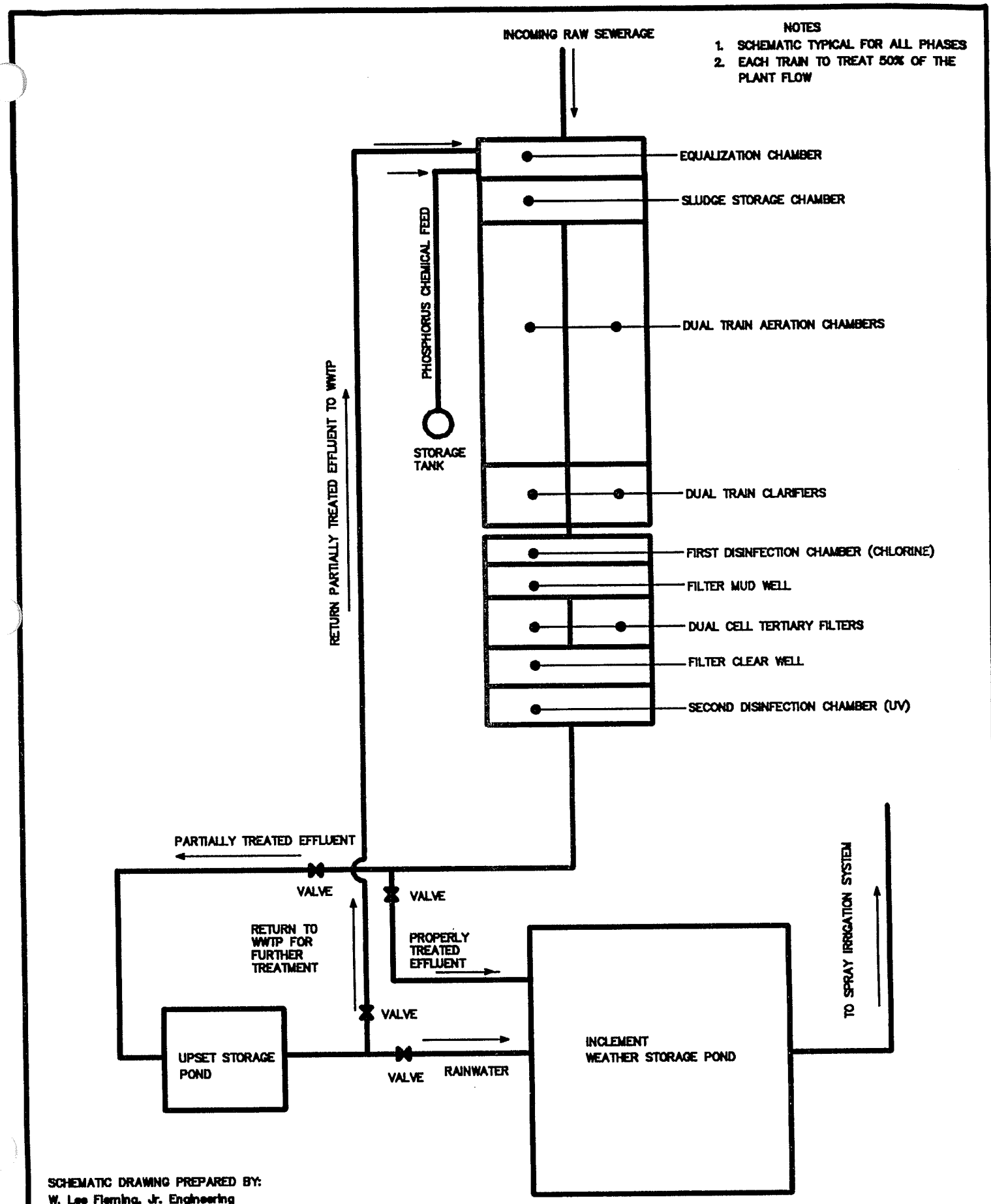
252 903-0390, (mobile) 919 781-0655 (office) 919 781-9766 (fax)

Thanks

J. Bryan Smith

Granville Farms, Inc.

PRELIMINARY WWTP SCHEMATIC



SCHEMATIC DRAWING PREPARED BY:
W. Lee Fleming, Jr. Engineering
503 Oberlin Rd. Ste. 204
Raleigh, N.C. 27605
Phone: 919/833-1234
FAX: 919/833-1105

PRELIMINARY BRIAR CHAPEL WATER RECLAMATION FACILITY SCHEMATIC

NOT TO SCALE

DATE PREPARED: JUNE 23, 2004