United States
Environmental Protection
Agency

Region 4
345 Courtland St., N.E.
Atlanta, GA 30365

904/9/93-002
EPA
December 1993

EPA

FINAL ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT

Tallahassee - Leon County
Wastewater Management
Tallahassee, Leon County, Florida

FINAL
ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT

TALLAHASSEE - LEON COUNTY WASTEWATER MANAGEMENT
TALLAHASSEE, LEON COUNTY, FLORIDA

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Region IV

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY FOR FINAL ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT

TALLAHASSEE-LEON COUNTY WASTEWATER MANAGEMENT

TALLAHASSEE-LEON COUNTY, FLORIDA

Draft ( )

Final (X)

U.S. Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Type of Action:	Administrative Action	(X)
	Legislative Action	( )

EXECUTIVE SUMMARY

Purpose of and Need for Proposed Project

The City of Tallahassee (City) prepared a 201 Facilities Plan (201 Plan) that proposed the expansion of the City's central sewers to serve growth areas in Leon County. A draft 201 Plan was approved in April 1977. The U.S. Environmental Protection Agency (USEPA) prepared an Environmental Impact Statement (EIS) that evaluated the 201 Plan alternatives and the "No-Federal-Action" alternative. A Final EIS was issued by the USEPA in 1983 (USEPA, 1983). The No-Federal-Action alternative was selected as the EIS preferred alternative in the 1983 EIS.

The 201 Plan and the 1983 EIS were required in part because the City had intended to use federal grants to fund the majority of a proposed expansion of the City's wastewater collection and treatment facilities. The 1983 EIS "...addressed the Federal Action of the provision of Federal funds for Phase II wastewater facilities as proposed by the Draft 201 Facilities Plan for Tallahassee-Leon County" (USEPA, 1983). The proposed Phase II wastewater facilities were intended to service growth areas that would not be served by 201 facilities that were already approved for federal funding.

The 1983 EIS considered four federal-action alternatives which proposed wastewater facility construction of either: 1) a new treatment plant in northeast Leon County (to serve the northeast growth areas) and the expansion of the existing Thomas P. Smith (T.P. Smith) Wastewater Treatment Plant/Southwest (SW) Treatment Facility beyond its Phase I capacity (to serve the southwest and southeast service areas), with treated effluent disposal for the Northeast (NE) Plant by means of rapid infiltration in the northeast and disposal of the T.P. Smith/SW Plant by conveyance to the expanded Southeast (SE) Sprayfield; or 2) an alternative similar to above except disposal of all treated effluent would be at the SE Sprayfield; or 3) expansion (with conservation measures) of the T.P. Smith/SW Treatment Facility to 19.9 mgd capacity or expansion (without conservation measures) of the T.P. Smith/SW Treatment Facility by 0.3 mgd capacity and continuing to operate the existing Lake Bradford Road Plant, with treated effluent disposal at the expanded SE Sprayfield and facilities serving as a regional treatment system in either case; or 4) construction of a new SE Treatment Plant (serving the southeast and northeast growth areas) to supplement the expanded T.P. Smith/SW Treatment Facility (serving the southwest service area and projected southwest growth areas), with treated effluent disposal at the expanded SE Sprayfield.

In addition to these four federal-action alternatives, a fifth alternative, the No-Federal-Action alternative, was also considered in the 1983 EIS. This alternative considered the given condition within the Tallahassee-Leon County area without changes and described wastewater treatment that would be available without new federal funding. Generally, the No-Federal-Action alternative assumed that no centralized, structural alternative would be constructed, with expansion of existing facilities only continuing to Phase I levels and new growth for wastewater disposal to be provided by on-lot and small community systems. The No-Federal-Action alternative was the baseline for evaluating environmental impacts of the structural alternatives considered in the 1983 EIS. As indicated above, the No-Federal-Action alternative was selected as the preferred alternative in the 1983 EIS.

Since the USEPA issuance of the 1983 EIS, investigations into failures of on-lot septic systems within the study area and compilations of information relating to soil types, water tables, and population density have provided data which were not available during the preparation of the EIS study. Subsequently, the City of Tallahassee, Leon County's Board of Commissioners, and the USEPA have determined the need to re-evaluate the No-Federal-Action alternative selected in the 1983 EIS.

In 1988, the City prepared a Master Sewer Plan (MSP) that proposed expanding their facilities within the City boundaries. With Leon County's approval, this expansion was to also include unincorporated portions of the County, and use monies from a 5-year capital improvements program. These monies would be from local sources and would not be expected to include federal funds. Given the decision to re-evaluate the No-Federal-Action preferred alternative of the 1983 EIS and the availability of local funds, several other options of the No-Federal-Action alternative could be considered. These option alternatives primarily included centralized system alternatives which involved the concept of spray irrigation of wastewater effluent or other forms of wastewater disposal and some improvement of existing wastewater treatment plants, and a decentralized system alternative which involved some improvements and use of on-lot systems. These option alternatives are addressed in the present EIS, which is a Supplement to the original 1983 EIS. A Draft EIS Supplement (DEISS) was issued by the USEPA on June 29, 1990 and is hereby being followed by this Final EIS Supplement (FEISS).

The EIS Supplement addresses direct and indirect impacts of wastewater management alternatives for the study area for a 20-year planning period (1990 through 2010). The study area boundaries used in the EIS Supplement are those boundaries defined for eight service areas in the 1988 City MSP. These boundaries were used because the City is the only entity proposing centralization of wastewater management facilities.

The terms "centralized" and "decentralized" are used in the EIS Supplement for the development of the system alternatives. Centralized, as used in the EIS Supplement, refers to a regional system that has a large collection system to convey sewage from the source to one or two large treatment facilities. These facilities are generally operated and maintained by a government agency or authority. Decentralized, as used in the EIS Supplement, refers to a system that includes a multitude of single-customer, on-lot systems and small collection/treatment systems (e.g., package plants) servicing a cluster of customers. The decentralized alternative of the EIS Supplement is similar to the No-Federal-Action alternative of the original 1983 EIS. The centralized alternatives of the EIS Supplement would also be No-Federal-Action alternatives provided local funds (i.e., no federal funds) were used.

Presently, the City has not requested any federal funds to implement the 1988 City MSP, nor does the implementation of the MSP as proposed otherwise constitute a "major Federal action" under Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended, and NEPA does not mandate that an EIS Supplement be prepared. Although there presently are no federal funds and no major federal action proposed for the alternatives of this EIS Supplement, the USEPA has prepared this discretionary EIS Supplement to provide technical guidance to the City of Tallahassee Sewer Division as well as other local decision-makers for facility expansion planning.

Alternatives Development

The alternative development process involved the identification of two (2) centralized wastewater conveyance component options, five (5) wastewater treatment component options, seventeen (17) effluent disposal component options and their corresponding conveyance facilities, and two (2) sludge treatment and disposal component options. Combinations of these components were analyzed to develop total wastewater management system alternatives. Three basic system scenarios were devised based on the collection and treatment component as follows:

1. Centralization with conventional conveyance and treatment of wastewater in the south at the existing Lake Bradford Road Plant and T.P. Smith Facility.

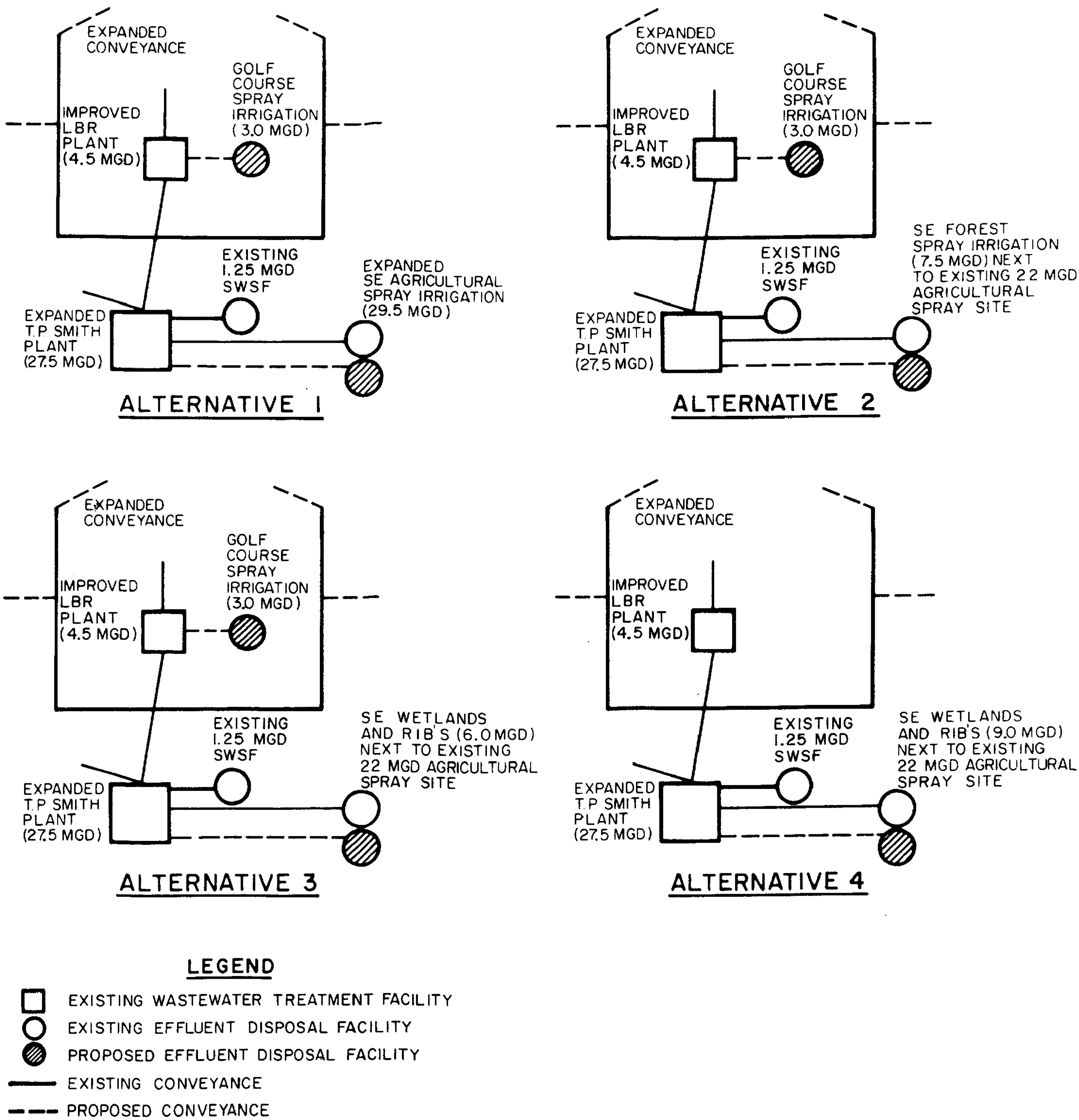
2. Centralization with conventional conveyance and treatment of wastewater in the south at the existing Lake Bradford Road Plant and T.P. Smith Facility and in the north at a new NE Plant.

3. Decentralization with the continued use of on-lot systems and area systems to meet future wastewater needs.

Using these scenarios, nine (9) system alternatives were developed (Alternatives 1-9). The selection of the wastewater effluent disposal components for the system alternatives was primarily based on capital costs. Figures ES-1 and ES-2 are schematics that illustrate the major components of the eight (8) centralized system alternatives. The ninth system alternative is the decentralized alternative. Figure ES-3 is a regional map that displays the location of alternative sprayfield disposal sites and area treatment plants.

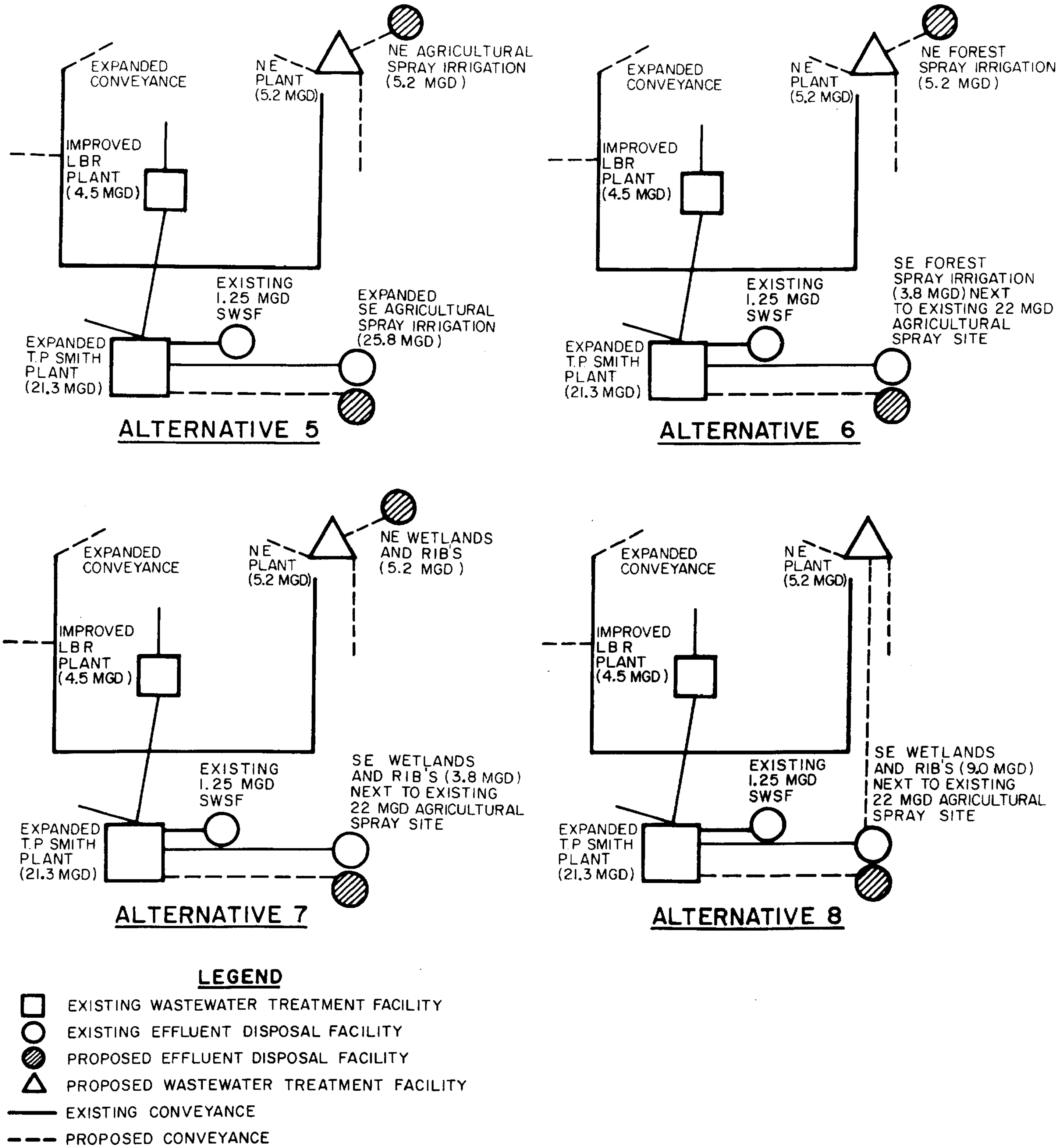
Due to the nature of this study, since there exists a wide variety of wastewater management components, four of the nine system alternatives were selected for more detailed EIS Supplement evaluation. Of the eight (8) centralized system alternatives, three (3) were selected for more detailed evaluation. The three selected were Alternatives 1, 2 and 7. The selection of these three was based on costs and preliminary environmental, technical feasibility, and implementability evaluations made during the general timeframe of the DEISS preparation stage (1989). In addition to these three centralized alternatives, Alternative 9, the decentralized alternative, was selected during this timeframe as a fourth alternative for more detailed evaluation.

Based on the information during the general 1989 timeframe, Alternative 1 has low estimated capital costs and present worth value in addition to being highly implementable. Alternative 1 proposes an expansion of the City's existing SE Sprayfield. This expansion would be an extension of an existing, successfully-operated, agricultural sprayfield, effluent disposal system. Alternative 2 has low estimated capital costs and present worth value. Implementability, although high, is considered lower than Alternative 1 because operating a forest spray irrigation system, including harvesting, is new to the operators of the existing City system. Alternative 7 has low estimated capital costs and present worth value. It was selected for more detailed consideration



CENTRALIZED WASTEWATER MANAGEMENT SYSTEM ALTERNATIVES 1 THROUGH 4

FIGURE ES-1



CENTRALIZED WASTEWATER MANAGEMENT SYSTEM ALTERNATIVES 5 THROUGH 8

FIGURE ES-2

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because it represented a system with both north and south wastewater management sites which allows wastewater to be managed nearer the source. Alternative 9, the decentralized alternative, is similar to the preferred alternative of the original 1983 EIS.

These four further-considered alternatives represent the following spectrum of possible scenarios: expansion of the City's existing, successful agricultural spray irrigation operations; use of forest spray irrigation operations that would have minimal disruption of the site's ecosystem; use of north and south systems that manage wastewater near the source; and maintaining the status quo of a "decentralized" system with some improvements.

Below is a brief description of each alternative selected for further study:

Alternative 1 - Centralization with wastewater conveyed to the south to be treated at the improved 4.5 mgd Lake Bradford Road (LBR) Plant and the improved and expanded 27.5 mgd T.P. Smith Facility. Effluent disposal would be handled by agricultural spray irrigation at the expanded 29.5 mgd Southeast (SE) Agricultural Sprayfield and by a 3.0 mgd golf course spray irrigation operation using four (4) existing local golf courses (Florida State University, Jake Gaither, Capital City Country Club, and Hilaman Municipal).

Alternative 2 - Same as Alternative 1 except that the 7.5 mgd expansion of the SE Agricultural Sprayfield would be for forest spray irrigation rather than agricultural spray irrigation. Alternative 2 would utilize the expansion areas of the SE Sprayfield site for forest spray irrigation and continue agricultural spray irrigation at the existing area.

Alternative 7 - Centralization with 80 percent of the wastewater conveyed to the south to be treated at the improved 4.5 mgd Lake Bradford Road Plant and the improved and expanded 21.3 mgd T.P. Smith Facility. The remaining 20 percent of the wastewater would be conveyed north to be treated at a new 5.2 mgd NE Plant. Effluent disposal would be handled by artificial (man-made; constructed) wetlands followed by Rapid Infiltration Basins (RIBs) located adjacent to the SE Agricultural Sprayfield and in a proposed NE disposal site.

Alternative 9 - Decentralization, which includes improving the 4.5 mgd Lake Bradford Road Plant, expanding the Killearn Lakes Plant (3.5 mgd), expanding the SE Agricultural Sprayfield (24.5 mgd), and using on-lot systems to meet the remaining future wastewater management needs.

Alternatives Evaluation

The above four alternatives (1, 2, 7 and 9) selected for further study were matrix-evaluated during the DEISS preparation stage (1989), based on cost-effectiveness, reliability, implementability, and environmental impacts. The cost-effectiveness rating evaluation (1989) included an analysis of the alternatives' capital costs, annual operation and maintenance (O&M) costs, present worth values, and annual household costs. The reliability evaluation estimated the degree to which each wastewater management system could consistently achieve and maintain effluent limits for which the system was designed, which included the City staff's experience in using the technologies. The implementability rating involved the City's approval of the technologies/alternatives, equitable cost distribution, certain public concerns such as land-use compatibility, and various other considerations. The environmental analysis was based on evaluation of both primary and secondary (indirect) impacts.

Table ES-1 is a matrix ranking summary of the four selected system alternatives. As shown in this table, Alternatives 1 and 2 were equally ranked highest among the four alternatives. Overall, Alternative 1 is ranked favorably due to its high reliability and implementability since it would be an expansion of the City's existing, successfully-operated management system for agricultural spray irrigation. Alternative 2 has the same overall favorable ranking because of its high implementability and because of anticipated low or minimal negative environmental impacts. Alternative 7 received a lower overall ranking because its capital costs were projected to be higher, environmental impacts, and reliability concerns relative to the proposed use of artificial wetlands (a relatively new technology for wastewater effluent treatment in the United States which has shown increasing reliability -- probably even since the 1989 matrix evaluation for the DEISS -- but has not been used by the City in the project area). Alternative 9, the decentralized alternative, also received an overall lower ranking because of reliability concerns pertaining to the lack of a structured maintenance program for on-lot (septic tank) systems and some documented on-lot system failures in the study area due in part to the drainage characteristics of certain soil types in the failure area and interspersed throughout the Tallahassee area.

TABLE ES-1
SUMMARY OF SYSTEM ALTERNATIVE RANKINGS
FOR THE FOUR ALTERNATIVES SELECTED FOR FURTHER EVALUATION [1]

	SYSTEM ALTERNATIVE			
Category	1	2	7	9
Cost-effectiveness	3	2	1	4
Reliability	4	3	2	2
Implementability	4	4	4	3
Environmental Impacts	2	4	2	3
Total	13	13	9	12
Overall Ranking	4	4	2	3

(1) Ranking goes from least preferred (=1) to most preferred (=4). When a tie exists for a category, both alternatives are assigned the same numerical ranking. Ranking was not statistically treated.

Although the matrix analysis is somewhat subjective, it should be noted that all of the characteristics addressed during the category rating process and all of the categories addressed during the ranking process were considered of equal importance. Weighing of the items would have been difficult to justify because, although certain items could be considered more "important" than others, the determination of a specific weighing value is highly subjective and dependent on the wants and needs of an individual or organization.

Selection of Preferred Alternative

Given the nine alternatives considered and the four alternatives (1, 2, 7 and 9) selected for further study in the EIS Supplement, the USEPA finds Alternative 1 to be an acceptable alternative. Alternative 1 is a practical alternative that represents a continuation of the City's successful agricultural spray irrigation approach to the disposal of treated effluent through an expansion of the City's SE Sprayfield, as well as the irrigation of existing golf courses. As such, Alternative 1 was considered the preferred alternative for the

EIS Supplement. This selection was based on the evaluative ranking results developed at the DEISS preparation stage (1989) for the four criteria considered (cost-effectiveness, reliability, implementability, and the environmental impacts) presented in Table ES-1. In general, the overall favorable ranking was attributed to: (1) projected relatively low capital costs, (2) the City's successful experience in operating agricultural spray irrigation facilities for effluent disposal, and (3) negative environmental impacts could be expected to be reasonably minimized. Alternative 1 would not only utilize the City's successful experience in agricultural spray irrigation, it also proposes to expand the City's existing SE Sprayfield as opposed to developing a new, separate sprayfield facility. Of the final four alternatives considered, Alternative 1 was rated the most cost-effective of the three centralized alternatives considered; was rated the most reliable given the City's success in agricultural spray irrigation at the existing SE Sprayfield; was rated as one of the three most implementable given that the alternative would expand the City's existing SE Sprayfield as opposed to developing a new, separate sprayfield facility; and negative environmental impacts could be expected to be reasonably minimized despite the fact that the alternative ranked as one of the two least environmentally preferable. Based on these criteria, Alternative 1 was tied with Alternative 2 as having the most favorable overall ranking. Alternative 1 was considered the preferred alternative over Alternative 2 in the EIS Supplement since the City has had successful experience in agricultural spray irrigation as opposed to forest spray irrigation proposed in Alternative 2. Nevertheless, forest irrigation is also to be tried by the City for Alternative 1 as a small demonstration project for an undetermined number of acres.

In general, Alternative 1 is a practical alternative that represents a continuation of the City's agricultural spray irrigation approach to the disposal of treated effluent through an expansion of the City's SE Sprayfield, as well as the irrigation of existing local golf courses.

<u>Success of the City's SE and SW Sprayfield Operations</u>

The City's experience with agricultural spray irrigation disposal operations has been successful at the existing SE Sprayfield, and the production of animal feed crops and/or processed foods for humans has reduced operational costs. The USEPA understands from the City that the City has been continuously spraying its SE Sprayfield since January 1981 (experimental spraying was initiated in fall of 1980). Continuous spraying at the SW Sprayfield for effluent disposal was begun in 1978, with experimental spraying starting in 1972. As such, the SE sprayfield has been successfully used for continuous spraying for some 13 years and the SW Sprayfield for some 15 years. In regard to environmental impacts of the operation, the City disinfects its wastewater at the expanded T.P. Smith Treatment Plant and the LBR Treatment Plant, further treats the treated effluent before it is spray irrigated, and also conducts a groundwater monitoring program.

The USEPA understands from the City that City effluent is disinfected in accordance with State of Florida standards and permit requirements. The City's wastewater treatment processes are the activated sludge process, chlorination, and natural ultraviolet light (sunlight) treatment in the holding ponds. Prior to effluent spray irrigation, the City also monitors its effluent for 40 parameters including 17 metals on a monthly basis; monitors for 11 parameters (biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen, residual chlorides, pH, fecal coliforms, and other parameters) on a twice a week basis; and monitors for the six (6) above parameters on a daily basis.

The City is also conducting an on-site groundwater monitoring program for its existing effluent sprayfields. Historically, over 60 monitoring wells have been drilled and tested at the SE Sprayfield site during interagency cooperative studies. Although the City has been monitoring wells for some time, the State of Florida required monitoring via a Groundwater Monitoring Program by permit condition since November 1, 1984. The City now quarterly monitors seven (7) compliance wells at the SE Sprayfield for six (6) parameters: NO_2 (nitrite) and NO_3 (nitrate) as nitrogen; nitrites; total Kjeldahl nitrogen; chlorides; dissolved organic carbon (DOC); and fecal coliforms. Pesticides and herbicides are also monitored annually.

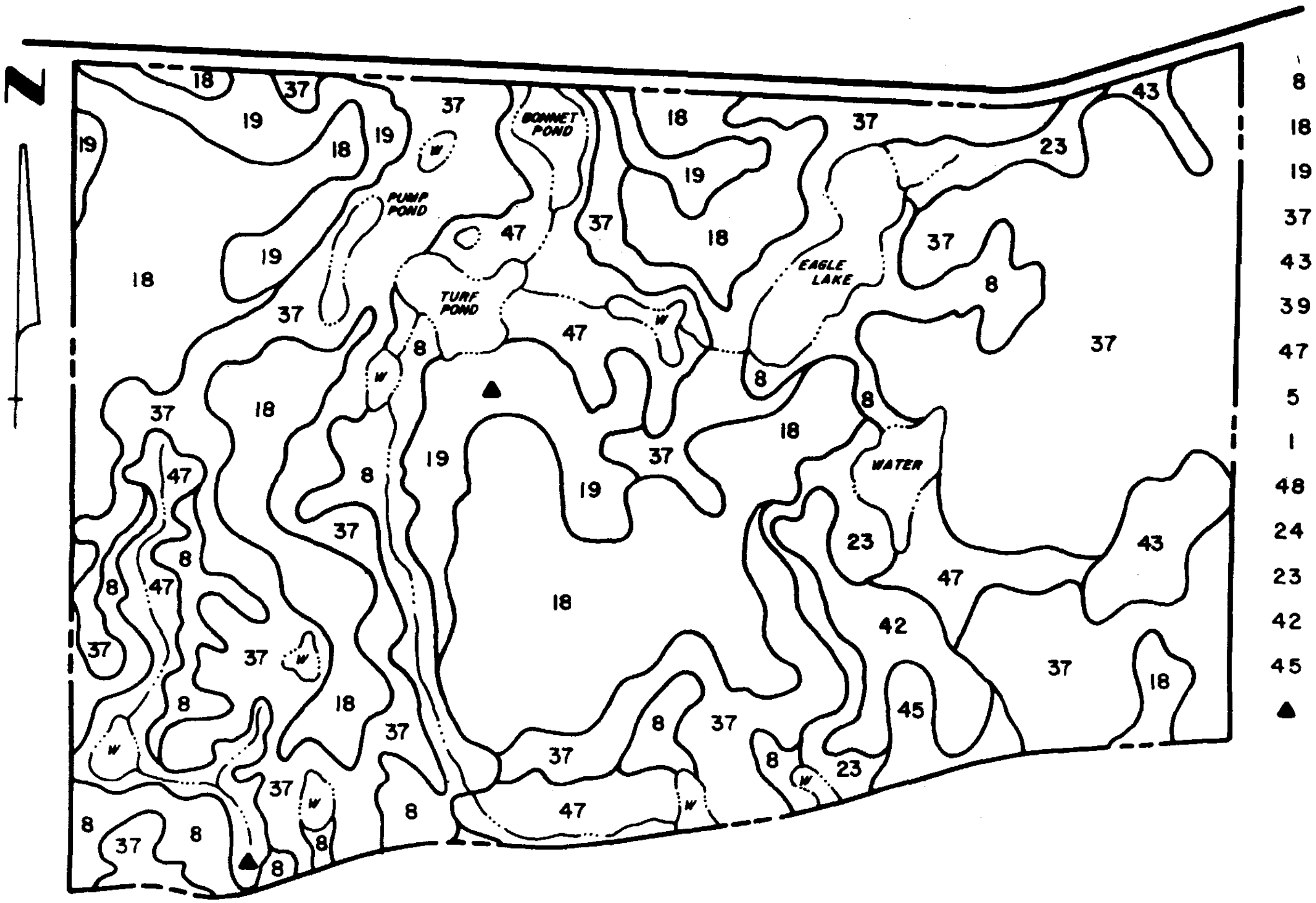
Based on this monitoring program, the USEPA understands from the City that the City discovered five (5) nitrate-nitrogen groundwater quality violations (1989, 1990 and 1991) in one of the seven compliance wells at the City's SE Sprayfield, and four (4) nitrate-nitrogen groundwater quality violations (1986, 1987 and 1988) in one of the two compliance wells at the City's SW Sprayfield. These exceedances have been resolved through corrective action by the City and monitoring has shown no additional groundwater quality violations since 1991 for parameters monitored. As a rule, nutrient groundwater quality problems can be minimized or prevented.

Environmental protection measures to minimize environmental impacts for Alternative 1 would include the use of wildlife corridors, vegetated buffer areas around the sprayfield site perimeter (external borders), frequent water quality monitoring during operation, and prudent control of spray irrigation application rates. The operation of the City's existing SE Sprayfield has been successful in that City monitoring has shown minimal nutrient water quality degradation in local groundwater resources. Nutrient groundwater quality problems can be monitored and generally be minimized.

Description of the Preferred Alternative

Alternative 1 is referred to as a centralized "treatment south" alternative. This means that all untreated wastewater flows would be conveyed to southwest Leon County to receive secondary treatment at either the improved Lake Bradford Road Plant or the expanded T.P. Smith Plant. The treated wastewater from the Lake Bradford Road Plant is proposed by Alternative 1 for disposal via a spray irrigation operation at four (4) golf courses. The treated wastewater from the T.P. Smith Plant is to be transported to the expanded SE agricultural spray irrigation fields for final disposal.

The expanded SE spray irrigation facility of Alternative 1 would consist of Eastern and Western Expansion areas. The Eastern Expansion area is being leased by the City from a forest-products company (St. Joseph Land and Development Company) and consists of approximately 1,830 acres total. Figure ES-4 is a soils map of this area. From the map it can be seen that the majority of soils in areas proposed for irrigation within the Eastern Expansion Area are Ortega and Kershaw Sands. The Ortega Sands are characterized as moderately-well drained soils that would provide good effluent filtration while Kershaw Sands are characterized as excessively-drained soils and would provide minimal effluent filtration. A total of 909 acres of center pivot and fixed-head agricultural spray irrigation is planned for the Eastern Expansion area (the USEPA understands from the City that the 909 acreage value may be changed by local decision-makers if Alternative 1 is implemented). Although, as indicated above, forest spray irrigation is to be tried by the City for Alternative 1 on a small demonstration project basis, the majority of the 909 acres are to be utilized for agricultural spray irrigation. The agricultural crop rotation in the Eastern Expansion area is expected to include corn, soy beans, canola, and rye/rye grass. All agricultural crops produced from effluent sprayfields are not for direct human consumption and must be utilized consistent with State of Florida regulations. Accordingly, irrigated crops produced by the City from the proposed Alternative 1 may only be utilized as animal feed (e.g., cattle feed) and/or as processed food for humans (e.g., canola oil; soy bean oil) only to the extent consistent with Chapter 17-610 of the Florida Administrative Code (F.A.C.). The remaining acreage balance (of approximately 1,830 total acres) would either be actively managed by the forest-products company, and/or set aside as wildlife corridors. Such land management by the St. Joseph Land and Development Company is proposed to include logging portions of the southern half of the proposed wildlife corridors of the Eastern Expansion area leased to the City. This timbering is to exclude jurisdictional wetlands designated by the U.S. Army Corps of Engineers (COE) or the Florida Department of Environmental Regulation (FDER: now the Florida Department of Environmental Protection, FDEP, effective July 1, 1993). As specified by the Florida Game and Fresh Water Fish Commission (FG&FWFC), timbering should also be limited to the thinning of alternate rows of planted pines in the proposed wildlife corridors, with vegetation in exposed areas between remaining trees being moderately maintained in coordination with the FG&FWFC through periodic control burns or perhaps mowing to benefit the habitat of the protected Gopher Tortoise. Figure ES-5 illustrates the "proposed"



LEGEND

- 8 CHIPLEY FINE SAND 0-2% SLOPES
- 18 KERSHAW SAND 0-5% SLOPES
- 19 KERSHAW SAND 5-8% SLOPES
- 37 ORTEGA SAND 0-5% SLOPES
- 43 RUTLEGE LOAMY FINE SAND
- 39 PELHAM FINE SAND
- 47 TALQUIN FINE SAND
- 5 BLANTON FINE SAND 0-5% SLOPES
- 1 ALBANY LOAMY SAND 0-2% SLOPES
- 48 TROUP FINE SAND 0-5% SLOPES
- 24 LUCY FINE SAND 0-5% SLOPES
- 23 LEON SAND
- 42 PLUMMER MUCKY FINE SAND DEPRESSIONAL
- 45 SAPELO FINE SAND
- ▲ SINK OR DEPRESSIONAL AREA

TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT
EASTERN EXPANSION SPRAYFIELD

SOILS MAP
PREFERRED ALTERNATIVE

1600 0 1600 3200
SCALE IN FEET

SOURCE : TAKEN FROM USDA SCS, LEON COUNTY SOIL SURVEY, 1981

GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA FEBRUARY, 1991

FIGURE ES-4

wildlife corridors as well as sensitive resources such as surface waterbodies and archaeological sites in the Eastern Expansion Area of Alternative 1.

Sludge generated during the treatment of the wastewater is to be disposed by land application near the T.P. Smith Facility, the SW Sprayfield for dewatered sludge disposal, and an expanded airport site for liquid sludge disposal. The latter site, however, is apparently at capacity based on FDEP nitrogen level determinations. The Western Expansion area of Alternative 1 (approximately 1,280 total acres) has not been acquired by the City and it is USEPA's understanding from the City that acquisition of and construction at the Western Expansion area appears unlikely at this time. Nonetheless, Figure ES-6 was prepared to delineate "suggested" wildlife corridors for any potential future use of the proposed Western Expansion Area of Alternative 1.

Although Alternative 1 is the preferred alternative of this USEPA EIS Supplement, the USEPA is not requiring its implementation since this EIS Supplement is discretionary and there are no federal funds and no major federal action proposed for Alternative 1 (or for Alternatives 2, 7 or 9) at this time. Unless the proposed project becomes a major federal action, the selection of an appropriate alternative for the City of Tallahassee wastewater management would be a local decision. At the time of issuance of this FEISS, a proposed Tallahassee wastewater management alternative had not been finalized. Local decision-makers including the City of Tallahassee, City Commission, Leon County Board of County Commissioners (County Commission), Citizens Advisory Committee (for a NE treatment plant), Citizens Advisory Committee (for effluent disposal) and the general public were continuing to locally review the project in terms of acceptability, design, prioritization, and implementation. As such, the contents of this FEISS may not include any or all aspects of the ultimate approach locally selected. The FEISS will serve, however, to provide technical guidance to local decision-makers and the public.

While the USEPA considers Alternative 1 the preferred alternative from a practical perspective, the other three system alternatives further considered in the EIS Supplement (Alternatives 2, 7 and 9) also have attributes that the local decision-makers may or may not wish to further consider in their selection of a preferred alternative. Of these alternatives, Alternative 2 is noteworthy from an environmental perspective. Alternative 2, as indicated above, is similar to Alternative 1 except that it proposes forest irrigation rather than agricultural irrigation. Overall, it was ranked equal to Alternative 1 in the 1989 matrix evaluation, but was ranked higher environmentally. Global climate change impacts, for example, due to land clearing of vegetation at the Eastern Sprayfield Area, would be offset to a greater degree through the irrigation of a forest crop than an agricultural crop due to the greater biomass of the tree crop. If the existing young pines on site could be irrigated (i.e., the site is not cleared and replanted with a new crop of pines), global climate change impacts would be further minimized and the existing silvicultural land use of the Eastern Expansion Area would essentially be unaltered. In addition, the potential for soil erosion would be significantly reduced if the existing trees would be irrigated or if the existing trees are harvested and replanted with a new crop of trees without the clearing and grubbing (stump removal) required for an agricultural crop. The City and the pulp and paper company that owns the land may reach a mutually beneficial agreement involving effluent utilization for silviculture. On the other hand, disadvantages for Alternative 2 would appear to be the City's inexperience in forest irrigation (although forest irrigation is being successfully used at 66 sites in the southeast, including 31 in Florida) and operational considerations such as understory maintenance of the tree crop and use of "drip" irrigation as opposed to "spray" irrigation (which may reduce the per-acre effluent disposal capacity of the operation and therefore require a larger sprayfield land area). The small forest irrigation demonstration project that the City is to try as part of Alternative 1 (if implemented), should provide an excellent opportunity for local decision-makers to compare the merits of agricultural irrigation versus forest irrigation. Operational, environmental and nutrient uptake (crop nitrogen demand) aspects of each technique would need to be considered by local decision-makers.

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Permitting Requirements

The preferred alternative would be subject to compliance with all federal, State of Florida, Leon County and City of Tallahassee permits, standards and/or ordinances relevant to the proposed spray irrigation project proposed in the preferred Alternative 1. Three applicable federal permitting areas are described below. They are the National Pollutant Discharge Elimination System (NPDES) permits issued by the USEPA/Region IV (for Florida projects), the "Sludge Only" permits issued by the USEPA/Region IV, and Section 404 wetland permits (Clean Water Act) issued by the COE and reviewed by the USEPA.

Pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124) and to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), an NPDES permit is required for point source storm water discharges to waters of the United States from the facility actually treating domestic wastewater. This provision applies to domestic wastewater treatment facilities that have design flows of at least 1.0 mgd. The NPDES storm water regulations of November 16, 1990, also require that point source storm water discharges to waters of the United States from all construction activities (including the initial clearing, until revegetated, of spray irrigation sites) disturbing a total of five or more acres must be permitted under the NPDES program. The permit application deadline for these discharges is 90 days prior to commencement of construction. Construction activities needing NPDES permit coverage can be made through a general permit recently issued by EPA/Region IV.

Relevant to NPDES permitting for the preferred Alternative 1, application for an NPDES permit would need to be made by the City for point source storm water discharges to waters of the United States from regulated treatment facilities actually treating domestic wastewater under the above-noted criteria. Application by the City for a separate NPDES permit would also be needed by the above-noted deadline for point source storm water discharges to waters of the United States for all construction sites associated with and actually involving the effluent land application site (including the initial clearing, until revegetated, of the proposed Eastern Expansion area of the SE Sprayfield and the proposed Western Expansion area (if implemented) of the preferred Alternative 1) disturbing a total of five or more acres of land. These permit requirements would be relevant for the preferred Alternative 1 as well as any existing unpermitted City sites.

Storm water point source discharges to waters of the United States from the operation (spray irrigation) of non-agricultural/non-silvicultural land application sites (such as golf courses, rights-of-way, and landscape areas) receiving domestic wastewater treated to the quality required by Chapter 17-610 F.A.C. for the land application of reclaimed water are not required to be covered by NPDES permits, unless the USEPA specifically requires a facility to submit an application on a case-by-case basis. Therefore, no NPDES permit is needed for the operation of such land application sites for the City's proposed project (if storm water point source discharges exist to waters of the United States for such sites) unless specifically requested by the USEPA. However, dedicated discharges of reclaimed water, without land application, are required to be covered by NPDES permits. It may also be noted that storm water discharges from the land application of wastewater effluent on agricultural and silvicultural sites are exempt from the NPDES permitting program if the sites are consistent with 40 CFR Part 122.3(e), so that the operation of such sites for the City's proposed project would not require an NPDES permit if consistent with 40 CFR 122.3(e). Therefore, no NPDES permit would be needed by the City for the operation of the four golf courses (if implemented) proposed in the preferred Alternative 1, as well as any similar existing City application sites (if such storm water point source discharges to waters of the United States exist at these sites). Additionally, since the land application of wastewater effluent on agricultural sites is exempt from the NPDES permitting program, the operation of the Eastern Expansion of the SE Sprayfield and the Western Expansion thereof (if implemented) proposed in the preferred Alternative 1, as well as any existing City application sites such as the SE Sprayfield (if such storm water point source discharges to waters of the United States exist at these sites), would not require an NPDES permit if these sites are consistent with 40 CFR 122.3(e).

Included in the proposed spray irrigation of wastewater effluent in the preferred Alternative 1 is the generation of and land application of wastewater sludge. Section 405(d) of the Clean Water Act requires that the disposal or reuse of sewage sludge be regulated. This regulatory activity is to be accomplished through the utilization of permits based upon technical federal regulatory standards. The USEPA established federal sludge disposal/reuse standards which were promulgated in the Federal Register at 40 CFR 503 on February 19, 1993. In general, these standards must be complied with by all treatment works treating domestic sewage by February 19, 1994. Violation of these standards would be a violation of the Clean Water Act. It is anticipated that current and proposed sludge disposal/reuse activities would be regulated through an NPDES permit, where applicable, or through issuance of a "Sludge-Only" permit. This federal permitting activity would be issued by the USEPA/Region IV until program authorization is given to the State of Florida. Therefore, the newly promulgated federal regulations are in addition to the State of Florida sludge disposal/reuse regulations. Relative to the preferred Alternative 1, the City must also make application for a Sludge Only permit for the current and proposed sludge disposal/reuse activity associated with the SE Sprayfield and the Alternative 1 proposal, as well as any other City sludge disposal/reuse practice. These federal regulations are in addition to the State of Florida sludge disposal/reuse regulations.

Specific to the City of Tallahassee, the USEPA last issued an NPDES permit for land application to the City of Tallahassee for the City's Thomas P. Smith Wastewater Treatment Plant in 1980. This federal permit was to expire in 1983 but was inactivated by the USEPA on April 6, 1981.

Failure to obtain prior authorization for discharges under the NPDES program may result in the USEPA assessment of administrative, civil, and/or criminal penalties under Section 309 of the Clean Water Act.

In addition to the NPDES permitting, the preferred alternative would also be subject to the requirements of a Section 404 (Clean Water Act) permit, which would include any unavoidable direct losses of wetlands through dredge-and-fill activities such as land clearing and construction activities. However, proposed spray irrigation areas within the proposed Eastern Expansion Area of Alternative 1 were selected to avoid wetland areas since hydric (wetland) soils would not be suitable/desirable for effluent disposal. Nevertheless, any project wetland losses would be subject to 404 permit determinations by the Jacksonville District COE, as well as wetland determinations by the State of Florida and Leon County, as appropriate. Conveyance pipeline crossings of wetlands would likewise be subject to Section 404 permitting. Also, the USEPA reviews 404 permit applications for the COE. Secondary impacts to wetlands and surface waterbodies could also occur. Periodic water quality monitoring of surface waters and selective application measures would help minimize such secondary impacts. Surface waters should not be allowed to become eutrophic due to spray irrigation of wastewater nutrients.

The permitting guidance outlined in this document is very general and is not intended to be used to make final decisions on the applicability of the NPDES or sludge regulations, or Section 404 of the Clean Water Act. Site-specific conditions are always important factors in making these determinations.

Key Environmental Impacts and Environmental Protection Measures

The most critical primary environmental impacts of the preferred alternative are:

- Potential groundwater and surface water contamination.
- Human health effects relative to effluent aerosols drifting off site.
- The removal of all vegetation in the spray areas.
- The loss of suitable habitat for protected or candidate protected species in the area (Gopher Frog, Gopher Tortoise, Indigo Snake,

Florida Pine Snake, Panhandle Golden Aster, and Panhandle Meadow Beauty) as well as the possible disruption of Gopher Frog migration paths for breeding in waterbodies.

The possible disruption of archeological sites in the spray irrigation areas.

Groundwater and surface water contamination can result from the disposal of effluent at the expanded SE Sprayfield and the golf courses. The removal of trees would result from establishing field areas for the cultivation of agricultural crops (animal feed and/or processed human food only). The disruption of Gopher Frog migration could result from construction-related separation of abandoned Gopher Tortoise burrows (used by Gopher Frogs as habitat) and surface waterbodies (needed by Gopher Frogs for breeding). Habitat disruption of the Panhandle Golden Aster and Panhandle Meadow Beauty may occur as a result of the conversion to agriculture. Archeological sites could be disturbed during sprayfield construction activities. Listed and newly-recorded archeological sites (per the City's survey of the Eastern Expansion area of preferred alternative) should be avoided to the extent determined by the Florida State Historical Preservation Officer (SHPO).

The secondary environmental impacts of the preferred alternative which generate the most concern are the impacts on public health and land-use changes. The public health issue is a concern to residents living adjacent to or downgradient/downstream/downwind of the SE Sprayfield and the adjacent proposed Eastern Expansion area as well as golf courses, should they be utilized for spray irrigation. (Residents living east (and north) of the proposed Eastern Expansion area have voiced complaints during the public hearing held by Leon County in Tallahassee on July 23, 1991, concerning aerosol spray drift, odor, and decreased property values.) Potential public health risks are related to aerosols containing non-pathogenic bacteria and pathogens (e.g., pathogenic bacteria, viruses, protozoans and other infectious microbes) traveling away from the sprayfield area and the potential groundwater contamination of the Floridan Aquifer, a drinking water source. (Groundwater concerns were voiced by the public during the USEPA Public Hearing held in Tallahassee on August 9, 1990.) Post-irrigation use of the golf courses may also be of public concern.

It is generally documented that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater. However, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious. However, several precautions can be taken to reduce the human health risk at spray irrigation sites. These include effluent treatment, effluent monitoring, on-site containment of aerosols, and groundwater monitoring.

The USEPA understands from the City that City effluent is disinfected in accordance with State of Florida standards and permit requirements. The City's wastewater treatment processes are the activated sludge process, chlorination, and natural ultraviolet light (sunlight) treatment in the holding ponds. Prior to effluent spray irrigation, the City monitors its effluent for 40 parameters including 17 metals on a monthly basis; monitors for 11 parameters (biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen, chlorine residual, chlorides, Ph, fecal coliforms, and other parameters) on a twice a week basis; and monitors for the six (6) above parameters on a daily basis.

Studies have shown that the health risk associated with aerosols from sewage effluent spray irrigation sites is extremely low, particularly for irrigation with wastewater that has been disinfected. Effluent sprayer nozzle design can also help minimize aerosol drift effects. The dispersal of aerosols is also directly related to wind velocities. (Local prevailing winds average 7.7 miles per hour and are from a southerly direction in the spring and summer and shift toward a more northerly direction near the end of the year.) Other factors which prolong pathogen viability and increase the distance of aerosol travel are increased relative humidity, lower temperature, and darkness. Studies also indicate that pathogens tend to survive longer in an aerosol than do the traditional indicator organisms. The use of dense evergreen forested buffer areas, which is proposed by the City along the external borders of the Eastern Expansion area for Alternative 1, should greatly reduce the spread of aerosols off site by acting as a barrier and by reducing wind velocities. Wildlife corridors within site boundaries of the proposed Eastern Expansion area consisting of natural vegetation, should further reduce the off-site migration of spray effluent aerosols. The spray application of wastewater directly to forested areas, as opposed to open agricultural fields, would further reduce the risk associated with aerosols (as previously mentioned, forest irrigation is proposed by the City as a small demonstration project within Alternative 1). However, in general, reasonable protection of residents neighboring a sprayfield should be possible through the proper design and implementation of appropriate effluent treatment methods, frequent effluent monitoring of treated wastewater prior to irrigation, natural ultraviolet light (sunlight) disinfection, prudent spraying operations, use of evergreen forested buffer areas along external borders of sprayfields, use of forested corridors within the general sprayfield area, and groundwater monitoring. Direct application of effluent to forested areas, such as the proposed City's small forest irrigation demonstration project, for Alternative 1, should further contain aerosols on site and further reduce the human health risk associated with aerosols.

The spray application of wastewater to golf courses and other public access areas, which would provide greater public exposure than agricultural or forest sprayfields, requires additional treatment for suspended solids removal and high-level disinfection under State of Florida regulations. Compliance with these regulations should greatly reduce the health risks associated with aerosols at golf courses. Irrigation of golf courses using wastewater effluent is also not an uncommon practice since 84 golf courses in Florida were being irrigated with wastewater as of 1991. In addition, golf course spray irrigation would require, per FDEP stipulation, that an alternate disposal method be made available as a backup (it is the USEPA's understanding from the City that such a contingency does not presently exist).

The USEPA understands from the City of Tallahassee that fecal coliform levels are monitored by the City before effluent is spray irrigated on sprayfields and after irrigation via groundwater monitoring. The USEPA also understands from the City that the water quality limits for fecal coliform levels used by the City for effluent prior to sprayfield irrigation is the State of Florida standards defining "secondary treatment" of wastewater, i.e., <200 organisms per 100 ml of effluent. Although there are no USEPA or federal standards for fecal coliforms for spray irrigated effluent, this criterion is consistent with USEPA guidance from the Requirements Memorandum #79-3 dated November 15, 1978 of the former Construction Grants Program (USEPA, 1978). The concepts of this memorandum were incorporated in a USEPA Technology Transfer manual entitled "Land Treatment of Municipal Wastewater" (USEPA No. 625-1-81-013) (USEPA, 1981). The 200 counts/100 ml of effluent criterion is USEPA's fecal coliform criterion for bathing (swimming) waters. It is presumed that water considered safe enough for swimming (which could include incidental drinking) would be adequate for irrigation of sprayfields, particularly with vegetated buffers. In the absence of federal standards regarding acceptable remaining levels of fecal coliforms in sprayed effluent, the USEPA recommends that the State of Florida the use, at a minimum, the above federal guidance (USEPA, 1981) to help protect public health and the environment during their permitting decision for effluent sprayfields in addition to any appropriate State of Florida regulations (Chapter 17-640 F.A.C.) for public access areas.

Potential public health effects from animal vectors at spray irrigation sites would be minimized through effluent disinfection. Such effects could be further minimized through prudent spraying operations that allow acceptable effluent soil infiltration rates that avoid ponding.

Human health concerns also exist for potential groundwater contamination of the Floridan Aquifer drinking water source. After application of the wastewater effluent to land surfaces, the wastewater infiltrates into the soil and interacts physically and chemically to remove the potentially harmful constituents not removed during effluent treatment. It is possible that some of these constituents could move quickly through the soil (depending on soil filtration characteristics and depth) and into the groundwater used as a source of public drinking water.

As previously indicated, the City is conducting an on-site groundwater monitoring program for its existing effluent sprayfields. Historically, over 60 monitoring wells have been drilled and tested at the SE Sprayfield site during interagency cooperative studies. Although the City has been monitoring wells for some time, the State of Florida required monitoring via a Groundwater Monitoring Program by permit condition since November 1, 1984. The City now quarterly monitors seven (7) compliance wells at the SE Sprayfield for six (6) parameters: NO_2 (nitrite) and NO_3 (nitrate) as nitrogen; nitrites; total Kjeldahl nitrogen; chlorides; dissolved organic carbon (DOC); and fecal coliforms. Pesticides and herbicides are also monitored annually.

Based on this monitoring program, the USEPA understands from the City that the City discovered five (5) nitrate-nitrogen groundwater quality violations in the seven compliance wells at the City's SE Sprayfield. Expected causes of these violations included a faulty well construction, application techniques for additional (non-effluent) fertilizer, and possibly on-site cattle burial. Overall, four (4) other violations (also for nitrate-nitrogen) were monitored in one of the two compliance wells at the City's SW Sprayfield. Expected causes for these violations included the fact that a stockpile of dewatered sludge was placed near a compliance well. The USEPA further understands from the City that the exceedances in these two wells were reported to the FDEP by the City as part of their quarterly reports and that the FDEP responded by writing a letter and by discussing some of the violations with the City. The discussed exceedances involving the faulty well, additional fertilizer, dewatered sludge, and possibly on-site cattle burial were resolved by constructing a new nearby well and adjusting farming techniques at the SE Sprayfield, and by removing the sludge at the SW Sprayfield, and that monitoring has shown no additional groundwater quality violations since 1991 for the parameters monitored. As a rule, nutrient groundwater quality problems can be minimized or prevented.

The impact of land-use changes at the SE Sprayfield is related to the change of silvicultural operations to agricultural operations. The concern is not so much for aesthetics or restriction of future land use potential but rather for global climate change impacts. Deforestation reduces the capacity of an area of the earth to sequester carbon dioxide from the atmosphere. Carbon dioxide is the major contributor to the greenhouse effect. However, if Alternative 1 is implemented, the proposed retaining or creation of vegetated areas in the sprayfield area is expected to help minimize the impact of deforestation due to converting forested land to sprayfields (e.g., use of agricultural sprayfields (i.e., vegetation) to replace cleared forested areas, implementation of the small forest irrigation demonstration project which would retain some existing forested area, retention of additional forested areas within the project area as wildlife corridors, and use of evergreen buffer strips along external sprayfield borders which would retain or create forested areas).

As a consequence of the land-clearing activities proposed for the Eastern Expansion Area, approximately 85% of the existing on-site Gopher Tortoise habitat (sandy, upland areas) would be converted to a spray irrigation field. However, the remaining 15% of the suitable habitat areas is to be protected by inclusion in the proposed wildlife corridors, i.e., the natural vegetation areas contiguous to spray irrigation areas within the Eastern Expansion area depicted in Figure 4-2. Protection of the remaining 15% of suitable habitat was recommended by the Florida Game and Fresh Water Fish Commission (FG&FWFC) "to ensure the continued on-site existence" of the protected Gopher Tortoise, Gopher Frog, Eastern Indigo, and Florida Pine Snake. (See FG&FWFC letter dated February 6, 1991 in Chapter 5 included as part of USEPA's response to DEISS Letter #5, based on the FG&FWFC's field observations on January 23, 1991). (Note: If the 909 acreage figure and/or their configuration proposed in this FEISS for spray irrigation in the Eastern Expansion area is changed by local decision-makers, adequate on-site sandy areas must still remain for the Gopher Tortoise. The USEPA recommends additional coordination with the FG&FWFC, as appropriate.)

Environmental Protection Measures

Table ES-2 provides environmental protection measures that would lessen the potentially detrimental, environmental impacts of the preferred alternative. These measures are recommended by the USEPA for implementation by the City of Tallahassee, if the preferred alternative is pursued for implementation by the City. They are categorized as to the likelihood of implementation.

TABLE ES-2
SUMMARY OF ENVIRONMENTAL PROTECTION MEASURES

Measures that will be implemented -

- Comply with the existing National Pollutant Discharge Elimination System (NPDES) permitting program (40 CFR Parts 122 and 124) and the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), which require an NPDES permit for:

  * Point source storm water discharges to waters of the United States from regulated domestic wastewater treatment facilities actually treating domestic wastewater that have design flows of at least 1 mgd;
  * Point source storm water discharges to waters of the United States from all construction activities associated with the spray irrigation project (including initial clearing of the application site until revegetated) disturbing a total of five or more acres of land -- application by 90 days prior to commencement of construction.

  Pursuant to Section 405(d) of the Clean Water Act, the City must also make application for a Sludge Only permit for the current and proposed sewage sludge disposal/reuse activity associated with the proposed project, as well as any other City sludge disposal/reuse practice. Also, standards promulgated in 40 CFR 503 (February 19, 1993) must, in general, be complied with by all treatment works treating domestic sewage by February 19, 1994. Permit application should therefore also be made by the City with the USEPA/Region IV for:

  * All current and proposed activities involving the land application of sludge.

- Conduct monitoring of the water quality of the effluent leaving the wastewater treatment plants (i.e., prior to effluent spray irrigation) for the parameters and at the frequency currently being conducted (40 parameters including 17 metals on a monthly basis; 11 parameters such as biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen, chlorine residual, chlorides, pH, fecal coliforms, and other parameters on a twice a week basis; and the six (6) above parameters on a daily basis). If pollutant concentrations exceed permit limitations, correct problems in the treatment operations and/or design as soon as possible.

- Conduct monitoring of the water quality of groundwater wells within one-half mile of the preferred Alternative 1 spray irrigation site for the six (6) parameters and at the quarterly frequency currently being conducted (nitrite and nitrate as nitrogen, nitrites, total Kjeldahl nitrogen, chlorides, and dissolved organic carbon (DOC), as well as any other water quality parameters specified by the State of Florida in order to detect any exceedances of relevant water quality standards. If monitoring data exhibit concentrations exceeding State of Florida water quality standards for groundwater and/or permit limitations, correct problems with irrigation operation and/or design as soon as possible.

- Conduct frequent monitoring of the water quality of surface waters. Surface waterbodies, for example, should not be allowed to become eutrophic.

- Retain wildlife corridors within the Eastern Expansion area proposed by the City for near-future construction (and in the Western Expansion area if ever developed). Wildlife corridors should maintain a portion of the natural vegetation of the on-site upland and wetland habitats. Corridors are intended to provide habitat areas contiguous to spray irrigation areas to allow undisturbed movement of wildlife around these irrigation areas, including Gopher Frog reproductive migrations. The Eastern Expansion Area wildlife corridors should include an isthmus area (a minimum of 300-500 feet wide) west of center pivot Area C to maintain corridor interconnection for north-south wildlife movement. The wildlife corridors should essentially be continuous, although occasionally would be crossed by dirt, gravel or paved access roads. Proposed logging activities within portions of the corridors should be minimized and selective. (Note: If the configuration of the areas to be irrigated in the Eastern Expansion Area are altered by local decision-makers from those shown in Figure ES-5, the USEPA recommends that an appropriate north-south wildlife corridor still be maintained. Likewise, if the proposed spray irrigation acreage (909 acres) and/or the proposed configuration of these acres are changed, the USEPA recommends that adequate on-site sandy areas still be maintained for the Gopher Tortoise. Additional coordination with the FG&FWFC is recommended, as appropriate.)

- Retain/create a buffer zone around the field areas that is a minimum of 400 feet in width along Tram Road and 100 feet along the other sprayfield external boundaries to minimize perturbations attributable to the sprayfield expansion area, particularly aerosol spray drift. The buffer zone should act as a year-round, vegetative screen and as such must be a dense evergreen forested area. The use of evergreen buffer areas, in combination with the above-described forested wildlife corridor areas, should greatly reduce the spread of aerosols off site by acting as barriers and by reducing wind velocities. The southern boundary already has a densely-forested buffer as a result of an existing gas pipeline right of way. The southern buffer width would be at least 400 feet. Buffer strips should also be retained around on-site waterbodies and along streams for field runoff filtration.

- Protect and preserve archaeological sites located in buffer areas and designated wildlife corridors. For the examined Eastern Expansion, these include Sites SF1, SF4, SF9, SF19, SF21, SF22, SF23, and SF26. Of particular concern is Site SF9 (Eagle Lake Site). The primary protection zone for this site should be a 1400-foot diameter circle, the center of which is to be coordinated with and established by the Florida SHPO.

- Utilize all agricultural crops raised via spray irrigation (e.g., corn, soy beans, canola, and rye/rye grass) at the proposed sprayfield expansion site(s) and existing sprayfields only for animal feed and/or for processed food for humans (e.g., canola oil; soy bean oil), i.e., not for direct human consumption, to the extent consistent with the State of Florida (Chapter 17-610 F.A.C.). Grazing of cattle on proposed or existing irrigated sprayfields only to the extent consistent with Chapter 17-610 F.A.C., and utilization of crops grown for consumption (e.g., bermuda hay for livestock feed) on existing sludge fields (Class B or equivilent) only to the extent consistent with Chapter 17-640 F.A.C.

- Comply with sound agricultural practices such as field terracing and row crop contouring.

- Comply with all federal, State of Florida, Leon County and City of Tallahassee standards, permits and/or ordinances relevant to the proposed sprayfield expansion.

Measures that are planned for implementation -

- Consider any reasonable public complaints made before or during operation of the proposed sprayfield expansion regarding effluent aerosol dispersion or other operational impacts.

- Conduct agricultural operations with the primary goal being the proper disposal of effluent.

- Conduct frequent monitoring of the water table level at the spray irrigation areas and adjust the effluent application rates accordingly. Application rates are not to exceed State of Florida permit conditions. The City's existing SE Sprayfield is currently permitted by the State of Florida to spray irrigate at a rate of 3.16 inches per week.

- Monitor weather conditions to avoid spraying effluent during crop harvesting and during inclement weather conditions (e.g., rainy, wet, windy, freezing conditions) if spraying during those conditions would be expected to cause detrimental environmental or human health effects, or be considered ineffective from an effluent disposal perspective. Similar prudent spraying operations should also be undertaken to the extent feasible during periods of increased relative humidity, lower temperature, and darkness since studies have shown that these conditions prolong pathogen viability and increase the distance of aerosol travel. Spraying should also not result in effluent ponding in order to minimize any human health effects from animal vectors. Application rates should be adjusted in any areas where ponding persists (ponding has apparently occurred in the SE corner of the existing SE Sprayfield).

- Create 6- to 8-inch vegetated (herbaceous ground cover) earthen berms along the sprayfield area/wildlife corridor boundaries as part of the leasing farmer's agricultural practices. Such berms would help contain surface water runoff and allow percolation and soil filtration of the applied effluent in designated spray irrigation areas. This would help reduce the probability of wetland and other surface waterbodies within the sprayfield expansion area (as well as the adjacent St. Marks River System) from becoming eutrophic.

- Create 10- to 12-inch vegetated (herbaceous ground cover) earthen berms around "live" sinkholes within the sprayfield expansion area to divert surface water runoff flows from direct access to groundwater and thereby help protect groundwater quality.

- During the design and proposed construction phases, Karstic depressions (other than the discussed "live" Karstic sinkholes) should also be avoided If avoidance is infeasible, filling depressions with native soils could be tried unless these depressional areas are wetlands. The fill soils should only be moderately well-drained, so that drainage into the Karstic areas would not be encouraged. Native soils should also preferably be mixed with organic material to enhance spray irrigation effluent filtration and pollutant removal. Since such filled areas may subsequently subside, slight initial mounding may be advisable or additional filling using the same soil mix may subsequently be needed. Should the depressional area collapse and become a "live" sinkhole, spray irrigation in the area should be stopped and vegetated earthen berms created around the sinkhole as indicated above.

- Preserve as many trees at the site as possible. Tree clearing should be limited to the sprayfield areas and designated farm operation areas. This would minimize habitat losses, habitat disruption, and global climate change (greenhouse effect) impacts. Additional proposed silvicultural timbering by the St. Joseph Land and Development Company on land in the Eastern Expansion area leased to the City should be minimized, selective, and exclude jurisdictional wetlands designated by the COE and/or the FDEP due to reproductive migrations of the protected Gopher Frog. Also, as specified by the Florida Game and Fresh Water Fish Commission (FG&FWFC), timbering should be limited to the thinning of alternate rows of planted pines in the proposed wildlife corridors, with vegetation in exposed areas between remaining trees being moderately maintained in coordination with the FG&FWFC through periodic control burns or perhaps mowing to benefit the habitat of the protected Gopher Tortoise. Should land access to the Western Expansion area be obtained by the City and the site developed, timbering should be similarly limited there.

Measures that could be implemented -

- Protect cultural resources on the edge of irrigation fields by incorporating them into "protection areas" (wildlife corridors and buffer zones) as determined by the Florida SHPO. These include sites SF2, SF7, and SF18. Additional City coordination with the Florida SHPO should be provided, as appropriate.

- Protect cultural resources located in irrigation fields as determined by the Florida SHPO. These include sites SF3, SF5, SF6, SF8, SF10, SF11, SF12, SF13, SF14, SF15, SF16, SF17, SF20, SF24 and SF25. Of these sites only one, SF3, which is located in the fixed sprinkler irrigation area, appears to warrant additional systematic archeological examination. Additional City coordination with the Florida SHPO should be provided, as appropriate.

- Protect any listed or uncovered cultural resources located along pipeline corridors to the satisfaction of the Florida SHPO.

PROJECT
UPDATES SUMMARY

PROJECT UPDATES SUMMARY

UPDATE OF PROJECT-RELATED LOCAL EVENTS AND CONCERNS

Presently, the City of Tallahassee has not requested any federal funds to implement the 1988 City Master Sewer Plan (MSP), nor does the implementation of the MSP as proposed otherwise constitute a "major Federal action" under NEPA, and NEPA does not mandate that an EIS Supplement be prepared. However, this discretionary EIS Supplement has been prepared by the USEPA to provide technical guidance to the City of Tallahassee Sewer Division as well as other local decision-makers for facility expansion planning. Unless the City MSP should at some time rise to the level of a "major Federal action," the decision-makers for the present project as proposed are local government entities as opposed to the federal government. Specifically, the local decision-makers include the City of Tallahassee, City Commission, Leon County Board of County Commissioners (County Commission), Citizens Advisory Committee (for effluent disposal), Citizens Advisory Committee (for a NE treatment plant), Citizens Advisory Committee (for sewage sludge management), and the general public.

The list of alternatives considered in the DEISS and FEISS does not constitute a finite list of alternatives, but is reasonable subset of alternatives that includes various forms of decentralized effluent disposal (septic tanks) or centralized effluent disposal (spray irrigation, artificial wetlands with RIBs, deep well injection, surface water discharge, etc.), various disposal sites within Leon County, and various forms of spray irrigation (agricultural, silvicultural, golf courses, etc.). Alternative 1 is selected in the FEISS as the preferred alternative based on a matrix evaluation process during the DEISS preparation stage (1989). It is a practical and implementable expansion of the City's existing agricultural SE Sprayfield. However, it is not the only feasible alternative that could be implemented in Leon County, and updates since 1989 may be relevant for site selection and disposal methods. The local decision-makers may or may not choose to consider alternatives beyond those presented in the DEISS and this FEISS.

A number of important local events have occurred at the Tallahassee government and public level since the completion of the DEISS, and the local decision process concerning the Tallahassee wastewater management still continued during the completion phase of the FEISS. Given the fact that the proposed project does not presently constitute a "major Federal action" under NEPA, and from a timely, procedural and practical perspective, not all of these events were considered in the FEISS. Therefore, along with the findings of the FEISS, local decision-makers may or may not choose to consider these events, local public concerns/comments, their own concerns/comments, more recently updated and future information, and alternative disposal methods/sites in determining a preferred approach to the wastewater management of the City of Tallahassee. In addition, local decision-makers may also wish to consider the recent USEPA guidance manual on water reuse (EPA/625/R-92/004) entitled "Guidelines for Water Reuse" (USEPA, 1992).

Although not all of these events and concerns were considered in the FEISS, the following is a documentation or summary of some of these important events and concerns based on most or portions of public comments (Also refer to Chapter 5 of this FEISS for public verbal and written comments at the USEPA Public Hearing with USEPA responses and the public comment letters on the DEISS with USEPA responses); the Leon County's (Leon County Public Works) "informal" comment letter on a draft version of the FEISS to the USEPA dated July 15, 1992 and the "informal" (outside NEPA DEISS comment period) response letter to the USEPA from the City of Tallahassee (Water and Sewer Department) dated October 27, 1992 (copies of these two letters are appended at the end of this chapter); and City of Tallahassee "informal" written editorial comments on a draft version of the FEISS dated August 21, 1992 and/or USEPA personal communications with the City of Tallahassee. Some additional USEPA project comments and concerns are also provided.

o <u>Treatment Plant and Sprayfield Capacity Reratings</u>

The City of Tallahassee has indicated that the City's T.P. Smith (TPS) Treatment Plant has been rerated to 20.0 mgd (rerated on 9/8/89 from 17.5 mgd). Together with the 4.5 mgd capacity of the City's Lake Bradford Road (LBR) Treatment Plant, the total design treatment capacity is 24.5 mgd. The disposal sprayfield facilities were then rerated in order to equal the design capacity of the treatment facilities. Sprayfield application rates were therefore increased in the City's FDEP permit from 3.0 inches/week (in/wk) to 3.16 in/wk to provide design irrigation capacities of 23.25 mgd (rerated on 9/8/89 from 22.0) at the City's SE Sprayfield and 1.25 mgd (rerated on 9/8/89 from 1.2 mgd) at the City's SW Sprayfield, for a total design irrigation capacity of 24.5 mgd.

Also, in addition to the rerating of the T.P. Smith Plant to 20.0 mgd, the City has more recently completed a 7.5 mgd expansion of the plant in January 1993, so that the total design treatment capacity for the TPS Plant is 27.5 mgd, as of the issuance of this FEISS. The total City design treatment capacity of the expanded TPS Plant (27.5 mgd) and the LBR Plant (4.5 mgd) is therefore 32.0 mgd. It may be noted that the City also operates a 0.06 mgd Municipal Airport Plant (MAP) facility, so that the total City treatment capacity technically is 32.06 mgd. (<u>Note</u>: The USEPA understands from the City that the City plans to close the MAP in 1996, although its flows will be diverted to the T.P. Smith Plant.)

Accordingly, an expansion of the City's existing sprayfields would be needed to increase the current total City sprayfield design irrigation capacity (24.5 mgd) to equal the total design treatment capacity (32.0 mgd, or 32.06 mgd if the MAP is included), and/or golf courses or other areas for spray irrigation and/or one or more other methods for effluent disposal (alternatives to spray irrigation) could be used to accommodate the additional treatment capacity. Alternative 1 proposes a City sprayfield expansion of 5.0 mgd (to a City design sprayfield irrigation total of 29.5 mgd) and a golf course irrigation design capacity of 3.0 mgd, for an combined addition of City sprayfield and golf course irrigation design capacity of 8.0 mgd and a total combined irrigation design capacity of 32.5 mgd. The additional 0.5 mgd capacity for spray irrigation would allow for the 0.06 mgd capacity for the MAP facility and would also provide some contingency capacity for golf course irrigation, i.e., golf courses are not always as available as sprayfields for irrigation due to their public access nature and other possible differences between sites such as weather.)

Although the total City treatment capacity was rerated to 32.0 mgd (or 32.06 if the MAP is included), it should be noted that the flow projections in the EIS Supplement indicated that only 31.0 mgd would be required for the planning period, so that 31.0 mgd was used in the EIS Supplement (e.g., Section 2.4.1; Tables 2-11 through 2-18) in developing costs.

o <u>Southern vs. Northern Leon County Wastewater Disposal</u>

Several speakers at the USEPA Public Hearing held in Tallahassee on August 9, 1990, and the County (July 15, 1992 letter), registered concerns regarding the fact that the treatment and disposal of sewage effluent from northern Leon County is proposed for southern Leon County if Alternative 1 ("treatment south" alternative) is implemented. It may be noted that, at least from a soils suitability perspective, it appears from the 1981 Soil Survey of Leon County, Florida (USDA [SCS] and USFS, 1981) that the northern part of Leon County is generally less suitable for septic tank and spray irrigation wastewater disposal than the southern part. This is not to say, however, that favorable soils for septic tanks and spray irrigation do not exist in both northern and southern areas of Leon County or that unfavorable soils do not exist in southern Leon County. However, the USEPA understands that the Leon County Public Works Department apparently conducted a spray irrigation site assessment in 1989 and determined that more acreage would be needed to dispose the same quantity of effluent in the selected northern alternative sites than in the selected southern alternative sites due to soil types. This suggests a slower percolation rate at the northern sites.

The USEPA understands from the City of Tallahassee that the City would concur with the County with such a trend for northern versus southern Leon County in general, since the northern portion of the County appears to be generally underlain by layers of clay and since sandy upper horizons are rather shallow. The City has conducted geohydrologic analyses by contractor for nine sites in northeastern Leon County in 1991. Core soil samples generally exhibited clay layers of varying degree in the samples collected. Such clay layers would affect the drainage capabilities of the area and thus its suitability for septic tank and spray irrigation disposal.

This trend also generally agrees with Table 2-9 of this FEISS. When the acreage predicted to be required for agricultural spray irrigation in the SE (component D1) is compared to agricultural spray irrigation in the NE (component D2), the average acreage needed per effluent flow (mgd) is much greater in the NE (430 acres/mgd) than in the SE (188 acres/mgd). The same trend also exists for the NE forest irrigation site (component D4: 524 acres/mgd) compared to the SE forest irrigation site (component D3: 197 acres/mgd). (This trend, however, is not true in every instance since the artificial wetlands with RIBs disposal in the SE (components D11 and D16) are predicted to require the same amount of acreage as in the NE (components D12 and D17), i.e., 111 acres/mgd). For Table 2-9, the maximum application rate was used to estimate acreages and was based on the soils in the 1981 Leon County Soil Survey at the given sites. However, the USEPA recommends that soil percolation testing be conducted at any site proposed for irrigation be implementation to determine actual soil percolation rates.

It may also be noted that the City indicated in its October 27, 1992 letter that the USEPA has "...been involved with readdressing the Environmental Impact Statement of 1983 because of septic tank failures. A joint City and County Commission letter was sent to EPA requesting that you [USEPA] revisit the 1983 decision. This request was prompted by septic tank failures in the County, beyond the city limits. It's difficult to imagine that the County continues to promote the septic approach given the problems that are encountered with these in clay soil areas." The USEPA recalls participating in a site visit of the greater Tallahassee area in 1987. Several failing septic tanks were observed, with more failures being noticed in northern Leon County than in the southern portions of the County. Although percolation tests were not conducted during the site visit, the effects of differences in soil filtration were observed among as well as within some of the residential subdivisions visited. This observed trend for northern vs. southern Leon County are generally supported by the 1981 Soils Survey for Leon County. Specific soil association characteristics regarding suitabilities for wastewater disposal are discussed below in the "Soils in Northern vs. Southern Leon County" section.

The local decision-makers may or may not choose to consider other northern alternatives, verify the 1989 Public Works study, review soil maps, and conduct on-site infiltration (percolation) studies at these sites for soil drainage capability and suitability determinations. The County indicated (July 15, 1992 letter) that such a review of northern alternatives is consistent with the locally-adopted "Southern Strategy" planning guidelines. However, regardless of soil suitability comparisons, Alternative 1 would remain a practical alternative since it is an expansion of the existing City SE Sprayfield (although greater conveyance would be needed for southern conveyance compared to a northern alternative).

o Soils in Northern vs. Southern Leon County

Based on the "General Soil Map" for Leon County in the 1981 Soil Survey, Leon County is dominated by three soil associations: the Orangeburg-Lucy-Norfolk association in the northern part of Leon County and the Kershaw-Ortega-Alpin and the Dorovan-Talquin- Chipley associations in the southern part of Leon County. The Orangeburg-Lucy-Norfolk soils and the Kershaw-Ortega-Alpin soils are generally well-drained while the Dorovan-Talquin-Chipley soils are generally not well-drained. Specifically, the 1981 Soil Survey classifies the Orangeburg-Lucy-Norfolk soils as "well drained soils" and the Kershaw-Ortega-Alpin soils as "excessively drained and moderately well drained soils," while the Dorovan-Talquin-Chipley soils are considered "somewhat poorly drained to very poorly drained soils." Of the two well-drained soil associations, the depths of these sandy associations differ significantly: the Orangeburg-Lucy-Norfolk soils are sandy to only 20-inch depths with loam below, compared to sandy 20-40 inches deep with loam below or are loamy throughout (Note: "loam" is a soil type that is defined in the 1981 Soil Survey as a mix of clay (7-27%), silt (28-50%), and sand (<52%) particles.) By contrast, the Kershaw-Ortega-Alpin soils are sandy to 80 inches or more, with some having loamy layers (lamellae) below 45-inch depths.

Regarding the suitabilities of these soil associations for septic tank absorption fields, Table 11 of the 1981 Soil Survey presents the "restrictive soil features" of existing soil types. All listed Orangeburg, Lucy and Norfolk soil types are classified as "moderate: percs slowly" and/or "moderate: wetness," with "moderate" being defined as having unfavorable soil properties for the given activity. The Kershaw soils are classified as "slight" which is defined as soil properties generally favorable for the activity. Oretega and Alpin soils are classified as "severe: poor filter," with "severe" being defined as soil properties very unfavorable for the activity. The Dorovan, Talquin and Chipley soils are classified as "severe: wetness" or "severe: floods, wetness." These classifications indicate that only the Kershaw soils have properties favorable for septic tank absorption field infiltration while the others do not adequately drain or drain too well and therefore do not provide proper filtration (i.e., adsorption of inorganics (metals), microbes, etc.).

o Suitability of Soils in the Proposed Eastern Expansion Area

Based on the 1981 Soil Survey, the soils of the Eastern Expansion Area sprayfield site proposed by the City are dominated by Ortega Sand, Kershaw Sand with a 0-5% slope, Talquin Fine Sand, Chipley Fine Sand and Kershaw Sand with a 5-8% slope, respectively (also refer to Fig. 4-1 in this FEISS). Of these, only the Kershaw sands are classified as favorable for septic tank absorption fields (classified as "slight," i.e., having favorable soil properties for the activity).

Of the portions of the proposed Eastern Expansion Area sprayfield proposed for irrigation (i.e., center pivot irrigation Areas A-E and adjacent fixed head irrigation areas: Refer to Fig. ES-5 or 4-2 of this FEISS), irrigation areas associated with and adjacent to Areas A, B, and D primarily contain Kershaw Sands while irrigation areas associated with and adjacent to Areas C and E primarily contain Ortega Sand. As indicated, Kershaw Sands are considered suitable soil types for septic tank absorption fields while Ortega Sand would not be favorable due to poor filtration capabilities (too well-drained sands). However, it should be noted that the City's proposed action is not septic tank disposal of raw sewage, but rather spray irrigation of monitored, secondarily-treated sewage effluent. As such, spray irrigation would disperse effluent over a greater area than septic tank disposal and also would dispose wastewater of a considerably higher water quality than untreated raw sewage wastewater of septic tanks. (Specifically, all of the vertical soil horizons are utilized for filtration during spray irrigation whereas several inches of soil filtration are not utilized in septic tank drainage fields, since drainage lines are buried several inches below the surface; spray irrigation utilizes the entire horizontal soil surface area whereas septic tank fields only utilize soil areas associated with the drainage lines; and secondarily-treated spray effluent requires considerably less soil filtration for purification than untreated septic tank raw sewage wastewater.)

Because of the filtration limitations of the Ortega Sand in the proposed irrigation areas associated with and adjacent to Areas C and E as well as some unfavorable soils interspersed in irrigation areas associated with and adjacent to Areas A, B and D, the USEPA recommends reduced irrigation application (inches/week) in these areas. If monitoring exhibits compliance with State of Florida groundwater quality standards and monitoring is conducted to the satisfaction of the State of Florida, additional application can be tried if commensurate with groundwater quality compliance. Groundwater monitoring is also essential since the entire Eastern Expansion Area lies in the Woodville Karst Plain, i.e., Karstic geology that is subject to water dissolution and collapse (sinkholes). In any areas of collapse, irrigation should be stopped immediately in those areas and the State of Florida notified. The USEPA recommends that no effluent be sprayed in a reasonable surrounding area of the existing sinkhole depressional area located within the proposed fixed head irrigation area adjacent to Area D, as well as any other potentially discovered sinkhole areas (Refer to Fig. ES-5 or 4-1 of this FEISS). The USEPA further recommends that the State of Florida consider the existing soil characteristics and Karstic conditions of the proposed Eastern Expansion Area in their permitting decision for the City's proposed sprayfield expansion.

o <u>Leon County Action on NE Treatment Plant</u>

The concept of a NE Wastewater Treatment Plant is not a new one. It was promoted in the 1977 201 Plan, but was not the preferred alternative in the USEPA 1983 FEIS. The City's 1988 MSP, however, calls for a NE Wastewater Treatment Plant to be constructed after the year 2010. The USEPA understands from the City of Tallahassee that a Citizens Advisory Committee (for a NE treatment plant) had been established to consider the establishment of a NE treatment plant and to determine where such a plant could be located and how best to dispose the effluent generated. The Committee, however, did not provide a final recommendation and has not reconvened on the issue. The USEPA further understands from the City that the City had made a commitment that a wastewater treatment plant in NE Leon County would be constructed in early 1997. Subsequently, however, the County (per personal communication with the City and the City's October 27, 1992 letter) unilaterally defranchised (cancelled) the City's water and sewer service zones outside City limits, so that the City consequently felt that a NE Plant would not be needed in the NE area (where the City's "urban services area" outside the City limits was located).

As a result of the County's action as well as the County's denial of the franchise applications for the SE Sprayfield, the City Commission has decided to hold the update of the City's Master Plan in abeyance (after action on certain proposed amendments had proceeded). The County indicated (July 15, 1992 letter) that the City Commission had apparently elected to terminate (March 11, 1992) the City consultant's work on the City's Master Plan and that this action "...may have put an end to the northeast treatment plant" since the NE Plant and the NE Sprayfield were the main items of the City's Master Plan.

As discussed below, however, the City of Tallahassee and Leon County have more recently signed a new "Water and Sewer Agreement" (1993) on February 11, 1993, which establishes a new urban services area outside of the City in northern Leon County. The USEPA also understands from the City that the northeast is the next likely area for potential treatment plant construction. The City already owns an 80-acre site in the northern part of the City that was acquired as part of the Welaunee annexation package that could potentially be used for such a NE plant. The site is located south of Interstate Highway 10 and north of Miccosukee Road, in the SW quarter of Section 12, Township 1.N., Range 1.E. (Also refer to Figure ES-3, where this site is depicted as the alternative "Northeast WWTP"). Given the public interest in such a plant (as opposed to conveyance of northern wastewater for treatment and disposal in southern Tallahassee) as demonstrated at the USEPA Public Hearing on August 9, 1990, local decision-makers may wish to further consider such a potential treatment plant with appropriate effluent disposal in their future Tallahassee wastewater management plans.

o <u>City of Tallahassee Action on T.P. Smith Plant Expansion</u>

In the absence of a NE Plant and under the proposed implementation of Alternative 1, wastewater generated in northeastern Leon County would initially continue to be conveyed via existing pump stations to the T.P. Smith Plant on the southwestern side of Tallahassee. The USEPA understands from the City that the City's 7.5 mgd expansion to the T.P. Smith Plant was completed in January 1993. Also at that time, a new force main from the northeast routed around the eastern side of the City of Tallahassee via Capital Circle to the T.P. Smith Plant was completed by the City and was operational in February 1993, although some refinements were still made thereafter. In the near future (1995-1997), the City furthermore expects that new additional pump stations would be required for conveyance.

o <u>Expansion of the City's SE Sprayfield Under Alternative 1</u>

Alternative 1, the preferred alternative of the FEISS, proposes the expansion of the City's existing SE Sprayfield. Both an Eastern Expansion Area and a Western Expansion Area are considered under Alternative 1. However, the USEPA understands from the City that the land of the Western Expansion Area has not been acquired by the City and that acquisition of and construction at the Western Expansion Area appears unlikely at this time. The FEISS has therefore concentrated on the potential environmental impacts of the expanding the SE Sprayfield toward the east, i.e., the Eastern Expansion Area.

o <u>Leon County Action on SE Sprayfield Expansion</u>

The USEPA understands from the City (October 27, 1992 letter) and/or the County (July 15, 1992 letter) that the County (Board of County Commissioners) has denied (July 23, 1991) two Leon County sewer "franchise" applications for right-of-way placement permits for the expansion of the SE Sprayfield and the expansion of an effluent force main from the T.P. Smith Treatment Plant to the SE Sprayfield. We understand the County's actions are based on citizen concerns for existing residents east (and north) of the site relative to the proposed Eastern Expansion area of Alternative 1, which the City has proposed for near-future construction. The USEPA understands from the City that citizen concerns regarding aerosol spray drift, odor, and decreased property value were voiced by some 20 speakers in a public hearing held by Leon County in Tallahassee on July 23, 1991.

As a consequence, the City's proposed Eastern Expansion area (part of Alternative 1) is presently denied by Leon County. The County has requested that the City revise/update the 1988 City MSP and that the City present various wastewater alternatives with cost estimates to the County for consideration. A Citizens Advisory Committee (for effluent disposal) consisting of both City and County appointees was established and has reviewed alternatives. During this process, the County Commission has stated that "the sole eastern expansion of the sprayfield is no longer a consideration of this Commission" (per the City's October 27, 1992 letter).

o Citizens Advisory Committee Action on Disposal Site Priorities

The USEPA understands from the City that at the time of preparation of the DEISS (1989), the City's next planned effluent disposal expansion (Alternative 1) was to expand the SE Sprayfield with golf course irrigation disposal to be provided as the sprayfields approached capacity. However, the USEPA further understands from the City that the Citizens Advisory Committee (for effluent disposal) recommended that the golf course disposal be provided first, followed by other public access disposal methods. This recommendation was considered in a meeting with the City Commission on November 16, 1992 and, ultimately, it was decided that the Citizens Advisory Committee should provide recommendations to the City Commission for their review. The Citizens Advisory Committee recommended to:

* Proceed with the golf course irrigation approach;
* Landscape irrigate public access areas at the Tallahassee Airport;
* Provide an additional 100 million gallons of effluent storage capacity for the SE Sprayfield to provide flexibility for effluent application for agricultural irrigation;
* Use the "one-half pivot" concept, which would provide additional flexibility for effluent application for agricultural irrigation by controlling the amount of effluent distributed to either side of the pivot sprinkler.

These recommendations were approved by the Citizens Advisory Committee on December 7, 1992, and were to be presented to the City Commission for their review. If it is decided that golf course irrigation is to precede sprayfield expansion, the City would recommend construction of a force main for effluent conveyance to the golf courses.

It also should be noted that, per FDEP stipulation, golf course spray irrigation would require that an alternate disposal method be made available as a contingency. It is the USEPA's understanding from the City that such a backup does not presently exist.

More recently, the City has reviewed the feasibility of irrigating golf course and other public access areas. An essentially final report entitled "Master Plan for Public Access Reuse" has been completed by City contractor in November 1993. The USEPA understands from the City that the report generally concludes that the operation would be expensive and that an application rate of 0.6-0.7 inches/week (i.e., 1 mgd) could be expected for the proposed sites. The local decision-makers may or may not wish to review the methods and conclusions of the report as part of their alternative selection process.

o City Commission Action on SE Sprayfield Expansion

In addition to the County's denial of the sewer franchise, we understand from the County (July 15, 1992 letter) that the City Commission has directed the City to stop pursuit of the expansion of the SE Sprayfield. The City (October 27, 1992 letter) has stated that they "...do not believe that the door is closed forever on a sprayfield expansion; and, in fact, it is one of the least costly of the alternatives considered." The City also indicated that after the review by the Citizen's Advisory Committee (for effluent disposal), the City Commission was expected to review the alternatives matter (November 16, 1992) and may readdress the SE Sprayfield option through its consultant. In addition, City technical studies, in which the County was included as being represented on the Technical Committee, concluded that the currently permitted effluent application rate (3.16 in/wk) for the SE Sprayfield should not be increased. Presumably, therefore, additional effluent could not be irrigated at the sprayfield without expansion. Under the circumstances, the design of the City's sprayfield expansion had not yet begun, and the City has been and is still leasing the Eastern Sprayfield Expansion Area.

o <u>City of Tallahassee and Leon County Water and Sewer Agreement of 1993</u>

On February 11, 1993, the City and County signed a Water and Sewer Agreement (1993) that re-established a City water and sewer service area outside the City limits, i.e., the County has allowed the City to again have jurisdiction over a portion of the northern County outside of the City limits except in areas where sewer service providers already exist. This agreed upon sewer service area, known as the "urban services area," is similar in location to the previous "urban services area" cancelled by the County, although it is not the same area and is smaller.

It should be noted that the FEISS (Refer to Fig. 1-1 and 2-1) still depicts the former (cancelled) urban services area as well as the other City sewer services areas. As indicated above, the urban services area outside the City limits has changed due to the City/County Water and Sewer Agreement. In addition, general configurational changes have also occurred to the boundaries of the other depicted City sewer services areas. The overall more significant changes to the City sewer services areas is an area reduction in the SE quadrant (north of Old Tram Road) and in the NE quadrant (north of Bannerman Road) as well as a relocation of the boundary through Lake Jackson instead of around it along its southern (Old Quincy Highway) and eastern boundaries.

As part of the City/County Agreement (page 3, item 7), it is stated that: "The County agrees to work with the City and the Citizens Committee on wastewater effluent to develop solutions to the disposal of wastewater effluent and recognizes that without resolution of this issue, many benefits of this agreement cannot be realized." The USEPA understands from the City that the City interprets this to mean that the County would consider the SE Sprayfield expansion (Alternative 1) as a disposal alternative. To this end, the USEPA further understands from the City that the County has indicated that wider vegetated buffer zones would be needed on the outside borders of the Eastern Expansion Area (the USEPA would support such a recommended added buffer), which would result in less actual spray irrigation acreage. Consequently, the 909 acres proposed on the Eastern Expansion area and used in this FEISS (See Fig. ES-5 and 4-2) as the proposed spray irrigation acreage, may be decreased. The configuration of the center pivot irrigation areas (Areas A-E) and adjacent fixed head irrigation areas may also be altered. The local decision-makers may or may not choose to implement such changes. However, whatever configuration is selected, the USEPA recommends that irrigation should be limited to suitable soil types for proper infiltration, that wildlife corridors are maintained within the sprayfield, and that a north-south corridor for wildlife movement also be maintained. Also, additional coordination with the Florida Game and Fresh Water Fish Commission (FGFWFC) may be needed (subsequent to the January 23, 1991 interagency field inspection and the FGFWFC follow-up letter dated February 6, 1991 - refer to Chapter 5 of this FEISS) to ensure that sufficient sandy habitat areas are still available for the Gopher Tortoise and other protected species under any revised irrigation area configuration.

o <u>Artificial Wetlands Alternatives</u>

The County indicated (July 15, 1992 letter) that artificial wetlands were not properly discussed in the EIS Supplement considering the rapid emergence of the technology in Florida. It should be noted that the EIS Supplement considers alternatives involving artificial wetlands, and includes such an alternative (Alternative 7) as one of the four alternatives considered for further study. The use of artificial wetlands is a relatively new technology for wastewater effluent treatment in the United States which has shown increasing reliability -- even since the 1989 matrix evaluation for the preparation of the DEISS. The local decision-makers may or may not choose to further explore such alternatives. It may be noted, however, that although the artificial wetlands method has been successfully used in the Orlando, Florida area, the City of Tallahassee has not used it in the project area; the City does have successful experience in the spray irrigation method proposed in Alternative 1. The USEPA also understands from the City that the artificial wetland method is not, by itself, an effluent disposal method but rather a treatment method that would still need to be followed by some form of disposal (e.g., RIBs, if feasible and environmentally appropriate). The City apparently believes that the nitrogen removal provided by artificial wetlands and required for RIB disposal can more reliably be provided by a sewage treatment plant.

o <u>1989 Matrix Evaluation of Alternatives</u>

Alternatives 1, 2, 7 and 9 were selected for further consideration in the alternatives analysis during the preparation of the DEISS. Matrix evaluations were completed by alternative for cost-effectiveness, implementability, reliability, and environmental impacts. It can be noted that some ratings of individual characteristics and rankings of alternatives may change with time and with decision-makers while others may not. For Alternative 1, for example, "land-use" impacts were rated a "1" (greatest impact) in the "environmental impact" matrix on Table 3-9, since the land-use conversion for the expansion of the SE Sprayfield would be from a silvicultural/natural forested area to an agricultural sprayfield. If, as the USEPA understands from the City of Tallahassee, the City is to try forest spray irrigation on a small demonstration project basis as part of the implementation of Alternative 1, land use would overall be less impacted for that portion of Alternative 1 and arguably may merit a higher rating for Alternative 1 for land-use impacts. Also, if the reliability and implementability of effluent treatment through the use of artificial (constructed) wetlands continues to increase and can be effectively used locally in combination with an appropriate effluent disposal method, the "potential for operational failure" implementation characteristic (rated a "1" in the "implementability" matrix on Table 3-7) may also arguably merit a higher rating for Alternative 7. Local decision-makers may or may not choose to consider such changes over time or differences in objective judgement during the alternative selection process.

o <u>"Effluent-to-Energy" Concept</u>

Local state and private foresters have expressed interest in the City's use of U.S. Forest Service (USFS) lands as spray irrigation sites for silviculture, i.e., the "effluent-to-energy" concept (Also refer to Chapter 5 of this FEISS). In general, the USEPA does not disagree with the "effluent-to-energy" concept, and USFS site alternatives were considered in the DEISS. However, it can generally be expected that the examined USFS sites are likely to support sensitive communities such as the longleaf pine-wiregrass communities and endangered species. As such, it is believed that these sites are not the best suited for silvicultural or other forms of development involving land clearing, and should instead be preserved or allowed to naturally recover if disturbed. In general, many other acres of land exist locally that are more suitable for effluent irrigation of trees and other vegetation. For example, Alternative 2 proposes silvicultural irrigation and Alternative 1 proposes agricultural irrigation at the City's SE Sprayfield expansion site. Although USFS sites and Alternative 2 were not selected as the preferred alternative in the FEISS, the selected Alternative 1 is an agricultural irrigation site that, if implemented, is to include some silvicultural irrigation, i.e., it is the understanding of the USEPA that the City is to try forest spray irrigation for an undetermined number of acres in the Eastern Expansion area of the SE Sprayfield on a small demonstration project basis as part of the implementation of Alternative 1. Local foresters may or may not choose to further discuss the proposed pilot study with the City of Tallahassee if such an alternative is implemented.

o <u>Spray Irrigation Acreage Estimates for Alternatives</u>

The City of Tallahassee has calculated the spray irrigation or RIB acreage needs for several components in Table 2-9. The City's calculations assumed a "rule-of-thumb" application rate of 2 inches per week. In general, the revised acreage estimates appear to be less (by varying percentages) than presented in the DEISS. The differences (City vs. EIS Supplement) in estimated acreage are apparently due to the fact that application rates presented in Chapter 2 (Table 2-9) are, as indicated above, the maximum application rates for the land considered for disposal, based on the 1981 Soil Survey. The local decision-makers may or may not choose to review these acreage estimates and the related estimates and sub-estimates (such as costs) presented in the FEISS, where necessary.

o <u>Additional Decentralized Alternatives</u>

The County indicated (July 15, 1992 letter) that decentralized alternatives (such as traditional and "hybrid" septic tanks and package treatment plants) considered "viable" by Leon County should have been addressed in the EIS Supplement (in addition to the considered Alternative 9). The City indicated (October 27, 1992 letter) that the City opposes package plants in the Urban Services Area due to "bad experiences nation-wide with these systems" and that there are current package treatment plants in Leon County with "known problems." The City has also opposed County amendment proposals to the City's Master Plan that would allow package plants in urban areas.

Although a decentralized alternative was considered in the EIS Supplement (Alternative 9), the approach taken by the EIS Supplement is that most larger cities are converting to a centralized form of wastewater management. While there are soil types in both northern and southern Leon County that could be used for septic tanks, the County also contains areas with poorly drained soils and tank failures. Also, if septic tanks fail, the resultant water quality problems are difficult to detect early and to subsequently mitigate, and conversion to a centralized system would then likely occur anyway and, if so, probably at a higher cost.

o <u>City/County Development Potential with a Centralized System</u>

One of the initial (pre-DEISS) concerns of the public was that a centralized sewage system would result in secondary development impacts, i.e., development of the City of Tallahassee and Leon County would be encouraged and accelerated compared to a decentralized system (such as septic tanks requiring minimum lot size acreage resulting in low density development). The USEPA does not disagree with such concerns for increased potential for development of the City and County with the implementation of a centralized system, and environmental degradation can be associated with increased populations. Development could result in non-point-source water quality degradation, wetland losses and other environmental impacts. We therefore encourage the local decision-makers to use good judgement in their land-use planning and zoning that allow controlled development, as well as compliance with State of Florida and Leon County Best Management Practices (BMPs) during construction. Conversely, failing septic tanks can also result in water quality problems for surface and groundwaters. Use of a centralized system should reduce such potential if infiltration/inflow reduction and other maintenance programs are implemented by the local provider.

o <u>Project Funding and Costs</u>

Although federal USEPA funds have been used for the City of Tallahassee sewer system infrastructure in the past and federal funds were associated with several alternatives in the USEPA 1983 EIS, no federal funds have presently been requested by the City for alternatives considered in the present EIS Supplement to the 1983 EIS, since all presented alternatives in the EIS Supplement are considered "no-federal-action" alternatives. It is the understanding of the USEPA that funding is to be obtained from local sources. The County indicated (July 15, 1992 letter) a concern that local public funding was not distinguished from local private funding in the EIS Supplement. The local decision-makers may or may not choose to distinguish cost sources for comparisons between, for example, centralized versus decentralized alternatives. In addition, the City of Tallahassee noted that a cost estimate for a backup system for golf course spray irrigation for Alternative 1 (so that irrigation at these sites could be discontinued if necessary) was not included in the FEISS (Chapter 2) and considered this omission a "major oversight." The EIS Supplement (Section 3.1 in this FEISS) also did not include the initial "hook-up" costs in the FEISS development of the total annual household costs for system customers (Section 3.1) for connection from a decentralized septic tank system to a centralize sewer system. The City also was unclear as to why the EIS Supplement estimated that sludge hauling costs for treatment south would be twice the cost for treatment north and south. This appears to be due to different hauling distances and land costs at the two facilities. Also, although the total City treatment capacity was rerated to 32.0 mgd (or 32.06 if the MAP is included), it should be noted that the flow projections in the EIS Supplement indicated that only 31.0 mgd would be required for the planning period, so that 31.0 mgd was used in the EIS Supplement (e.g., Section 2.4.1; Tables 2-11 through 2-18) in developing costs. Local decision-makers may or may not choose to consider such cost issues. Finally, it should be noted that cost estimates in this FEISS were based on 1989 dollars unless otherwise indicated, which the local decision-makers may or may not choose to update.

o <u>Residential Connection to Centralized Sewer System</u>

The USEPA understands from the City of Tallahassee that public complaints are common regarding "hook-up" fees associated with residential connections to a sewer system. The City's policy regarding connection has allowed some practical public discretion. In general, if a septic system is functioning properly, the City has not required a resident to connect to the sewer system; however, a failing septic tank inside the City limits may not be repaired in lieu of connection to the sewer system. In either case, however, a small City monthly "readiness to serve charge" of $8.15 (for a typical residential meter size: in fiscal year 1994 (FY 94) dollars) is required from all residents in a sewered area, even if not connected. City fees (in FY 94 dollars) for connection inside the City limits are $2,970, which includes a system fee of $2,520 and a (4-inch) tap fee of $450, while City fees outside the City limits total $4,305.60 including a system fee of $3,855.60 ($3,780 plus 2% Leon County tax) and a (4-inch) tap fee of $450. The City offers a loan program, so that connection payments can be made with monthly utility payments. In addition, there is a City monthly user fee of $2.60 per 1,000 gallons of sewage for residents inside the City limits, and a $3.90 monthly user fee plus 2% per 1,000 gallons of sewage for residents outside the City limits. In addition to these payments to the City, actual on-lot connection of a residence to the sewer system would be required, so that an additional plumbing cost of approximately $1,000 (in 1993 dollars) per average residence can be expected. In general, the USEPA believes that the City's practical approach regarding public discretion for sewer connection may be acceptable provided that water quality problems are not continued or created (as determined by the City or other appropriate government agency) so that water quality standards are not violated.

As noted previously, the initial "hook-up" costs were not considered in the FEISS. Local decision-makers may or may not choose to consider such additional costs.

o <u>USEPA NEPA Compliance</u>

As previously indicated, the City of Tallahassee presently has not requested any federal funds to implement the 1988 City MSP, nor does the implementation of the MSP as proposed otherwise constitute a "major Federal action" under Section 102(2)(C) of NEPA, and NEPA does not mandate that an EIS Supplement be prepared. However, this discretionary USEPA EIS Supplement provides technical guidance to the City of Tallahassee Sewer Division as well as other local decision-makers for facility expansion planning. Unless the proposed project becomes a major federal action, the selection of an appropriate alternative for the City of Tallahassee wastewater management would be a local decision. Since no major federal action is currently planned, the USEPA presently does not intend to prepare a Record of Decision (ROD) for this EIS Supplement. If, however, local decision-makers should ultimately include federal involvement in the City MSP at the level of a "major Federal action," the EIS Supplement (the DEISS and this FEISS) will serve to meet the requirements of NEPA (and an ROD would be prepared), unless a significant amount of time has passed before project implementation and significant changes have occurred in the project as proposed, in the impacts of the project, and/or in the project area. After appropriate examination of such considerations, the need for a supplemental EIS to update the present EIS Supplement could be determined.

o <u>USEPA Action on Storm Water Regulations and Permitting</u>

Storm water point source discharges to waters of the United States from the operation (spray irrigation) of non-agricultural/ non-silvicultural land application sites (such as golf courses, rights-of-way, and landscape areas) receiving domestic wastewater treated to the quality required by Chapter 17-610 F.A.C. for the land application of reclaimed water are not required to be covered by NPDES permits, unless the USEPA specifically requires a facility to submit an application on a case-by-case basis. Therefore, no NPDES permit is needed for the operation of such land application sites for the City's proposed project (if storm water point source discharges exist to waters of the United States for such sites) unless specifically requested by the USEPA. However, dedicated discharges of reclaimed water, without land application, are required to be covered by NPDES permits. It may also be noted that storm water discharges from the land application of wastewater effluent on agricultural and silvicultural sites are exempt from the NPDES permitting program if the sites are consistent with 40 CFR Part 122.3(e), so that the operation of such sites for the City's proposed project would not require an NPDES permit if consistent with 40 CFR 122.3(e).

o <u>USEPA Action on Sludge Standards and Permitting</u>

The USEPA established federal sludge disposal/reuse standards which were promulgated in the <u>Federal Register</u> at 40 CFR 503 on February 19, 1993. In general, these standards must be complied with by all treatment works treating domestic sewage by February 19, 1994. Violation of these standards would be a violation of the Clean Water Act. It is anticipated that current and proposed sludge disposal/reuse activities would be regulated through an NPDES permit, where applicable, or through issuance of a "Sludge-Only" permit. This federal permitting activity would be issued by the USEPA/Region IV until program authorization is given to the State of Florida. Therefore, the newly promulgated federal regulations are in addition to the State of Florida sludge disposal/reuse regulations.

o <u>Citizens Advisory Committee Action on Sewage Sludge</u>

In response to the Florida regulations regarding sewage sludge and in anticipation of the promulgation of the new federal (USEPA) sewage sludge standards (40 CFR 503 [February 19, 1993]), a Citizens Advisory Committee (for sewage sludge management) was formed on July 8, 1992. This Committee addressed various processes to further reduce pathogens in sludge to allow disposal at the existing agricultural (i.e., bermuda grass utilized as hay for livestock) sludge fields indefinitely if the sludge meets additional pollutant concentration requirements for inorganics such as metals (since Tallahassee is not a particularly industrialized area, we understand from the City that these requirements can be met). The Committee agreed that the "chemical stabilization" method might be the best for future implementation in a few years. Although the City is currently in compliance with the permit requirements for Class B sludge, the City wishes to be able to dispose Class A sludge in the future. (Note: Class A and B sludge are federal classifications defined in the promulgated standards. A Class A pathogen facility utilizes treatment to reduce pathogen densities to levels that are protective of public health and the environment; a Class B facility utilizes both treatment and site restrictions to reduce pathogen densities to levels that are protective of public health and the environment.)

Also, the State of Florida regulations (Chapter 17-640 F.A.C.) address sludge fields (Class B residuals) used as agricultural vs. disposal fields and the utilization of crops grown on such sludge fields. In general, in order for sludge fields to be defined as "agricultural" as opposed to "disposal" fields depends on the amount of nitrogen applied (essentially, if the amount of nitrogen from sludge and, if applicable, irrigated effluent does not exceed the nitrogen demand of the crop, it is defined as an agricultural field). Class B restrictions regarding field buffer zones and crop utilization are specifically addressed in Rule 17-640(6) F.A.C. Essentially, crops grown on Class B sludge fields for consumption as animal feed or human food (fruits and vegetables that do not touch the soil/sludge that are to be consumed raw; pasture vegetation) can not be harvested until 30 days after the last sludge application. Root crops that do touch the soil/sludge can not be harvested until 18 months after the last sludge application. Accordingly, City of Tallahassee utilization of crops (bermuda grass utilized as hay for livestock) grown on sludge fields must be consistent with Chapter 17-640 F.A.C.

o Population Projections for Tallahassee

The USEPA understands from the County (July 15, 1992 letter) that the County has concerns regarding the County-expected use of pre-1990 population estimates in the EIS Supplement. The County suggests that these estimates may now be too high compared to the 1990 census, given the economic "recession" (July 15, 1992 letter) and the adopted local Comprehensive Plan which affects County developmental density. As such, the local decision-makers may or may not choose to consider circumstances that may affect projections relating to the appropriate amount of expansion of the Tallahassee wastewater management systems. According to the Tallahassee-Leon County Planning Department (1992) statistics dated February 14, 1992, obtained by the USEPA through the Tallahassee Chamber of Commerce (Tallahassee Chamber), the 1990 census for Leon County (including university students) indicates a population of 192,493 and a population projection for the year 2010 of 261,600 (35% increase since 1990). It should be mentioned that, according to personal communications with the Tallahassee Chamber (1992 and 1993), the City of Tallahassee constitutes approximately 90% of Leon County and that no census data or projections exist at this time for incorporated Tallahassee. However, estimates for incorporated Tallahassee obtained through the Tallahassee Chamber indicate a (presumed) 1990 population estimate for the City of 124,773. In addition to this information, the Tallahassee Chamber indicated that the Leon County has a labor pool from a 13-county radius including south Georgia. Therefore, an additional, apparently significant, population of commuters exists in the County (including the City) during the work day.

o City Water Usage Projections

The County (July 15, 1992 letter) also has concerns regarding the EIS Supplement projection of 160 gpcpd of water usage as being high for the region and accordingly resulting in an over-estimation of the amount of City expansion necessary. It is the USEPA's understanding from the City that the 160 gpcpd is the peak flow and 140 gpcpd is the average daily flow, the latter being used in the EIS Supplement. It should be noted that water usage projections are partially based on drinking and wastewater volumes for residents. Based on the literature (Baker et al., 1975; USEPA, 1977), average American per capita household consumption rates can be expected to approximate 60 gpd but can be greater (86 gpcpd - Durham, North Carolina projections for 2010: USEPA, 1989; 123 gpcpd - general Florida in 1985: USGS, 1990). Added to such domestic requirements are the water needs of local industrial, commercial, power plant, etc. consumption needs. The City (October 27, 1992 letter) emphasized that the 160 gpcd wastewater flow rate was "...not an average sewage use by residents" but rather was "...the total flow at the plants (residential, industrial, commercial, and institutional) divided by the total population served by the sewer system." The City also indicated that the per capita figure is higher than what one resident produces since Tallahassee experiences a "very significant sewage flow" from non-residential sources including people working in Tallahassee but living outside the City sewer system. This is consistent with the above Tallahassee Chamber information regarding commuters.

Examples of overall water consumption rates in the literature are 100 gpcpd for Baldwin County, Alabama (USEPA, 1990); 187 gpcpd for Dade County, Florida (Miami-Dade Water and Sewer Authority Department, 1991); and 172 gpcpd for general Florida in 1985 (USGS, 1990). The local decision-makers may or may not choose to revisit the 160 gpcpd figure and attendant sewage treatment/ effluent disposal needs based on specific local consumption needs, water conservation methods (which the USEPA encourages), projected City growth, and contingencies. It should be noted that domestic and agricultural irrigation usage should not be included in per capita figures since such wastewater would not be returned to the sewer system; the commercial, industrial and demographic aspects of the Tallahassee service area are important considerations; university students and families with children often exhibit greater than average domestic water usage; and conservation methods may or may not be practiced in the Tallahassee area.

o Local Water Conservation

The County (July 15, 1992 letter) also has concerns that water conservation methods relative to City water distribution and City sewerage generation were not provided in the EIS Supplement. Suggested heightened water management practices were: system-wide reductions of pressure, water conservation programs, and the adoption of incentive-based rate structures. It was suggested that water conservation methods may preclude the need for the City's proposed additional sewer facilities. The City indicated (October 27, 1992 letter) that "...water conservation would not have resulted in these projects being done" and that the T.P. Smith Plant was being expanded because of increased peak monthly flows in 1987 and 1988 which resulted in the City "...slightly exceeding the plant's average capacity." In addition, the FDEP had requested that the plant and SE Sprayfield be expanded, which was agreed to in a City-FDEP Memorandum of Understanding. A proposed new force main was intended to "...handle diversions from an existing trunk which became overloaded during very wet periods" and new growth in the future. The City's "aggressive" Infiltration/Inflow (I/I) reduction program had also discovered leaks of which 75% had been repaired to reduce peak flows (with work continuing on the other discovered leaks).

The USEPA strongly supports water conservation methods and related recycling and pollution prevention (source reduction) methods in households and industry. The FEISS addresses some water conservation approaches in Table 2-5 of this FEISS; however, the USEPA understands from the City that, although conceptually not opposed to water-saving devices, the City presently has no prepared plan to implement water-saving devices and believes that such devices would be difficult to implement since Tallahassee has an abundant water supply. Nevertheless, the USEPA encourages the City and the County to consider water conservation methods as part of facility design and to implement such conservation methods.

o City Centralized Sewer System Spills

The County indicated (July 15, 1992 letter) concerns regarding "numerous repeated sewage spills" from the centralized City system that occurred throughout 1991 at Lake Munson and Lake Lafayette were not discussed in the EIS Supplement. The City indicated (October 27, 1992 letter) that these spills occurred during heavy rainfall periods during January and March of 1991 and that City trunk lines experienced more infiltration and inflow than could be handled, and offered that the total volume spilled in 1991 from the City's system "...was about 0.4 percent of the estimated volume which flows from septic tanks within Leon County annually."

Such spills are generally more "visible" than septic tank failures and are a localized or point source impact, which therefore can be (and should be) relatively easily corrected by the City. The City indicated (October 27, 1992 letter) that such problems had not occurred in 1992 due to drier weather, the City's I/I reduction program, and the City's capital improvement program. The City furthermore stated that: "We are not happy about the 1992 incidents but these were very unusual in nature and due to our capital improvements, won't be repeated."

o <u>Other Sewer Service Providers</u>

The County indicated (July 15, 1992 letter) that the future role of other local sewer service providers, such the Talquin Electric Cooperative (TECO), should be have been considered as opposed to limiting the alternatives of the EIS Supplement to the promotion of the City's central sewer system. In addition to references to TECO in the FEISS (e.g., Section 2.1.2), local decision-makers may or may not choose to use various providers in the wastewater management of Tallahassee, although the City would seem to be the largest centralized system in the area and have experience with large (mgd) process flow volumes. To date, TECO apparently is experienced in accommodating area small (mgd) process flow volumes.

o <u>Human Health Risks</u>

Potential health risk concerns associated with spray irrigation of treated effluent have been raised by the local public. These include concerns from sprayfield aerosols containing non-pathogenic bacteria and pathogens (e.g., pathogenic bacteria, viruses, protozoans and other infectious microbes) traveling away from the sprayfield area, and the potential groundwater contamination of drinking water. It is generally documented that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater. However, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious. However, several precautions can be taken to reduce the human health risk at spray irrigation sites, including effluent treatment, effluent monitoring, on-site containment of aerosols, prevention of on-site ponding of sprayed effluent to reduce animal vectors, and groundwater monitoring. The USEPA supports the implementation of such precautions for sprayfield irrigation projects.

The USEPA understands from the City of Tallahassee that fecal coliform levels are monitored by the City before effluent is spray irrigated on sprayfields and after irrigation via groundwater monitoring. The USEPA also understands from the City that the water quality limits for fecal coliform levels used by the City for effluent prior to sprayfield irrigation is the State of Florida standards defining "secondary treatment" of wastewater, i.e., <200 organisms per 100 ml of effluent. Although there are no USEPA or federal standards for fecal coliforms for spray irrigated effluent, this criterion is consistent with USEPA guidance from the Requirements Memorandum #79-3 dated November 15, 1978 of the former Construction Grants Program (USEPA, 1978). The concepts of this memorandum were incorporated in a USEPA Technology Transfer manual entitled "Land Treatment of Municipal Wastewater" (USEPA No. 625-1-81-013) (USEPA, 1981). The 200 counts/100 ml of effluent criterion is USEPA's fecal coliform criterion for bathing (swimming) waters. It is presumed that water considered safe enough for swimming (which could include incidental drinking) would be adequate for irrigation of sprayfields, particularly with vegetated buffers. In the absence of federal standards regarding acceptable remaining levels of fecal coliforms in sprayed effluent, the USEPA recommends that the State of Florida the use, at a minimum, the above federal guidance (USEPA, 1981) to help protect public health and the environment during their permitting decision for effluent sprayfields in addition to any appropriate State of Florida regulations (Chapter 17-640 F.A.C.) for public access areas.

As suggested above, the USEPA also supports implementation of vegetated buffer zones on outer borders of sprayfields, implementation of internal sprayfield vegetated corridors, reduction of sprayfield spraying during windy days and during the night (to the extent feasible) when atmospheric conditions promote aerosol dispersion, in order to help contain spray irrigation aerosols on-site sprayfields. In regard to groundwater monitoring of sprayfields, the USEPA understands from the City that the State of Florida groundwater standards used by the City for groundwater monitoring are the drinking water standards for fecal coliforms, i.e., no (zero) fecal coliforms, so that City compliance with these standards would result in no additional fecal coliforms in the groundwater.

The spray application of wastewater effluent on golf courses and other public access areas having greater public access than agricultural or silvicultural sprayfields, would require additional effluent treatment for suspended solids removal and high-level disinfection under State of Florida regulations (Chapter 17-610 F.A.C.). Compliance with these regulations should greatly reduce the health risks associated with aerosols at golf courses and other public access irrigation areas. Irrigation of golf courses is not uncommon in Florida. However, such public access irrigation areas would need an alternate disposal method available as a backup so that irrigation at these sites could be discontinued as necessary (it is the understanding of the USEPA from the City that such a backup method does not currently exist for Alternative 1).

Also related to human health is the utilization of crops grown for consumption on sprayfields and sludge fields (see below).

- <u>Crops Grown On Sprayfields And Sludge Fields</u>

The USEPA understands from the City that crops for animal feed and/or processed food for humans are grown and harvested on City sprayfields. Crops include corn, canola, rye/rye grass and soy beans (processed foods probably would include soy bean and canola oils). Cattle are also grazed on irrigated fields. Also, sludge fields (Class B or equivalent) are used by the City for the harvest of bermuda grass for hay for cattle feed (harvesting 30 days after last sludge application).

The FDEP stipulates that all agricultural products produced from effluent irrigated sprayfields are not for direct human consumption (Chapter 17-610 F.A.C.: Rules 17-610.200(13), 17-610.310(d), 17-610.320(2), 17-610.425, 17-610.426, 17-610.475, and possibly others). Consistent with Chapter 17-610 F.A.C., "edible" crops intended for human consumption must be "peeled, skinned, cooked or thermally processed before consumption is allowed" (Rule 17-610.475). Also, cattle providing milk for human consumption are not to be grazed on irrigated fields until 15 days from the last field application of reclaimed water (Rule 17-610.425). Accordingly, irrigated agricultural crops produced by the City from the proposed Alternative 1 may only be utilized as animal feed and/or as processed food for humans to the extent consistent with Chapter 17-610 F.A.C. Grazing of cattle on proposed or existing irrigated sprayfields may also only be conducted to the extent consistent with Chapter 17-610 F.A.C.

The USEPA understands from the City that a significant number of cattle (perhaps 100 head) died during one winter (cerca 1990) at the City's SE Sprayfield. Although the City does not believe that the deaths were related to the cattle grazing on the sprayfield, the cattle were not autopsied. The cattle were buried on site.

State of Florida regulations (Chapter 17-640 F.A.C.) also address the utilization of crops grown on sludge fields. Class B restrictions regarding field buffer zones and crop utilization are specifically addressed in Rule 17-640(6) F.A.C. Essentially, crops grown on Class B sludge fields for consumption as animal feed or human food (fruits and vegetables that do not touch the soil/sludge that are to be consumed raw; pasture vegetation) can not be harvested until 30 days after the last sludge application. Root crops that do touch the soil/sludge can not be harvested until 18 months after the last sludge application. Accordingly, City of Tallahassee utilization of crops for animal feed grown on sludge fields must be consistent with Chapter 17-640 F.A.C.

o <u>Project Environmental Impact Mitigation</u>

The County (July 15, 1992 letter) has concerns regarding the lack of mitigation presented in the EIS Supplement for the more undesirable environmental impacts of the proposed expansion of the City's SE Sprayfield. The EIS Supplement approach to such projected impacts was in the form of "pollution prevention/ reduction" through the implementation of "Environmental Protection Measures" which are provided below and characterized as to the likelihood of implementation by the City. Some of the important proposed measures include: retainage/creation of vegetated buffer strips along outer borders of the sprayfield, retainage of wildlife corridors and habitat within the sprayfield area, coordination with the State of Florida (Florida Game & Fresh Water Fish Commission) regarding effects on the Gopher Tortoise and Gopher Frog and other protected species, avoidance of wetlands, completion of an on-site archaeological survey, use of agricultural spray irrigation and silvicultural spray irrigation (small demonstration project) to minimize habitat losses and global climate change impacts associated with land-use conversions from forests to sprayfields, avoidance of sprayfield drainage into Karstic sinkhole areas, prevention of the use of irrigated agricultural products for direct human consumption, and continuance of the City's effluent and groundwater monitoring. The USEPA also supports mitigation of unavoidable project impacts as well as the correction of any project violations of relevant federal, state, and local regulations.

The City suggested (October 27, 1992 letter) that mitigation would not be needed for public improvement projects such as sanitary sewer and proper treatment projects that reduce public health risks and environmental damage. While it is clear that competent sewer systems and treatment are beneficial to the public, the USEPA does not believe that the environmental impacts of such improvements should not be minimized through environmental prevention methods as well as mitigation, as appropriate, if impacts are unavoidable.

o <u>City of Tallahassee Timeframe</u>

The City has expressed concern regarding the length of time taken to prepare this FEISS. It may be noted, however, that this FEISS is a discretionary EIS Supplement presently proposing no use of federal funds or a major federal action. Nevertheless, the USEPA recognizes that the proposed project is locally significant; this discretionary EIS Supplement has been prepared by the USEPA to provide technical guidance to the City of Tallahassee Sewer Division as well as other local decision-makers for facility expansion planning.

o <u>State of Florida Reorganization</u>

The Florida Department of Environmental Regulation (FDER) and the Florida Department of Natural Resources (FDNR) were reorganized effective July 1, 1993, to become a single Florida Department of Environmental Protection (FDEP). References made to "FDER" and "FDNR" in the DEISS and in the remaining text of this FEISS may therefore appropriately be updated to "FDEP" (with the exception of citations published prior to July 1, 1993).

EPA ATLANTA 11 10 AM '92

ENVIRONMENTAL ASSESSMENT BRANCH

BOARD OF COUNTY COMMISSIONERS

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July 15, 1992

Mr. Heinz J. Mueller, Chief
Environmental Policy Section EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: Comments on Draft Copy of the EPA Tallahassee Wastewater Management Final Environmental Impact Statement Supplement (FEISS)

Dear Mr. Mueller:

Upon a review of the subject document we have identified what are believed to be the following shortcomings of text:

1. It has been found that the document generally ignores and otherwise fails to mention our locally adopted "Southern Strategy." It is our observation that all of the alternatives evaluated consider southerly expansions of both wastewater treatment and disposal facilities which deviates from the intent of these important local planning guidelines.

2. The document fails to address the restraints placed on an implementation of alternatives:

   A. How would the City of Tallahassee expand or supply additional southeast disposal facilities being that the Board of County Commissioners has recently denied the City all necessary franchise areas and right-of-way placement permits to support these undertakings?

   B. How is the City of Tallahassee to expand its southeast disposal facility being that the City Commission has recently directed city staff to drop all pursuits of this work? In addition, does not the City presently have a consultant working to identify a means of optimizing the use of lands upon which existing disposal facilities are sited in lieu of constructing additional facilities on adjacent lands? It is noted that it is our belief that the hiring of this consultant also follows the direction of the City

Commission.

C. The document fails to mention that the proposed additions of a northeast treatment plant and northeast effluent disposal areas may now be moot considerations. It is believed that on March 11, 1992 the Tallahassee City Commission elected to terminate its contract with consultant working to amend the City's Master Sewer Plan and that this may have put an end to the northeast treatment plant. These new facilities were to be the primary focus of this report.

3. The document generally fails to identify and otherwise ignores what we believe to be the establishment of other viable alternatives:

A. None of the alternatives evaluated focuses completely upon a decentralized approach to wastewater management. It is our observation that the primary consideration of all the alternatives evaluated is the future propagation and expansion of the City of Tallahassee's central sewer system.

B. The future role of other significant providers of local sewer service, namely those supplied through Talquin Electric Cooperative and others, fails to be a consideration of this document.

C. The future role of package treatment plants in accomplishing local wastewater management goals fails to be a consideration of this document.

D. The future viability of traditional and "hybrid" septic tank systems as a wastewater management option is generally ignored by this document.

E. The interrelationships of City water distribution to City sewerage generation rates is generally ignored. Does not the possible implementation of heightened water management practices including system-wide reductions of pressure, water conservation programs, or the adoption of incentive-based rate structures at least bear consideration in this report. It is our observation that the report generally fails to explain why all of the additional City sewer facilities need to be constructed when several good water conservation options are known to exist.

4. The document generally fails to substantiate or validify the selection of data:

A. Unless mistaken, this document is prepared based upon the use of pre-

1990 population estimates. It is pointed out that subsequent to this time the 1990 census has been released (showing that earlier estimates of the local population base may have been too high), a local Comprehensive Plan has been adopted and put into effect (including comprehensive revisions of land use maps impacting developmental density and the resulting population projections of areas still yet to be developed) and an economic recession has gained a stronghold on the area impacting development and slowing growth. It is highly doubtful that the population estimates used to assemble the report are any longer valid in light of these current events.

B. It is our observation that the per capita estimates utilized in this document are among the highest, if not the highest, in use anywhere in our region of the Country. How have you substantiated the selection and usage of such an inflated per capita consumption rates as 160 gpcpd? Can it be that this is truly a realistic figure? Does not the use of such a high figure as 160 gpcpd vastly overestimate sewer flow? Could it not result in a tendency to recommend that we vastly overconstruct "needed" sanitary sewer facilities?

C. Problems are observed in the cost analysis section of report. It is presently not clear as to whether or not there are any distinctions made between what are to be public and private costs. Should there be any public interest in the private costs of accomplishing wastewater management so long as these systems do not become eventual public problems?

5. The document generally fails to fully assess the environmental impacts of the alternatives considered:

A. Only failures of decentralized facilities (package plants/septic tanks) are noted. Not included are the impacts of numerous repeat sewage spills from city systems such as those evidenced throughout 1991 (Lake Munson, Lake Lafayette). What are the environmental impacts of these failures and how have they been assessed?

B. Why are man-made wetlands discredited without discussion when the technology is so rapidly emerging in Florida and with successful demonstrations already in existence located as near to us as the City of Orlando?

C. It is not clear how the impacts of constructing additional centralized facilities were assessed and what these impacts are. Also, why have you not advised us as to what forms of mitigation are in order to offset the more undesirable consequences realized through an analysis of the impacts?

This concludes our desire to comment on the EIS supplement as of this time. In the event that you may find questions relating to any of our various comments, please feel free to call.

Sincerely,

Thomas P. Brantley, P.E.
Chief of Engineering Design

Enclosures

cc: Board of County Commissioners
Parwez Alam, County Administrator
Herb Thiele, County Attorney
Brent Wall, Assistant to the County Administrator
Michael C. Willett, Public Works Director
Tony Park, P.E., Director of Engineering Services

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CITY OF TALLAHASSEE

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STEVE MEISBURG
Commissioner

DANIEL A. KLEMAN
City Manager
ROBERT B. INZER
City Treasurer-Clerk

JAMES R. ENGLISH
City Attorney
RICARDO FERNANDEZ
City Auditor

October 27, 1992

Mr. Chris Hoberg
Environmental Protection Agency
Environmental Policy Section
Federal Activities Branch
345 Courtland Street, N.E.
Atlanta, GA 30365

Dear Mr. Hoberg:

Thank you for sending us a copy of Leon County's July 15, 1992 comments on the Draft FEISS. I wish to correct certain errors in their comments and provide comments on other items contained in their letter. My comments will be referenced to item numbers in their letter (attached).

Item

2.A. On July 23, 1991 the County denied two franchise applications for an effluent force main from the T. P. Smith Plant to the Southeast Sprayfield and for the expansion of the field itself. The City Commission and County Commission subsequently made appointments to an advisory committee which has looked into alternatives. During this process, the County Commission stated that "the sole eastern expansion of the sprayfield is no longer a consideration of this Commission." We do not believe that the door is closed forever on a sprayfield expansion; and, in fact, it is one of the least costly of the alternatives considered. The City Commission is expected to review this matter on November 16, 1992.

2.B. Due to the July 23, 1991 action by the County Commission, the City is obviously not spending a great deal of money on the Southeast Sprayfield expansion. After the City Commission reviews the work of the citizen committee, the City's effluent consultant (CDM), and staff, it may readdress the Southeast Sprayfield option.

The City did complete work, throughout its consultant and a technical committee, on addressing the question of whether or not more effluent could be directed toward the existing Southeast Sprayfield. The conclusion was that the field cannot accept more water than currently permitted (3.16 inches/week application). The County was included on the technical committee.

2.C. The City Commission did not terminate work on the master sewer plan update, but rather put this work "on hold" because of County action. The County had sent proposed amendments to the State's Department of Community Affairs (DCA) which would allow small lots (down to 1/2 acre) to develop on septic tanks and would have allowed package treatment plants to serve urban needs. The City was opposed to these County proposals; and, in fact, the DCA within the last month rejected the County's proposed amendments.

A second County action also led to the City Commission's action to hold the master plan update in abeyance. The County took the unilateral action of defranchising City water and sewer zones which lie beyond the city limits. Since 1980, the City and County have acted within the confines of a 1980 City-County agreement which provided water and sewer zones within which the City could operate. Upon defranchising these areas, the City was left with an unknown as to what it will serve in the future.

3.C. The City remains opposed to package treatment plants in the Urban Services Area because of bad experiences nation-wide with these systems. In addition, there are current package treatment plant problems within Leon County with known problems.

3.D. You have been involved with readdressing the Environmental Impact Statement of 1983 because of septic tank failures. A joint City and County Commission letter was sent to EPA in 1987 requesting that you revisit the 1983 decision. This request was prompted by septic tank failures in the County, beyond the city limits. It's difficult to imagine that the County continues to promote the septic tank approach given the problems that are encountered with these in the clay soil areas.

3.E. There are numbers of reasons why the City is currently constructing numerous sewer facilities. I assume that Mr. Brantley is referring to the current plant expansion and large force main projects. In either case, water conservation would not have resulted in these projects not being done. The plant is being expanded because of peak monthly flows in 1987 and 1988 which resulted in our slightly exceeding the plant's average capacity. Even though we continued to produce high quality effluent, which met all DER requirements, DER felt that we should expand the plant and sprayfield. A memorandum of understanding was agreed to by DER and the City which called for the expansions. The force main has been installed, again primarily because of peak flows. In the near term, it will handle diversions from an existing trunk which became overloaded during very wet periods. In the longer term, it will handle new growth. Conservation would not have been sufficient to preclude either of these projects.

I must point out that since 1988, the City has had a very aggressive Infiltration/Inflow (I/I) reduction program. We have smoke tested the entire sewer system once and have started smoke testing it for a second time. We've found leaks both in City right-of-way and on private property and have repaired 75 percent of the leaks found with work continuing on the remaining leaks. This has reduced our peak flow during wet weather considerably. Attached is a recent report which summarizes the result of our aggressive I/I reduction program.

4.B. There may be a misunderstanding regarding the 160 gpcd wastewater flow rate. It is not the average sewage use by residents. It is very simply the total flow at the plants (residential, industrial, commercial, and institutional) divided by the total population served by the sewer system. Because we have a very significant sewage flow from other than residential, the per capita figure is higher than what one resident contributes. It is also influenced by the fact that much of this non-residential flow is the result of people living beyond our sewer system but working in Tallahassee.

5.A. This area received extremely heavy rainfall in January and March 1991. During those periods, several City trunk lines received more infiltration and inflow than they could handle and spills occurred. In addition, a pipe broke in the very bottom of one of our pump stations so a spill occurred until crews could make the repair. As a result of drier weather, the I/I program, and our capital improvement program, we have not had these types of problems in 1992. I would point out that the total volume that was spilled in 1991 from our system was about 0.4 percent of the estimated volume which flows from septic tanks within Leon County annually. We are not happy about the 1992 incidents but these were very unusual in nature and due to our capital improvements, won't be repeated again.

5.C. I fail to understand why mitigation would be needed to compensate for a public improvement. Sanitary sewers and proper treatment have been a necessity in our urban society and have been a major factor in reducing environmental damage and public health risk.

Thank you for your consideration of my comments. I would be happy to answer questions.

Sincerely,

James H. Peters, P.E.
Director
Water & Sewer Department

JHP/je
Attachments
xc: Tom Brantley, Leon County
John Dean, Supt.-Wastewater Operations

LEON

BOARD OF COUNTY COMMISSIONERS

Leon County Courthouse
Tallahassee, Florida 32301
(904) 488-4710

Commissioners:
ANITA L. DAVIS
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GAYLE NELSON
District 2
MANNY JOANOS
District 3
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MARJORIE TURNBULL
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J. LEE VAUSE
At-Large

PARWEZ ALAM
County Administrator
(904) 488-9962

HERBERT W.A. THIELE
County Attorney
(904) 487-1008

LEON COUNTY PUBLIC WORKS
Leon County Courthouse
301 South Monroe Street
2nd Floor, Room 201
Tallahassee, Florida 32301
904 / 488-8003

July 15, 1992

Mr. Heinz J. Mueller, Chief
Environmental Policy Section EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: Comments on Draft Copy of the EPA Tallahassee Wastewater Management Final Environmental Impact Statement Supplement (FEISS)

Dear Mr. Mueller:

Upon a review of the subject document we have identified what are believed to be the following shortcomings of text:

1. It has been found that the document generally ignores and otherwise fails to mention our locally adopted "Southern Strategy." It is our observation that all of the alternatives evaluated consider southerly expansions of both wastewater treatment and disposal facilities which deviates from the intent of these important local planning guidelines.

2. The document fails to address the restraints placed on an implementation of alternatives:

   A. How would the City of Tallahassee expand or supply additional southeast disposal facilities being that the Board of County Commissioners has recently denied the City all necessary franchise areas and right-of-way placement permits to support these undertakings?

   B. How is the City of Tallahassee to expand its southeast disposal facility being that the City Commission has recently directed city staff to drop all pursuits of this work? In addition, does not the City presently have a consultant working to identify a means of optimizing the use of lands upon which existing disposal facilities are sited in lieu of constructing additional facilities on adjacent lands? It is noted that it is our belief that the hiring of this consultant also follows the direction of the City

Commission.

C. The document fails to mention that the proposed additions of a northeast treatment plant and northeast effluent disposal areas may now be moot considerations. It is believed that on March 11, 1992 the Tallahassee City Commission elected to terminate its contract with consultant working to amend the City's Master Sewer Plan and that this may have put an end to the northeast treatment plant. These new facilities were to be the primary focus of this report.

3. The document generally fails to identify and otherwise ignores what we believe to be the establishment of other viable alternatives:

A. None of the alternatives evaluated focuses completely upon a decentralized approach to wastewater management. It is our observation that the primary consideration of all the alternatives evaluated is the future propagation and expansion of the City of Tallahassee's central sewer system.

B. The future role of other significant providers of local sewer service, namely those supplied through Talquin Electric Cooperative and others, fails to be a consideration of this document.

C. The future role of package treatment plants in accomplishing local wastewater management goals fails to be a consideration of this document.

D. The future viability of traditional and "hybrid" septic tank systems as a wastewater management option is generally ignored by this document.

E. The interrelationships of City water distribution to City sewerage generation rates is generally ignored. Does not the possible implementation of heightened water management practices including system-wide reductions of pressure, water conservation programs, or the adoption of incentive-based rate structures at least bear consideration in this report. It is our observation that the report generally fails to explain why all of the additional City sewer facilities need to be constructed when several good water conservation options are known to exist.

4. The document generally fails to substantiate or validify the selection of data:

A. Unless mistaken, this document is prepared based upon the use of pre-

1990 population estimates. It is pointed out that subsequent to this time the 1990 census has been released (showing that earlier estimates of the local population base may have been too high), a local Comprehensive Plan has been adopted and put into effect (including comprehensive revisions of land use maps impacting developmental density and the resulting population projections of areas still yet to be developed) and an economic recession has gained a stronghold on the area impacting development and slowing growth. It is highly doubtful that the population estimates used to assemble the report are any longer valid in light of these current events.

B. It is our observation that the per capita estimates utilized in this document are among the highest, if not the highest, in use anywhere in our region of the Country. How have you substantiated the selection and usage of such an inflated per capita consumption rates as 160 gpcpd? Can it be that this is truly a realistic figure? Does not the use of such a high figure as 160 gpcpd vastly overestimate sewer flow? Could it not result in a tendency to recommend that we vastly overconstruct "needed" sanitary sewer facilities?

C. Problems are observed in the cost analysis section of report. It is presently not clear as to whether or not there are any distinctions made between what are to be public and private costs. Should there be any public interest in the private costs of accomplishing wastewater management so long as these systems do not become eventual public problems?

5. The document generally fails to fully assess the environmental impacts of the alternatives considered:

A. Only failures of decentralized facilities (package plants/septic tanks) are noted. Not included are the impacts of numerous repeat sewage spills from city systems such as those evidenced throughout 1991 (Lake Munson, Lake Lafayette). What are the environmental impacts of these failures and how have they been assessed?

B. Why are man-made wetlands discredited without discussion when the technology is so rapidly emerging in Florida and with successful demonstrations already in existence located as near to us as the City of Orlando?

C. It is not clear how the impacts of constructing additional centralized facilities were assessed and what these impacts are. Also, why have you not advised us as to what forms of mitigation are in order to offset the more undesirable consequences realized through an analysis of the impacts?

This concludes our desire to comment on the EIS supplement as of this time. In the event that you may find questions relating to any of our various comments, please feel free to call.

Sincerely,

Thomas P. Brantley, P.E.
Chief of Engineering Design

Enclosures

cc: Board of County Commissioners
Parwez Alam, County Administrator
Herb Thiele, County Attorney
Brent Wall, Assistant to the County Administrator
Michael C. Willett, Public Works Director
Tony Park, P.E., Director of Engineering Services

RECEIVED

SEP 02 1992

WATER & SEWER DEPT.

MEMORANDUM

TO: Andrew J. Davis
Wastewater Collection Supervisor

FROM: James Love JRL
I/I Reduction Supervisor

DATE: September 1, 1992

SUBJECT: I/I Report

Infow Reduction Report

As of August 31, 1992

Cummulative Totals

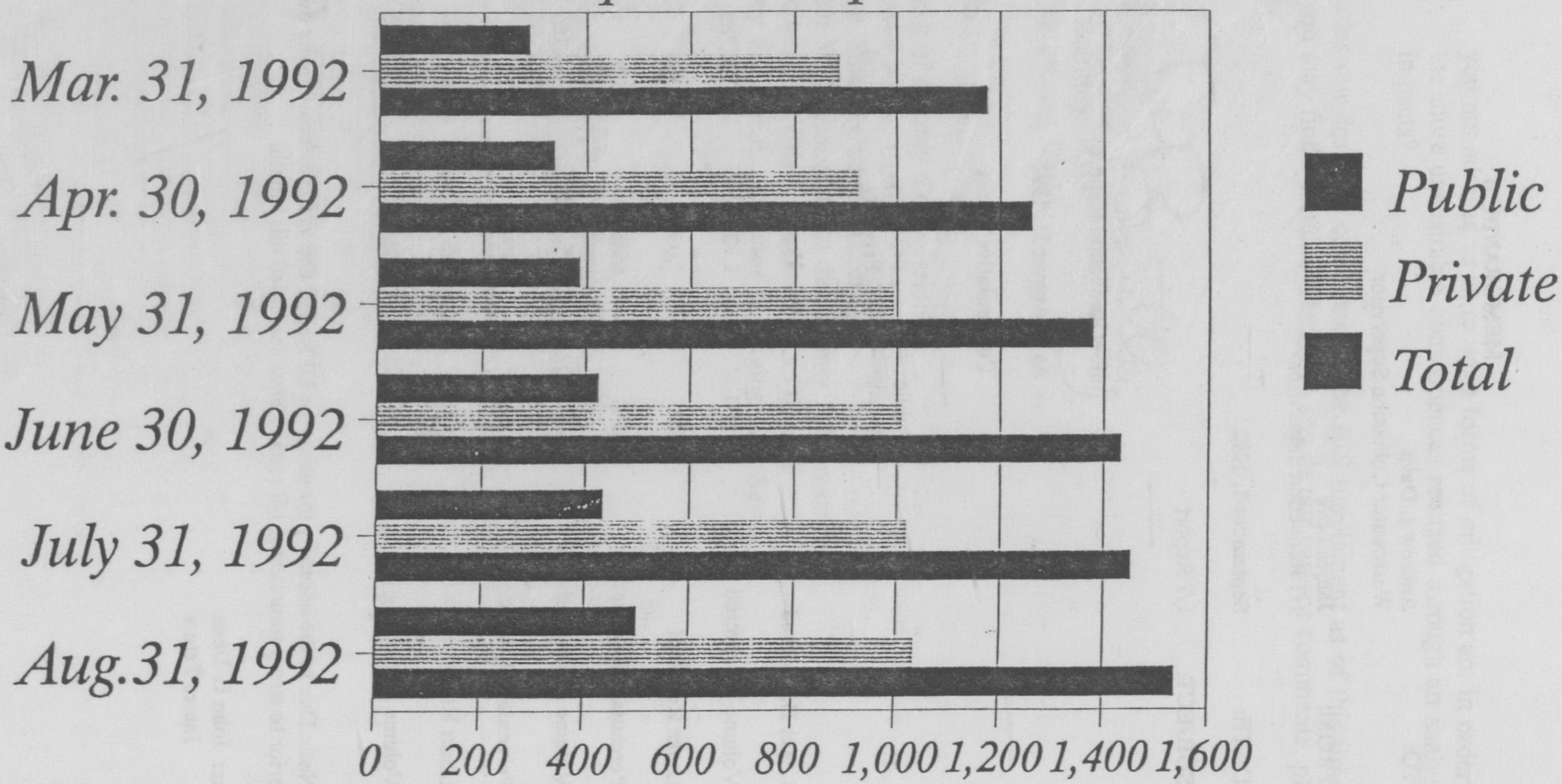
	Public R-O-W	Private Property	Total
Leaks Discovered	844	1,199	2,043
Volume Discovered	5,971,017	1,729,372	7,700,389
Leaks Repaired	502	1,036	1,538
Percentage Repaired	59%	86%	75%
Volume Eliminated (Gal.)	3,657,422	1,540,744	5,198,166
Percentage Eliminated	61%	89%	67%
Leaks Remaining	342	163	505
Volume Remaining (Gal.)	2,313,595	188,628	2,502,223

Note: Due to the necessity for using the I/I Repair Crews to perform repairs on City and County roads, prior to street resurfacing, I/I repairs have decreased this month.

xc: John L. Dean
James Peters

Inflow\Infiltration Reduction Program

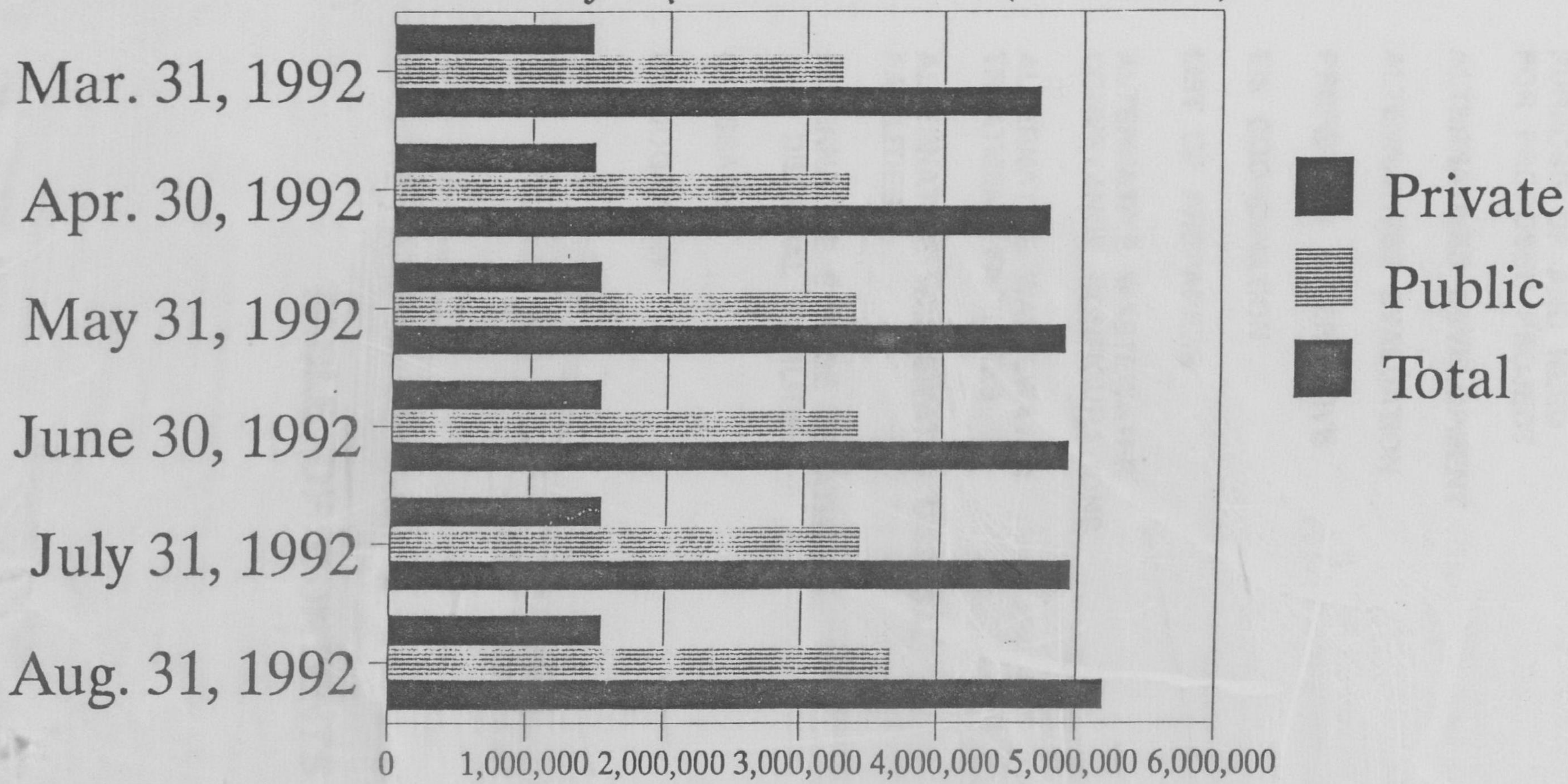
Repairs Completed:



US-30

Inflow\Infiltration Reduction Program

Volume of I\I Eliminated (Gallons):



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TALLAHASSEE-LEON COUNTY WASTEWATER MANAGEMENT
TALLAHASSEE, LEON COUNTY, FLORIDA

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LIST OF ACRONYMS

1983 EIS	Original USEPA Final Environmental Impact Statement, Tallahassee-Leon County Wastewater Management, Tallahassee-Leon County, Florida (1983)
201 Plan	Tallahassee-Leon County, Florida, 201 Wastewater Facilities Plan (Draft 201 Plan approved in April 1977)
Area Systems	Wastewater Management facilities with design average daily flows less than 500,000 gallons per day (gpd). FDEP refers to these facilities as Type II (flows between 100,000 and 500,000 gpd) and Type III (flows between 2,000 and 100,000 gpd)
City	City of Tallahassee, Florida
City Comp Plan	City of Tallahassee Comprehensive Plan
City MSP	City of Tallahassee Master Sewer Plan, 1987-2010 (1988)
County	Leon County, Florida
County MW&SSP	Preliminary Leon County Master Water and Sewer Service Plan (1988); Plan not approved by Leon County Board of Commissioners
EIS Supplement	Environmental Impact Statement Supplement, Tallahassee-Leon County Wastewater Management, Tallahassee-Leon County, Florida (Supplement to the USEPA 1983 EIS)
FDEP	Florida Department of Environmental Protection
FDER	Florida Department of Environmental Regulation
FDNR	Florida Department of Natural Resources
FG&FWFC	Florida Game and Fresh Water Fish Commission
gpcd	Gallons per capita per day
gpd	Gallons per day
LBR Plant	Lake Bradford Road Wastewater Treatment Plant
LCPH	Leon County Public Health Department
MAP Plant	Municipal Airport Wastewater Treatment Plant
mgd	Million gallons per day
NEPA	National Environmental Policy Act of 1969, as amended
NE Plant	Northeast Wastewater Treatment Plant
NPDES	National Pollutant Discharge Elimination System
RIB	Rapid-Infiltration (Basin) System
SE Plant	Southeast Wastewater Treatment Plant
SE Sprayfield	Southeast Wastewater Effluent Sprayfield (SESF)

LIST OF ACRONYMS
(continued)

SHPO	State Historic Preservation Officer
SW Sprayfield	Southwest Wastewater Effluent Sprayfield (SWSF)
TECO	Talquin Electric Cooperative, Inc.
TLCPD	Tallahassee-Leon County Planning Department
TPS Plant	Thomas P. Smith Wastewater Treatment Plant
USEPA	United States Environmental Protection Agency
USDA FS	United States Department of Agriculture, Forest Service
USDA SCS	United States Department of Agriculture, Soil Conservation Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

CHAPTER 1

PURPOSE OF AND NEED FOR PROPOSED PROJECT

CHAPTER 1 PURPOSE OF AND NEED FOR PROPOSED PROJECT

1.1 PURPOSE AND SCOPE OF THE EIS SUPPLEMENT

1.1.1 Impetus for the EIS Supplement

Since the mid-1970s, wastewater management alternatives have been developed and evaluated for the Tallahassee-Leon County (Florida) area in four major studies, including:

1977 - Tallahassee-Leon County, Florida; 201 Facilities Plan (201 Plan); Draft 201 Plan approved in April 1977.

1983 - Final Environmental Impact Statement Tallahassee-Leon County Wastewater Management, Tallahassee-Leon County, Florida (1983 USEPA EIS)

1988 - City of Tallahassee Master Sewer Plan, 1987-2010 (City MSP)

1988 - Preliminary Leon County Master Water and Sewer Service Plan (County MW&SSP)

The City of Tallahassee (City) prepared a 201 Facilities Plan (201 Plan) that proposed the expansion of the City's central sewers to serve growth areas in Leon County. A draft 201 Plan was approved in April 1977. The 1983 EIS further evaluated the 201 Plan alternatives and the "No-Federal-Action" alternative. The 1988 City MSP documented several basic alternatives (with many sub-alternatives) that reflect the City's current requirements and concepts for future wastewater management. The preliminary County MW&SSP presented eleven generalized alternatives; five which entail County provision of water and sewer services; five which rely on provision of water and sewer services by organizations other than the County; and one which entails County provision of water services only and relies on provision of seven services by others. The preliminary County MW&SSP does not include the selection of a preferred alternative. Further evaluations and the selection will be included in a future revision. Sections 1.3.1 through 1.3.4 in this report describe in more detail the alternatives developed and evaluated for each study referred to above.

The 201 Plan and the 1983 EIS were required in part because the City had intended to use federal grants to fund the majority of a proposed expansion of the City's wastewater collection and treatment facilities. The 1983 EIS ". . . addressed the Federal Action of the provision of Federal funds for Phase II wastewater facilities as proposed by the Draft 201 Facilities Plan for Tallahassee-Leon County" (USEPA, 1983). The proposed Phase II wastewater facilities were intended to service growth areas that would not be served by 201 facilities that were already approved for federal funding.

The 1983 EIS considered four federal-action alternatives which proposed wastewater facility construction of either: 1) a new treatment plant in northeast Leon County (to serve the northeast growth areas) and the expansion of the existing Thomas P. Smith (T.P. Smith) Wastewater Treatment Plant/Southwest (SW) Treatment Facility beyond its Phase I capacity (to serve the southwest and southeast service areas), with treated effluent disposal for the Northeast (NE) Plant by means of rapid infiltration in the northeast and disposal of the T.P. Smith/SW Plant by conveyance to the expanded Southeast (SE) Sprayfield; or 2) an alternative similar to above except disposal of all treated effluent would be at the SE Sprayfield; or 3) expansion (with conservation measures) of the T.P. Smith/SW Treatment Facility by 0.3 mgd capacity and continuing to operate the existing Lake Bradford Plant, with treated effluent disposal at the expanded SE Sprayfield and facilities serving as a regional treatment system in either case; or 4) construction of a new SE Treatment Plant (serving the southeast and northeast growth areas) to supplement the expanded T.P. Smith/SW Treatment Facility (serving the southwest service area and projected southwest growth areas), with treated effluent disposal at the expanded SE Sprayfield.

In addition to these four federal-action alternatives, a fifth alternative, the No-Federal-Action alternative, was also considered in the 1983 EIS. This alternative considered the given condition within the Tallahassee-Leon County area without changes and described wastewater treatment that would be available without new federal funding. Generally, the No-Federal-Action alternative assumed that no centralized, structural alternative would be constructed, with expansion of existing facilities only continuing to Phase I levels and new growth for wastewater disposal to be provided by on-lot and small community systems. The No-Federal-Action alternative was the baseline for evaluating environmental impacts of the structural alternatives considered in the 1983 EIS. The No-Federal-Action alternative was selected as the preferred alternative in the 1983 EIS.

Since the USEPA issuance of the 1983 EIS, investigations into failures of on-lot septic systems within the study area and compilations of information relating to soil types, water tables, and density have provided data which were not available during the EIS study. Subsequently, the City of Tallahassee, Leon County's Board of Commissioners, and the USEPA have determined the need to re-evaluate the No-Federal-Action alternative selected in the 1983 EIS.

In 1988, the City prepared an MSP that proposed expanding their facilities within the City boundaries. With the County's approval, this expansion was to also include unincorporated portions of the County, and use monies from a 5-year capital improvements program. These monies would be from local sources and would not be expected to include federal funds. Given the decision to re-evaluate the No-Federal-Action preferred alternative of the 1983 EIS and the availability of local funds, several other options of the No-Federal-Action alternative could be considered. These option alternatives primarily included centralized system alternatives which involved the concept of spray irrigation of wastewater effluent or other forms of wastewater disposal and some improvement of existing wastewater treatment plants, and a decentralized system alternative which involved some improvements and use of on-lot systems. These option alternatives are addressed in the present EIS, which is a Supplement to the original 1983 EIS. A Draft EIS Supplement (DEISS) was issued by the USEPA on June 29, 1990 and is hereby being followed by this Final EIS Supplement (FEISS).

The EIS Supplement addresses direct and indirect impacts of wastewater management alternatives for the study area for a 20-year planning period (1990 through 2010). The study area boundaries used in the EIS Supplement are those boundaries defined for eight service areas in the 1988 City MSP. These boundaries were used because the City is the only entity proposing centralization of wastewater management facilities.

1.1.2 USEPA NEPA Compliance

The City of Tallahassee presently has not requested any federal funds to implement the 1988 City MSP, nor does the implementation of the MSP as proposed otherwise constitute a "major Federal action" under Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended, and NEPA does not mandate that an EIS Supplement be prepared. Although there presently are no federal funds and no major federal action proposed for the alternatives of this EIS Supplement, the USEPA has prepared this discretionary EIS Supplement to provide guidance to the City of Tallahassee Sewer Division as well as other local decision-makers for facility expansion planning. Unless the proposed project becomes a major federal action, the selection of an appropriate alternative for the City of Tallahassee wastewater management alternative would be a local decision. Since no federal action is currently planned, the USEPA presently does not intend to prepare a Record of Decision (ROD) for this EIS Supplement. If, however, local decision-makers should ultimately include federal involvement in the City MSP at the level of a "major Federal action," the EIS Supplement (the DEISS and this FEISS) will serve to meet the requirements of NEPA (and a ROD would be prepared), unless a significant amount of time has passed before project implementation and significant changes have occurred in the project as proposed, in the impacts of the project, and/or in the project area. After appropriate examination of such considerations, the need for a supplemental EIS to update the present EIS Supplement could be determined.

1.1.3 Centralization Versus Decentralization

The terms "centralized" and "decentralized" are used in the EIS Supplement for the development of the system alternatives. Centralized, as used in the EIS Supplement, refers to a regional system that has a large collection system to convey sewage from the source to one or two large treatment facilities. These facilities are generally operated and maintained by a government agency or authority. Decentralized, as used in the EIS Supplement, refers to a system that includes a multitude of single-customer, on-lot systems and small collection/treatment systems (e.g., package plants) servicing a cluster of customers. The decentralized alternative of the EIS Supplement is similar to the No-Federal-Action alternative of the original 1983 EIS. The centralized alternatives of the EIS Supplement would also be No-Federal-Action alternatives provided local funds, i.e., no federal funds, were used.

1.1.4 Study Area Definition

Development of alternatives for this EIS Supplement is based on centralization versus decentralization of wastewater management facilities. Because the City is the only entity proposing centralization as per their City MSP, the study area was defined as the service areas delineated in the City MSP which are illustrated in Figure 1-1. (Update: The City sewer services area depicted in Figure 1-1 has since been updated due to a Leon County-City of Tallahassee (1993) "Water Sewer Agreement" dated February 14, 1993. In addition to general configurational changes to the service area boundary (depicted in the figure as bold lines), the new sewer services area constitutes an area reduction in the SE quadrant (north of Old Tram Road) as well as a relocation of the boundary through Lake Jackson instead of around it along its southern (Old Quincy Highway) and eastern boundaries.)

The City MSP divided the metropolitan Tallahassee area into eight service areas, while the 1983 EIS utilized only three. A comparison of these service areas is presented as follows.

1983 EIS	City MSP
Northeast	• Pump Station No. 12 (small portion northeast of Lake Jackson) • Northeast (except small southwest portion)
Southeast	• Buck Lake (except small west portion) • Southeast (outside Capital Circle)
Southwest	• Pump Station No. 12 (except small portion northeast of Lake Jackson) • Northeast (small southwest portion) • Buck Lake (small west portion) • Southeast (small portion south of Capital Circle) • Lake Bradford Plant (all) • Riggins Road (except small portion north of I-10) • Spring Hill Road (all) • T. P. Smith Facility (all)

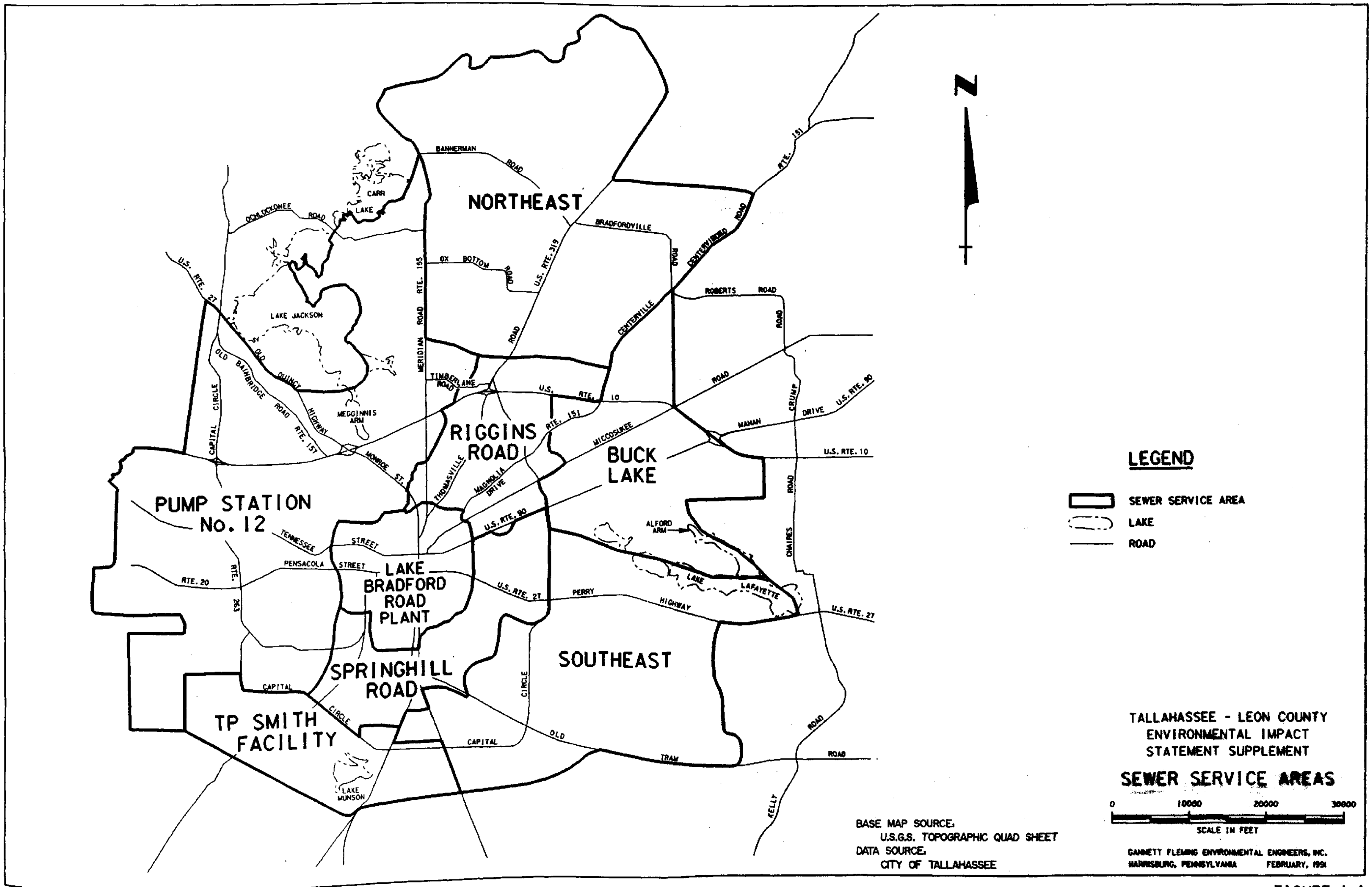

NORTHEAST
RIGGINS ROAD
BUCK LAKE
PUMP STATION No. 12
LAKE BRADFORD ROAD PLANT
SPRINGHILL ROAD
TP SMITH FACILITY
SOUTHEAST
LAKE JACKSON
CARR LAKE
MEGGINNIS ARM
ALFORD ARM
LAKE LAFAYETTE
LAKE MUNSON
BANNERMAN ROAD
OCHLOCKONEE ROAD
OX BOTTOM ROAD
BRADFORDVILLE ROAD
CENTERVILLE ROAD
ROBERTS ROAD
MICCOSUKEE ROAD
MAHAN DRIVE
CRUMP ROAD
CHAIRES ROAD
TIMBERLANE ROAD
MERIDIAN ROAD RTE. 155
U.S. RTE. 319
U.S. RTE. 27
U.S. RTE. 90
U.S. RTE. 10
RTE. 151
OLD BAINBRIDGE ROAD RTE. 157
OLD QUINCY HIGHWAY
CAPITAL CIRCLE
MONROE ST.
THOMASVILLE
MAGNOLIA DRIVE
TENNESSEE STREET
PENSACOLA STREET
RTE. 20
RTE. 263
PERRY HIGHWAY
OLD TRAM ROAD
KELLY
N
LEGEND
SEWER SERVICE AREA
LAKE
ROAD
TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT
SEWER SERVICE AREAS
0 10000 20000 30000
SCALE IN FEET
BASE MAP SOURCE:
U.S.G.S. TOPOGRAPHIC QUAD SHEET
DATA SOURCE:
CITY OF TALLAHASSEE
GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA FEBRUARY, 1991

FIGURE 1-1

1.2 BACKGROUND AND ISSUES

1.2.1 The 1983 EIS

During the preparation of the 1983 EIS, seven issues were considered (USEPA, 1983):

1. Potential public health risks associated with land application of wastewater, including aerosol pathogens and potential groundwater contamination.

2. Potential over-estimate of wastewater flow projections.

3. Potential detrimental impacts to wetlands from development in northeast Leon County.

4. Potential incompatibility of the proposed northeast treatment plant and residential use of the area.

5. Potential detrimental impacts on wetlands and the dam at Lake Lafayette from construction, operation, and maintenance of the proposed northeast plant force main to the Southeast Sprayfield.

6. Cost-effectiveness of renovating the Lake Bradford Plant (LBR Plant) versus closing it.

7. Potential impacts on the habitats of threatened and endangered flora and fauna by any of the alternatives being considered at that time.

Since the preferred alternative of the 1983 EIS was the No-Federal-Action, these issues were not necessarily resolved by the EIS, but were left for local consideration.

1.2.2 The EIS Supplement Public Scoping Meeting

On April 19, 1988, a Public Scoping Meeting was held in the City to solicit public input for the scoping process and the identification of issues relevant to the proposed funding of wastewater treatment facilities. From the notes of the meeting and the written comments received by USEPA, a list of project concerns was developed. Some of these concerns related to the original 1983 EIS issues; some were unique to the EIS Supplement situation; and others were only remotely related to either of the aforementioned.

Based upon the 1983 EIS issues, the concerns raised during the EIS Supplement Public Scoping Meeting, and the availability of information, a list of issues to be addressed during the preparation of the EIS Supplement was developed. These issues are presented below. Issues 1 through 7 are from the previous EIS, and issues 8 through 10 are from the EIS Supplement scoping process.

1. Land Application Impacts
   a. Disease transmittal by spray aerosols and animal vectors.
   b. Groundwater contamination.
   c. Long-range impacts on vegetation.

2. Wastewater Flow and Population Projections
   a. New data.

3. Development Potential in Northeast Leon County
   a. Incompatible land use.

4. Proposed Northeast Wastewater Treatment Plant
   a. Incompatible land use.

5. Northeast Force Main to Southeast Sprayfield
   a. Construction impacts.
   b. Operation and maintenance problems.

6. Abandonment of the LBR Plant
   a. Reduced environmental impacts.
   b. Economics.

7. Impacts on Vegetation and Wildlife
   a. Loss of habitat.
   b. Impact on protected species.

8. Performance of Existing Wastewater Treatment Facilities
   a. Failing on-lot/community systems.
   b. Odor problems.

9. Siting of Wastewater Treatment Facilities
   a. Socioeconomic impacts.
   b. Non-point source impacts.
   c. Accurate mapping.

10. Project Coordination with Local Agencies, Organizations, and Individuals
    a. Overlap of similar ongoing or proposed studies.
    b. Public participation.

1.3 PREVIOUS STUDIES

1.3.1 Tallahassee-Leon County, Florida, 201 Facilities Plan (201 Plan)

The scope of a Step I-201 Plan is confined to planning for publicly-owned wastewater collection, treatment, and disposal systems. Other point sources of pollution, such as privately-owned package treatment plants and industrial dischargers operating under National Pollutant Discharge Elimination System (NPDES) permits, are noted only if they might one day become part of the municipal system. Likewise, nonpoint source pollution has a bearing on the 201 Plan only if storm water entering the sewers must be eliminated or treated and disposed by the facilities proposed in the plan. The control of the sources of nonpoint pollution does not fall within the jurisdiction of the 201 Plan, but rather is the concern of 208 planning. A 208 Plan has been conducted by the Tallahassee-Leon County Planning Department (TLCPD). Through cooperative agreements between the County and City, those wastewater management issues which would be covered by both the 201 and the 208 Plans were identified to ensure a thorough investigation and avoid duplication.

The draft 201 Plan was approved in April 1977 by the City and County Commissioners, and received initial approval from the Florida Department of Environmental Regulations (FDER) and the USEPA. USEPA subsequently made a decision to initiate Step II Grants for only those facilities which would relieve existing water quality problems. This decision was made, in part, due to the opposition of citizens and private organizations to portions of the 201 Plan. It was further decided that an EIS would be prepared on those portions of the 201 Plan that included anticipated population growth and could possibly result in significant environmental impacts. All Phase I facilities funded by USEPA, have been completed and include the following:

- Upgrading of 2.5 mgd Southwest Treatment Plant,
- New Southwest Holding Pond and Pumping Station,

- New 22.5 mgd Southwest to Southeast Force Main,
- New 10.0 mgd Southeast Holding Pond and Pump Station,
- Expansion of T. P. Smith Plant (TPS Plant) to 17.5 mgd,
- Expansion of Southeast Wastewater Effluent Sprayfield (SE Sprayfield) to 18.3 mgd, revised to 22.0 mgd, and rerated to 23.25 mgd,
- Abandonment of the Dale Mabry Plant (abandoned in 1982),
- New 17.5 mgd Sludge Handling Facility (completed in 1983), and
- Additional Interceptors and Pump Stations.

Those proposed Phase II portions of the 201 Plan which were addressed in the 1983 EIS included the following:

- New 5.0 mgd Northeast Wastewater Treatment Plant (NE Plant),
- New 60,000 Linear-foot Force Main to SE Sprayfield from NE Plant,
- Expansion of 2,000-acre Southwest Wastewater Effluent Sprayfield (SW Sprayfield),
- Expansion of TPS Plant beyond 17.5 mgd,
- Additional Interceptors to Growth Areas, and
- Abandonment of the LBR Plant.

1.3.2 Final Environmental Impact Statement, Tallahassee-Leon County, Florida, Wastewater Management (1983 EIS)

Four comprehensive alternatives were developed for the Tallahassee-Leon County area in the 1983 EIS. Each of these alternatives incorporated complete wastewater management systems for the metropolitan Tallahassee area.

In developing the alternatives, the situations presented below were considered:

- The 1983 EIS wastewater flow projection for the planning period (through the year 2000) was 22.3 million gallons per day (mgd) without conservation measures. The 201 Plan projected flow for the year 2000 was 30.4 mgd.

- The 1983 EIS identified three major wastewater generation areas: the southwest, the northeast, and the southeast. Alternatives were developed for serving these three areas.

- The evaluation of conservation measures for the 1983 EIS study showed that a flow reduction of 2.4 mgd by the year 2000 is feasible. The costs and structural configurations of each alternative were described with and without conservation.

- The only wastewater disposal options evaluated in detail were land application options. Surface water discharges and other options were eliminated as inappropriate for cost, environmental or technical reasons.

- Alternatives that produce sludge beyond the 201 Plan Phase I capacity of 17.5 mgd were to be disposed by landspreading at the TPS Plant Site or on City-owned land adjacent to the airport.

- FDER requires secondary treatment prior to application of effluent to the land. USEPA decisions regarding funding of pre- application levels of treatment prior to land application were to be determined on a case-by-case basis.

- The Dale Mabry Plant was to be closed.

The wastewater management alternatives developed for the 1983 EIS were described as follows:

- Alternative 1A: This alternative included construction of a new NE Plant to provide service in the northeastern growth areas of the County and the developed portions of the northeast presently served by on-lot and small community systems. Effluent from the plant would be disposed by rapid infiltration at a northeast disposal site. The TPS Plant/Southwest Facility would be expanded beyond 17.5 mgd to service the Southwest and Southeast Service Areas. The SE Sprayfield would also be expanded to receive additional effluent from the TPS Plant.

- Alternative 1B: This alternative was the same as 1A except that the treated effluent from the NE Plant would be conveyed to the expanded SE Sprayfield for disposal.

- Alternative 2: For this alternative, existing facilities would serve as a regional treatment system. The structural configuration depended upon whether or not conservation measures were implemented. Without conservation measures, the most cost-effective system is continued operation of the LBR Plant at 4.5 mgd and expansion of the TPS Plant by 0.3 mgd. With conservation measures, an expanded TPS Plant would serve the entire sewered area as a regional treatment plant with a 19.9 mgd capacity. This alternative included extensive construction of interceptors to serve the northeastern and eastern portions of the 201 Plan planning area. Effluent disposal would be carried out as in Alternative 1. (Note: The USEPA understands from the City of Tallahassee that the City, although conceptually not opposed to water conservation, believes that water conservation would be very difficult to implement in Tallahassee due to abundant local water supplies; also, the City considers that the above-referenced proposed 19.9 mgd capacity treatment plant would be an under-capacity system for 1993 conditions).

- Alternative 3: Under this alternative, a new Southeast Wastewater Treatment Plant (SE Plant) would be constructed to supplement the treatment capacity of the expanded TPS Plant. The SE Plant would serve growth areas in the southeast and northeast. The TPS Plant would serve projected growth areas in the southwest and the existing service area. For both plants, effluent would be disposed at the SE Sprayfield.

- Alternative 4: This, the No-Federal-Action Alternative, was described by considering the present situation in the Tallahassee-Leon County area and projecting future conditions with no changes in public policy or private practices. Expansion of the wastewater system would continue only until the limits of 201 Plan Phase I expansion were reached. New growth in wastewater generation would be handled by on-lot and small community systems. Population infilling would take place in the City's service area and some additional collectors would be necessary.

Alternative 4, "No-Federal-Action," was chosen as the preferred alternative in the 1983 EIS based upon low population growth projections and the anticipated ability of on-lot and small community wastewater treatment facilities to serve the existing and projected population.

1.3.3 City of Tallahassee Master Sewer Plan, 1987-2010 (City MSP)

The four system alternatives presented in the City MSP, prepared by William M. Bishop Consulting Engineers, Inc. (May 1988), were developed from 17 sub-alternatives, most of which involved variations in the wastewater conveyance system.

In developing the alternatives, the following situations were considered by the City:

- The expansion of the TPS Plant by 7.5 mgd, to 25.0 mgd would serve the City until 1997. After the existing TPS Plant is re-rated for an additional 2.5 mgd, the 7.5 mgd expansion will serve the City until the year 2000. An additional 4.67 mgd will be needed to carry the City to 2010. Estimates for future capacity were based on a per capita flow of 175 gallons per day.

- The most significant demand on future wastewater management facilities would come from the northwest and northeast areas of Tallahassee, followed by southeast and southwest.

- Land application by spray irrigation was the most feasible method of effluent disposal.

- Land spreading was the most feasible method of sludge disposal.

- The City would continue to operate two treatment facilities, the TPS Plant and the LBR Plant, with the Municipal Airport Plant (MAP) to be closed with its flow diverted to the TPS Plant.

- The conveyance system on the east side and in the City was overloaded and needed immediate attention.

- The TPS Plant and LBR Plant were experiencing peak flow problems.

The four system alternatives developed in the City MSP are summarized as follows:

- <u>Alternative 1</u>: This alternative involved treating all of the wastewater at either the LBR Plant or the TPS Plant. Effluent from both treatment plants would be pumped to the SE Sprayfield for disposal.

  Wastewater from the Northeast and Southeast Service Areas would be collected and then transported to the TPS Plant through a new force main that would follow Centerville Road and Capital Circle. A new pump station would be constructed near the intersection of Wahnish Way and Bragg Drive to eliminate overflows in the trunkline and Springhill Road pump station.

- <u>Alternative 2</u>: This alternative involved construction of a new NE Plant adjacent to Interstate 10 and the phasing out of the LBR Plant. Effluent from the TPS Plant would be pumped to the SE Sprayfield for disposal. Effluent from the NE Plant would be pumped through a new force main to the SE Sprayfield.

  Wastewater from the NE Service Area would be pumped to the treatment plant through force mains serving the areas north, west, and south of the NE Plant. The Southeast Service Area would be served through the existing transmission system. A new pump station would be constructed near the intersection of Wahnish Way and Bragg Drive to eliminate overflows in the trunkline and Springhill Road pump station.

- <u>Alternative 3</u>: This alternative involved construction of a new SE Plant in the vicinity of Tram Road and Capital Circle and phasing out of the LBR Plant. Effluent from the TPS Plant would be pumped to the SE Sprayfield for disposal. The effluent from the SE Plant could initially be pumped directly into the existing effluent force main from the TPS Plant to the SE Sprayfield.

Wastewater from the Northeast and Southeast Service Areas would be collected and then transported to the SE Plant through a new force main that would follow Centerville Road and Capital Circle. A new pump station would be constructed near the intersection of Wahnish Way and Bragg Drive to eliminate overflows in the trunkline and Springhill Road pump station.

- Alternative 4: This alternative involved treating all of the wastewater at either the LBR Plant or the TPS Plant. Effluent from both treatment plants would be pumped to the SE Sprayfield for disposal.

  Wastewater from the Northeast and Southeast Service Areas would be collected and then transported to the TPS Plant through a new force main that would follow Centerville Road and Capital Circle. A force main would be constructed from Riggins Road pump station to Capital Circle which would divert flow from the trunkline near Wahnish Way and Bragg Drive.

Originally, Alternative 1 of the MSP was selected as the preferred alternative. This was changed later due to public opposition to the construction of a pump station at Wahnish Way and Bragg Drive. Alternative 4 of the MSP was then developed and selected as the preferred alternative, providing for a Centerville Road/Capital Circle force main to divert flow from the Wahnish Way and Bragg Drive area.

1.3.4 Preliminary Leon County Master Water and Sewer Service Plan (1988) (County MW&SSP)

Leon County considered two basic premises in developing wastewater management alternatives for the unincorporated areas of the County: (1) the County remaining in a non-provider role, and (2) the County changing to a provider role. The County considered the following goals to guide the development of alternatives under both premises:

- Manage the impact of growth.
- Increase ability to respond to citizens' needs.
- Develop tools for managing services.
- Provide sewer services at lowest possible costs.

The eleven alternatives, six provider (one is the water only), and five non-provider, presented in the Leon County MW&SSP, are summarized as follows:

- Alternative 1, Non-Provider: This is the "status quo" alternative where the City would remain "the sole local governmental entity to authorize the planning, construction, and operation of sewage disposal utility services in the unincorporated area of...Leon County." This would result in the expansion of the various service roles of others and the continued decline of the present role of the County in this respect.

- Alternative 2, Non-Provider: This alternative is similar to Alternative 1 above except that the administration of sewer services by the County would be revised. The purpose of updating these documents would be to remove several noted deficiencies that exist in the current authorized service area and/or zone application fees, to establish a "grace period" for remaining unauthorized systems to apply for service area status with the County, to re-define the County's relationship with the City in granting extensions to the City's water and sewer zone, and to implement a program for monitoring water and sewer systems.

- Alternative 3, Non-Provider: In this alternative, the County would cease to process future water and sewer service area applications altogether. In place of this task, the County would negotiate and establish assigned service areas to the existing water and sewer services providers. Under this alternative, service area boundaries could be derived using any number of criteria, and then assigned between those entities best suited to provide these services. This alternative is basically envisioned as a "one-time" assignment and all presently unauthorized service areas would remain within the unincorporated area of the County.

- Alternative 4, Non-Provider: This alternative follows the same basic logic as Alternative 3, with the exception that all presently unauthorized service areas of the County would be negotiated for assignment to the City in its entirety. In fact, the City has recently offered its proposal to the County to accomplish this very task. This proposal basically involves the City's offer to share service revenues with the County over a 30-year period of time in exchange for the exclusive granting of water and sewer service privileges within all presently unauthorized water and sewer territory.

- Alternative 5, Non-Provider: This alternative involves the establishment of negotiated service area boundaries between providers, much in the same fashion that is presented in Alternative 3, but only enacted to moderate limits. Under this alternative, the County would retain its exclusive authority in the outermost regions of the County under either the existing or revised criteria as discussed in both Alternatives 1 and 2, and make assignments to providers only in those areas where immediate attention will be necessary.

- Alternative 6, Provider: This alternative involves the County ceasing to grant water and sewer service to others altogether, thus allowing the County to pursue the provision of water and sewer services in unserviced areas from County-owned/operated systems.

- Alternative 7, Provider (Water Only): This alternative assumes that the County would elect to enter as a provider of water services only. The basic workings of this alternative would not differ considerably from that discussed in Alternative 6 above, but would apply to the scope of water services provision only.

- Alternative 8, Provider: This alternative is similar to Alternative 6, but rather involves the County entering as only a minor provider of water and sewer services while continuing to allow the further franchising of service areas by other providers. This approach would basically encompass the assumption of operation and maintenance responsibility over small isolated water or sewer systems as an alternative to having such responsibilities being accepted by others.

- Alternative 9, Provider: This alternative follows the same basic approach as does Alternative 8, with the exception that systems assumed for County operation and control would be required to fit a large central system concept. This would be the situation if the County desired constructing its own sewage treatment plant, and then soliciting system connections in direct competition with the City and/or Talquin Electric Cooperative, Inc. (TECO).

- Alternative 10, Provider: This alternative would basically consist of the County making contractual arrangements with a qualified outside entity to design, construct, operate, and maintain a major new sewage treatment facility.

- Alternative 11, Provider: Under the pursuit of this alternative, the County would seek to assume control of existing water systems, sewer systems, or both. This alternative basically consists of the County attempting to acquire, either by purchase or by gift, existing systems inclusive of existing user populations. It offers the County its clearest means of entering the picture as a provider of water and sewer services in service areas of known quantity and demonstrated potential.

The USEPA understands from Leon County (personal communication, 1991) that the Leon County Board of Commissioners has not approved the 1988 preliminary Leon County Master Water and Sewer Service Plan.

CHAPTER 2

ALTERNATIVES DEVELOPMENT

CHAPTER 2 ALTERNATIVES DEVELOPMENT

2.1 EXISTING WASTEWATER MANAGEMENT

2.1.1 City of Tallahassee

The City Master Sewer Plan (MSP:1988) prepared by Bishop Engineers described the City's existing service areas, interceptor lines, pumping stations, treatment plants, effluent disposal systems, and sludge handling facilities. Summary descriptions, current through September, 1989, follow.

2.1.1.1 Interceptors

The City's sewer system contains about 100 miles of pipeline with diameters ranging from 12 inches to 42 inches. The alignment of these interceptors is illustrated in Figure 2-1.

2.1.1.2 Pumping Stations

The City operates approximately seventy-five (75) pumping stations as part of the wastewater collection system. Of these, seven are considered part of the interceptor system and are located on Figure 2-1. At least two of the pumping stations are known to be overloaded during periods of extreme wet weather. These are Pump Station No. 12 and Springhill Road Pump Station. The City has already initiated construction to expand Pump Station No. 12 and divert flow away from Springhill Road Pump Station.

2.1.1.3 Treatment Facilities

The City operates three wastewater treatment facilities. They are: (1) T. P. Smith Facility (TPS Plant and SW Plant), (2) Lake Bradford Road (LBR) Plant, and (3) Municipal Airport Wastewater Treatment Plant (MAP). The locations of these facilities are shown on Figure 2-1. Table 2-1 identifies the treatment type for each facility.

2.1.1.4 Effluent Disposal Facilities

Table 2-1 also identifies the disposal technique used for each of the treatment facilities. With the exception of the small MAP Plant, all of the effluent from the City-owned wastewater treatment plants is disposed by spray irrigation. The spray irrigation facility (SE Sprayfield) consists of a 1,900-acre sprayfield with a 22.0 mgd capacity (Update: rerated to 23.25 mgd on 9/8/89) constructed approximately eight miles east of the T. P. Smith Facility. The facility components include a 52 million gallon holding pond and 22.0 mgd (Update: rerated to 23.25 mgd on 9/8/89) pumping station at the T. P. Smith Facility, 40,000 feet of 36-inch force main, and a 48-million gallon holding pond and a 22.0 mgd (Update: rerated to 23.25 mgd on 9/8/89) pumping station at the sprayfield. The sprayfield consists of thirteen center pivot irrigators. There is also a 102 acre, 1.25 mgd agricultural sprayfield adjacent to the TPS Plant referred to as the Southwest Sprayfield (SW Sprayfield). The locations of the disposal facilities are shown in Figure 2-1 (Update: The City sewer services area depicted in Figure 1-1 has since been updated due to a Leon County-City of Tallahassee (1993) "Water Sewer Agreement" dated February 14, 1993. In addition to general configurational changes to the service area boundary (depicted in the figure as bold lines), the new sewer services area constitutes an area reduction in the SE quadrant (north of Old Tram Road) as well as a relocation of the boundary through Lake Jackson instead of around it along its southern (Old Quincy Highway) and eastern boundaries.

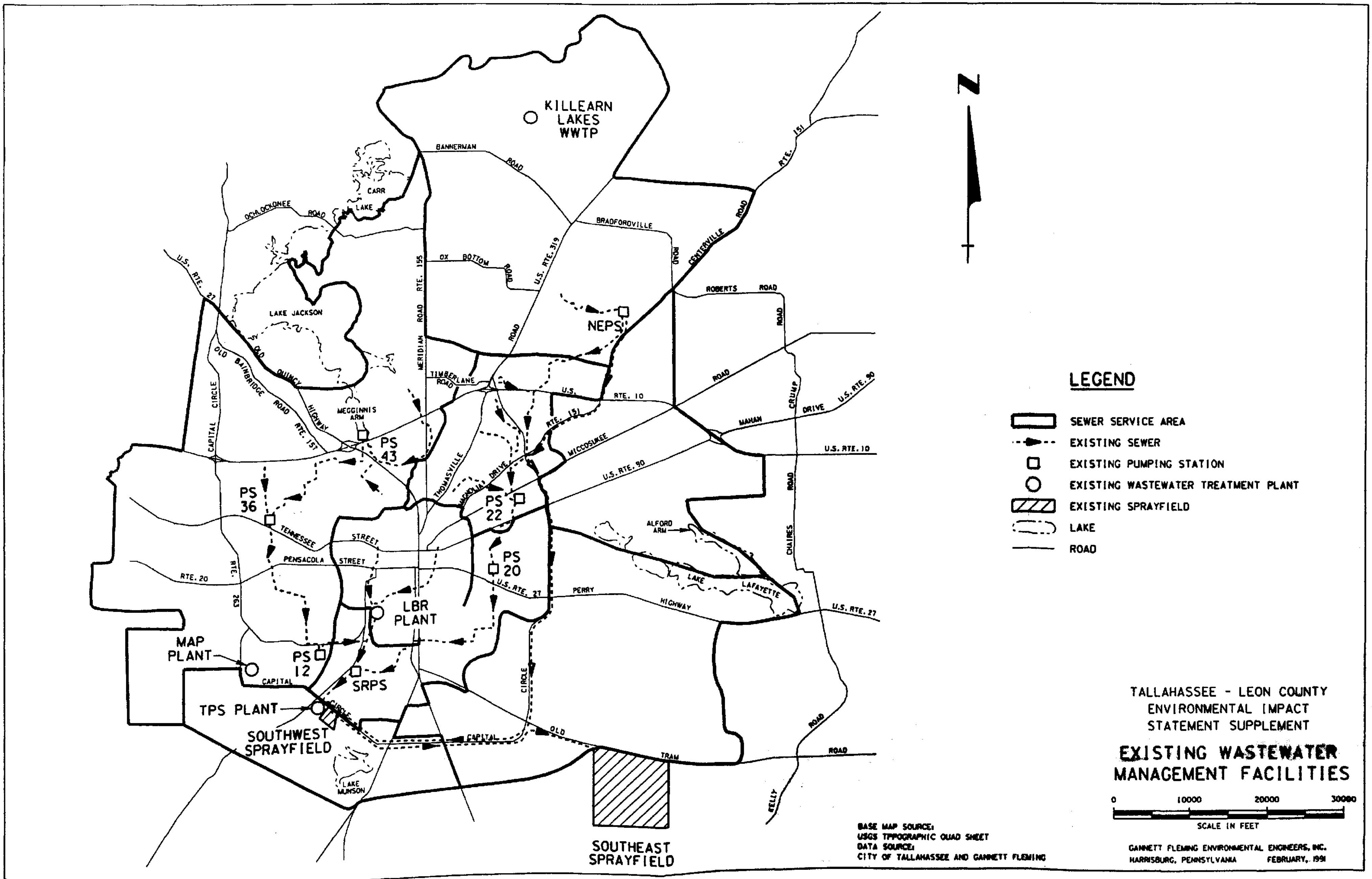

KILLEARN LAKES WWTP
BANNERMAN ROAD
CARR LAKE
OCHLOCKONEE ROAD
BRADFORDVILLE ROAD
OX BOTTOM ROAD
U.S. RTE. 319
RTE. 151
CENTERVILLE ROAD
U.S. RTE. 27
LAKE JACKSON
MERIDIAN ROAD RTE. 155
ROBERTS ROAD
NEPS
OLD QUINCY HIGHWAY
OLD BAINBRIDGE ROAD RTE. 157
TIMBERLANE ROAD
U.S. RTE. 10
RTE. 151
CAPITAL CIRCLE
MEGGINNIS ARM
PS 43
THOMASVILLE
MAGNOLIA DRIVE
MICCOSUKEE ROAD
MAHAN DRIVE
U.S. RTE. 90
U.S. RTE. 10
CRUMP ROAD
PS 36
PS 22
TENNESSEE STREET
PENSACOLA STREET
RTE. 20
RTE. 263
PS 20
ALFORD ARM
LAKE LAFAYETTE
CHAIRES ROAD
U.S. RTE. 27
PERRY HIGHWAY
LBR PLANT
MAP PLANT
PS 12
SRPS
CAPITAL CIRCLE
TPS PLANT
SOUTHWEST SPRAYFIELD
OLD TRAM ROAD
LAKE MUNSON
KELLY ROAD
SOUTHEAST SPRAYFIELD
N
LEGEND
SEWER SERVICE AREA
EXISTING SEWER
EXISTING PUMPING STATION
EXISTING WASTEWATER TREATMENT PLANT
EXISTING SPRAYFIELD
LAKE
ROAD
BASE MAP SOURCE:
USGS TOPOGRAPHIC QUAD SHEET
DATA SOURCE:
CITY OF TALLAHASSEE AND GANNETT FLEMING
TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT
EXISTING WASTEWATER
MANAGEMENT FACILITIES
0 10000 20000 30000
SCALE IN FEET
GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA FEBRUARY, 1991

FIGURE 2-1

TABLE 2-1

EXISTING WASTEWATER TREATMENT FACILITIES

	Plant Name	Design Flow (mgd)	Treatment Type and Disposal: Wastewater	Treatment Type and Disposal: Sludge
1.	T. P. Smith Facility SW Plant	2.5[1]	High-rate Trickling Filter Rotating Biological Contractors Spray Irrigation	Anaerobic Digestion Land Spreading
	TPS Plant	17.5[1]	Activated Sludge Spray Irrigation	Aerobic Digestion Thickening and Dewatering Land Spreading
2.	LBR Plant	4.5	Trickling Filter Activated Sludge Spray Irrigation	Anaerobic Digestion Land Spreading
3.	MAP Plant	0.06	Trickling Filter Evaporation/Percolation Pond	Anaerobic Digestion Land Spreading

[1] Update: TPS plant (trickling filter and activated sludge components) was rerated from 17.5 mgd to 20.0 mgd (2.5 mgd + 17.5 mgd) on 9/8/89. Spray irrigation capacity at the SE Sprayfield was rerated from 22.0 mgd to 23.25 mgd on 9/8/89.

The farm management facility at the SE Sprayfield consists of five silos, loading and unloading equipment, scales, a maintenance equipment shed, and an operators' building. This facility is used to harvest and store the crops, including corn, soybeans, canola, and rye/rye grass that are grown on the sprayfield. All agricultural crops produced from the effluent sprayfields are not to be used for direct human consumption, consistent with State of Florida regulations. Accordingly, irrigated crops produced by the City are to only be used as animal feed and/or processed food for humans (e.g., canola oil; soybean oil) to the extent consistent with Chapter 17-610 F.A.C.

A pumping station and force main are also in place to allow the effluent from the LBR Plant to be pumped to the holding pond at the T. P. Smith Facility. The SW Sprayfield immediately east of the TPS Plant utilizes fixed head spray guns and accepts approximately 1.25 mgd. Coastal Bermuda grass is grown on this site and is harvested as hay for animal feed.

2.1.1.5 Sludge Disposal

All of the sludge from the City-owned wastewater treatment facilities is disposed of by some form of land application. The majority of sludge is landspread in the liquid form on land the City owns around the municipal airport. Approximately 456 dry tons/year, or 0.31 dry tons/mgd of plant flow, of anaerobically digested sludge is hauled from the LBR Plant. The TPS Plant is currently generating 1,909 dry tons/year, or 0.42 dry tons/mgd of plant flow, of aerobically and anaerobically digested sludge.

The T. P. Smith Facility has a dissolved air flotation unit which is used to thicken aerobic digested sludge. The thickened sludge is usually hauled directly to the airport for landspreading. However, the thickened sludge can also be sent to one of five belt presses at the site for dewatering. Sludge that has been dewatered is also landspread at the airport.

The actual acreage available for sludge disposal by landspreading consists of 490 acres at the municipal airport, 102 acres at the sprayfield next to the T. P. Smith Facility, 12 acres of area around the T. P. Smith Facility grounds, and 202 acres of City-owned pine forest west of the municipal airport, for a total of 806 acres.

It is the USEPA's understanding from the FDER that the City sludge field near the municipal airport is in compliance with the State's nitrogen application criterion (500 pounds of nitrogen per acre per year: 500 lbs/N/ac/yr). However, the sludge field is apparently at capacity based on FDER nitrogen level determinations. Continued use of the sludge field, particularly if greater nitrogen application is planned in association with selection of a wastewater disposal alternative, should be evaluated in light of the fact that the field is at capacity. The sludge field must remain in compliance with the State of Florida requirements.

2.1.2 Talquin Electric Cooperative, Inc. (TECO)

TECO owns and operates six community wastewater treatment facilities in Leon and Wakulla Counties providing wastewater services in five geographic locations. Three of these facilities serve communities located in Leon County.

The Lakewood Community Wastewater Treatment Facility (Lakewood Facility) located in western Leon County is a two-plant complex with a total of 0.3 mgd of wastewater treatment capacity. At present, the Lakewood Facility serves approximately 450 accounts, primarily residential, but including a limited amount of commercial and industrial development.

The Meadows Wastewater Facility (Meadows Facility) is located in east Leon County with a total treatment capacity of 0.07 mgd. This facility serves 215 residential accounts.

TECO's newest, and soon to be largest wastewater treatment facility, is located in northern Leon County at Killearn Lakes. At present, the Killearn Lakes plant is a 0.10 mgd plant, but engineering design is underway to expand this facility by 0.25 mgd for a total capacity of 0.35 mgd. This plant is serving approximately 100 residential units and a small number of commercial operations. The location of the plant is shown in Figure 2-1.

2.1.3 Leon County

The County does not currently own or operate any wastewater management facilities and has stated in the past that it does not desire, except as a last resort, to become a provider of these services. The County's present role in the area of sewer services is to authorize and monitor sewer system franchises to other providers in unincorporated areas.

The current extent of sewer system franchises within the County involves those areas authorized to the City, TECO, and other small private entities. The Preliminary Leon County Master Water and Sewer Service Plan (County MW&SSP) identified nine community wastewater systems in addition to TECO's facilities. Four of these are authorized and five are unauthorized, according to FDER and Leon County Public Health Department (LCPH) records. The County's position concerning these additional private providers is that they are important for providing service to remote, rural areas of the County and will be considered on an individual basis for future small developments. However, they are not capable of providing the level of sewer services addressed in this EIS Supplement and subsequently are not considered as potential providers in this report.

2.1.4 On-lot Wastewater Management

On-lot treatment and disposal systems are in common use in the Tallahassee-Leon County area. The systems most frequently used are septic tanks with either subsurface or mound drainfields. Only a few areas within the City limits utilize on-lot systems and those areas are progressively being added to the City's sewer system. The area between the City limits and the outer limits of the wastewater service areas include small (five to ten lots) and larger subdivisions that are utilizing on-lot systems. This area and the remainder of the County also include isolated small clusters and single resident on-lot systems.

Septic tank drainfield failures have been investigated and documented for the Killearn Lakes Subdivision area. Generally it was found that the combination of poor soil conditions (slowly permeable soils), water table elevations (artificially perched on confining layers), storm water runoff ("sheet flow" drainage system), and the density of development (small lots of 1/4 acre) were the major factors involved. The study prepared for this area by the Leon County Public Health Unit (LCPHU) recommended installing a central sewage system and an adequate stormwater collection system. It also advised that restrictions should be made for issuing on-lot sewage disposal system permits.

Currently the County is compiling a computer-based inventory of septic tank drainfield failures. However, this inventory only includes new failures and therefore cannot provide a historical record to quantify the problem caused by failures or to identify all specific problem areas.

2.2 BACKGROUND INFORMATION

2.2.1 Regulatory Criteria

2.2.1.1 State Regulations for Effluent Disposal

FDER regulates effluent disposal pursuant to the Florida Administrative Code (F.A.C.), Chapter 17-6 Wastewater Facilities and Chapter 17-610 Reuse of Reclaimed Water and Land Application. Specific regulations or environmental conditions that have severely restricted or eliminated the use of particular disposal techniques for the study area include the following:

- Surface water discharge - FDER has classified the Ochlochonee and St. Marks Rivers as "Outstanding Florida Water" thereby imposing a zero effluent limitation.

- Deep well injection - FDER requires (1) the identification of a saline formation that has a dissolved solids concentration of 10,000 mg/l (preferably two confining geological layers should be present between this saline zone and a freshwater zone), and (2) the availability of reasonable transmissivities (rate of flow into aquifer). Specifically, Chapter 17-28 of the FAC would apply to deep well injection proposals relative to suitable injection zones and well construction. USDA Soil Conservation Service (SCS) has stated that there are few or no confining layers separating the freshwater and saline layers of the Floridan Aquifer, which is the main water supply source for the study area. However, there is a possibility of an anhydride layer below the limestone formation of the Floridan Aquifer that might serve as a confining layer, but excessive depths (3,500 feet or greater, i.e., below the Floridan Aquifer) and probable low permeabilities limit the potential for deep well injection. A test well drilled in 1977 in Gainesville, Florida, showed little potential for water disposal and the project was terminated. Also, the USGS (1979), in cooperation with the FDER, has stated that Area II, which includes Leon County, "...is the least suitable in Florida for waste injection."

2.2.1.2 Federal Regulations for Effluent Disposal and Sludge Disposal

The 40 Code of Federal Regulations (CFR) Section 122.1(b)(1) states that a National Pollutant Discharge Elimination System (NPDES) permit is required for the discharge of pollutants from "any 'point source' into 'waters of the United States'" (point source is defined in 40 CFR Part 122.2 as "any discernable, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged) into waters of the United States." Part 122.2 also states that "[t]his term does not include return flows from irrigated agriculture or agricultural storm water runoff." Failure to obtain proper authorization for discharges under the NPDES Program may result in the assessment of administrative, civil, and/or criminal penalties under Section 309 of the Clean Water Act (CWA).

Pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124) and to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), an NPDES permit is required for point source storm water discharges to waters of the United States from the facility actually treating domestic wastewater. This provision applies to domestic wastewater treatment facilities that have design flows of at least 1.0 mgd. The NPDES storm water regulations of November 16, 1990, also require that point source storm water discharges to waters of the United States from all construction activities (including the initial clearing, until revegetated, of spray irrigation sites) disturbing a total of five or more acres must be permitted under the NPDES program. The permit application deadline for these discharges is 90 days prior to commencement of construction. Construction activities needing NPDES permit coverage can be made through a general permit recently issued by EPA/Region IV.

Storm water point source discharges to waters of the United States from the operation (spray irrigation) of non-agricultural/non-silvicultural land application sites (such as golf courses, rights-of-way, and landscape areas) receiving domestic wastewater treated to the quality required by Chapter 17-610 F.A.C. for the land application of reclaimed water are not required to be covered by NPDES permits, unless the USEPA specifically requires a facility to submit an application on a case-by-case basis. Therefore, no NPDES permit is needed for the operation of such land application sites for the City's proposed project (if storm water point source discharges exist to waters of the United States for such sites) unless specifically requested by the USEPA. However, dedicated discharges of reclaimed water, without land application, are required to be covered by NPDES permits. It may also be noted that storm water discharges from the land application of wastewater effluent on agricultural and silvicultural sites are exempt from the NPDES permitting program if the sites are consistent with 40 CFR Part 122.3(e), so that the operation of such sites for the City's proposed project would not require an NPDES permit if consistent with 40 CFR 122.3(e).

For the operation (spray irrigation) of land application sites that are not exempt from NPDES permitting and that would only have infrequent point source discharges during bypass or upset conditions and during rainfall conditions that exceed the capacity of systems designed to contain storm water up to a 10 year-24 hour storm event, a "No-Discharge" NPDES permit would be appropriate. Application for such discharges is required under the NPDES permitting program. If a site is determined to be discharging without NPDES coverage, the owner/operator would be subject to administrative, civil, and/or criminal penalties under Section 309 of the Clean Water Act. Also, for land application sites not having point source discharges (zero discharge sites), no NPDES permit would be required for operation. In any case, however, a "Sludge Only" permit (see below) would be required for the disposal/reuse of generated sludge. In addition, the above storm water NPDES regulations (55 FR 47990 dated November 16, 1990) would apply during the construction of either case as well as for the treatment plants actually treating the effluent for spray application as described previously.

Included in the proposed spray irrigation of wastewater effluent in the preferred Alternative 1 is the generation of and land application of wastewater sludge. Section 405(d) of the Clean Water Act requires that the disposal or reuse of sewage sludge be regulated. This regulatory activity is to be accomplished through the utilization of permits based upon technical federal regulatory standards. The USEPA established federal sludge disposal/reuse standards which were promulgated in the Federal Register at 40 CFR 503 on February 19, 1993. In general, these standards must be complied with by all treatment works treating domestic sewage by February 19, 1994. Violation of these standards would be a violation of the Clean Water Act. It is anticipated that current and proposed sludge disposal/reuse activities would be regulated through an NPDES permit, where applicable, or through issuance of a "Sludge-Only" permit. This federal permitting activity would be issued by the USEPA/Region IV until program authorization is given to the State of Florida. Therefore, the newly promulgated federal regulations are in addition to the State of Florida sludge disposal/reuse regulations.

An administrative penalty may be assessed by the Administrator of the USEPA (the Administrator) for a violation of Section 301, 302, 306, 307, 308, 318, or 405 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

The Administrator is authorized by the CWA to commence a civil action for appropriate relief, including a permanent or temporary injunction, for any violation for which he is authorized to issue a compliance order under subsection (a) of Section 309 of the CWA.

The CWA provides that any person who negligently violates Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or imprisonment of not more than 2 years, or both. Any person who knowingly violates such sections is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment of not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a known endangerment violation, a person shall be subject to a fine of not more than $500,000 or imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

The permitting guidance outlined above in this section (and in this document in general) is very general and is not intended to be used to make final decisions on the applicability of the NPDES or sludge regulations. Site-specific conditions are always important factors in making these determinations. Additional information on the USEPA NPDES permitting program can be obtained from:

Mr. Roosevelt Childress, Chief
Storm Water and Municipal Unit
Water Permits and Enforcement Branch
Water Management Division
USEPA, Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365
(404) 347-3012; Extension 2980

2.2.1.3 Federal Regulations for Activities Affecting Wetlands

Any unavoidable wetland losses due to construction of an alternative land application project (e.g., land clearing and grubbing; access road development; facility construction) would be subject to Section 404 (Clean Water Act: CWA), wetland permit determinations by the U.S. Army Corps of Engineers (COE), i.e., the federal 404 permitting agency, as well as the State of Florida and Leon County, as appropriate. Direct loss of wetlands through dredge-and-fill activities is generally not anticipated for the actual spray irrigation fields, since hydric (wetland) soils are not suitable/desirable for spray irrigation.

The permitting information outlined above in this section (and in this document in general) is very general and is not intended to be used to make final decisions on the applicability of Section 404 of the CWA. Site-specific conditions are always important factors in making these determinations. Additional information on 404 permits may be obtained from the Jacksonville, Florida District COE, and from the USEPA, which reviews individual 404 and some nationwide permit applications for the COE:

Mr. Tom Welborn, Chief
Wetlands Regulatory Section
Wetlands, Oceans and Watersheds Branch
Water Management Division
USEPA, Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365
(404) 347-4015

2.2.1.4 Sewer Expansion

County Ordinance 80-29 regulates sewer expansion in unincorporated portions of the County. This ordinance includes provisions for an application procedure that is to be used in securing a franchise for providing water or sewer service by private providers, or by the City, in the event that the area to be serviced is not contiguous to the City's existing service zones.

The City/County Water and Sewer Agreement regulates sewer expansion in unincorporated portions of the County by providing a stream-lined application procedure for use by the City in performing contiguous area expansions of its designated water and sewer service zones.

As stated in the County MW&SSP, the County has attempted to use these regulatory documents to bring all water and sewer systems in unincorporated areas under its authority. Such efforts have met with limited success in that there are still a number of existing water and sewer systems in the County which have failed to come into compliance with Ordinance 80-29.

The USEPA understands from the City that the County Commissioners of Leon County have unanimously denied (1991) issuance of a Leon County sewer franchise which the County maintains is needed for the expansion of the existing SE Sprayfield. As a consequence, the City's proposed expansion to the Eastern Expansion area is presently denied by Leon County.

2.2.2 Population Projections

Population estimates by traffic zone (May, 1988) were obtained from the Tallahassee-Leon County Planning Department (TLCPD). The estimates used in this EIS Supplement are for the medium growth scenario and include the planning years 1990, 2000, and 2010. Estimates of the population projections for the EIS Supplement's service areas were determined by overlaying the service area boundary map and the traffic zone map. The percentage of each traffic zone lying within the service area boundaries was determined and multiplied by the corresponding population count for each traffic zone.

Based on the traffic zone population projections, the pattern of population growth shows growth areas clustered in the portion of the County north of the City and not evenly dispersed throughout the County. Ownership of undeveloped land surrounding the City could be a limiting factor in the future growth of the area, particularly for those areas owned by the USDA Forest Service (FS) or St. Joseph Land and Development Company.

Table 2-2 presents the estimates for the sewered, unsewered, and total populations in each service area from 1987 to 2010. The sewered population refers to those residents or equivalent units to be serviced by centralized wastewater treatment and disposal facilities. The unsewered population refers to those residents or equivalent units to be serviced by on-lot and/or area facilities. The percentage of the total population that would be sewered in the future was determined by analyzing the characteristics of each traffic zone in the service area and using the percentage served values for each service area provided in the City MSP.

Parts of the traffic zones north of Bannerman and Bradfordville Roads of the Northeast service area are not included in the population projections. TECO's Killearn Lakes facility currently serves a large portion of this area. In addition, traffic zones south and east of Capital Circle and Old St. Augustine Road of the Southeast service area are assumed to remain unsewered with the exception of a small portion of traffic zone 358 which is currently part of the City's service area. The preliminary 1988 Leon County MW&SSP has identified these zones as areas with "surplus septic acreage" based on proposed development and soil characteristics.

More recent population information also exists. According to the Tallahassee-Leon County Planning Department (1992) statistics dated February 14, 1992, the 1990 census population of Leon County including the City of Tallahassee and university students is 192,493 and a population projection for the year 2010 of 261,600 (35% increase since 1990). According to the Tallahassee Chamber of Commerce, the 1990 population of the City of Tallahassee is 124,733 (presumably also for 1990 and including university students).

2.2.3 Flow Projection Analysis

Monthly average wastewater flows at the TPS/SW Plants and the LBR Plant were obtained from the City for the years 1983 through July, 1988. These flow values were analyzed to determine a base flow estimate for each service area. The peak monthly average flow on record for the study area was found to be 21.61 mgd for the month of March 1988. This value was, therefore, selected to be the base flow estimate.

Wastewater flow increases for the future were based on the medium population projections presented in the previous section and a per capita flow rate for future growth of 140 gallons per capita per day (gpcd). (Update: It is the USEPA's understanding from the City of Tallahassee that 160 gpcpd is the peak flow and 140 gpcpd is the average daily flow, the latter being used in the EIS Supplement). This estimated flow rate includes commercial and industrial flows as a part of the residential flow. Table 2-3 lists the wastewater flow projections for each service area.

Both the base flow estimate of 21.61 mgd and the per capita flow rate for future growth of 140 gpcd were agreed upon for use in this study by USEPA, the City, and FDER.

The alternative development process of the EIS Supplement requires distinguishing between expanding service to accommodate infilling within the City's existing service area and expanding service to handle additional areas outside of the existing service area boundaries. Also, the current and proposed service provided by TECO in the study area must be accounted for in the alternatives. Table 2-4 summarizes the flow estimates for the various categories. These estimates were determined by overlaying the traffic zone map with the service area map, and the Leon County Planning Department sewer service franchise map. In cases where existing flow values were available, but the numbers of customers served were not, the flow rate of 140 gpcd was used to calculate a population estimate.

TABLE 2-2

POPULATION PROJECTIONS BY SERVICE AREA

Service Area	Centralized Sewered Population				Unsewered Population[1],[2]				Total Population			
	1987	1990	2000	2010	1987	1990	2000	2010	1987	1990	2000	2010
Lake Bradford Road	36,618	36,514	36,452	36,443	0	0	0	0	36,618	36,514	36,452	36,443
P.S. No. 12	31,352	37,211	48,497	55,271	13,437	9,303	5,389	2,909	44,789	46,514	53,886	58,180
Riggins Road	17,795	20,083	23,061	29,596	0	0	0	0	17,795	20,083	23,061	29,596
Northeast	6,145	8,070	12,396	16,938	6,964	7,808	8,469	8,388	13,109	15,878	20,865	25,326
Springhill Rd	24,293	25,668	28,213	30,427	0	0	0	0	24,293	25,668	28,213	30,427
T. P. Smith	499	1,039	1,537	1,948	1,495	1,038	659	487	1,994	2,077	2,196	2,435
Southeast	565	1,580	2,234	4,777	7,211	7,489	12,898	17,434	7,776	9,069	15,132	22,211
Buck Lake	442	1,010	2,920	9,199	3,975	4,039	4,380	2,300	4,417	5,049	7,300	11,499
Totals	117,709	131,175	155,310	184,599	33,082	29,677	31,795	31,518	150,791	160,852	187,105	216,117

(1) Includes populations using on-lot and small community wastewater treatment and disposal facilities.

(2) Based on service percentages provided in the City MSP, Table 4.1-B.

TABLE 2-3

FLOW PROJECTIONS FOR CENTRALIZED SERVICE

Service Area	Increase in Population Since 1987			Base Flow (MGD)	Total Projected Flow (MGD)		
	1990	2000	2010		1990	2000	2010
Lake Bradford Road	-104	-166	-175	6.88	6.87	6.86	6.86
P.S. No. 12	5,859	17,145	23,919	5.18	6.00	7.58	8.53
Riggins Road	2,288	5,266	11,801	3.10	3.42	3.84	4.75
Northeast	1,925	6,251	10,793	1.66	1.93	2.54	3.17
Springhill Rd	1,375	3,920	6,134	4.46	4.65	5.01	5.32
T. P. Smith	540	1,038	1,449	0.13	0.21	0.28	0.33
Southeast	1,015	1,669	4,212	0.13	0.27	0.36	0.72
Buck Lake	568	2,478	8,757	0.07	0.15	0.42	1.30
Totals	13,466	37,601	66,890	21.61	23.50	26.89	30.97

TABLE 2-4

POPULATION AND FLOW PROJECTION SUMMARY

	Population	Flow (mgd)	
I. Base Year 1987			
A. City's Existing Service Area			
Total	139,128	24.61	
Served by City	117,709	21.61	
Served by On-lot	21,419	3.00	
B. Proposed Master Plan Expansion Area			
Total	11,663	1.63	
Served by TECO	714	0.10	(1)
Served by On-lot	10,949	1.53	
C. Total Study Area			
Total	150,791	26.24	
Served by City	117,709	21.61	
Served by TECO	714	0.10	(1)
Served by On-lot	32,368	4.53	
II. Design Year 2010			
A. Centralized Alternatives			
Total	216,117	35.38	
Served by City	184,599	30.97	(6)
(Base)	(117,709)	(21.61)	
(Infilling)	(42,957)	(6.01)	(3)
(Expansion)	(23,933)	(3.35)	
Served by TECO	2,500	0.35	(2)
Served by On-lot	29,018	4.06	
B. Decentralized Alternative			
Total	216,117	35.38	
Served by City	138,352	24.50	(4)
(Base)	(117,709)	(21.61)	
(Infilling)	(20,643)	(2.89)	
(Expansion)	(0)	(0)	
Served by TECO	2,500	0.35	(2)
Served by On-lot	75,265	10.53	(5)

---

(1) Only includes the Killearn Lakes area (0.1 mgd) because the service areas of Lakewood (0.3 mgd) and the Meadows (0.07 mgd) are outside of the study area even though the treatment facilities are inside the study area.

(2) This provides for the planned expansion at the Killearn Lakes facility to allow it to receive 0.35 mgd flows.

(3) This assumes all infilling growth will be served by 2010.

(4) This is the maximum flow that can be managed by the City's facilities at their current levels:

- LBR Plant - 4.5 mgd
- TPS Plant - 20.0 mgd (rerated)

24.5 mgd

(5) An alternate version of the Decentralized Alternative could involve the expansion of area facilities to handle some of wastewater flow that is indicated to be received by on-lot systems. The decision to use on-lot versus area facilities should be made based on the soils and/or density of development.

(6) The evaluation of centralized alternatives was based on a design flow of 30.97 mgd because the remaining study area flow, 4.41 mgd (34.38-30.97), is not being considered for centralized service as described in Section 2.2.2.

2.2.4 Flow Reduction Measures

Flow reduction measures refer to water conservation techniques. These measures are nonstructural techniques which can reduce treatment operating costs, relieve overloaded wastewater treatment, collection and disposal facilities, and reduce the capacity required for new facilities. The nonstructural measures with potential application in the Tallahassee Leon County area include plumbing codes, flow-control devices, and educational programs to reduce water use and the resulting wastewater flow.

The USEPA understands from the City of Tallahassee that the City, although conceptually not opposed to water-saving devices, presently has no prepared plan to implement water-saving devices and believes such devices would be difficult to locally implement since Tallahassee has an abundant water supply.

Table 2-5 shows the list of assumptions used in estimating the potential for wastewater flow reduction in the study area. The effects of these flow reduction measures on wastewater flow projections were estimated by considering that per capita reductions in wastewater flows at new and renovated homes are estimated at 20 gpcd for residents and 6.75 gpcd for commercial/institutional employees based on the assumptions. These flow rate reductions result in a per capita flow rate of 117 gpcd for new growth after 1990. (Update: No earlier than sometime after issuance of this FEISS, although as indicated above, the City presently has no prepared plan to implement water-saving devices). Flow projections for Leon County with the simulated water-saving fixtures are shown on Table 2-6. The effect of water-saving fixtures at new and renovated residences and commercial/institutional establishments is to reduce projected year 2010 average flows to treatment plants from 30.97 to 29.75 million gallons per day (mgd). This amounts to only a 4% reduction but is considered a reasonable figure because water-saving devices will not be required for existing or non-renovated houses.

Such a water conservation program would not be difficult to implement nor would it require significant sacrifices by people in new or renovated structures. Water-saving toilets and shower heads have been used without complaints or public health concerns in other areas. Operation and maintenance of fixtures would not be costly or frequent.

The use of these water-saving devices will, however, reduce water and sewer revenues. Other adverse impacts include initial costs and increased concentrations of wastewater constituents reaching a wastewater treatment plant.

Benefits which would be obtained from 1.22 mgd of lower flow in the year 2010 are the following:

- Less need for expansion of wastewater collection, treatment and disposal systems.
- Less need for expansion of water supply wells, treatment, distribution and storage systems.
- Lower operation, maintenance and energy costs for wastewater and water supply systems.
- Reduced size of geographical area which is impacted by the disposal of wastewaters.
- Groundwater sources are better conserved for future use.
- Improved chances for proper operation of on-site wastewater treatment and disposal systems.

TABLE 2-5

ASSUMPTIONS FOR ESTIMATING
POTENTIAL FOR FLOW REDUCTIONS

1. Water-saving devices will be required only for residences and establishments built or renovated beginning in 1990 (Update: No earlier than sometime after issuance of this FEISS).

2. No devices will be installed at faucets.

3. Conventional residential toilets use 5 gallons per flush; conventional commercial/institutional toilets use 4.5 gal/flush. Water-saving toilets will use 3.5 gallons per flush or 30 and 22 percent less water, respectively, than conventional toilets.

4. Conventional shower heads emit 6 gallons per minute; water-saving shower heads emit 3.5 gallons per minute or 42 percent less water than conventional shower heads.

5. Each resident flushes a toilet 5 times per day. Each employee/institutional resident flushes a toilet 3 times per day.

6. Each resident and 30 percent of the employee/institutional population takes a five-minute shower each day. Time to take a shower is assumed to be the same with and without water-saving shower heads.

7. 15 percent of existing residences will be renovated between 1990 (Update: No earlier than sometime after issuance of this FEISS: see item 1 above) and 2010 requiring the installation of water-saving toilets and shower heads. This assumption is based on an average age for home renovation of 50 years and that 15 percent of existing homes will be 50 years of age by the year 2010.

8. The per capita wastewater flow rate of 140 gpcd used for future growth consists of the following components: 75 gpcd for residential flows, 10 gpcd for inflow and infiltration in the collection system, and 55 gpcd for commercial and industrial flows. (Update: It is the USEPA's understanding from the City of Tallahassee that 160 gpcpd is the peak flow and 140 gpcpd is the average daily flow, the latter being used in the EIS Supplement).

9. Forty (40) percent of the residents are working at establishments outside of the home.

Note: The USEPA understands from the City of Tallahassee that the City, although conceptually not opposed to water-saving devices, presently has no prepared plan to implement water-saving devices and believes that such devices could be difficult to locally implement since Tallahassee has an abundant water supply.

TABLE 2-6

FLOW REDUCTION PROJECTIONS BY SERVICE AREA

Service Area	Increase in Population Between 1990 and 2010	1990 Base Flow (MGD)	Projected 2010 Flow (MGD) Without Flow Reduction Measures	Projected 2010 Flow (MGD) With Flow Reduction Measures	Estimated Reduction
Lake Bradford Road	-71	6.87	6.86	6.86(1)	0.00
P.S. No. 12	18,060	6.00	8.53	8.11	0.42
Riggins Road	9,513	3.42	4.75	4.53	0.22
Northeast	8,868	1.93	3.17	2.97	0.20
Spring Hill Road	4,759	4.65	5.32	5.21	0.11
T.P. Smith	909	0.21	0.33	0.32	0.01
Southeast	3,197	0.27	0.72	0.64	0.08
Buck Lake	8,189	0.15	1.30	1.11	0.19
Totals	53,424	23.50	30.97	29.75	1.22

(1) This results from a decrease of population by 71 with an average flow value of 140 gpcd (Update: It is the USEPA's understanding from the City of Tallahassee that 160 gpcpd is the peak flow and 140 gpcpd is the average daily flow, the latter being used in the EIS Supplement).

- Lower sewer, water and energy costs for each water-conserving residence and establishment.

- National water conservation goals are supported by responsible action.

The wastewater management alternatives selected for detailed evaluation in the EIS Supplement (Refer to Section 2.4.6) are evaluated with and without flow reduction measures to demonstrate the positive effects of flow reduction measures and to address the "worst-case" scenario, respectively.

2.3 DESCRIPTION OF WASTEWATER MANAGEMENT COMPONENTS

Cost estimates in this section are in third-quarter 1989 dollars.

2.3.1 Alternative Wastewater Conveyance Configurations

The City has a well established conventional wastewater conveyance system consisting of gravity sewer lines, pump stations, and force mains. Alternative wastewater conveyance components have been identified for service area expansions. These alternative components are related to the location of the treatment components. Table 2-7 summarizes the alternative conveyance components. Components C1 and C2 include the costs for conveyance of collected wastewater to treatment facilities. The remaining components include the costs for conveyance of treated wastewater to disposal facilities. It should be noted that the pump stations to be constructed at the disposal sites are not included in the conveyance costs of this table but are made a part of effluent disposal facility costs of Table 2-9. Sections A-1 and A-2 of Appendix A describe in more detail the elements of the wastewater conveyance components since they contribute significantly to a total system alternative's capital costs. The configurations of wastewater conveyance components C1 and C2 are illustrated on Figures 2-2 and 2-3, respectively.

2.3.2 Alternative Wastewater Treatment Facilities

The FDER requires secondary level of treatment for public and private wastewater treatment facilities. The treatment process must achieve a ninety percent (90%) removal of biochemical oxygen demand (BOD), and total suspended solids (TSS). Additionally, effluent used to irrigate public access areas, such as golf courses, must first receive filtration to reduce TSS, and high level disinfection. The percolated effluent must not add contaminants to the groundwater aquifer in concentrations that violate safe drinking water standards. Therefore, the effluent disposal method used may require that additional advanced wastewater treatment be employed to remove pollutants such as nitrogen, phosphorus, chemical oxygen demand (COD), heavy metals, or toxic compounds and total suspended solids (TSS).

The wastewater treatment alternative components presented here either meet the secondary level of treatment for existing facilities or will be designed to meet the secondary level of treatment in the case of new or expanded facilities. Also, facilities must be capable of handling the peak daily flows generated by the appropriate service areas. Table 2-8 summarizes the alternative wastewater treatment components. Note that treatment components for improving and expanding the TPS Plant (T2) and for constructing a new NE Plant (T3) include the option of having phosphorus removal capabilities. This was done to provide for the use of artificial wetlands and power plant cooling as effluent disposal components, which require additional phosphorus removal to meet effluent regulations. Figure 2-4 illustrates the locations of the proposed and expanded treatment facilities. Appendix B describes in more detail, the elements of the treatment alternative components.

The SE Plant proposed in the 1983 EIS was not included in the alternative development process as an option to the NE Plant because it was determined that "good engineering practice" requires treatment of wastewaters as close to the source as possible, in this case the Northeast service area. The use of long interceptors for transporting untreated sewage creates anaerobic conditions in the pipelines. This leads to undesirable biological transformations, especially the generation of hydrogen sulfide. These transformations cause problems such as the corrosion of sewers and other facilities and the need for control of odorous/toxic gases in sewers. The treatability of the wastewater is also reduced because of the significant increase in the immediate oxygen demand of the wastewater arriving at the plant, and the significant growth of filamentous microorganisms (from slime layer accumulation) that affect the operations of a treatment process. All these problems increase both the capital and annual operation and maintenance costs for a facility and are difficult to quantify in the planning process. It should be noted that the treatability of wastewater may be an issue for the alternative component involving an expanded TPS Plant to accept flows from the northeast. It is assumed that the additional costs to overcome any problems that may occur are offset by the lower costs for expanding an existing treatment plant versus the higher costs for siting, constructing, and operating a separate new plant.

The 0.25 mgd expansion of the existing Killearn Lakes Plant is currently underway. No consideration was given to the possibility of expanding this facility beyond that capacity, in that a larger expansion would be similar to the alternative for the construction of the proposed NE Plant.

2.3.3 Alternative Wastewater Disposal Facilities

Table 2-9 summarizes the alternative disposal components. The applicability of these disposal components is related to corresponding treatment components. It should be noted that for disposal components using the SE disposal site (D1, D2, D11, and D16), land costs are incorporated into the O&M costs. Currently the City has a lease agreement with the St. Joseph Land and Development Company, the owners of the SE land. The agreement sets a lease rate for the land based on the market value price of two (2) cords of pulpwood per acre per year plus property taxes. A similar type of agreement is expected to be used for any additional lands.

As stated in the preliminary County MW&SSP, the USEPA agreed to amend the scope of the EIS Supplement from that of the originally authored document to include additional lands presently under consideration by the City of Tallahassee for an expansion of its effluent spray disposal facilities. These lands are situated in the Apalachicola National Forest, and are owned by the USDA Forest Service (FS).

The City approached the USDA FS with a proposal for a land exchange in order to obtain the subject lands for this purpose. The USDA FS did not commit to the proposed trade, but expressed that they would require an EIS be prepared to address the issues surrounding the action prior to any consideration of such an exchange. After the August 15, 1989 Public Workshop concerning the EIS Supplement, USDA FS forest lands were removed from further consideration as locations for effluent disposal by USEPA, though the USEPA does support the use of effluent irrigation for biomass production in appropriate sites. The public and the Florida Game and Fresh Water Fish Commission (FG&FWFC) expressed concern over losing valuable longleaf pine-wiregrass habitat found in these forested areas and the restriction of public access to these areas for recreation. The primary issue in question is the available longleaf pine-wiregrass habitat, not the existing vegetation. The FG&FWFC recommends that such habitat in Florida is critical to maintain and should also be restored to the fullest extent possible. As such, this is a perfect site for the reintroduction of longleaf pine and the cutting of the

TABLE 2-7

ALTERNATIVE WASTEWATER CONVEYANCE COMPONENTS

ID	Description	Design Flow (mgd)	Item	Capital[1]	Annual O & M	Length of Pipe (feet)[2]	Number of Pump Stations
C1	Treatment South, Conveyance to Lake Bradford Road Plant and T.P. Smith Plant	31.0	Sewer	30,027	188	254,535 FM	18
			Pump	10,424	216	125,000 GS	
			Contingency	12,135	-		
			Total	52,586	404		
C2	Treatment North and South, Conveyance to Lake Bradford Road Plant, and new NE Plant	31.0	Sewer	19,108	155	167,335 FM	17
			Pump	8,743	178	121,100 GS	
			Contingency	8,356	-		
			Total	36,207	333		
C3	Conveyance from T. P. Smith Plant to SE Disposal Site	2.5	Holding Pond	311	-	42,000 FM	(expand existing pump station)
			Sewer	866	8		
			Pump	109	14		
			Contingency	386	-		
			Total	1,672	22		
		3.8	Holding Pond	472	-		
			Sewer	1,317	12		
			Pump	165	22		
			Contingency	587	-		
			Total	2,541	34		
		7.5	Holding Pond	932	-		
			Sewer	2,600	23		
			Pump	326	43		
			Contingency	1,157	-		
			Total	5,016	66		
		9.0	Holding Pond	1,119	-		
			Sewer	3,120	27		
			Pump	391	52		
			Contingency	1,389	-		
			Total	6,019	79		
C4	Conveyance from T.P. Smith Plant to Forest Service Land Near Airport	5.0	Sewer	1,568	8	17,000 FM	1
			Pump	1,247	43		
			Contingency	845	-		
			Total	3,660	51		
C5	Conveyance from T.P. Smith Plant to T.P. Smith Disposal Site	5.0	Sewer	-	-		
			Pump	1,277	23		
			Contingency	374	-		
			Total	1,621	23		

TABLE 2-7
(continued)
ALTERNATIVE WASTEWATER CONVEYANCE COMPONENTS

ID	Description	Design Flow (mgd)	Item	Capital[1]	Annual O & M	Length of Pipe (feet)[2]	Number of Pump Stations
C6	Conveyance from NE Plant to NE Disposal Site	5.2	Sewer	--	-	0	1
			Pump	1,296	39		
			Contingency	389	-		
			Total	1,685	39		
C7	Conveyance from NE Plant to T.P. Smith Disposal Site	5.2	Sewer	7,945	39	82,800 FM	1
			Pump	1,296	65		
			Contingency	2,772	-		
			Total	12,013	104		
C8	Conveyance from NE Plant to SE Disposal Site	5.2	Sewer	6,400	32	66,700 FM	1
			Pump	1,297	64		
			Contingency	2,309	-		
			Total	10,006	96		
C9	Conveyance from NE Plant to Forest Service Land Near Airport	5.2	Sewer	9,576	48	99,800 FM	1
			Pump	1,296	66		
			Contingency	3,261	-		
			Total	14,133	114		
C10	Conveyance from T.P. Smith Plant to Golf Courses	3.0	Sewer	1,396	7	38,000 FM	1
			Pump	1,538	51		
			Contingency	880	-		
			Total	3,814	58		
C11	Conveyance from Lake Bradford Road Plant to Golf Courses	3.0	Sewer	1,321	6	36,200 FM	1
			Pump	1,538	50		
			Contingency	858	-		
			Total	3,717	56		
C12	Conveyance from NE Plant to Golf Courses and County Club	0.5	Sewer	246	1	20,000 FM	1
			Pump	256	12		
			Contingency	151	0		
			Total	653	13		
C13	Conveyance from T.P. Smith Plant to Power Plant	3.0	Sewer	2,204	11	44,800 FM	1
			Pump	1,538	41		
			Contingency	1,122	-		
			Total	4,864	52		
C14	Conveyance from NE Plant to Golf Course, County Club, and ABM State Gardens	1.0	Sewer	554	3	10,000 FM	1
			Pump	513	23		
			Contingency	320	-		
			Total	1,387	26		

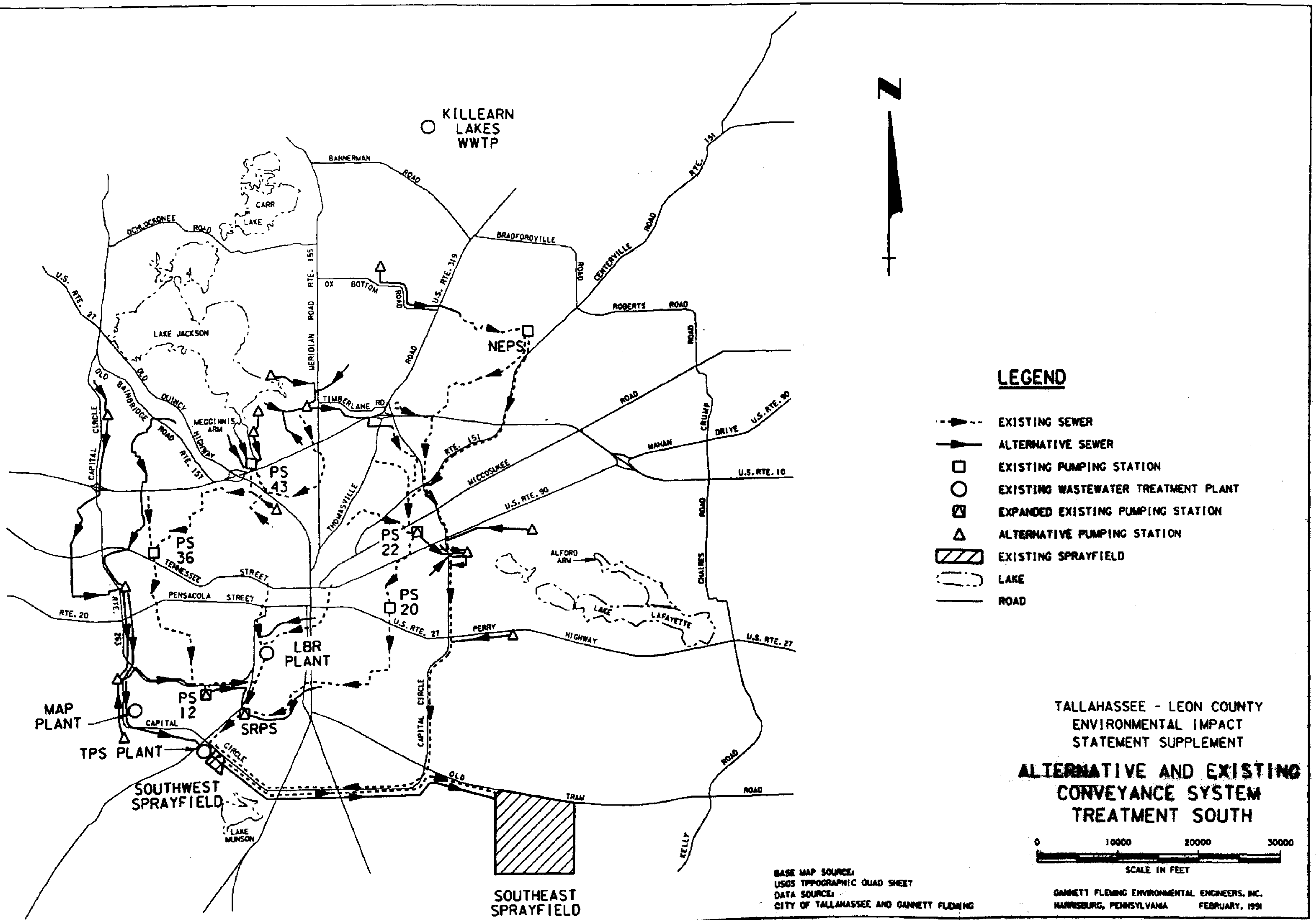
TABLE 2-7
(continued)
ALTERNATIVE WASTEWATER CONVEYANCE COMPONENTS

ID	Description	Design Flow (mgd)	Item	Capital[1]	Annual O & M	Length of Pipe (feet)[2]	Number of Pump Stations
C15	Conveyance from T.P. Smith to Power Line Right-of-Way Areas	1.0	Sewer	3,382	17	154,500 FM	1
			Pump	1,025	74		
			Contingency	1,322	-		
			Total	5,729	91		
C16	Conveyance from T.P. Smith to Existing Sludge Disposal Fields	3.9	Sewer	1,107	5	20,000 FM	1
			Pump	1,999	31		
			Contingency	932	-		
			Total	4,038	36		
C17	Conveyance from T.P. Smith to Rapid Infiltration Basins at SE Site			(Same as C3)			
C18	Conveyance from T.P. Smith to Irrigation Site(s) and Percolation Ponds	1.5	Sewer	2,043	10	79,100 FM	1
			Pump	769	109		
			Contingency	844	-		
			Total	3,656	119		
C19	Treatment Decentralized (Conveyance System for Area Systems)	0.25	Total	1,008[3]	9	11,000 Fm	1 PS/ Area System

(1) Includes contingency costs at 30% of construction costs (15% for engineering, 10% for legal and administrative costs, and 5% for interest during construction). Cost estimates are in third quarter 1989 dollars.

(2) FM = Force Main
GS = Gravity Sewer

(3) Based on 530 connectors.

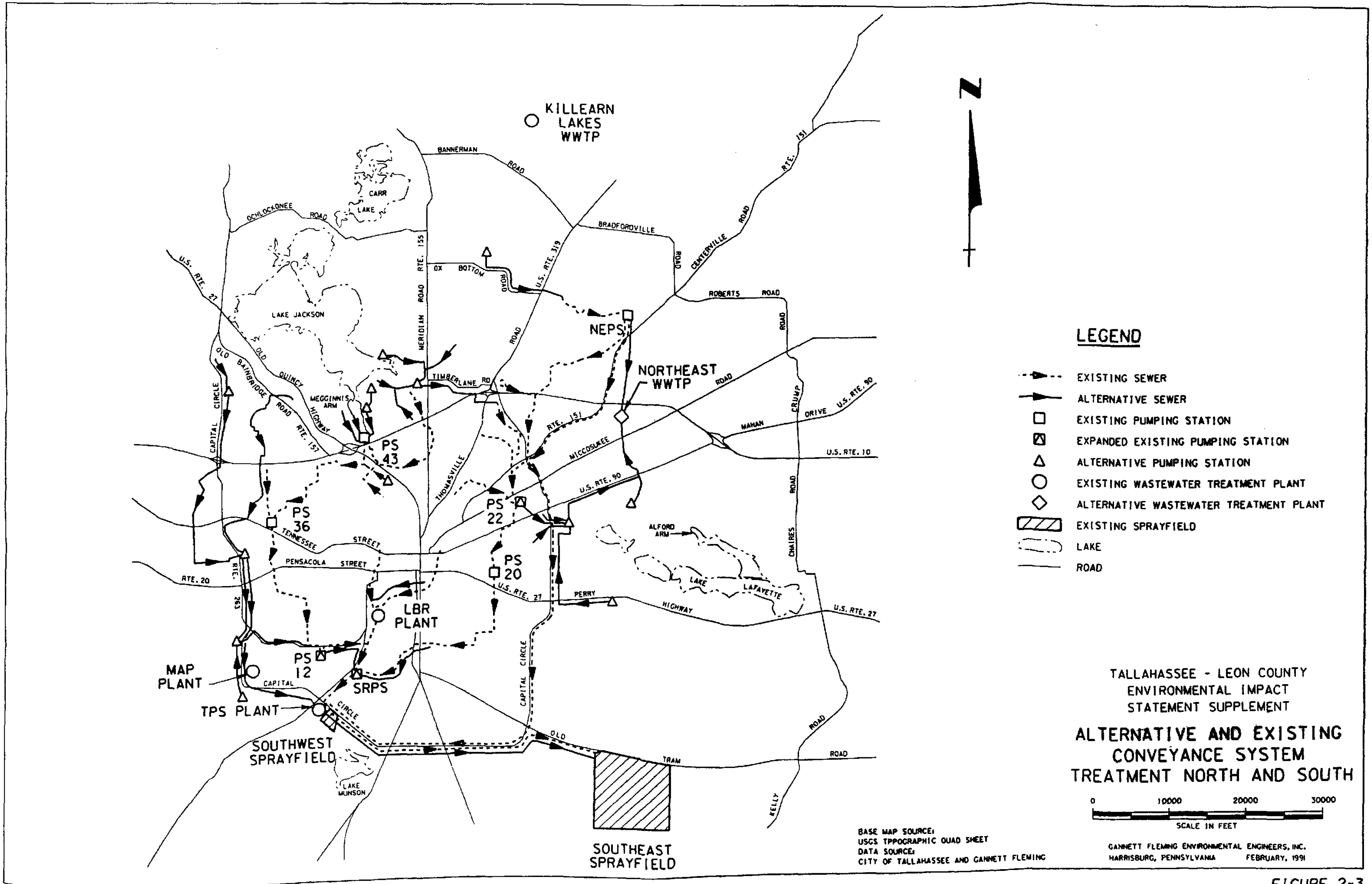


TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT

ALTERNATIVE AND EXISTING CONVEYANCE SYSTEM TREATMENT SOUTH

GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA FEBRUARY, 1991

FIGURE 2-2



TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT

ALTERNATIVE AND EXISTING CONVEYANCE SYSTEM TREATMENT NORTH AND SOUTH

GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA FEBRUARY, 1991

FIGURE 2-3

TABLE 2-8

ALTERNATIVE WASTEWATER TREATMENT COMPONENTS

ID	Description	Design Flow (mgd)	Costs (Thousand $) Item	Capital[1]	Annual O&M	Design Characteristics[2]
T1	Lake Bradford Road Plant	4.5	Treatment	587	94	o Influent/effluent pump rates
	Improvement		Conting.	176	-	= 6.75 mgd
			Total	763	94	o Add flow equalization tank
						and sludge thickener
						o Modify influent division
						structure, bar screen and
						grit chamber, and sewer
						division headquarters
T2	T. P. Smith Plant Improvement		Without P Removal:			o Increase master pump
	and Expansion from 20.0 mgd	21.3	Treatment	2,246	332	station rate to equal a
			Conting.	337	-	peak flow rate
			Total	2,583	332	o Add primary clarifiers,
						aeration tanks, secondary
		27.5	Treatment	12,959	1,916	clarifiers, a return sludge,
			Conting.	1,943	-	pump station, an aerobic
			Total	14,902	1,916	digester, a bar screen, a
						preliminary treatment
			With P Removal:			dewatering unit and dual
	Additional cost for Phosphorus Removal[3]	3.8	Treatment	707	122	conveyor belts, flow equal-
			Conting.	212	-	ization tanks, pump station
			Total	919	122	and underdrains for raw
						sewage overflow
		6.0	Treatment	1,023	193	o Modify grit chambers,
			Conting.	307	-	Parshall flume and chlorine
			Total	1,330	193	contact chamber
						o Optional phosphorus removal
		9.0	Treatment	1,301	290	unit (alum addition)
			Conting.	390	-	o Doesn't include disposal
			Total	1,691	290	costs of extra sludge
						generated by phosphorus
						removal
T3	Northeast Plant Construction		Without P Removal:			
		5.2	Land	143	-	o Secondary treatment level
			Treatment	16,309	453	with activated sludge waste-
			Conting.	4,893	-	water treatment, chlorina-
			Total	21,345	453	tion, flotation sludge
						thickening, anaerobic sludge
	Additional cost for Phosphorus Removal[3]	5.2	With P Removal:			digestion, and mechanical
			Treatment	505	97	sludge dewatering
			Conting.	151	-	o Optimal phosphorus removal
			Total	656	97	unit (biological A/O unit)

TABLE 2-8 (Cont'd.)
ALTERNATIVE WASTEWATER TREATMENT COMPONENTS

ID	Description	Design Flow (mgd)	Costs (Thousand $) Item	Capital[1]	Annual O&M	Design Characteristics[2]
T4	On-lot Systems (includes disposal)	6.25	Septic Tank and Soil Absorption	25,793	142	o 3.125 mgd handled by septic tanks with soil absorption fields (typical unit has a 1,000 gallon septic tank and 750 square foot field with a 30 minute/inch percolation rate
			Septic Tank and Sand Mound	67,505	779	
			Total	93,298	921	o 3.125 mgd handled by septic tanks with sand mounds (typical unit has a 1,000 gallon septic tank, a mound height between 3.5 and 5 feet, and a centrifugal pump with a rate of 30 gallon/minute)
T5	Area Systems	0.25	Killearn Lake Plant Expansion	1,130	145	o Contact stabilization treatment with land application disposal

(1) Conting. = Contingency costs assumed to be 30% of construction costs (15% for engineering, 10% for legal and administrative costs, and 5% for interest during construction). Component T2 excludes the engineering contingency costs because the design stage is completed. Cost estimates are in third quarter 1989 dollars.

(2) In addition the characteristics listed, all effluent to be used for spray irrigation requires filtration to 5 mg/l Total Suspended Solids (TSS) and high-level disinfection such as golf course irrigation.

(3) Additional phosphorus removal is required for effluent disposal options D5 (Power Plant Cooling) and D16/D17 (Artificial Wetlands). For artificial wetlands, phosphorus would be the limiting nutrient and would require considerably more land if not removed during the treatment process.

TABLE 2-9

ALTERNATIVE WASTEWATER DISPOSAL COMPONENTS

ID	Description	Design Flow (mgd)	Item	Costs (Thousand $) Capital[1]	Annual O&M	Design Characteristics
D1	Southeast Agricultural Spray Irrigation	2.5	Land	-	22	o Application rates of 2 in/wk o Storage facility for a maximum of 7 days of flow o Crop rotation management similar to existing system o O&M costs include land lease costs
		(469 acres)[2]	Facilities	1,468	327	
			Conting.	440	-	
			Total	1,908	349	
		3.8	Land	-	33	
		(712 acres)[2]	Facilities	2,231	497	
			Conting.	669	-	
			Total	2,900	530	
		7.5	Land	-	65	
		(1,410 acres)[2]	Facilities	4,403	980	
			Conting.	1,321	-	
			Total	5,724	1,045	
D2	Northeast Agricultural Spray Irrigation	5.2	Land	22,350	-	o Application rate of 0.75 in/wk o Storage facility for a maximum of 7 days of flow o Crop rotation management similar to existing system at SE Sprayfield o Capital costs include land purchase costs
		(2,235 acres)[2]	Facilities	7,195	669	
			Conting.	2,159	-	
			Total	31,704	669	
D3	Southeast Forest Spray Irrigation	3.8	Land		34	o Buried, solid-set sprinklers with 60'x80' sprinkler and pipe spacing (approx. 9 sprinklers/acre) and operating pressures between 55 and 70 psi o Application rates of 2 in/wk for mature growth and 1.5 in/wk for growth 2 years and under o Tree species include slash pine, loblolly pine and pond (swamp) pine o "Whole tree" harvesting every 10 years o Storage facility for a maximum of 7 days of flow o O&M costs include land lease cost
		(747 acres)[2]	Facilities	4,848	167	
			Conting.	1,454	-	
			Total	6,303	201	
		7.5	Land	-	68	
		(1,475 acres)[2]	Facilities	9,428	316	
			Conting.	2,828	-	
			Total	12,256	384	

TABLE 2-9 (Cont'd.)

ALTERNATIVE WASTEWATER DISPOSAL COMPONENTS

ID	Description	Design Flow (mgd)	Costs (thousand $) Item	Capital[1]	Annual O&M	Design Characteristics
D4	Northeast Forest Spray Irrigation	5.2 (2,725 acres)	Land Facilities Conting. Total	27,250 14,111 4,233 45,594	- 560 - 560	o Same as Alternative Component D3 except application rates are 0.75 in/wk for mature growth and 0.40 in/wk for growth 2 years and under o Capital costs include land purchase costs
D5	Power Plant Cooling at A. B. Hopkins Generating Station	3.0	Facilities Conting. Total	4,270 1,281 5,551	265 - 265	o T. P. Smith Facility to be upgraded to include filtration and high-level disinfection o Storage facility for 3 mg o The expected Blowdown of less than 1.0 mgd would require a modification of the existing NPDES permit for the Hopkins Power Station in order to continue discharging the blowdown into a tributary of Lake Talquin.
D6	Golf Course Irrigation o FL State University o Jake Gaither o Capital City Country Club o Hilaman Municipal	3.0	Facilities Conting. Total	2,307 691 2,998	78 - 78	o Use existing golf course ponds for flow storage o Use existing irrigation systems for distribution o Treatment Facility to be upgraded to include filtration and high-level disinfection
D7	Golf Course Irrigation at Killearn Golf Course and Country Club	0.5	Facilities Conting. Total	390 117 507	23 - 23	o Same as Alternative Component D6

TABLE 2-9 (Cont'd.)

ALTERNATIVE WASTEWATER DISPOSAL COMPONENTS

ID	Description	Design Flow (mgd)	Costs (thousand $) Item	Capital[1]	Annual O&M	Design Characteristics
D8	Golf Course Irrigation at Killearn Golf Course and Country Club and at Alfred B. Maclay State Gardens	1.0	Facilities Conting. Total	871 261 1,132	44 - 44	o Same as Alternative Component D6 o Storage facility for 0.5 mg needed at the State Gardens o Evaluation of State Gardens' plant species needed to determine acceptable irrigation areas
D9	Power Line Right-of-Way Areas	2.0	Facilities Conting. Total	3,460 1,038 4,498	111 - 111	o T. P. Smith Facility to be upgraded to include filtration and high-level disinfection o Application rate of 2.0 in/wk o Right-of-way areas to have an average width of 100 feet; therefore, 26.67 miles of right-of-way are required o Buried, solid set sprinklers o No storage facility
D10	Existing Sludge Disposal Fields	3.9	Facilities Conting. Total	523 157 680	72 - 72	o Application rate of 2.0 in/wk[3] o Center pivot sprinklers o No storage facility o Evaluation to determine possible adverse effects of spray irrigation on airport activities

TABLE 2-9 (Cont'd.)

ALTERNATIVE WASTEWATER DISPOSAL COMPONENTS

ID	Description	Design Flow (mgd)	Costs (thousand $) Item	Capital[1]	Annual O&M	Design Characteristics
D11	Rapid Infiltration Basins at SE Site	3.8	Land	-	9	o May require treatment for additional nitrogen removal to prevent groundwater contamination
		(190 acres)[2]	Facilities	3,725	347	
			Conting.	1,117	-	
			Total	4,842	356	
		6.0	Land	-	14	o Application rate of 10 in/wk
		(300 acres)	Facilities	5,882	547	
			Conting.	1,764	-	o No storage facility
			Total	7,646	561	o RIBs to be constructed as small, one-acre cells
		9.0	Land	-	21	
		(450 acres)	Facilities	8,822	801	o Extensive groundwater monitoring required
			Conting.	2,646	-	
			Total	11,468	822	o Evaluation of sinkhole activity to prevent "short circuiting" of the infiltration system o O&M costs include land lease costs
D12	Rapid Infiltration Basins at NE Site	5.2	Land	2,600	-	o Same as Alternative Component D11 except that land is purchased not leased
		(260 acres)	Facilities	5,097	474	
			Conting.	1,529	-	
			Total	9,226	474	o Capital costs include land purchase costs
D13	Landscape Irrigation and Disposal in Percolation Ponds (redistribution)	1.5	Facilities	1,461	65	
			Conting.	439	-	
			Total	1,900	65	
D14	Surface Waters					
	St. Mark's River (pipe length = 15 mile)	5.0	Convey.	9,870	55	o St. Mark's River has been classified by FDER as a Special Waters (0 effluent limitation)
			Conting.	2,961	-	
			Total	12,831	55	
	Ochlockonee River (pipe length = 9.8 mile)	5.0	Convey.	7,323	112	o Ochlockonee River has been classified by FDER as a Special Waters (0 effluent limitation)
			Conting.	2,197	-	
			Total	9,520	112	
	Ocean Outfall (Gulf of Mexico, pipe length = 22.4 miles)	5.0	Convey.	16,707	90	o Outfall consists of a 1 mile long, buried pipe
			Conting.	5,012	-	
			Total	21,719	90	

TABLE 2-9 (Cont'd.)

ALTERNATIVE WASTEWATER DISPOSAL COMPONENTS

ID	Description	Design Flow (mgd)	Costs (thousand $) Item	Capital(1)	Annual O&M	Design Characteristics
D15	Deep Well Injection	5.0	Test Prog.	767	-	o Install a test well to identify a geologic formation suitable for injection
			Pump	1,247	129	
			Wells	1,610	60	
			Conting.	1,087	-	
			Total	4,711	189	o Costs assume a well depth of 4,000 feet and an injection pressure of 75 psi
D16	Artificial (Constructed) Wetlands at SE Disposal Site	3.8 (234 acres)	Land	-	11	o Subsurface flow systems
			Facility	4,653	51	o Pilot program to be developed prior to full-scale construction to determine pollutant removal efficiencies
			Conting.	1,396	-	
			Total	6,049	62	
		6.0 (370 acres)	Land	-	17	
			Facility	7,285	75	o Detention time = 14 days
			Conting.	2,186	-	o Maximum loading rate = 6 acre-in/wk
			Total	9,471	92	o Maximum nutrient loading rate = 75 $g/m^2/yr$ total nitrogen
		9.0 (554 acres)	Land	-	26	
			Facility	10,774	97	
			Conting.	3,232	-	o Maximum effluent content from wetlands = 5 mg/l BOD; 5 mg/l TSS; 3 mg/l Total N; and 1 mg/l Total P
			Total	14,006	123	o Fill is a 30 inch deep gravelly sand mixture (maximum 10% diameter 8 mm) that is planted with bulrushes o Media is lined with an artificial or compacted clay liner with a permeability = $1x10^{-6}$ meters/sec o Slope of system = 1.5% o Integrated discharge system with RIBs o O&M costs include land lease costs

TABLE 2-9 (Cont'd.)

ALTERNATIVE WASTEWATER DISPOSAL COMPONENTS

ID	Description	Design Flow (mgd)	Costs (thousand $) Item	Capital(1)	Annual O&M	Design Characteristics
D17	Artificial (Constructed) Wetlands at NE Disposal Constructed Site	5.2 (320 acres)	Land	3,200	-	o Same as Alternative Component D16 except that land is purchased not leased
			Facility	6,355	69	
			Conting.	1,907	-	
			Total	11,462	69	o Capital costs include land purchase costs

(1) Conting. = Contingency costs assumed to be 30% of construction costs (15% for engineering, 10% for legal and administrative costs, and 5% for interest during construction). Cost estimates are in third quarter 1989 dollars.

(2) Land requirements vary due to application rates and buffer areas for acreages shown under "Design Flow" column. Application rates shown under "Design Characteristics" are the maximum application rate of the land considered for disposal (based on soil survey (USDA [SCS] and USFS, 1981) assessments as opposed to actual on-site percolation testing). Average application rates could be lower or higher than maximums presented.
The City of Tallahassee has calculated the acreage needs for the footnoted components shown under "Design Flow." An average "rule-of-thumb" application rate of 2 inches per week was assumed. In general, the revised acreage estimates appear to be less (by varying percentages) than those presented in this table. The examples of updated acreages provided by the City are:

Component D1
City's calculated average acreage is 322 acres vs. 469 acres for 2.5 mgd flow; 490 acres vs. 712 acres for 3.8 mgd flow; and 987 acres vs. 1,410 acres for 7.5 mgd flow.

Component D2
City's calculated average acreage is 1,786 acres vs. 2,235 acres for 5.2 mgd flow.

Component D3
City's calculated average acreage is 490 acres vs. 747 acres for 3.8 mgd flow; and 987 acres vs. 1,475 acres for 7.5 mgd flow.

Component D11
City's calculated average acreage is 98 acres vs. 190 acres for 3.8 mgd flow.

Differences in the acreage estimates are apparently due to the use of maximum rates versus average (2 inches/week) application rates. The USEPA recommends actual on-site percolation testing prior to implementation of any alternative. The local decision-makers may or may not choose to reconsider the acreage values for these examples (and possibly others where necessary during the alternatives selection process. Changes in acreages could also accordingly affect other related factors itemized in Table 2-9 such as capital needs.

(3) The USEPA understands from the City of Tallahassee that if effluent and sludge are co-disposed, groundwater Nitrate-N limits will be exceeded under an application rate of 2.0 in/wk. Therefore, the City recommends that the application rate should initially be limited to 1.0 in/wk for at least a trial period. The City is currently spreading sludge in 200 acres of pine forest and 500 acres of hay fields, i.e., (700 acres) (1.0 in/wk) (0.00388) = 2.7 mgd.

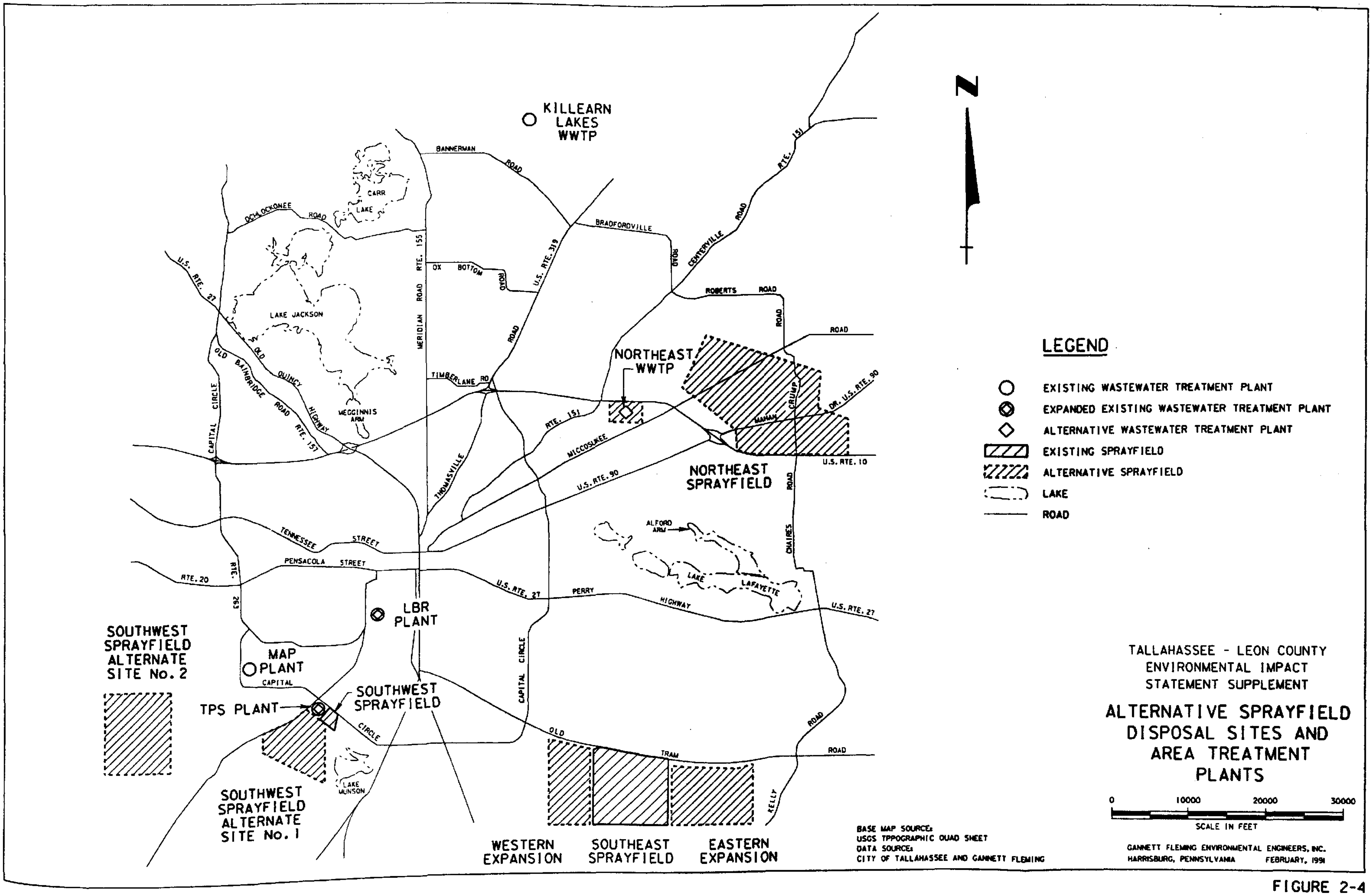

KILLEARN LAKES WWTP
BANNERMAN ROAD
CARR LAKE
OCHLOCKONEE ROAD
BRADFORDVILLE ROAD
CENTERVILLE ROAD
RTE. 151
U.S. RTE. 27
MERIDIAN ROAD RTE. 155
OX BOTTOM ROAD
U.S. RTE. 319 ROAD
ROBERTS ROAD
LAKE JACKSON
OLD BAINBRIDGE ROAD RTE. 151
OLD QUINCY HIGHWAY
CAPITAL CIRCLE
MEGGINNIS ARM
TIMBERLANE RD
NORTHEAST WWTP
RTE. 151
MICCOSUKEE ROAD
CRUMP
MAHAN DR. U.S. RTE. 90
U.S. RTE. 10
NORTHEAST SPRAYFIELD
THOMASVILLE
U.S. RTE. 90
TENNESSEE STREET
PENSACOLA STREET
RTE. 20
RTE. 263
ALFORD ARM
LAKE LAFAYETTE
CHAIRES ROAD
U.S. RTE. 27 PERRY HIGHWAY
U.S. RTE. 27
LBR PLANT
SOUTHWEST SPRAYFIELD ALTERNATE SITE No. 2
MAP PLANT
CAPITAL CIRCLE
TPS PLANT
SOUTHWEST SPRAYFIELD
CAPITAL CIRCLE
LAKE MUNSON
SOUTHWEST SPRAYFIELD ALTERNATE SITE No. 1
OLD TRAM ROAD
KELLY ROAD
WESTERN EXPANSION
SOUTHEAST SPRAYFIELD
EASTERN EXPANSION
N
LEGEND
EXISTING WASTEWATER TREATMENT PLANT
EXPANDED EXISTING WASTEWATER TREATMENT PLANT
ALTERNATIVE WASTEWATER TREATMENT PLANT
EXISTING SPRAYFIELD
ALTERNATIVE SPRAYFIELD
LAKE
ROAD
TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT
ALTERNATIVE SPRAYFIELD DISPOSAL SITES AND AREA TREATMENT PLANTS
0 10000 20000 30000
SCALE IN FEET
BASE MAP SOURCE:
USGS TPPOGRAPHIC QUAD SHEET
DATA SOURCE:
CITY OF TALLAHASSEE AND GANNETT FLEMING
GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA FEBRUARY, 1991

FIGURE 2-4

present slash pine. Figure 2-4 illustrates the locations of the alternative disposal facilities including the USDA FS facilities. Appendix C describes in detail each of the alternative components.

2.3.4 Alternative Sludge Treatment and Disposal Facilities

Table 2-10 summarizes the alternative sludge handling components. Appendix D describes each of the components in more detail.

2.3.5 Alternative Decentralized Wastewater Management Facilities

2.3.5.1 On-lot Systems

On-lot wastewater treatment systems in Tallahassee are generally limited to septic tanks, although sand filters and extended aeration systems have also been used (USEPA, 1981). On-lot systems are mostly associated with individual residents, although some institutions and commercial facilities also use the systems. Subsequently, the on-lot component assumes the use of septic tanks for residential lots.

Septic tanks alone do not meet secondary treatment levels; they rely on the biological activity in the soil absorption drainfield to complete the secondary level treatment. Additional treatment takes place as the effluent percolates through the soil. Septic tank with effluent field systems can operate effectively with limited maintenance as long as soil conditions, land slopes and land use are suitable.

Slopes are normally not a critical limitation to the siting of drainfields due to the low topographic relief in the study area, but slopes are locally limiting in situations of steep slopes on the edge of incised streams. Site-specific soil conditions and adjacent land use can severely influence drainfield placement in the County.

Based on the "General Soil Map" for Leon County in the 1981 Soil Survey (USDA [SCS] AND USFS, 1981), Leon County is dominated by three soil associations: the Orangeburg-Lucy-Norfolk association in the northern part of Leon County and the Kershaw-Ortega-Alpin and the Dorovan-Talquin-Chipley associations in the southern part of Leon County. The Orangeburg-Lucy-Norfolk soils and the Kershaw-Ortega-Alpin soils are generally well-drained while the Dorovan-Talquin-Chipley soils are generally not well-drained. Specifically, the 1981 Soil Survey classifies the Orangeburg-Lucy-Norfolk soils as "well drained soils" and the Kershaw- Ortega-Alpin soils as "excessively drained and moderately well drained soils," while the Dorovan-Talquin-Chipley soils are considered "somewhat poorly drained to very poorly drained soils." Of the two well-drained soil associations, the depths of these sandy associations differ significantly: the Orangeburg-Lucy-Norfolk soils are sandy to only 20-inch depths with loam below, compared to sandy 20-40 inches deep with loam below or are loamy throughout (Note: "loam" is a soil type that is defined in the 1981 Soil Survey as a mix of clay (7-27%), silt (28-50%), and sand (<52%) particles.) By contrast, the Kershaw-Ortega-Alpin soils are sandy to 80 inches or more, with some having loamy layers (lamellae) below 45-inch depths.

Regarding the suitabilities of these soil associations for septic tank absorption fields, Table 11 of the 1981 Soil Survey presents the "restrictive soil features" of existing soil types. All listed Orangeburg, Lucy and Norfolk soil types are classified as "moderate: percs slowly" and/or "moderate: wetness," with "moderate" being defined as having unfavorable soil properties for the given activity. The Kershaw soils are classified as "slight" which is defined as soil properties generally favorable for the activity. Oretega and Alpin soils are classified as "severe: poor filter," with "severe" being defined as soil properties very unfavorable for the

TABLE 2-10

ALTERNATIVE SLUDGE TREATMENT/DISPOSAL COMPONENTS

ID	Description	Design Capacity (Dry Tons/mgd)	Cost (Thousand $) Capital(1)	Annual O&M(2)
SD1	Land Spreading	0.36		
	Treatment South			
	Sludge Hauling		269	252
	Sludge Disposal		1,196	164
	Total		1,465	416
	Treatment North and South			
	Sludge Hauling		134	199
	Sludge Disposal		2,548	209
	Total		2,682	408
SD2	Pelletization	0.36	10,251	2,435

(1) Cost estimates are in third quarter 1989 dollars.

(2) Cost differences are due to different hauling distances and land costs at the two facilities.

activity. The Dorovan, Talquin and Chipley soils are classified as "severe: wetness" or "severe: floods, wetness." These classifications indicate that only the Kershaw soils have properties favorable for septic tank absorption field infiltration while the others do not adequately drain or drain too well and therefore do not provide proper filtration (i.e., adsorption of inorganics (metals), microbes, etc.). Leon County therefore appears to be a mix of soil types with "slight," "moderate" or "severe" classifications regarding the suitability for septic tank activity. The preliminary 1988 Leon County MW&SSP also addresses the issue of soil suitability for septic tanks within Leon County.

From discussion with the USDA SCS and the LCPH, it is evident that use of the soils in the northeast area for septic tank effluent drainfields is somewhat limited. USDA SCS and LCPH employees involved with permitting on-lot systems indicated that, as house densities increase on areas of marginal soils, the incidence of drainfield failures increase. In particular, USDA SCS and LCPH employees feel the problems experienced in the Killearn Lakes Subdivision are intensified due to the small (1/4 acre) lot size and the semi-controlled sheet flow for stormwater management.

The predominant soil type, which experiences septic tank operation problems, is the Dothan soil series. The USDA SCS description of this soil indicates a perched water table at 3-1/2 to 4 feet during portions of the year. The experience in Killearn Lakes is that the water table is at 2 inches above ground to 12 inches below ground for extended periods of time. The USDA SCS and LCPH personnel believe that the septic tank failures are due to the elevated groundwater table brought on by water added to the soil profile through the on-lot systems effluent drainfields and by small lots with closely spaced drainfields. The problem is exacerbated by the directed sheet flow over numerous lots in the area.

Drainfield failures on lots on Dothan soils occur in other areas within the County; however, the failure rate in other portions of the County is low in comparison to the Killearn Lakes failure rates. This is primarily due to localized natural variations in the soil and larger lot sizes in other subdivisions.

To overcome less than ideal conditions, various processes have been developed that enhance the treatment and disposal capabilities of on-lot systems. Sand mound disposal systems are utilized in some soils that are not suitable for conventional soil drainfields. Rather than a five- to six-foot depth to water table required for soil percolation, only a three-foot depth to water table is normally required with sand mounds. The mound itself provides an unsaturated soil depth for additional treatment with increased wastewater retention capacity which results in higher treatment efficiency.

Mound systems are being used in isolated instances within the Killearn Lakes Subdivision with varying degrees of success. Some of the problems associated with these individual systems are that the grade of the house and septic tank results in little area on the lots being available for the mound without the need for pumping, and when the groundwater level is very shallow the water moving through the mound moves laterally out of the mound resulting in surface ponding or flow over the developed lot.

Evapotranspiration beds allow wastewater to be utilized by plants and evaporated into the atmosphere. These beds can be used only where evaporation and transpiration exceeds precipitation. Within Leon County, climate conditions prevent the use of evapotranspiration beds during the wettest months of the year because rainfall exceeds evaporation by more than 2 inches per month.

Component T4 uses a combination of conventional soil absorption fields and innovative sand mounds for costing purposes. Costs for this component are presented in Table 2-8.

2.3.5.2 Area Systems

The area system treatment component will have to meet the same secondary treatment levels and required advanced wastewater treatment as the larger conventional facilities. The area system disposal components include evaporation-percolation ponds and irrigation systems as well as soil absorption drainfields and sand mound systems. Both ponds and irrigation systems become more competitive as larger flows are handled. Land requirements for each type of system are variable depending on soil percolation rates, evapotranspiration, and treatment system buffer requirements established by state and local agencies.

These systems will most likely be located in the outer fringe of the City's existing service areas and elsewhere in the unsewered areas of the County. It is also possible that existing developments with failing on-lot systems could be retrofitted with area systems as opposed to connection with the existing conventional system. The actual size and location of these systems would vary on a case-by-case basis. For this report the component, T5, only includes the costs for the proposed TECO facility at Killearn Lakes. Costs for this component are presented in Table 2-8.

2.3.6 Management Options

Management as used here refers to owning, planning, constructing, operating, and/or maintaining of wastewater service facilities. Development of management options requires a review of the management of existing wastewater services as was done in Section 2.1.

The entities identified as currently managing major wastewater facilities include the City and TECO. Other small private providers exist but are not considered capable of managing the level of services needed in the future and therefore are not identified here. It is realized, however, that a limited amount of services will be provided by such companies. The County's current management role involves only the authorization for planning, constructing, and operating wastewater services and includes no direct management of facilities.

In the County MW&SSP, alternatives were presented for the provision of wastewater services in unincorporated areas of the County. The "provision" of wastewater services as used in the County MW&SSP is similar to the definition of management presented in this section. These "provision" alternatives are summarized in Section 1.3.4 of this FEISS. The basic premises considered in developing these alternatives were: (1) the County remaining in a non-provider role and (2) the County changing to a provider role.

The development and selection of management options depends on the physical wastewater facilities to be used for future needs, the existing management scenarios, and the potential management entities' capabilities.

A large centralized facility can probably be best operated and maintained by a single large organization. This is due to the technical sophistication normally required for large centralized wastewater collection, treatment, and disposal units. A single, large organization has the resources and continuity to best meet the needs of such a system. Potential management entities in the study area include the City or the County (or if feasible, a joint venture between the two). The City has an existing Water and Sewer Department that is experienced in managing large systems. TECO's ability to manage a large centralized facility is unknown in that it is presently only experienced with managing facilities that process flows of 0.3 mgd or less.

Small area facilities, such as those currently operated by TECO, and a combination of small private entities can be managed individually as is currently done or they can be managed by one large organization such as that described for a large centralized facility. Having one organization manage many small wastewater facilities has the advantage of conformity to one uniform set of standards for operation and maintenance and of access to a large pool of specialized labor force and inventories that small, individual managers may not have. The disadvantages of centralized management for a decentralized system is the logistic problems that occur when managing remote facilities distributed over a large geographic area and the potential slowing of response time to problems occurring at these remote sites due to the requirements of bureaucratic procedures normally found in large organizations.

A variation of individual management and centralized management of decentralized facilities is a joint-venture. The joint-venture can take one of several forms. One scenario could have a large entity, such as the City or the County, plan, construct and/or own the facilities and another entity or group of entities operate and maintain the facilities.

In regards to on-lot wastewater systems, management normally consists of the County Department of Health approving the site, the private owner building and maintaining the facility, and the Department of Health inspecting problems as they occur. No management option is proposed to replace this procedure but it is recommended that the County continue to document all inspections and problems to provide information for future wastewater management planning tasks and to control adverse environmental impacts.

2.3.7 Industrial Pre-Treatment

The USEPA/Region IV has primacy over industrial waste pre-treatment in Florida since the USEPA/Region IV has primacy over the National Pollutant Discharge Elimination System (NPDES) permitting program in Florida.

Currently, the City of Tallahassee has no surface water discharges of wastewater effluent and is not required to implement a pre-treatment program since they do not have any NPDES permits. The City has conducted a Sewer System Inventory Program which has provided them with flow data on their industrial customers. The City does not have any categorical industries connected to the sewer system and has only minimal industrial development within their service area. Presently, the only major industrial sewer customers include a crab processing plant, a gear manufacturer, and two (2) university laboratories.

The City is revising their Sewer Use Ordinance to include specific requirements for industrial wastewater pretreatment. The adoption of this ordinance is expected to result in the implementation of a pretreatment program by requiring industries to:

1. Obtain industrial waste discharge permits;
2. Meet specified discharge limits;
3. Install monitoring manholes; and
4. Conduct quarterly self-monitoring and document the results in a report to the City.

2.4 ALTERNATIVE WASTEWATER MANAGEMENT SYSTEMS SCREENING

Alternative wastewater screening was performed for the nine (9) system alternatives considered (Alternatives 1-9). This evaluation was developed during 1989. Four of these nine alternatives (1, 2, 7 and 9) were selected for further evaluation in the EIS Supplement, specifically during the DEISS preparation stage (1989). The matrix rating evaluation of the four selected system alternatives is addressed in Chapter 3.

2.4.1 Alternative Wastewater Management System Composition

Combinations of the previously-described alternative components were analyzed to compose total wastewater management system alternatives. Three alternative system scenarios were devised based on the collection and treatment components. These basic scenarios are as follows:

1. Centralization with conventional conveyance and treatment of wastewater in the south at the existing Lake Bradford Road Plant and T. P. Smith Facility.
   Improve Lake Bradford Road Plant (4.5 mgd).
   Improve and expand T. P. Smith Facility (27.5 mgd).
   Total design flow = 31.0 mgd.
   Components include C1, T1, and T2.

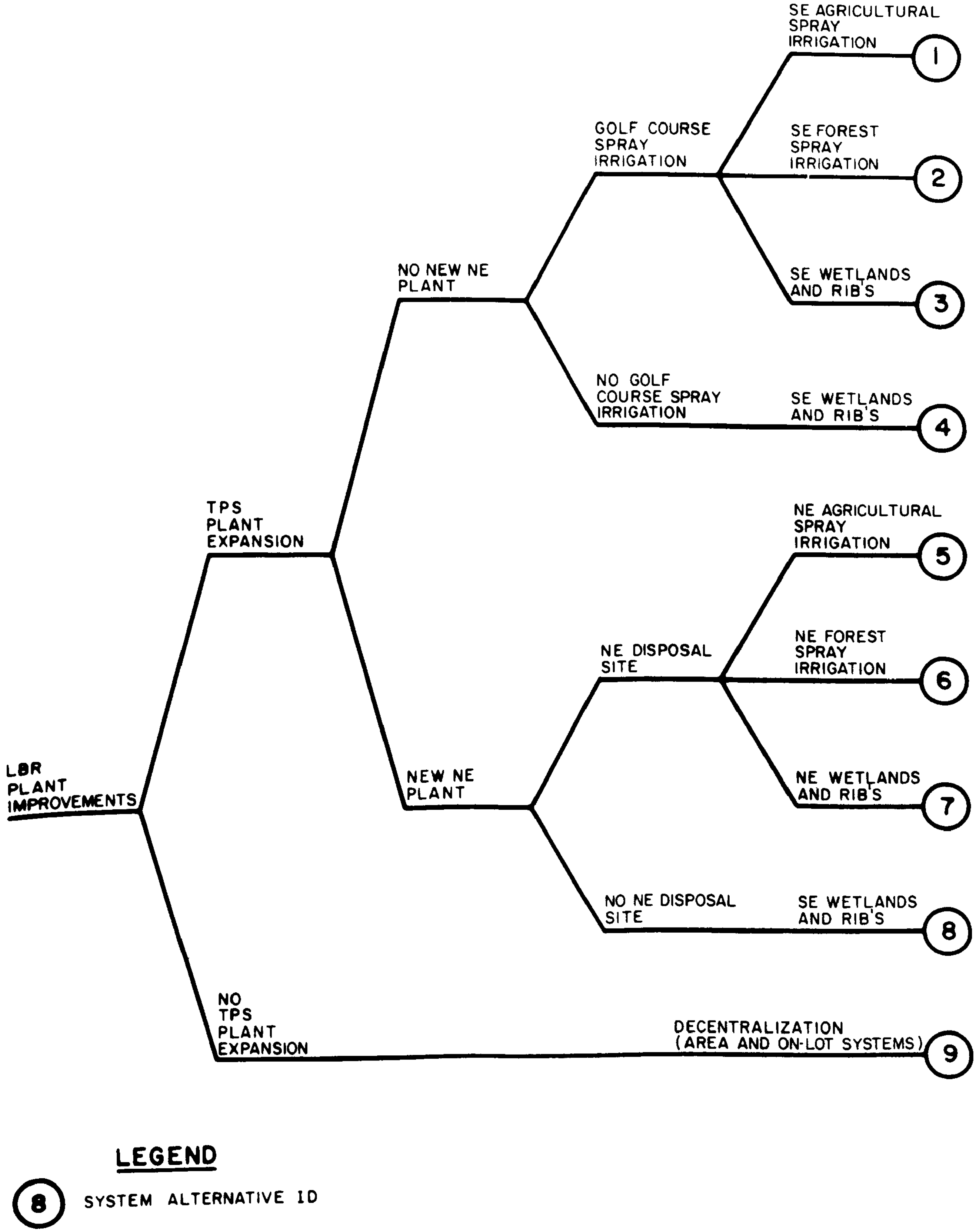
2. Centralization with conventional conveyance and treatment of wastewater in the south at the existing Lake Bradford Road Plant and T. P. Smith Facility and in the north at a new NE plant.
   Improve Lake Bradford Road Plant (4.5 mgd).
   Improve and expand T. P. Smith Facility (21.3 mgd).
   Add new NE Plant (5.2).
   Total design flow = 31.0 mgd.
   Components include C2, T1, T2, and T3.

3. Decentralization
   Continue to use on-lot systems and area systems to meet future wastewater management needs.
   Improve Lake Bradford Road Plant (4.5 mgd).
   Components include C19, T1, T4, and T5.

NOTE: Although the total City treatment capacity was rerated to 32.0 mgd (or 32.06 mgd if the MAP facility is included), the flow projections in this EIS Supplement indicated that only 31.0 mgd would be required for the planning period, so that 31.0 mgd was used in the EIS Supplement (e.g., items 1 and 2 above and in Tables 2-11 through 2-19 below in developing costs.

A "total system" alternative incorporates one of these basic scenarios with selected components for the conveyance and disposal of treated wastewater. Figure 2-5 is a decision tree that illustrates the major decision points that lead to the development of system alternatives. The selection of the components that are addressed in this decision tree was based on capital costs in that those combination of components with the lowest capital costs per unit of design flow were included. It should be noted that the artificial wetland disposal component was merged with the Rapid Infiltration Basin (RIB) disposal component for system alternatives 3, 4, 7 and 8. No streams are nearby that are permitted to receive the discharge from the wetlands; therefore, RIBs are proposed to receive the high quality wetland effluent. Since RIBs in the study area can safely handle only effluent that has received high levels of treatment, merging the two as one disposal facility overcomes these shortcomings and takes advantage of the components.

Tables 2-11 through 2-19 are summaries of the composite "total system" alternatives which were chosen based on the reasonableness of their cost estimates and implementability characteristics. Alternative system A9 is essentially the "No-Federal-Action" alternative that was the selected preferred alternative of the 1983 EIS. Subsequently, it is included so that it will receive detailed evaluation along with the selected centralized system alternatives. Figures 2-6 and 2-7 exhibit the major components of the eight (8) centralized system alternatives.



DECISION TREE FOR SELECTED SYSTEM ALTERNATIVE DEVELOPMENT

FIGURE 2-5

All system alternatives are sized to handle the total projected 2010 design flow of 31.0 mgd. The only exceptions are the TPS Plant and SE Sprayfield expansions of 7.5 mgd. These are the City's current level of planned expansions which would bring the total design flow capacities at the T. P. Smith Facility and the SE Sprayfield to 27.5 mgd. These capacities, together with the improved LBR Plant capacity of 4.5 mgd, provides a total treatment capacity of 32 mgd.

It should be noted that treatment components T4 and T5, on-lot systems and area systems, only include those flows (6.50 mgd) that would be connected to a centralized facility if a centralized system was selected. The remaining on-lot systems of the study area that handle a flow of 4.06 mgd (Refer to Table 2-4) are not included because all system alternatives would have this component.

The flows, acreages, and estimated costs presented in the tables are only for the proposed new facilities and expansion components. Existing facilities' flows, acreages, and annual O&M costs are not included with the exception of the wastewater conveyance and the LBR Plant components. The conveyance component design flow, 31.0 mgd, is the study area's total projected flow for the year 2010. The LBR Plant's 4.5 mgd flow value is an existing design flow that will be achieved when the existing facilities are improved. The costs include the proposed plant improvements.

2.4.2 Preliminary Cost Evaluation

Tables 2-11 through 2-19 also provide cost estimates for capital project and annual operation and maintenance costs for each of the system alternatives. These estimates are summarized in Table 2-20, and they include a present worth value for each alternative. Present worth analysis is a method of alternative comparison that incorporates both initial capital outlay and future annual costs. These costs are the basis for the evaluation of the four (4) system alternatives selected for further evaluation (1, 2, 7 and 9), as presented in Chapter 3. Costs for the LBR Plant improvements, the TPS Plant expansion, and the SE Agricultural Sprayfield expansion (including force main conveyance) were based on costs taken from the City's 5-year capital budget. Costs for the Killearn Lakes Plant expansion were based on estimates obtained from TECO staff. All other costs were calculated using cost curves provided in various USEPA manuals and historical cost data provided by the USEPA's NEPA contractor. The capital costs include contingencies which are percentages of the construction costs (15% for engineering design, 10% for legal and administrative costs, and 5% for interest during construction). The only exceptions are the capital costs for the TPS Plant expansion (excluded engineering design costs because design already has been completed) and on-lot systems (no contingencies included).

It should be realized that alternatives incorporating agricultural (animal feed) or silvicultural operations, as is the case for Alternatives 1, 2, 5 and 6, will receive revenues from the sale of their harvested crops. The amount of revenues will vary greatly depending on the type of crop, the crop's current market value, and the type of growing season experienced for a given year. Subsequently, these revenues are not accounted for in the cost estimation process.

2.4.3 Environmental Evaluation

This section summarizes the significant environmental impacts associated with each of the nine (9) system alternatives. These impacts were evaluated along with costs and technical feasibility to select the system alternatives for detailed evaluation (Refer to Section 2.4.6). The environmental impacts

TABLE 2-11

SYSTEM ALTERNATIVE 1 (1)

Component Description	Flow (mgd)	Land (Acres)	Estimated Costs (Thousand $) Capital	Annual O&M
Treatment Plant Conveyance to Lake Bradford Road Plant and T. P. Smith Plant	31.0	---	52,586	404
Lake Bradford Road Plant Improvements	4.5	---	763	94
T. P. Smith Plant Improvement and Expansion from 20.0 mgd	7.5	---	14,902	1,916
Collection/Treatment Subtotal			68,251	2,414
Conveyance from T. P. Smith Plant to SE Disposal Site	7.5	---	5,016	66
Southeast Agricultural(2) Spray Irrigation (expansion of existing 22.0 mgd SE Sprayfield)(3)	7.5	1,410	5,724	1,045
Conveyance from Lake Bradford Road Plant to Golf Courses	3.0	---	3,717	56
Golf Course Irrigation o Florida State University o Jake Gaither o Capital City Country Club o Hilaman Municipal	3.0	---	2,998	78
Disposal Subtotal		1410	17,455	1,245
System Total		1410	85,706	3,659

(1) Cost estimates in third quarter 1989 dollars.

(2) Some forest irrigation is to be tried by the City as a small demonstration project.

(3) Update: The USEPA understands from the City of Tallahassee that the 22.0 mgd design capacity at the City's SE Sprayfield has been rerated (9/8/89) to 23.25 mgd -- The City of Tallahassee has indicated that the City's T.P. Smith (TPS) Treatment Plant has been rerated (9/8/89) to 20.0 mgd. Together with the 4.5 mgd capacity of the City's Lake Bradford Road (LBR) Treatment Plant, the total treatment design capacity is 24.5 mgd. The disposal sprayfield facilities were then rerated in order to equal the design capacity of the treatment facilities. Sprayfield application rates were therefore increased in the City's FDER permit from 3.0 inches per week (in/wk) to 3.16 in/wk to provide design capacities of 23.25 mgd (rerated on 9/8/89 from 22.0 mgd) at the City's SE Sprayfield and 1.25 mgd (rerated on 9/8/89 from 1.2 mgd) at the City's SW Sprayfield for a total design irrigation capacity of 24.5 mgd. Also, in addition to the rerating of the TPS Plant to 20.0 mgd, the City has more recently completed a 7.5 mgd expansion of the plant in January 1993, so that the total design treatment capacity for the TPS Plant is 27.5 mgd as of the issuance of this FEISS. The total design treatment capacity of the expanded TPS Plant (27.5 mgd) and the LBR Plant (4.5 mgd) is therefore 32.0 mgd, while the total City sprayfield design irrigation capacity is 24.5 mgd. It should also be noted that although the City's total treatment capacity was rerated to 32.0 mgd (or 32.06 mgd if the HAP facility is included), the flow projections in this EIS Supplement indicated that only 31.0 mgd would be required for the planning period, so that 31.0 mgd was used in the EIS Supplement (see "Flow" column in Tables 2-11 through 2-18 for the T.P. Smith Plant and LBR Plant.)

TABLE 2-12

SYSTEM ALTERNATIVE 2 (1)

Component Description	Flow (mgd)	Land (Acres)	Estimated Costs (Thousand $) Capital	Annual O&M
Treatment Plant Conveyance to Lake Bradford Road Plant and T. P. Smith Plant	31.0	---	52,586	404
Lake Bradford Road Plant Improvements	4.5	---	763	94
T. P. Smith Plant Improvement and Expansion from 20.0 mgd	7.5	---	14,902	1,916
Collection/Treatment Subtotal			68,251	2,414
Conveyance from T. P. Smith Plant to SE Disposal Site	7.5	---	5,016	66
Southeast Forest Spray Irrigation (expansion to existing 22.0 mgd SE Sprayfield)(2)	7.5	1,475	12,256	384
Conveyance from Lake Bradford Road Plant to Golf Courses	3.0	---	3,717	56
Golf Course Irrigation o Florida State University o Jake Gaither o Capital City Country Club o Hilaman Municipal	3.0	---	2,998	78
Disposal Subtotal		1,475	23,987	584
System Total		1,475	92,238	2,998

(1) Cost estimates in third quarter 1989 dollars.

(2) Update: The USEPA understands from the City of Tallahassee that the 22.0 mgd design irrigation capacity of the City's SE Sprayfield has been rerated to 23.25 mgd on 9/8/89 (Also see footnote 3 of Table 2-11).

TABLE 2-13

SYSTEM ALTERNATIVE 3 [1]

Component Description	Flow (mgd)	Land (Acres)	Estimated Costs (Thousand $) Capital	Annual O&M
Treatment Plant Conveyance to Lake Bradford Road Plant and T. P. Smith Plant	31.0	---	52,586	404
Lake Bradford Road Plant Improvements	4.5	---	763	94
T. P. Smith Plant Improvement and Expansion from 20.0 mgd	7.5	---	16,232	2,109
Collection/Treatment Subtotal			69,581	2,607
Conveyance from T. P. Smith Plant to SE Disposal Site	7.5	---	5,016	66
Artificial Wetlands at SE Disposal Site	6.0	370	9,471	92
Rapid Infiltration Basins at SE Disposal Site	6.0	300	7,646	561
Conveyance from Lake Bradford Road Plant to Golf Courses	3.0	---	3,717	56
Golf Course Irrigation o Florida State University o Jake Gaither o Capital City Country Club o Hilaman Municipal	3.0	---	2,998	78
Disposal Subtotal		670	28,848	853
System Total		670	98,429	3,460

(1) Cost estimates in third quarter 1989 dollars.

TABLE 2-14

SYSTEM ALTERNATIVE 4 [1]

Component Description	Flow (mgd)	Land (Acres)	Estimated Costs (Thousand $) Capital	Annual O&M
Treatment Plant Conveyance to Lake Bradford Road Plant and T. P. Smith Plant	31.0	---	52,586	404
Lake Bradford Road Plant Improvements	4.5	---	763	94
T. P. Smith Plant Improvement and Expansion from 20.0 mgd	7.5	---	16,594	2,206
Collection/Treatment Subtotal			69,943	2,704
Conveyance from T. P. Smith Plant to SE Disposal Site	9.0	---	6,019	79
Artificial Wetlands at SE Disposal Site	9.0	554	14,006	123
Rapid Infiltration Basins at SE Disposal Site	9.0	450	11,468	822
Disposal Subtotal		1,004	31,493	1,024
System Total		1,004	101,436	3,728

(1) Cost estimates in third quarter 1989 dollars.

TABLE 2-15

SYSTEM ALTERNATIVE 5 (1)

Component Description	Flow (mgd)	Land (Acres)	Estimated Costs (Thousand $) Capital	Annual O&M
Treatment North and South Conveyance to Lake Bradford Road Plant, T. P. Smith Plant, and new NE Plant	31.0	---	36,207	333
Lake Bradford Road Plant Improvements	4.5	---	763	94
T. P. Smith Plant Improvement and Expansion from 20.0 mgd	1.3	---	2,583	332
Northeast Plant Construction	5.2	---	21,345	453
Collection/Treatment Subtotal			60,898	1,212
Conveyance from NE Plant to NE Disposal Site	5.2	---	1,685	39
Northeast Agricultural Spray Irrigation	5.2	2,235	31,704	669
Conveyance from T. P. Smith Plant to SE Disposal Site	3.8	---	2,541	33
Southeast Agricultural Spray Irrigation (expansion to existing 22.0 mgd SE Sprayfield)(2)	3.8	712	2,900	530
Disposal Subtotal		2,947	38,830	1,271
System Total		2,947	99,728	2,483

(1) Cost estimates in third quarter 1989 dollars.

(2) Update: The USEPA understands from the City of Tallahassee that the 22.0 mgd design irrigation capacity of the City's SE Sprayfield has been rerated to 23.25 mgd on 9/8/89 (Also see footnote 3 of Table 2-11).

TABLE 2-16

SYSTEM ALTERNATIVE 6 (1)

Component Description	Flow (mgd)	Land (Acres)	Estimated Costs (Thousand $) Capital	Annual O&M
Treatment North and South Conveyance to Lake Bradford Road Plant, T. P. Smith Plant, and new NE Plant	31.0	---	36,207	333
Lake Bradford Road Plant Improvements	4.5	---	763	94
T. P. Smith Plant Improvement and Expansion from 20.0 mgd	1.3	---	2,583	332
Northeast Plant Construction	5.2	---	21,345	453
Collection/Treatment Subtotal			60,898	1,212
Conveyance from NE Plant to NE Disposal Site	5.2	---	1,685	39
Northeast Forest Spray Irrigation	5.2	2,725	45,594	560
Conveyance from T. P. Smith Plant to SE Disposal Site	3.8	---	2,541	33
Southeast Forest Spray Irrigation (expansion of existing Sprayfield)	3.8	747	6,303	201
Disposal Subtotal		3,472	56,123	833
System Total		3,472	117,021	2,045

(1) Cost estimates in third quarter 1989 dollars.

TABLE 2-17

SYSTEM ALTERNATIVE 7 [1]

Component Description	Flow (mgd)	Land (Acres)	Estimated Costs (Thousand $) Capital	Annual O&M
Treatment North and South, Conveyance to Lake Bradford Road Plant, T. P. Smith Plant, and new NE Plant	31.0	---	36,207	333
Lake Bradford Road Plant Improvements	4.5	---	763	94
T. P. Smith Plant Improvement and Expansion from 20.0 mgd	1.3	---	3,502	454
Northeast Plant Construction	5.2	---	22,001	550
Collection/Treatment Subtotal			62,473	1,431
Conveyance from NE Plant to NE Disposal Site	5.2	---	1,685	39
Artificial Wetlands at NE Disposal Site	5.2	320	11,462	69
Rapid Infiltration Basins at NE Disposal Site	5.2	260	9,226	474
Conveyance from T. P. Smith Plant to SE Disposal Site	3.8	---	2,541	33
Artificial Wetlands at SE Disposal Site	3.8	234	6,049	67
Rapid Infiltration Basins at SE Disposal Site	3.8	190	4,842	356
Disposal Subtotal		1,004	35,805	1,038
System Total		1,004	98,278	2,469

(1) Cost estimates in third quarter 1989 dollars.

TABLE 2-18

SYSTEM ALTERNATIVE 8 [1]

Component Description	Flow (mgd)	Land (Acres)	Estimated Costs (Thousand $) Capital	Annual O&M
Treatment North and South, Conveyance to Lake Bradford Road Plant, T. P. Smith Plant, and new NE Plant	31.0	---	36,207	333
Lake Bradford Road Plant Improvements	4.5	---	763	94
T. P. Smith Plant Improvement and Expansion from 20.0 mgd	1.3	---	3,502	454
Northeast Plant Construction	5.2	---	22,001	550
Collection/Treatment Subtotal			62,473	1,431
Conveyance from NE Plant to SE Disposal Site	5.2	---	10,006	96
Conveyance from T. P. Smith Plant to SE Disposal Site	3.8	---	2,541	33
Artificial Wetlands at SE Disposal Site	9.0	554	14,006	123
Rapid Infiltration Basins at SE Disposal Site	9.0	450	11,468	822
Disposal Subtotal		1,004	38,021	1,074
System Total		1,004	100,494	2,505

(1) Cost estimates in third quarter 1989 dollars.

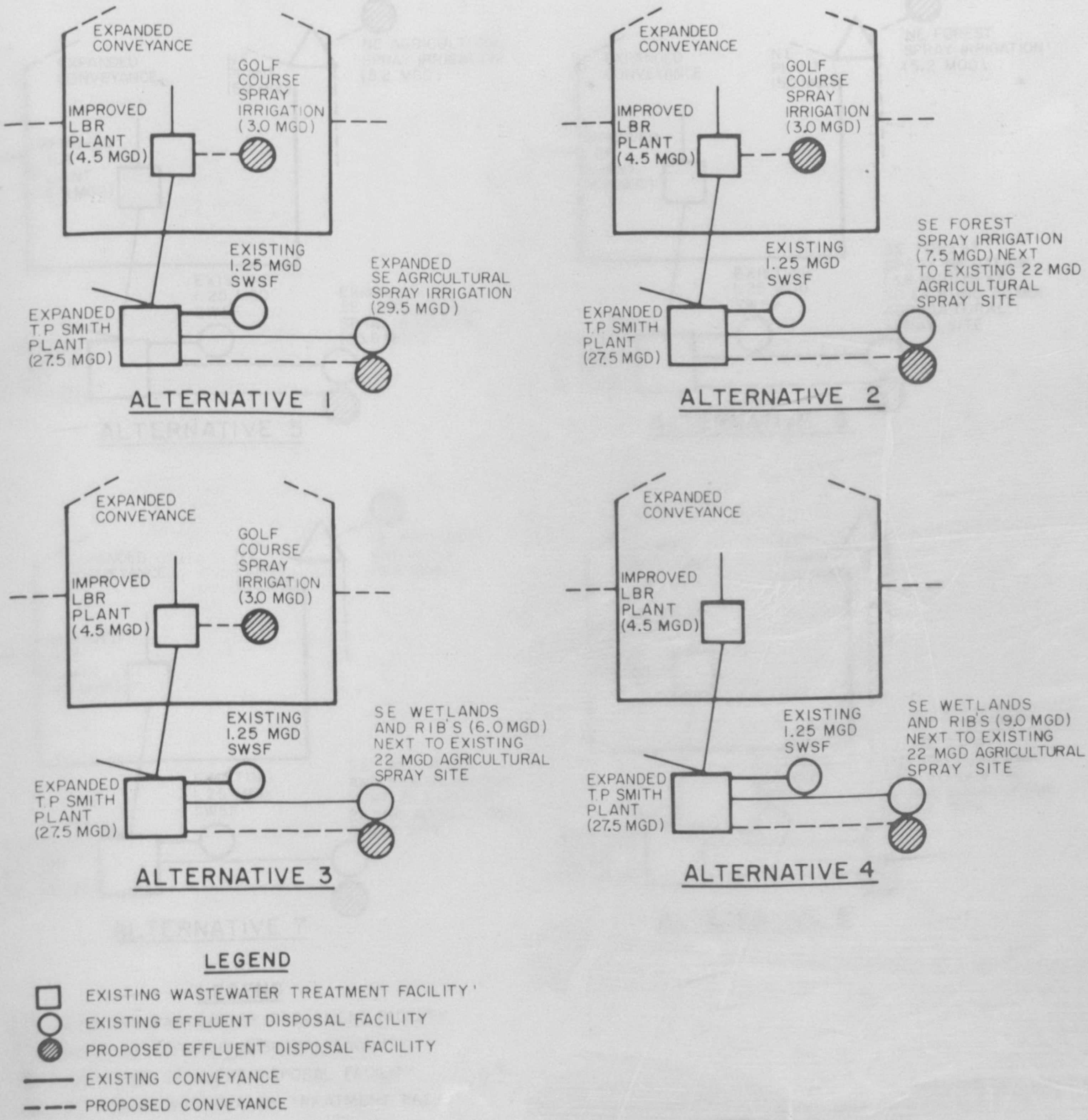
TABLE 2-19

SYSTEM ALTERNATIVE 9 [1]

Component Description	Flow (mgd)	Land (Acres)	Estimated Costs (Thousand $) Capital	Annual O&M
Lake Bradford Road Plant Improvements	4.5	---	763	94
Treatment Decentralized (Conveyance for Area System Treatment)	0.25	---	1,008	9
Area System Treatment	0.25	---	1,130	145
On-lot Systems	6.25	---	93,298	921
Conveyance from T. P. Smith Plant to SE Disposal Site [2]	2.5	---	1,672	22
Southeast Agricultural Spray Irrigation (expansion to existing 22.0 mgd SE Sprayfield) [2]	2.5	469	1,908	349
System Total			99,779	1,540

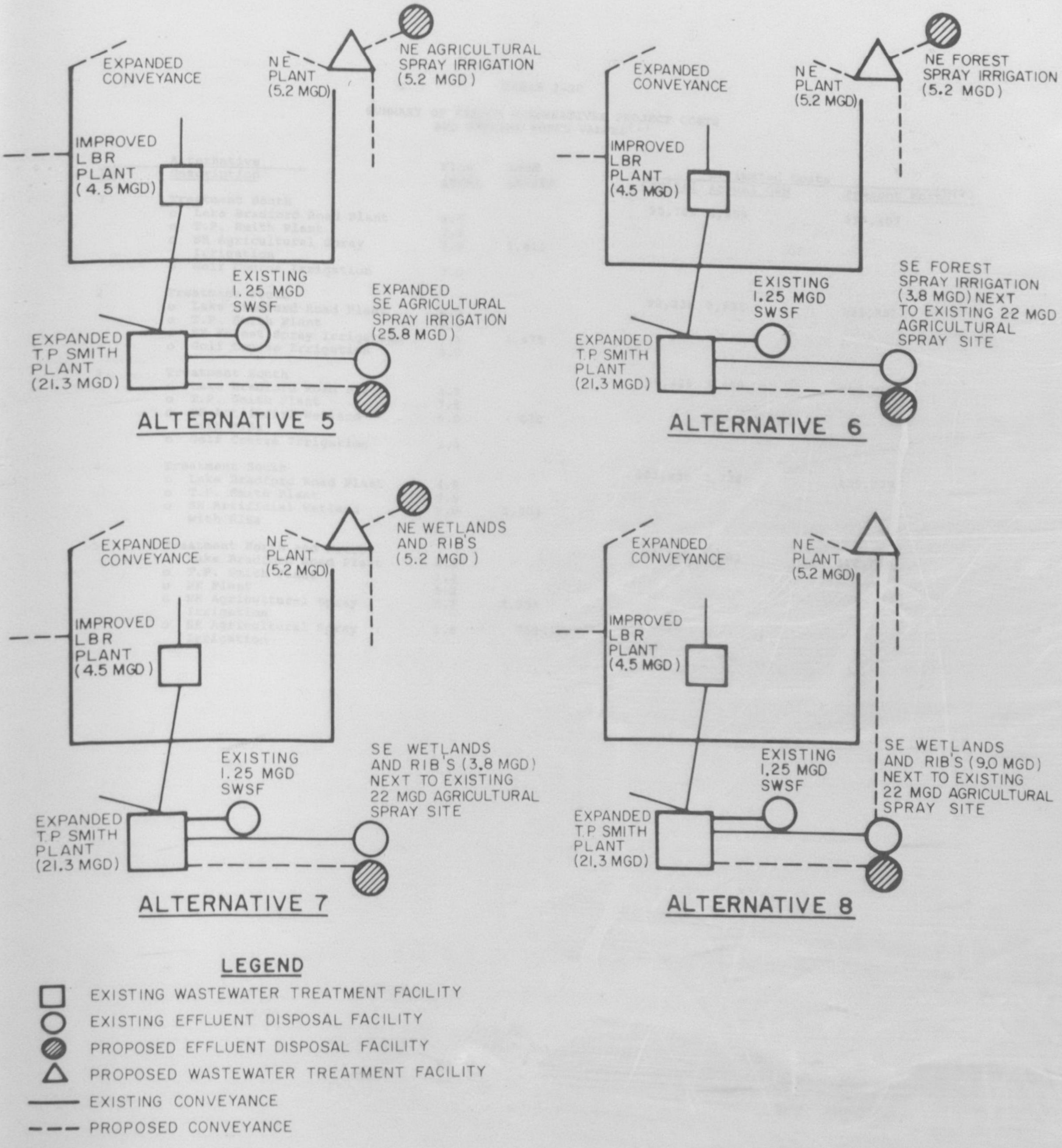
(1) Cost estimates in third quarter 1989 dollars.

(2) Required expansion to handle flows from the Lake Bradford Road (LBR) Treatment Plant (4.5 mgd), and entire T.P. Smith (TPS) Treatment Plant (20.0 mgd: i.e., TPS Plant (17.5 mgd) and SW Plant (2.5 mgd) - Update: The USEPA understands from the City of Tallahassee that the entire TPS Plant was rerated to 20.0 from 17.5 mgd on 9/8/89. The total design treatment capacity for the TPS Plant and LBR Plant is therefore 24.5 mgd. The USEPA also understands that the 22.0 mgd design capacity of the City's SE Sprayfield has been rerated (9/8/89) to 23.25 mgd and the capacity of the City's SW Sprayfield has been rerated (9/8/89) to 1.25 mgd for a total design irrigation capacity of 24.5 mgd. Also, in addition to the rerating of the TPS Plant to 20.0 mgd, the City has more recently completed a 7.5 mgd expansion of the plant in January 1993, so that the total design treatment capacity for the TPS Plant is 27.5 mgd. The total design treatment capacity of the expanded TPS Plant (27.5 mgd) and the LBR Plant (4.5 mgd) is therefore 32.0 mgd, while the total City sprayfield design irrigation capacity is 24.5 mgd.



CENTRALIZED WASTEWATER MANAGEMENT SYSTEM ALTERNATIVES 1 THROUGH 4

FIGURE 2-6



CENTRALIZED WASTEWATER MANAGEMENT SYSTEM
ALTERNATIVES 5 THROUGH 8

FIGURE 2-7

TABLE 2-20

SUMMARY OF SYSTEM ALTERNATIVES PROJECT COSTS AND PRESENT WORTH VALUES(1)

ID	Alternative Description	Flow (mgd)	Land (acres	Estimated Costs Capital	Annual O&M	Present Worth(2)
1	Treatment South			85,706	3,659	119,407
	o Lake Bradford Road Plant	4.5				
	o T.P. Smith Plant	7.5				
	o SE Agricultural Spray Irrigation	7.5	1,410			
	o Golf Course Irrigation	3.0				
2	Treatment South			92,238	2,998	119,851
	o Lake Bradford Road Plant	4.5				
	o T.P. Smith Plant	7.5				
	o SE Forest Spray Irrigation	7.5	1,475			
	o Golf Course Irrigation	3.0				
3	Treatment South			98,429	3,460	130,297
	o Lake Bradford Road Plant	4.5				
	o T.P. Smith Plant	7.5				
	o SE Artificial Wetland with RIBs	6.0	670			
	o Golf Course Irrigation	3.0				
4	Treatment South			101,436	3,728	135,773
	o Lake Bradford Road Plant	4.5				
	o T.P. Smith Plant	7.5				
	o SE Artificial Wetland with RIBs	9.0	1,004			
5	Treatment North and South			99,728	2,483	122,598
	o Lake Bradford Road Plant	4.5				
	o T.P. Smith Plant	1.3				
	o NE Plant	5.2				
	o NE Agricultural Spray Irrigation	5.2	2,235			
	o SE Agricultural Spray Irrigation	3.8	712			

TABLE 2-20 (Cont'd.)

SUMMARY OF SYSTEM ALTERNATIVES PROJECT COSTS
AND PRESENT WORTH VALUES[1]

ID	Alternative Description	Flow (mgd)	Land (acres	Estimated Costs Capital	Annual O&M	Present Worth[2]
6	Treatment North and South			117,021	2,045	135,856
	o Lake Bradford Road Plant	4.5				
	o T. P. Smith Plant	1.3				
	o NE Plant	5.2				
	o NE Forest Spray Irrigation	5.2	2,725			
	o SE Forest Spray Irrigation	3.8	747			
7	Treatment North and South			98,278	2,469	121,019
	o Lake Bradford Road Plant	4.5				
	o T. P. Smith Plant	1.3				
	o NE Plant	5.2				
	o NE Artificial Wetland with RIBs	5.2	580			
	o SE Artificial Wetland with RIBs	3.8	424			
8	Treatment North and South			100,494	2,505	123,566
	o Lake Bradford Road Plant	4.5				
	o T. P. Smith Plant	1.3				
	o NE Plant	5.2				
	o SE Artificial Wetland with RIBs	9.0	1004			
9	Decentralized			99,779	1,540	113,963
	o Lake Bradford Road Plant	4.5				
	o Killearn Lake Plant Expansion	0.25				
	o On-lot	6.25				
	o SE Agricultural Spray Irrigation	2.5	469			

(1) Cost estimates are in third quarter 1989 dollars.

(2) Assumes an 8.875 percent compound interest rate for a 20 year period. Capital recovery factor = 0.1085724 and present worth factor = 9.210445.

and associated environmental protection measures for the four (4) system alternatives selected for further study (1, 2, 7 and 9) are addressed in more detail in Chapter 3.

The centralized system alternatives require additional collection conveyance pipelines to supplement the existing lines. The locations of these pipelines have been designed to follow existing rights-of-way in order to avoid environmental and cost problems. Of the eight (8) centralized alternatives, four (4) will require construction of the NE Plant. The NE Plant would allow wastewater generated in northeast Tallahassee to be conveyed a short distance to the NE Plant. Without construction of the NE Plant, wastewater generated in the northeast area would need to be conveyed via existing pump stations to the TPS Plant on the southwest side of Tallahassee. The environmental impacts of the conveyance pipelines necessary for the selected system alternatives are discussed in greater detail in Chapter 3. (Update: The USEPA understands from the City of Tallahassee that in the absence of a NE Plant and under the proposed implementation of Alternative 1, wastewater generated in northeastern Leon County would initially continue to be conveyed via existing pump stations to the T.P. Smith Plant on the southwestern side of Tallahassee. The USEPA understands from the City that the City's 7.5 mgd expansion to the T.P. Smith Plant was completed in January 1993. Also at the time, a new force main from the northeast routed around the eastern side of the City of Tallahassee via Capital Circle to the T.P. Smith Plant was completed by the City and was operational in February 1993, although additional refinements were made thereafter. In the near future (1995-1997), the City furthermore expects that new additional pump stations would be required for conveyance.)

The major environmental concerns for all the alternatives are related to the alternatives' effluent disposal components. Disposal for each of the alternatives involves either two or three land application sites. Table 2-21 summarizes the sensitive environmental characteristics of each site that were evaluated to determine the impacts associated with each disposal component.

Any areas found to have longleaf pine-wiregrass plant communities would require special consideration because the FG&FWFC has identified these communities to be in need of protection. Ecological as well as archeological/ historical resources may be impacted. Therefore, an archeological survey would need to precede any proposed construction so that proper assessment of known sites and potential new, yet uncovered/unrecorded sites can be realized. If additional sites not identified in the survey are found during actual construction, construction should be stopped and the Florida State Historical Preservation Officer (SHPO) contacted. In addition to site avoidance and proposed project design modification, the evaluation, excavation, and relocation of certain identified sites may be possible through coordination with the Florida SHPO.

The permitting guidance outlined for alternatives presented in this section is very general and is not intended to be used to make final decisions on the applicability of the NPDES or sludge regulations. Site specific conditions are always important factors in making these determinations.

2.4.3.1 System Alternative 1: Treatment South, SE Agricultural and Golf Course Spray Irrigation

Environmental concerns associated with the construction and operation of Alternative 1 would mainly be due to the physical expansion of the existing SE Agricultural Spray Irrigation area, specifically the associated land conversion and habitat loss impacts. The expansion areas lie within the Cody Scarp Sandhills, the Lutterloh Pond closed basin, and the Woodville Karst Plain, and is adjacent to the St. Marks River Lowlands. These areas are marked by outstanding-quality, mature cypress and gum swamps and

TABLE 2-21

Summary of Environmental Characteristics of Effluent Disposal Sites

Proposed Effluent Disposal Sites	Total Approx. Acreage	Physiographic Region	Principle Closed Basin	Quality of Water Bodies and Wetlands	Upland Plant Community	Level of Recharge for Floridan Aquifer	Wildlife Habitat
Site 1 - West of and adjacent to existing SE Sprayfield	400	Cody Scarp Sandhills	Lutterloh Pond	Good to High	Former longleaf pine-wiregrass sandhill habitat converted to sand pine and slash pine plantations with moderate to low amounts of wiregrass	High	Habitat for Indigo Snake, Florida Pine Snake, Gopher Tortoise, and Gopher Frog migration area. Also habitat for Panhandle Golden Aster. Shores of ponds and lakes are habitat for Panhandle Meadow Beauty. Woodstorks have been observed using Site 2 for roosting and feeding.
Site 2 - East of and adjacent to existing SE Sprayfield	1600	Cody Scarp Sandhills with some southern portions in the Woodville Karst Plain	Eagle Lake Turf Pond Bonnett Pond Numerous Unnamed Waterbodies	Outstanding cypress and gum swamps and marshes and good to outstanding lakes and ponds	Former longleaf pine-wiregrass sandhill habitat converted to sand pine and slash pine plantations with moderate to low amounts of wiregrass	High	
Site 3 - NE Sprayfield	6500	Tallahassee Red Hills	Six watersheds that drain into Alford Arm of Lake Lafayette	Poor to outstanding, 1/3 to 1/2 of wetlands have been eliminated and most are substantially smaller than indicated on the Leon County E.S.A. maps	Former longleaf pine-wiregrass clayhill habitat converted to a mixture of cultivated crop and pasture, old-field successional loblolly pine-shortleaf pine forest (~2000 acres), natural oak-pine-hickory forest (~300 acres), natural live oak forest, young successional pines and hardwoods and pine plantations	Low to None with spots of High	Woodstorks live in the lower Lake Lafayette's pure cypress stands

Source: Environmental analysis based on field visits to the sites by Tom Greene, Environmental Specialist for the Leon County Public Works Department, November, 1989.

marshes; good or outstanding-quality lakes and ponds; flood-prone Karstic depressions; and good to high-quality wetlands. A rich assortment of fauna and flora, several species of which are of special concern or endangered, are known to utilize the region as a cover and food source. Conversion to intensive agriculture would likely create adverse effects to this sensitive ecosystem by removing valuable habitat associated with the bottomland forest systems. Existing functions such as surface water hydrology, sediment transport and detention, water quality, and native biotic diversity would likely be impacted by this alternative. It should be noted, however, that this area is not pristine and is largely composed of managed pine plantations in the area projected for use. Figures showing wildlife corridors and soils are shown in Sections 4.4 and 4.5, respectively. Archeological resources are described in Sections 2.5.2 and 4.6.1.

The conveyance system necessary for implementation of this alternative would consist of:

1) a force main from the TPS Plant eastward along Capital Circle and Old Tram Road to the SE Sprayfield area, and

2) a primary line along Lake Bradford Road and Orange Avenue with pipelines supplying effluent to four golf courses.

Both lines would be constructed within existing rights-of-way, hence causing little damage to environmentally-sensitive areas. There would be some impacts during construction such as noise, dust, and heavy machinery exhaust, but these would be temporary and would cease when construction would be completed.

The irrigation of sprayfield and golf course areas could potentially also cause environmental problems. One concern would be human health concerns relative to the production and off-site migration of aerosols by the spray irrigation sprinkler nozzles and potential groundwater contamination problems of the Floridan aquifer drinking water source. Post-irrigation use of the golf courses may also be of concern if effluent pathogens are not completely disinfected. These human health concerns are discussed below (Also refer to Section 4.6.2).

It is generally documented (Crook, 1990; Asano et al., 1992) that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater. However, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious. However, several precautions can be taken to reduce the human health risk at spray irrigation sites. These include effluent treatment, effluent monitoring, on-site containment of aerosols, and groundwater monitoring.

The USEPA understands from the City that City effluent is disinfected in accordance with State of Florida standards and permit requirements. The City's wastewater treatment processes are the activated sludge process, chlorination, and natural ultraviolet light (sunlight) treatment in the holding ponds. Prior to effluent spray irrigation, the City also monitors its effluent for 40 parameters including 17 metals on a monthly basis; monitors for 11 parameters (biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen, chlorine residual, chlorides, pH, fecal coliforms, and other parameters) on a twice a week basis; and monitors for the six (6) above parameters on a daily basis.

Studies have shown that the health risk associated with aerosols from sewage effluent spray irrigation sites is extremely low, particularly for irrigation with wastewater that has been disinfected. The dispersal of aerosols is also directly related to wind velocities. Other factors which prolong pathogen viability and increase the distance of aerosol travel are increased relative humidity, lower temperature, and darkness. Studies also indicate that pathogens tend to survive longer in an aerosol than do the traditional indicator organisms. However, in general, reasonable protection of residents neighboring a sprayfield should be possible through the proper design and implementation of appropriate effluent treatment methods, frequent effluent monitoring of treated wastewater prior to irrigation, natural ultraviolet light (sunlight) disinfection, prudent spraying operations, use of evergreen forested buffer areas along external borders of sprayfields (which act as a barrier to the off-site migration of spray effluent aerosols and also reduce wind velocities), use of forested corridors within the general sprayfield area (which further help to contain aerosols on site), and groundwater monitoring.

The spray application of wastewater to golf courses and other public access areas, which would provide greater public exposure than agricultural or forest sprayfields, requires additional treatment for suspended solids removal and high-level disinfection under State of Florida regulations. Compliance with these regulations should greatly reduce the health risks associated with aerosols at golf courses. Irrigation of golf courses using wastewater effluent is also not an uncommon practice since 84 golf courses in Florida were being irrigated with wastewater by 1991. In addition, golf course spray irrigation would require, per FDER stipulation that an alternate disposal method (e.g., Rapid Infiltration Basin (RIB) system; alternate sprayfield) be made available as a back-up. The system alternative costs on Table 2-20 do not include the costs for a back-up system.

Potential public health effects from animal vectors at spray irrigation sites would be minimized through effluent disinfection. Such effects could be further minimized through prudent spraying operations that allow acceptable effluent soil infiltration rates that avoid ponding.

Human health concerns also exist for potential groundwater contamination of the Floridan Aquifer drinking water source. After application of the wastewater effluent to land surfaces, the wastewater infiltrates into the soil and interacts physically and chemically to remove the potentially harmful constituents not removed during effluent treatment. It is possible that some of these constituents could move quickly through the soil (depending on soil characteristics and depth) and into the groundwater used as a public drinking water source.

The City is conducting an on-site groundwater monitoring program for its existing effluent sprayfields. Historically, over 60 monitoring wells have been drilled and tested at the SE Sprayfield site during interagency cooperative studies. Although the City has been monitoring wells for some time, the State of Florida required monitoring via a Groundwater Monitoring Program by permit condition since November 1, 1984. The City now quarterly monitors seven (7) compliance wells at the SE Sprayfield for six (6) parameters: NO_2 (nitrite) and NO_3 (nitrate) as nitrogen; nitrites; total Kjeldahl nitrogen; chlorides; dissolved organic carbon (DOC); and fecal coliforms. Pesticides and herbicides are also monitored annually.

Based on this monitoring program, the USEPA understands from the City that the City discovered five (5) nitrate-nitrogen groundwater quality violations in the seven compliance wells at the City's SE Sprayfield. Expected causes of these violations included a faulty well construction, application techniques for additional (non-effluent) fertilizer, and possibly on-site cattle burial. Overall, four (4) other violations (also for nitrate-nitrogen) were monitored in one of the two compliance wells at the City's SW Sprayfield. Expected causes for these violations included the fact that a stockpile of dewatered sludge was placed near a compliance well. The

USEPA further understands from the City that the exceedances in these two wells were reported to the FDER by the City as part of their quarterly reports and that the FDER responded by writing a letter and by discussing some of the violations with the City. The discussed exceedances involving the faulty well, additional fertilizer, dewater sludge, and possibly on-site cattle burial were resolved by constructing a new nearby well and adjusting farming techniques at the SE Sprayfield, and by removing the sludge at the SW Sprayfield, and that monitoring has shown no additional groundwater quality violations since 1991 for the parameters monitored. As a rule, nutrient groundwater quality problems can be minimized or prevented.

Aspects of Alternative 1 involving agricultural (animal feed and/or processed human food only) and golf course spray irrigation methods would be subject to NPDES permitting if point source storm water discharges to waters of the United States exist during the construction of the Alternative 1 sites and from the treatment plants treating the spray irrigation effluent. Pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124) and to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), an NPDES permit is required for point source storm water discharges to waters of the United States from the facility actually treating domestic wastewater. This provision applies to domestic wastewater treatment facilities that have design flows of at least 1.0 mgd. The NPDES storm water regulations of November 16, 1990, also require that point source storm water discharges to waters of the United States from all construction activities (including the initial clearing, until revegetated, of spray irrigation sites) disturbing a total of five or more acres must be permitted under the NPDES program. The permit application deadline for these discharges is 90 days prior to commencement of construction. Construction activities needing NPDES permit coverage can be made through a general permit recently issued by EPA/Region IV.

Storm water point source discharges to waters of the United States from the operation (spray irrigation) of non-agricultural/ non-silvicultural land application sites (such as golf courses, rights-of-way, and landscape areas) receiving domestic wastewater treated to the quality required by Chapter 17-610 F.A.C. for the land application of reclaimed water are not required to be covered by NPDES permits, unless the USEPA specifically requires a facility to submit an application on a case-by-case basis. Therefore, no NPDES permit is needed for the operation of such land application sites for the City's proposed project (if storm water point source discharges exist to waters of the United States for such sites) unless specifically requested by the USEPA. However, dedicated discharges of reclaimed water, without land application, are required to be covered by NPDES permits. It may also be noted that storm water discharges from the land application of wastewater effluent on agricultural and silvicultural sites are exempt from the NPDES permitting program if the sites are consistent with 40 CFR Part 122.3(e), so that the operation of such sites for the City's proposed project would not require an NPDES permit if consistent with 40 CFR 122.3(e).

Included in the proposed spray irrigation of wastewater effluent in Alternative 1 is the generation of and land application of wastewater sludge. Section 405(d) of the Clean Water Act requires that the disposal or reuse of sewage sludge be regulated. This regulatory activity is to be accomplished through the utilization of permits based upon technical federal regulatory standards. The USEPA established federal sludge disposal/reuse standards which were promulgated in the __Federal Register__ at 40 CFR 503 on February 19, 1993. In general, these standards must be complied with by all treatment works treating domestic sewage by February 19, 1994. Violation of these standards would be a violation of the Clean Water Act. It is anticipated that current and proposed sludge disposal/reuse activities would be regulated through an NPDES permit, where applicable, or through issuance of a "Sludge-Only" permit. This federal permitting activity would be issued by the USEPA/Region IV until program authorization is given to the State of Florida. Therefore, the newly promulgated federal regulations are in addition to the State of Florida sludge disposal/reuse regulations.

2.4.3.2 System Alternative 2: Treatment South, SE Forest and Golf Course Spray Irrigation

The environmental concerns associated with Alternative 2 need not be significant if the existing tree species are utilized as the spray irrigation forest crops.

The SE Forest Spray Irrigation system would cause an initial disturbance associated with construction activities related to the buried irrigation system and to the replacement of existing longleaf forest stands with water-tolerant species. Existing forest stands on the SE disposal site consist primarily of water-tolerant species, sand pine and slash pine (Refer to Table 2-21). The sand pine, though water-tolerant, does not generate much biomass. Therefore, replacement of existing trees with fast growing, water-tolerant species would be beneficial in terms of nutrient uptake; however, species replacement would be more environmentally disruptive.

After the irrigation system has been installed, effluent would be applied at a rate compatible with the site's ability to accept water. This rate would have to be monitored carefully so as not to interfere with the site's natural ability to transport sediment and overland flow, absorb natural precipitation, conserve surface soil, assimilate nutrients, and support healthy, diverse, and native vegetative and animal life.

The forest site would be managed by maintaining, harvesting, and reforesting of fast-growing, water-tolerant forest stands. During periods of harvest, whether every 10 years in a selective harvest practice, or every 25 years on a clear-cut practice, there would be damage to the site and soil.

The impacts caused by the golf course irrigation disposal method and the conveyance system would be identical to those described for Alternative 1 in Section 2.4.3.1.

The need for NPDES permitting for the effluent disposal proposed in Alternative 2 through the forest and golf course spray irrigation method would be as described in Section 2.4.3.1. The need for sludge permitting would also be as described in Section 2.4.3.1. Other federal, state and local permitting may also be involved for the Alternative 2 disposal methods.

2.4.3.4 System Alternative 3: Treatment South, SE Artificial (Constructed) Wetlands/RIBs and Golf Course Spray Irrigation

Environmental concerns associated with Alternative 3 would be primarily due to the construction and operation of the SE Artificial (Constructed) Wetlands with Rapid Infiltration Basins (RIBs). The construction and operation of artificial wetlands could be an attractive alternative because of the relatively small land requirement. For a design flow of 6.0 mgd, for example, only 370 acres would be necessary. An additional 300 acres is needed for the rapid infiltration basins, but the total of 670 acres is still far less than the disposal alternatives with agricultural or forest spray irrigation facilities.

The primary concerns associated with the rapid infiltration basins are groundwater mounding and contamination, and possible sinkhole formation. The effluent going to these basins will already have been treated by both the treatment plant and the wetlands and therefore have received a high level of treatment, which is greater than secondary levels.

The environmental concerns caused by the golf course irrigation disposal method and the conveyance system would be identical to those described for Alternative 1 in Section 2.4.3.1.

Effluent disposal proposed in Alternative 3 through the artificial (constructed) wetlands/RIBs method need not, by itself, be subject to NPDES permitting if the RIBs do not drain as a point source discharge into waters of the United States. However, pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124) and to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), an NPDES permit is required for point source storm water discharges to waters of the United States from the facility actually treating domestic wastewater, as discussed in Section 2.4.3.1. This provision applies to domestic wastewater treatment facilities that have design flows of at least 1.0 mgd. Storm water permitting requirements would also apply to any point source storm water discharges to waters of the United States from the RIB site. Also, as discussed in Section 2.4.3.1, the NPDES storm water regulations of November 16, 1990, also require that point source storm water discharges to waters of the United States from all construction activities (including the initial clearing, until revegetated, of spray irrigation sites) disturbing a total of five or more acres must be permitted under the NPDES program. The permit application deadline for these discharges is 90 days prior to commencement of construction. Construction activities needing NPDES permit coverage can be made through a general permit recently issued by EPA/Region IV.

Storm water point source discharges to waters of the United States from the operation (spray irrigation) of non-agricultural/non-silvicultural land application sites (such as golf courses proposed for Alternative 3) receiving domestic wastewater treated to the quality required by Chapter 17-610 F.A.C. for the land application of reclaimed water are not required to be covered by NPDES permits, unless the USEPA specifically requires a facility to submit an application on a case-by-case basis. Therefore, no NPDES permit is needed for the operation of such land application sites for the City's proposed project (if storm water point source discharges exist to waters of the United States for such sites) unless specifically requested by the USEPA. However, dedicated discharges of reclaimed water, without land application, are required to be covered by NPDES permits. It may also be noted that storm water discharges from the land application of wastewater effluent on agricultural and silvicultural sites are exempt from the NPDES permitting program if the sites are consistent with 40 CFR Part 122.3(e), so that the operation of such sites for the City's proposed project would not require an NPDES permit if consistent with 40 CFR 122.3(e). Other federal, state and local permitting may also be involved for the Alternative 3 disposal methods.

Related to the disposal of wastewater effluent through artificial (constructed) wetlands/RIBs and golf course spray irrigation is the generation of and land application of wastewater sludge. The need for sludge permitting would be as described in Section 2.4.3.1.

2.4.3.4 System Alternative 4: Treatment South, SE Artificial (Constructed) Wetlands/RIBs

Environmental concerns caused by Alternative 4 would be similar in nature to those caused by Alternative 3, except there is no golf course irrigation component in Alternative 4. Therefore, the artificial (constructed) wetlands and RIBs are larger to make up the difference and the land area requirements are increased by approximately 50%. This is important, considering the habitat of the protected Gopher Frog and Gopher Tortoise.

The treated effluent conveyance system used in this alternative would require only a force main from the TPS Plant to the SE Disposal Site via the Capital Circle Southwest and Old Tram Road right-of-way. Construction-related impacts such as noise, dust, and exhaust would occur along this corridor, but no long-term impacts on environmentally sensitive areas are foreseen.

The need for NPDES permitting for the effluent disposal proposed in Alternative 4 through the artificial (constructed) wetlands/RIBs method would be as described in Section 2.4.3.3 without the golf course spray irrigation aspects. The need for sludge permitting would be as described in Section 2.4.3.1. Other federal, state and local permitting may also be involved for the Alternative 4 disposal methods.

2.4.3.5 System Alternative 5: Treatment North and South, NE and SE Agricultural Spray Irrigation

Environmental concerns associated with Alternative 5 would be due mainly to the development of the NE and expansion of the SE agricultural spray irrigation facilities. The impacts from the expansion of the SE site have been discussed in Section 2.4.3.1. The addition of the NE Sprayfield area would create additional problems. First, the clay soils could be expected to induce spray effluent and any added fertilizers to reach surface waters and hence affect wetlands, ponds, and streams.

A larger issue regarding the NE site is the extensive high-quality successional and native forest, which constitutes about 50 percent of the site's uplands. Any management scheme employed on this site would likely destroy most or all of the existing plant and animal life. The conversion of existing forest to agricultural fields would destroy valuable habitat.

Construction of the NE plant would take place in an area adjacent to the spray site, and would cause impacts much like those noted above.

There would be considerable environmental impact due to the construction and maintenance of pipelines into and out of the proposed NE plant. The NE Disposal Site for this alternative is located in the Lake Lafayette Lowlands, which are characterized by wet pine flatwoods, successional pine-hardwoods, and likely beech-magnolia hammocks. Unless the proposed pipelines follow existing rights-of-way along Miccosukee Road, Route 90 or Route 10, there would be a substantial amount of vegetation, habitat, and wetland loss and disturbance. The conveyance from the TPS Plant to the SE Disposal Site would not present a significant environmental impact since the pipeline would follow existing rights-of-way.

The need for NPDES permitting for the effluent disposal proposed in Alternative 5 through the agricultural spray irrigation method would be as described in Section 2.4.3.1 without the golf course spray irrigation aspects. The need for sludge permitting would also be as described in Section 2.4.3.1. Other federal, state and local permitting may also be involved for the Alternative 5 disposal method.

2.4.3.6 System Alternative 6: Treatment North and South, NE and SE Forest Spray Irrigation

Implementation of Alternative 6 would create environmental concerns which are similar to Alternative 2, discussed in Section 2.4.3.2, in that the disposal method is forest spray irrigation. As noted in Table 2-21, the NE disposal site has large areas of water-tolerant tree species (loblolly pine and shortleaf pine forest). Any areas of this site that do not have water-tolerant tree species would have to have the existing tree stands replaced. Any area found to have longleaf pine-wiregrass plant communities would require special consideration because the FG&FWFC has identified these habitats to be in need of protection. This method has an advantage over agricultural spray irrigation because once construction is completed, there is relatively little disturbance of the forest, except at harvest time which is to occur for a given plot at intervals of no less than 10 years. The NE plant is also a component of Alternative 6 and would cause impacts much like those noted for the preparation of agricultural irrigation discussed in Section 2.4.3.5.

The environmental impacts due to construction of the treated effluent conveyance system would be identical to those for Alternative 5 (Section 2.4.3.5).

The need for NPDES permitting for the effluent disposal proposed in Alternative 6 through the forest spray irrigation method would be as described in Section 2.4.3.2 without the golf course spray irrigation aspects. The need for sludge permitting would be as described in Section 2.4.3.1. Other federal, state and local permitting may also be involved for the Alternative 6 disposal method.

2.4.3.7 System Alternative 7: Treatment North and South, NE and SE Artificial (Constructed) Wetlands/RIBs

Alternative 7 would require artificial (constructed) wetlands and rapid infiltration basins to be constructed in both the SE and the NE sites. Construction in forested areas would require removal of trees and hence habitat, but generally, the alternative is an environmentally sound one. The land area that would be required for this alternative (580 acres in NE and 424 acres in SE) is relatively small.

The treated effluent conveyance system necessary for implementation of this alternative would be similar, if not identical, to that used for Alternatives 5 and 6. The environmental impacts would therefore be similar, if not identical.

The need for NPDES permitting for the effluent disposal proposed in Alternative 7 through the artificial (constructed) wetlands/RIBs method would be as described for in Section 2.4.3.3 without the golf course spray irrigation aspects. The need for sludge permitting would be as described in Section 2.4.3.1. Other federal, state and local permitting may also be involved for the Alternative 7 disposal methods.

2.4.3.8 System Alternative 8: Treatment North and South, SE Artificial (Constructed) Wetlands/RIBs

The environmental concerns associated with Alternative 8 would be identical to Alternative 7, except there would be no wetland development at the NE site.

The treated effluent conveyance of wastewater in this alternative would consist of: 1) the force main along Capital Circle, as described in Alternative 1 and 2) a force main, approximately 12 miles in length, from the NE Plant to the SE Disposal Site. The long-term environmental impacts created by this construction would be limited to a 1-mile segment immediately south of the NE Plant and north of Miccosukee Road. The area is characterized by Loblolly-Shortleaf Pine forest, Oak-Pine-Hickory forest, Live Oak forest, and cultivated crop, pasture land, and pine plantation. Construction of the conveyance pipeline and right-of-way would impact one or more of these community types by the removal of vegetation and habitat.

The need for NPDES permitting for the effluent disposal proposed in Alternative 8 through the artificial (constructed) wetlands/RIBs method would be as described in Section 2.4.3.7. The need for sludge permitting would be as described in Section 2.4.3.1. Other federal, state and local permitting may also be involved for the Alternative 8 disposal methods.

2.4.3.9 System Alternative 9: Decentralization

Environmental concerns caused by Alternative 9, or decentralized treatment/disposal, would be due to the potential impacts of on-lot systems and the expansion of the SE agricultural spray irrigation facility (Refer to Alternative 1 of Section 2.4.3.1 for impacts caused by the SE facility). It should be noted, however, that with a decentralized system, the acreage required for a SE Sprayfield expansion is reduced from 1410 to 469 acres.

Because of the hydraulic connection and proximity between surface and groundwaters in the area, on-lot systems could cause significant problems if they fail. Excessive nutrient loads and BOD could enter the aquifer system. This condition is not easily remedied, and an alternative system would need to be installed.

The on-lot systems have an advantage in that they at least temporarily eliminate the need for alternatives which require large land areas to operate.

The environmental consequences due to the construction of a conveyance pipeline from the TPS Plant to the SE Disposal Site would be expected to be minimal. The force main would utilize the existing right-of-way corridor following Capital Circle Southwest and Old Tram Road. Long-term impacts are not foreseen.

Effluent disposal proposed in Alternative 9 through the decentralized (on-lot) system, would not, by itself, require an NPDES permit. However, such on-lot systems would be supplemented by centralized systems (expansion of the City's agricultural spray irrigation operation (SE Sprayfield) and expansion of the Killearn Lakes Plant and the Lake Bradford Plant). As such, the need for NPDES and sludge permitting for the centralized aspects of Alternative 9 would be as described in Section 2.4.3.1. Other federal, state and local permitting may also be involved for the Alternative 9 disposal methods.

2.4.4 Technical and Institutional Feasibility

Technical feasibility of a system alternative includes evaluating the alternative in terms of installation (or construction) and operation and maintenance of the alternative facilities. Table 2-22 lists the major potential installation and operation problems for the recommended components of the alternative systems.

The feasibility of installing or constructing any of the alternatives depends on ease of installation or construction, availability of materials, and availability of manpower experienced in operating and maintaining the structural facilities associated with each alternative. None of the alternatives has any severe technical constraints in terms of installation or construction. Septic tanks, sewers, extended aeration treatment plants for area systems, an activated sludge treatment plant, and spray irrigation and sludge spreading systems are already being utilized within the study area. The RIBs recommended for possible use following artificial (constructed) wetlands have only been used in the study area on an experimental basis. However, because this disposal system is similar to a stabilization pond, in terms of construction and installation, the fact that one has never been constructed in the study area before cannot be considered a severe technical constraint. As for artificial (constructed) wetlands, this effluent treatment method (i.e., treatment subsequent to wastewater treatment plant treatment) has been successfully used in Europe. Biologically, artificial wetlands resemble horizontal trickling filters. Although it is a relatively new wastewater disposal technology in the United States, it has shown increasing reliability in areas such as nearby Orlando, Florida. The reliability of constructed wetlands has probably increased even since the (1989) matrix evaluation for the DEISS. The Orlando facility, for example, has been functional for several years and the Tennessee Valley Authority (TVA) operates facilities in Kentucky and Alabama, and possibly other areas. Constructed wetlands also exist in other states such as Mississippi, California and Maryland (Also refer to Section C-13 entitled "Artificial (Constructed)

TABLE 2-22

POTENTIAL INSTALLATION AND OPERATION PROBLEMS
OF SYSTEM COMPONENTS

Type of Comment	Concerns with Installation and Performance
Interceptor Sewers	- Obtaining rights-of-way prior to installation
	- Anaerobic conditions if wastewater remains in a sewer for a long period of time
	- Possible surface water degradation resulting from construction-related soil erosion
Activated Sludge Treatment of Wastewater	- Disruption of microorganism activity due to sudden shock
Wastewater Disposal by Rapid Infiltration	- Lack of local familiarity with operation procedures
	- More attention needed for proper maintenance of inundation basins
	- Performance reliability highly dependent on physical, chemical and biological constituents found in soil profile
Sludge Treatment	
a) Anaerobic digestion	- Performance is susceptible to changes in loadings, flows, and temperature
b) Vacuum filtration	- Performance may vary with digested sludge characteristics
Sludge Disposal by Landspreading	- Uncertainty of predicting rainfall patterns immediately following an application of sludge
Wastewater Disposal by Slow Rate (Spray Irrigation)	- Performance reliability highly dependent on physical, chemical and biological constituents found in soil profile
	- Buried lines for spray irrigation of lands requires a significant amount of excavation and land disturbance
	- Spraying of treated wastewater requires special care to avoid clogging of nozzles

Wetlands" in Appendix C of this FEISS). However, success in the United States (compared to Europe) is still fairly recent, this treatment method has not been used in the study area, and City personnel are not familiar with the technology -- particularly when compared to the agricultural spray irrigation technology. Reliability and acceptance in the United States would be expected to continue to increase with time and implementation experience. As suggested above, subsequent to artificial wetland treatment, the treated effluent discharged from the artificial wetlands must be disposed via an acceptable disposal method, (e.g., RIBs if feasible and if environmentally appropriate).

Operation and maintenance characteristics have been broken down into the following criteria: reliability, flexibility, and ease of operation and maintenance for both the homeowner and the managing entity for public systems. The reliability of a wastewater management system is reflected in its ability to consistently achieve and maintain water quality and other environmental goals for which it is intended with a minimum of operational problems. The flexibility of an alternative is measured in terms of its capability to adapt to higher future wastewater flows and its ability to comply with future changes in water quality goals. For example, an activated sludge system has the ability to accept higher flows and still achieve the desired treatment performance. The ease of operation and maintenance of an alternative must be considered in terms of the amount of attention required to maintain the desired reliability.

The comparison of the technical feasibility of centralized wastewater management systems (Alternatives 1 through 8) versus a decentralized wastewater management system (Alternative 9) is presented in Table 2-23. Area systems, part of a decentralized system, are subject to many of the problems associated with the components of a centralized system in addition to potential management problems which come with being decentralized.

As mentioned before, there are no severe technical constraints associated with installation or construction of a centralized plant and collection system or a decentralized system. Care must be taken in the selection of sites for wastewater disposal, sludge disposal, and on-lot systems; site selection is of greater concern in a decentralized wastewater management system.

A centralized system appears to present the least amount of O&M problems because of the well-defined responsibility and the centralized nature of collection and treatment systems. Alternative 9 is characterized by a substantial number of on-lot and area systems dispersed over a large geographical area, which leads to a decentralized and somewhat less defined management responsibility.

As shown on Table 2-23, the majority of operation and maintenance concerns with centralized wastewater management systems deal with the reliability of the systems under uncertain conditions. For example, in the activated sludge treatment of wastewater, the microorganism activity can be disrupted by sudden, shock loadings of flows entering aeration basins. Also in the landspreading of sludge or spray irrigation of treated effluent, an unexpected heavy rain immediately following a land application effort may cause excessive runoff. These problems can be managed, however, by providing and maintaining a well-trained staff of operation and maintenance personnel.

Wastewater management under Alternative 9, Decentralization, leaves the responsibility for proper operation of disposal systems to individual home owners. In order to improve the reliability of a decentralized system, the possibility of a Tallahassee-Leon County wastewater management agency, similar to the jointly operated Tallahassee-Leon County Planning Department, should be investigated. This agency would assume responsibility for the management of these on-lot and area systems and could have a variety of functions:

TABLE 2-23

SUMMARY OF THE TECHNICAL FEASIBILITY OF CENTRALIZED VS. DECENTRALIZED SYSTEMS

	Centralized Plant [1] and Collection System	On-Lot Systems [2]
Installation and Construction	o Expertise is available.	o Expertise is available.
	o Terrain would not be a problem.	o Attention to site characteristics necessary; sites or systems may require some modification.
	o No severe technical constraints.	
Operation and Maintenance (O&M)	o Reliability good if well trained staff maintained.	o Reliability may be a problem particularly with individual responsibility for each system.
	o Flexibility, in a well-designed system.	o Flexibility problems possible in that the systems must be tailored to local conditions.
	o System may possibly be complex and difficult to operate if unfamiliar with operation.	
		o Simple system to operate and maintain.

(1) System Alternatives 1 through 8.

(2) System Alternative 9.

- Inventory and review of existing alternative systems.

- Planning, including evaluation of alternative systems for individual communities, and guidelines for site evaluation, design and installation.

- Involvement with operation and maintenance such as homeowner notification and approval of maintenance experts.

- Financing clearinghouse.

- Water quality monitoring.

- Public education.

- Coordination with related programs.

- Stockpiling of replacement parts.

From a planning point of view, the decentralized system has less flexibility due to limitations of soils within parts of the study area. In addition, it is thoroughly documented that retrofitting of houses to a centralized system often occurs as development density increases. Centralized alternatives can be tailored to the needs of the community, whereas the decentralized alternative is tailored around local conditions. The use of area systems in the decentralized system will increase its flexibility for planning significantly.

In comparing the operating and maintenance characteristics of the alternative systems, it may seem that wastewater treatment plants are more difficult to operate and maintain than a less complex on-lot or area system. However, the individual homeowner has more responsibility in the maintenance of a septic tank, unless the system is taken over and maintained by a managing agency. Thus, it would probably be easier to operate and maintain a centralized sewer system and treatment plant, or plants, than the on-lot systems of each customer.

2.4.5 Implementability and Environmental Protection Measures

The primary stages of a wastewater management project include:

- Planning and design.
- Construction.
- Operation and maintenance.
- Public acceptance.

Within each of these stages, measures can be incorporated which mitigate adverse impacts or enhance beneficial impacts. Environmental protection measures are often financially justifiable and are considered more essential than enhancement measures in terms of implementing an acceptable alternative. This section summarizes appropriate implementation procedures and how environmental protection measures can be inserted into the procedures. One measure that applies to all construction activities is to minimize the disturbance at all sites to reduce soil erosion and destruction of vegetation and animal habitats.

2.4.5.1 Conveyance Facilities

The planning, design and construction procedure for the interceptors in conveyance systems should include the following to minimize the adverse impacts of their construction:

- Transit surveys of corridor routes.

- Planning measures and restrictive construction techniques to minimize impacts of interceptor construction particularly at stream crossings.

- Designing interceptors and environmental protection measures including erosion and stormwater runoff control techniques.
- Securing contractor services.

2.4.5.2 Wastewater Disposal Facilities

Table 2-24 summarizes the evaluation of land disposal techniques for implementability. The components were analyzed to verify their viability based on implementability and any potential environmental protection measures. The following is a list of components that have been identified as non-viable alternatives or "conditionally" viable alternatives along with the condition that eliminates them from further evaluation or imposes a condition for successful implementation and operation:

Implementation of any of the land application disposal components requires a soil survey and site layout during the planning and design process. This would be most extensive for disposal sites in the Northeast service area since portions of the Southeast site have already been utilized for disposal. The site layout procedure would need to include planning of buffer zones and runoff controls such as diversions or storage basins. It is recommended that soil surveys be periodically undertaken during the operations of any implemented facility.

2.4.5.3 On-Lot Treatment and Disposal Facilities

Also considered as a part of the alternatives' implementability analysis is the need to "correct" failing on-lot systems documented by the LCPH. For system alternatives recommending centralized collection and treatment, many on-lot and some area systems would be replaced with connections to the central system. Any remaining failing systems would need to undergo remedial action. In some cases, this remedial action would involve replacing failing septic tanks/drainfields with connections to area systems. Table 2-25 summarizes potential failure types and corrective actions for a typical septic tank/soil absorption field system.

For all on-lot systems, environmental protection measures can include the following:

- Development of a management group or other type of association to oversee all on-site system activities.

- Field tests of soils, permeability and other parameters for each lot that is to have an on-lot system.

- Standardization of practices for firms that install on-lot systems.

- Regular inspection and maintenance of on-lot systems by a regulatory agency such as the LCPH.

According to the Leon County Public Health Unit (LCPHU), the successful operation of septic tank drainfields in the study area is a function of available soil storage above a confining layer and the capacity of the soil to move water. Accordingly, percolation tests and the measuring of water table elevations before development may be misleading for determining the suitability of areas to accommodate drainfields. The need exists to develop a more accurate methodology.

TABLE 2-24

WASTEWATER LAND DISPOSAL TECHNIQUES
IMPLEMENTABILITY
ADVANTAGES AND DISADVANTAGES

ID	Description	Advantage	Disadvantage
D3, D4	Forest Spray Irrigation	o Produces a marketable product including construction lumber, tree wood chips, and pulp and paper. o Has good nitrogen-consumption potential. o Conserves groundwater sources. o Less land grubbing/soil erosion/ global warming potential	o Requires commitment of large land areas. o Requires special water-tolerant tree species. o Buffer zones needed for public acceptance.
D1, D2	Agricultural Spray Irrigation	o Produces a marketable fodder crop. o Has good nitrogen-consumption potential. o Conserves groundwater sources.	o High operational costs to prepare land, plant, and harvest. o Buffer zones needed for public health protection. o Requires commitment of large land areas. o Soil erosion/global warming potential due to land clearing and grubbing
D6, D7, D8	Golf Course Irrigation	o Nutrient value of wastewater may lessen fertilizer application. o Conserves groundwater sources.	o Requires high quality effluent to prevent public health risks. o May require low pressure spray nozzles pointed downward to minimize aerosol drift (although high-level effluent disinfection should help alleviate aerosol concern). o Restriction of spraying during windy days.
D8	Irrigation of Ornamental Gardens	o Nutrient value of wastewater may lessen fertilizer application. o Conserves groundwater sources.	o Requires high quality effluent to prevent public health risks. o Reclaimed water is known to have adverse effects on some vegetation (e.g., azaleas and some tree species). o May require special low pressure spray nozzles pointed downward to minimize aerosol drift (although high-level effluent disinfection should help alleviate aerosol concern). o Restriction of spraying during windy days.

TABLE 2-24 (Cont'd.)

WASTEWATER LAND DISPOSAL TECHNIQUES
IMPLEMENTABILITY
ADVANTAGES AND DISADVANTAGES

ID	Description	Advantage	Disadvantage
D9	Power Line Right-of-Way Irrigation	o Conserves groundwater sources.	o Will result in higher operational costs due to increased frequency of mowing irrigated areas. o Requires more distribution pipe
D10	Sludge Disposal Field Application	o Minimal site preparation.	o Buffer zone needed for public health protection. o Appropriate groundwater monitoring required to determine extent of contaminant leaching. o Inundation basins must be maintained to break-up soil clogging conditions.
D11, D12	Rapid Infiltration Basins	o Reduced area requirements. o Replenishes groundwater supplies over time.	o Required nitrogen control may add to treatment cost. o Increased possibility of sinkhole formation. o Extensive groundwater monitoring required to determine extent of contaminant leaching.
D13	Landscape Irrigation and Percolation Ponds	o Replaces existing and future withdrawal of groundwater.	o Requires high quality effluent to prevent public health risks. o Possible public resistance to have treated wastewater applied to "your backyard."
D15	Deep-Well Injection	o Reduced area requirements.	o Extensive groundwater monitoring required to determine extent of contaminants leaching. o Requires establishment of a pilot program to determine economic feasibility.
D16, D17	Artificial (Constructed) Wetlands	o Reduced area requirements. o Have been successfully used in Europe.	o Require disposal of discharge which would involve an NPDES permit if discharged into waters of the United States.

TABLE 2-24 (Cont'd.)

WASTEWATER LAND DISPOSAL TECHNIQUES
IMPLEMENTABILITY
ADVANTAGES AND DISADVANTAGES

ID	Description	Advantage	Disadvantage
		o A functional facility exists in nearby Orlando, Florida. o Require less land area than spray irrigation fields.	o May require establishment of a pilot program to determine actual treatment efficiencies in a given climate locale. o Buffer zone needed for public health protection. o Success in the United States still fairly recent.
T4	Soil Absorption Fields and Sand Mounds	o Easy to construct.	o Can become clogged if not periodically maintained. o Requires commitment of large land areas.

Note: D5 and D14 do not include land disposal techniques.

Component		Condition
D14 -	Surface Water Discharge of Plant Effluent	FDER has classified the Ochlockonee and St. Marks Rivers as "Outstanding Florida Water", thereby imposing a zero effluent limitation.
D15 -	Deep Well Injection	FDER requires information on the location of a saline formation to receive the effluent and the availability of reasonable transmissivities.
D1, D2, D3, D4, D6, D7, D8, D9, and D13		Application rates for these slow rate processes must be carefully calculated and maintained to avoid ponding and groundwater contamination. Wells would need to be installed for continuous monitoring.

TABLE 2-25

FAILURES AND REMEDIAL ACTIONS
ON-LOT SYSTEMS [1]

Type of Failure	Remedial Action
Overloaded absorption field; septic tank effluent breaks through ground surface	o Increase absorption o Flow reduction measures o Eliminate clear water discharges o Oxidize clogging mat; pump out and repair or replace septic tank o More frequent maintenance o Dosing o Modification of site or system: regrading/filling/alternate system
Insufficient renovation by soil absorption field	o Modification of site or system: filling/alternate system o Intercept flow to groundwater by subsurface drainage

(1) Remedial action for failing on-lot systems also includes connecting to a centralized or area system.

2.4.5.4 Public Acceptance

Public acceptance of wastewater management alternatives will be closely related to the costs and inconvenience to homeowners and related to public health implications.

The probable reaction of specific groups affected by each alternative may be suggested by examining the particular interests of each group. For example, commercial owners, including apartment and office building owners, would be likely to favor alternatives which remove the responsibility for wastewater disposal from them and place it with a public agency. Cost would probably be a secondary consideration to relief from wastewater treatment problems. Owners of existing package treatment plants would be likely to favor alternatives that will leave their operations intact, while not favoring those alternatives that would curtail their operation. Landowners with interest in residential, commercial, or industrial development would favor the alternatives which most greatly facilitate such development.

A USEPA public hearing for the Draft EIS Supplement (DEISS) was held on August 9, 1990 at the Tallahassee City Commission Chambers, Tallahassee, Florida. The USEPA hosted the public hearing and received comments from eight different speakers. Public participation is further detailed in Sections 5.3.1 and 5.3.2.

2.4.6 <u>System Alternatives Selected for Detailed Evaluation</u>

Due to the nature of this study, in that there exists a wide variety of wastewater management components, four of the nine considered system alternatives were selected for more detailed evaluation in the EIS Supplement. The detailed evaluation includes an estimation of annual costs to the users. Also included is a detailed environmental evaluation that addresses both primary and secondary impacts of the specific system alternatives.

The system alternatives consist of eight (8) centralized alternatives and one (1) decentralized alternative. Because the decentralized system, Alternative 9, is similar to the 1983 EIS preferred alternative ("No-Federal-Action") and because it has the lowest calculated present worth, it was selected as one of the four (4) alternatives to undergo detailed evaluation in the EIS Supplement. The centralized alternatives of the EIS Supplement would also be No-Federal-Action alternatives provided local funds, i.e., no federal funds, were used.

The selection of the three (3) centralized system alternatives for further EIS consideration is based on the evaluation and screening process presented in Sections 2.4.2 through 2.4.5. Below is a brief description of the screening as it applies to each centralized system alternative (Alternatives 1-8). Those selected were system Alternatives 1, 2, and 7.

2.4.6.1 System Alternative 1: Treatment South, SE Agricultural and Golf Course Spray Irrigation

This system alternative is one of the alternatives selected for further EIS Supplement consideration. It has the lowest capital costs of all alternatives and the lowest present worth value of all centralized alternatives. Environmental impacts, though significant are minimized because the spray irrigation expansion includes areas adjacent to existing, successful, City-operated sprayfields. Golf courses would be irrigated only at specified times of the day when public exposure can be minimized. Implementability is also very high because the type of spray irrigation at the SE Sprayfield expansion site would be an extension of the existing agricultural operation and the golf course irrigation would be integrated with the existing irrigation system.

2.4.6.2 System Alternative 2: Treatment South, SE Forest and Golf Course Spray Irrigation

This system, which is a variation of Alternative 1, is one of the selected alternatives. It has the second lowest capital costs of all alternatives and the second lowest present worth of all centralized alternatives. The forest spray irrigation expansion includes forest areas near the existing, successfully-operated, agricultural sprayfields. This alternative also includes golf courses, which would be irrigated only at specified times of the day when public exposure can be minimized. Implementability is lower than System Alternative 1 because operating a forest spray irrigation system, including harvesting is new to the operators of the existing, adjacent agricultural operation and the buried, spray irrigation system requires special construction. As is the case for System Alternative 1, the golf course irrigation component would be integrated with the existing irrigation system.

2.4.6.3 System Alternative 3: Treatment South, SE Artificial Wetlands/RIBs and Golf Course Spray Irrigation

This system is not an alternative selected for further study. It has the third lowest capital costs, as does Alternative 7, but has a slightly higher operation and maintenance cost, which increases its present worth value. It is different from System Alternative 7 only in that it treats and disposes the wastewater in the southeast areas and includes golf course irrigation. Since selected Alternatives 1 and 2 already address siting all wastewater management facilities in the south and using the golf courses, it was determined that this alternative not be included.

2.4.6.4 System Alternative 4: Treatment South, SE Artificial (Constructed) Wetlands/RIBs

This alternative is not a selected alternative. It has the second highest capital costs and present worth value for all alternatives. It is a variation of Alternative 3 in that all treated effluent would be handled by artificial wetlands and RIBs adjacent to the SE Sprayfield.

2.4.6.5 System Alternative 5: Treatment North and South, NE and SE Agricultural Spray Irrigation

This alternative is not a selected alternative. It has the fifth lowest capital costs and present worth value for all alternatives. Implementability is a problem because 1) the inconsistent soil characteristics in the NE require special design of the irrigation system to avoid adverse environmental impacts and 2) the prevalence of sensitive wetlands in the NE makes the use of spray irrigation a potential adverse environmental impact.

2.4.6.6 System Alternative 6: Treatment North and South, NE and SE Forest Spray Irrigation

This alternative is not a selected alternative. It has the highest capital cost and present worth value of all alternatives. Implementability is a problem because 1) the inconsistent soil characteristics in the NE require special design of the irrigation system to avoid adverse environmental impacts, 2) the prevalence of sensitive wetlands in the NE makes the use of spray irrigation a potential adverse environmental impact, and 3) the operation of the forest spray irrigation system is new to the operators of the existing agricultural operation.

2.4.6.7 System Alternative 7: Treatment North and South, NE and SE Artificial (Constructed) Wetlands/RIBs

This alternative is a selected alternative. It has the third lowest capital costs of all alternatives, as does Alternative 3, but has a slightly lower operation and maintenance cost, which results in the third lowest present worth value for a centralized system. It is also included as one of the selected alternatives in order to include the detailed evaluation of a system with North and South Wastewater Management Sites which results in having the wastewater managed near the source. The use of artificial (constructed) wetlands as a wastewater treatment technology has been successful in Europe but is still a relatively new technology in the United States. The environmental impacts of constructed wetlands are low because of the inclusion of liners to be used in the wetland design and because of the relatively small land area requirements. Implementability can be expected to involve some start-up problems; however, implementability was overall considered to be the same as for the spray irrigation alternatives and can be expected to improve with time and experience. Constructed wetlands have shown increasing reliability in the United States (e.g., Orlando, Florida facility) and reliability has probably increased even since the FEISS preparation matrix analyses (1989). However, success in the United States (compared to Europe) is still fairly recent, the disposal method has not been used in the study area, and City personnel are not familiar with the technology -- particularly when compared to the agricultural spray irrigation technology. Reliability was therefore considered less than for spray irrigation alternatives, but can be expected to increase with time and experience. The discharge from the artificial wetlands would be disposed of through RIBs.

2.4.6.8 System Alternative 8: Treatment North and South, SE Artificial (Constructed) Wetlands/RIBs

This alternative is not a selected alternative. It has the fourth highest capital costs and present worth value for all alternatives.

2.4.6.9 Selected System Alternatives with Flow Reduction Measures

Table 2-26 summarizes the cost savings that could be realized if the flow reduction measures described in Section 2.2.4 were instituted. The flow reductions do not affect all components of a system alternative. Unaffected Components include the upgrading of the LBR Plant and the disposal components handling the LBR Plant's effluent (golf course irrigation). Generally, reducing the flow from 30.97 mgd to 29.75 mgd, which is a 4% decrease, generates an average decrease of 14% in capital costs, 18% in annual O&M costs, and 15% in present worth costs.

2.5 AFFECTED ENVIRONMENT

Section 2.5 is a modification of the "Affected Environment" section presented in the USEPA 1983 EIS (USEPA, 1983), for which the present EIS is a supplement. As such, considerable portions of the 1983 EIS were excerpted or edited and included in Section 2.5; some new material was also added. Statistics primarily relate to the 1983 EIS.

2.5.1 Description of the Study Area

Tallahassee, Leon County, is located in northwestern Florida. The City serves as both the state capital and county seat. The majority of the County's population is concentrated within Tallahassee and its immediate environs. Most urbanization has occurred north and east of the City. The remaining land area is comprised of natural and planted woodlands and swamps, and contains scattered residential development.

The EIS Supplement addresses direct and indirect impacts of wastewater management alternatives for the study area for a 20-year planning period (1990 through 2010). It is necessary to document the existing natural and man-made environments so that an assessment of the primary and secondary impacts of alternative actions can be made, and environmental protection measures can be recommended.

TABLE 2-26

SUMMARY OF COSTS WITH AND WITHOUT FLOW
REDUCTION MEASURES FOR THE FOUR SYSTEM
ALTERNATIVES SELECTED FOR FURTHER CONSIDERATION
(ESTIMATED COSTS IN THOUSANDS $) [1]

	WITHOUT FLOW REDUCTION				WITH FLOW REDUCTION[3]			
Alter. ID	Land (acres)	Capital Costs	Annual O&M Costs	Present Worth Value[2]	Land	Capital (acres)	Annual O&M Costs	Present Worth CostsValue[2]
1	1,410	85,706	3,659	119,407	996 (29%)	74,488 (13%)	2,744 (25%)	99,761 (16%)
2	1,475	92,238	2,998	119,851	1,042 (29%)	79,158 (14%)	2,280 (24%)	100,158 (16%)
7	1,004	98,278	2,469	121,019	870 (13%)	86,047 (12%)	2,144 (13%)	105,794 (13%)
9	469	98,771	1,531	112,872	469 (0%)	82,184 (17%)	1,340 (12%)	94,526 (16%)

(1) Cost estimates are in third quarter 1989 dollars.

(2) Assumes an 8.875 percent compound interest rate for a 20 year period.
Capital recovery factor = 0.1085724 and present worth factor = 9.210445.

(3) Percent reduction is the value in brackets.

2.5.2 Existing Natural Environment

Leon County is located 20 miles from the Gulf of Mexico and has a mild and moist climate that is characteristic of the Gulf States. The average year-round temperature in Tallahassee is 68° F (20° C) and has varied between 65° F (18.3° C) and 71° F (21.6° C). The average yearly rainfall is about 61 inches (154.9 cm) with variations from as low as 30.98 inches (78.7 cm) to 104.18 inches (264.6 cm). Prevailing winds average 7.7 miles per hour. They are from a southerly direction in the spring and summer and shift toward a more northerly direction near the end of the year.

No major odor producers are identified within the boundaries of the 1983 EIS study area. A few potential sources of odor, such as sewage treatment plants and light industry exist. According to the FDER, no major violations of ambient air quality standards have been reported during the 1983 EIS time-frame and air quality in the study area has been good. The primary noise generators in the study area are the Tallahassee Municipal Airport, railroad corridors, and Interstate 10, U.S. 319, U.S. 90, and U.S. 27.

Three major physiographic divisions are recognized in Leon County: 1) the Northern Highlands, 2) the Gulf Coastal Lowlands, and 3) The River Valley Lowlands (See Figure 2-8 which delineates the physiographic subdivisions including Karstic characteristics). Development in the study area has taken place mainly in the Northern Highlands, which is projected as the major future growth area, and to a lesser degree in the Gulf Coastal Lowlands. Subsurface geological formations in the study area include the Miccosukee and the Hawthorn Formations in northern Leon County, the St. Marks Formation and Sewanee Limestone in southeast Leon County, and the Jackson Bluff Formation in southwest Leon County.

About 25 percent of the land in the study area has slopes between one and four percent. The remainder of the County has slopes exceeding four percent in areas characterized by gently rolling topography. Slopes may exceed 10 to 15 percent in some areas along drainage ways.

Based on the "General Soil Map" for Leon County in the 1981 Soil Survey, Leon County is dominated by three soil associations: the Orangeburg-Lucy-Norfolk association in the northern part of Leon County and the Kershaw-Ortega-Alpin and the Dorovan-Talquin- Chipley associations in the southern part of Leon County. The Orangeburg-Lucy-Norfolk soils and the Kershaw-Ortega-Alpin soils are generally well-drained while the Dorovan-Talquin-Chipley soils are generally not well-drained. Specifically, the 1981 Soil Survey classifies the Orangeburg-Lucy- Norfolk soils as "well drained soils" and the Kershaw-Ortega-Alpin soils as "excessively drained and moderately well drained soils," while the Dorovan-Talquin-Chipley soils are considered "somewhat poorly drained to very poorly drained soils." Of the two well-drained soil associations, the depths of these sandy associations differ significantly: the Orangeburg-Lucy-Norfolk soils are sandy to only 20-inch depths with loam below, compared to sandy 20-40 inches deep with loam below or are loamy throughout (Note: "loam" is a soil type that is defined in the 1981 Soil Survey as a mix of clay (7-27%), silt (28-50%), and sand (<52%) particles.) By contrast, the Kershaw-Ortega-Alpin soils are sandy to 80 inches or more, with some having loamy layers (lamellae) below 45-inch depths.

Regarding the suitabilities of these soil associations for septic tank absorption fields, Table 11 of the 1981 Soil Survey presents the "restrictive soil features" of existing soil types. All listed Orangeburg, Lucy and Norfolk soil types are classified as "moderate: percs slowly" and/or "moderate: wetness," with "moderate" being defined as having unfavorable soil properties for the given activity. The Kershaw soils are classified as "slight" which is defined as soil properties generally favorable for the activity. Oretega and Alpin soils are classified as "severe: poor filter," with "severe" being defined as soil properties very unfavorable for the activity. The Dorovan, Talquin and Chipley soils are classified as "severe:

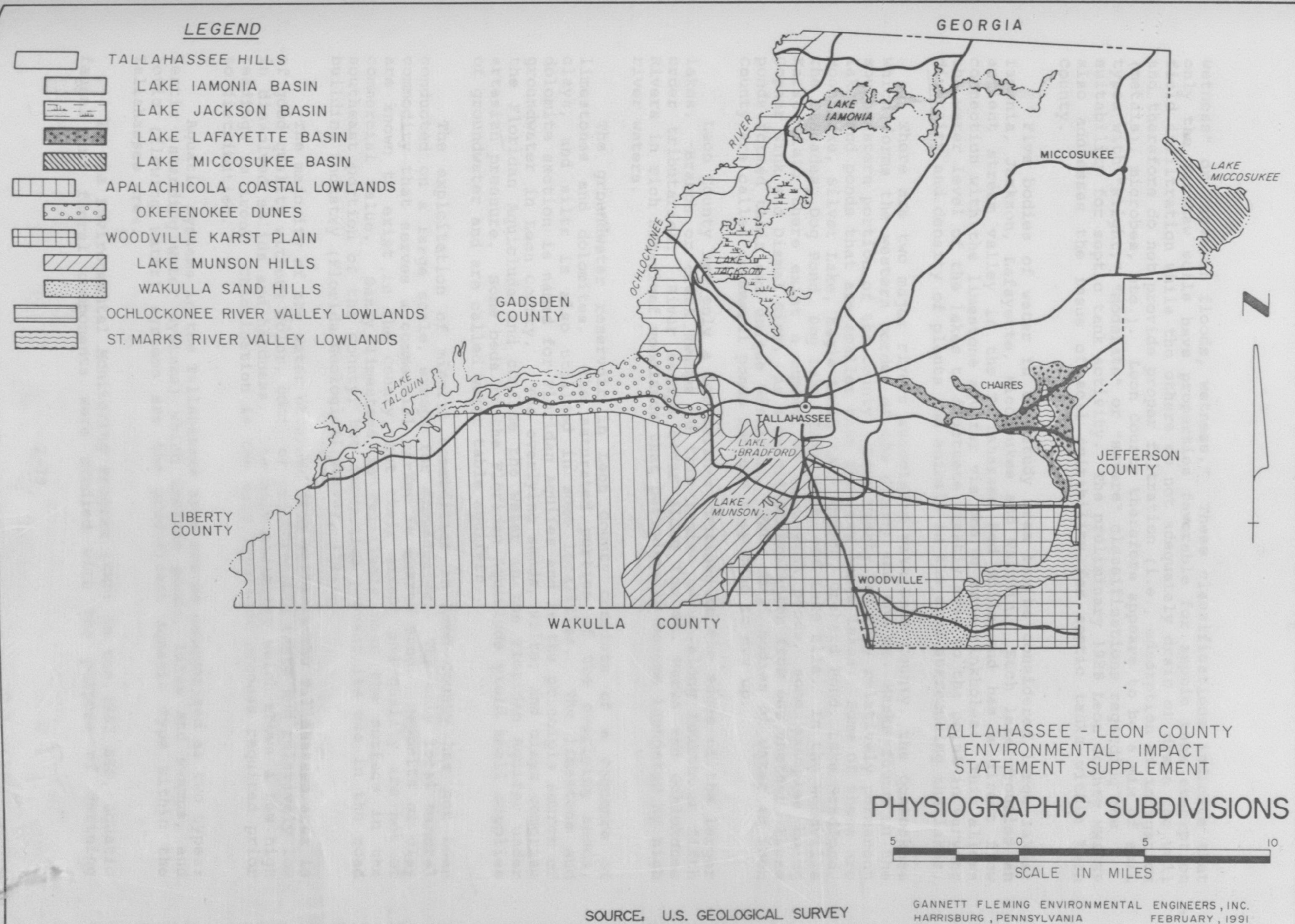

LEGEND
TALLAHASSEE HILLS
LAKE IAMONIA BASIN
LAKE JACKSON BASIN
LAKE LAFAYETTE BASIN
LAKE MICCOSUKEE BASIN
APALACHICOLA COASTAL LOWLANDS
OKEFENOKEE DUNES
WOODVILLE KARST PLAIN
LAKE MUNSON HILLS
WAKULLA SAND HILLS
OCHLOCKONEE RIVER VALLEY LOWLANDS
ST. MARKS RIVER VALLEY LOWLANDS
GEORGIA
LAKE IAMONIA
MICCOSUKEE
LAKE MICCOSUKEE
OCHLOCKONEE RIVER
LAKE JACKSON
GADSDEN COUNTY
LAKE TALQUIN
TALLAHASSEE
CHAIRES
LAKE BRADFORD
JEFFERSON COUNTY
LAKE MUNSON
LIBERTY COUNTY
WOODVILLE
WAKULLA COUNTY
N
TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT
PHYSIOGRAPHIC SUBDIVISIONS
5 0 5 10
SCALE IN MILES
SOURCE: U.S. GEOLOGICAL SURVEY
GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA
FEBRUARY, 1991

FIGURE 2-8

wetness" or "severe: floods, wetness." These classifications indicate that only the Kershaw soils have properties favorable for septic tank absorption field infiltration while the others do not adequately drain or drain too well and therefore do not provide proper filtration (i.e., adsorption of inorganics (metals), microbes, etc.). Leon County therefore appears to be a mix of soil types with "slight," "moderate" or "severe" classifications regarding the suitability for septic tank activity. The preliminary 1988 Leon County MW&SSP also addresses the issue of soil suitability for septic tanks within Leon County.

Five bodies of water in the study area can be considered large lakes: Iamonia, Jackson, Lafayette, Miccosukee and Talquin. Each lake occupies an ancient stream valley in the Tallahassee Red Hills and has a direct flow connection with the limestone aquifer via one or more sinkholes. This allows the water level of the lakes to fluctuate greatly even to the point in varying diversity and density of plants and animals in the area surrounding the lakes.

There are two major rivers associated with Leon County, the Ochlocknee which forms the western border of the County and the St. Marks found in the southeastern portion of the County. Leon County has many relatively permanent lakes and ponds that are smaller that the five large lakes. Some of these are Moon Lake, Silver Lake, Eagle Lake, Lake Munson, Orchard Pond, Lake Bradford, the Cascades, Dog Pond, Dog Lake, Lake Hall, and Lake Ella. In the Woodville Karst Plain there exist a number of open sink ponds, some examples being Gopher Sink and Dismal Sink. As a result of isolation from one another, these ponds formed their own unique ecosystem. Many small bodies of water in Leon County are called ephemeral ponds because they tend to dry up.

Leon County has only a few marshes confined to the edges of the larger lakes. Branch or creek swamps in this region occur along fourth or fifth order tributaries. River swamps occur along the St. Marks and Ochlokonee Rivers in rich broadleaf woodlands that periodically become inundated by high river waters.

The groundwater reservoir in Leon County consists of a sequence of limestones and dolomites. The saturated portion of the overlying sands, clays, and silts is also utilized in some localities. The limestone and dolomite section is named for Floridan Aquifer and is the principle source of groundwater in Leon County. The overlying sands, silts, and clays comprise the Floridan Aquiclude and confine the water in the Floridan Aquifer under artesian pressure. Some beds in the Floridan Aquiclude yield small supplies of groundwater and are called water table aquifers.

The exploitation of mineral commodities in Leon County has not been conducted on a large scale, except for groundwater. The only local mineral commodity that serves a commercial market is quartz sand. Deposits of clay are known to exist in the County, but their extent and quality are not of commercial value. Sandy limestone is relatively near the surface in the southeast portion of the County, but impurities prevent its use in the road building industry (Florida Geological Survey, 1961).

The majority of the water obtained from wells in the Tallahassee area is of good quality without color, odor, or objectionable taste and relatively low in dissolved solids and hardness. The only parameter which shows a few high readings is iron. Chlorination is the only treatment process required prior to distribution.

Aquatic systems in the Tallahassee area can be categorized as two types: lentic (standing water systems) which include ponds, lakes and swamps, and lotic (flowing water) systems are the predominant aquatic type within the Tallahassee area.

In the Environmental Monitoring Program (EMP) in the 1983 EIS, aquatic faunal and floral components were studied with the purpose of defining existing water quality conditions within the study area. These studies indicate that the aquatic systems of the study area are currently suffering from degraded water quality. While the problems are widespread, there are indications that there is a direct relationship to non-point and point pollution sources. The Lake Munson system seems to be in the worst condition.

The classification of the terrestrial vegetation was developed through a series of studies to provide a detailed mapping effort. The 201 Study, 208 Study (City of Tallahassee, 1977), 208 Study (Tallahassee-Leon County Planning Department, 1978), and the EIS EMP-Segment II (USEPA 1980) activities have all addressed vegetation.

The definition and description of the wildlife in Leon County have been much less sophisticated than that of the vegetation. The level of effort involved has generally been restricted to species lists. This effort has been extended to habitat/wildlife associations only for protected or sensitive species, and Florida species of special concern. Table 2-27 provides the status of protected plants and animals which may occur in the study area.

EIS Supplement field investigations (January 23, 1991) showed that several protected animals are likely to occur within some of the potential sprayfield areas. Active and abandoned Gopher Tortoise burrows were observed at the Eastern Expansion area (Alternative 1) of the existing SE Sprayfield. Abandoned burrows can be used by Gopher Frogs and the Florida Pine Snake. In the southern sprayfield sites, proper habitat conditions are present for the occurrence of the Gopher Frog, Indigo Snake, Gopher Tortoise and Florida Pine Snake. Wiregrass, while not legally protected, was also found on site.

Wiregrass acts to carry fire which is vital in Longleaf pine habitat. The area is also habitat for the Panhandle Golden Aster and the Panhandle Meadow Beauty. (See Table 2-27 for protected status listings for local flora and fauna.)

A number of ecosystems have been identified as being vulnerable to impacts of wastewater management systems or development, or as providing habitat for threatened and endangered species. The ecosystems may be grouped in the following categories: lakes, wetlands, aquatic-subterranean ecosystems, habitats for protected species, steepheads and other ravines, and floodplains.

Nonpoint source pollution refers to nondiscrete and diffuse inputs or loadings which are usually associated with rainfall events and are associated with both natural processes and human activities. Non-point sources which affect the study area include atmosphere, vegetation, urban areas, construction activities, agriculture-silviculture activities and solid waste disposal sites.

There are 9 known and previously-documented (listed) archeological sites in the SE and SW Sprayfield study areas. Figure 2-9 shows the locations of these resources. These sites are known to contain relics of various early cultures.

During November 1990, the City contracted with the University of West Florida, Institute of West Florida Archeology, for a Phase I Cultural resource inventory and assessment of the proposed expansion areas of the TPS Plant and the Eastern Expansion area of the SE Sprayfield. A final report was submitted to the City in February 1991 with the following conclusions:

- The only site of cultural remains located in the TPS Plant parent tract was the previously recorded 8LE546.

- No culturally significant remains were found to exist in the TPS Plant expansion tract.

TABLE 2-27

PROTECTED FLORA AND FAUNA THAT RANGE IN THE STUDY AREA

	Florida Species of Special Concern	Federal-Level Category 2	Threatened in Florida	Endangered in Florida	Threatened in United States	Endangered in United States
Eastern Indigo Snake *Drymarchon Corais*	X		X		X	
Florida Pine Snake *Pituophis Melanoleucus melanoleucus*	X	X				
Gopher Tortoise *Gopherus polyphemus*	X	X				
Gopher Frog *Rana aerolata aesopus*	X	X				
Panhandle Golden Aster *Pityopsis flexuosa*				X		C
Panhandle Meadow Beauty *Rhexia salicifolia*		X				

Notes:

Species of Special Concern - a species which is known to be vulnerable, but no protection measures have been enacted at the State level.

Federal Level Category 2 - species which are candidates for federal listing as threatened or endangered. These species show evidence of vulnerability, but not enough is known to support a listing.

C = Candidate - any species proposed for listing as federally threatened or endangered.

Source: Dave Martin, USFWS, Jacksonville, Florida.

PAGE NOT

AVAILABLE

DIGITALLY

- Cultural remains were located in 26 new sites in the Eastern Expansion area of the SE Sprayfield (See Figures 2-9 and 4-2).

- Of the 26 areas of cultural material recorded in the Eastern Expansion area, five appear to be significant enough to warrant further consideration.

Recommendations presented in this final report (February, 1991) for protecting the cultural resources at these sites are incorporated into the environmental protection measures of Sections 3.3.5 and 4.6.1.

2.5.3 Existing Man-Made Environment

The populations of Tallahassee and Leon County have experienced steady growth over the past 50 years. The primary factor in population growth has been in-migration. The sunbelt states, and Florida in particular, have experienced significant population increases over the last two decades. In addition, Tallahassee is the State's capitol and the site of Florida State University and Florida A&M University. Increased opportunities in government employment and increased enrollments have both contributed to in-migration.

Residential land use is the predominant land use in the study area. Other land uses in Leon County include commercial, industrial, institutional, open space, agriculture, transportation/utilities, and the Apalachicola National Forest. The TLCPD 1987 population projections were employed in the EIS Supplement. Section 2.2.2 documents the projections by service area for the study area that were used to estimate sewage flows (Sections 2.2.3 and 2.2.4).

Population information more recent than the 1983 USEPA EIS presently exists. According to the Tallahassee-Leon County Planning Department (1992) statistics dated February 14, 1992, the 1990 census population of Leon County including the City of Tallahassee and university students is 192,493 and a population projection for the year 2010 of 261,600 (35% increase since 1990). According to the Tallahassee Chamber of Commerce, the 1990 population of the City of Tallahassee is 124,733 (presumably also for 1990 and including university students).

Leon County is primarily a government, trade and service center. Over fifty percent (>50%) of non-agricultural employment is in government, reflecting Tallahassee's status as the State capitol. Approximately twenty percent (20%) of the nonagricultural employment is in wholesale and retail trade. The third largest employment sector is services, which records approximately thirteen percent (13%) of total nonfarm employment, and is attributable to the presence of Florida A&M University, Florida State University, and Tallahassee Community College in the study area.

A wide variety of recreational opportunities are available in Leon County. Apalachicola National Forest is the largest recreational resource in this area covering 103,471 acres. Silver lake, located within the Forest offers a complete range of outdoor activities. Numerous State, County, City, and privately-owned parks and recreational facilities are available for public use.

Of the major components of the transportation system (highway, air, rail, and water), only highway and air systems have significant importance to the study area. Four major Federal highways, U.S. 90, U.S. 27, U.S. 319, and I-10, intersect the Tallahassee area. The Tallahassee Municipal Airport is owned and operated by the City of Tallahassee and is served by several commercial airlines. There are no important navigable waters or significant rail centers in the study area, although there is rail freight service to Leon County.

Various natural resources are found and utilized within the Tallahassee-Leon County study area. The major natural resources are minerals, timber, agriculture, freshwater fish and wildlife.

One Class I sanitary landfill is found in the study area, located on U.S. 27 South. It is owned and operated by Leon County. The existing site comprises 620 acres and has a life of 30 years. The sanitary landfill operates the trench method and uses the lined cell concept for compacting the refuse. The landfill currently disposes about 400 tons of waste daily.

Land development controls are an important aspect of water quality management planning. Land use regulations can be used to direct development away from sensitive environmental areas, including water-quality-sensitive areas. Land use controls can also serve to mitigate any short- or long-term negative impacts that may result from the provision of wastewater treatment and disposal facilities. Leon County and the City of Tallahassee at present administer many environmentally-oriented regulatory measures. However, most ordinances now in effect are only for the purpose of regulating development.

CHAPTER 3

ALTERNATIVES EVALUATION

CHAPTER 3 ALTERNATIVES EVALUATION

This chapter addresses the evaluation and rating of the four system alternatives selected for further evaluation (Alternatives 1, 2, 7 and 9) in the EIS Supplement. The characteristics of the categories of the cost-effectiveness, implementability, reliability, and environmental impacts were considered by alternative in a matrix rating format. The evaluation was developed during the DEISS preparation stage (1989). The rating information was subsequently utilized to rank the overall acceptability of the four alternatives relative to the four categories considered. Ranking was not statistically treated (Refer to Chapter 4 of this FEISS).

3.1 COST AND IMPLEMENTABILITY EVALUATION

3.1.1 Cost Effectiveness

The USEPA requires that the alternative evaluation process include a cost-effectiveness analysis. The objective of a cost-effectiveness analysis, according to USEPA regulations for the construction grants program (Code of Federal Regulations Title 40, Part 35, Appendix A), is to determine which wastewater management system alternative will meet federal, state, or local requirements in the minimum total resource cost over time. Furthermore, the most cost-effective alternative is defined as the system with the lowest present worth value (1989) unless non-monetary costs are overriding. The non-monetary factors include primary and secondary environmental effects, implementation capability, operability, and performance reliability and flexibility. Even though use of federal funds is not anticipated for the considered alternatives, it is still important to the users and potential users, and therefore to USEPA, that the wastewater management system costs be reasonable for the users.

Tables 2-11 through 2-19 presented the estimated project costs for each of the system alternatives. These costs are used as a basis for the project cost analysis presented in Section 3.1.1.1 for the four (4) selected system alternatives. A discussion of financing options is included to determine sources of revenue for construction of an alternative, particularly the centralized alternatives. User charges for the four (4) alternatives were estimated to determine the financial impact of the proposed wastewater treatment and disposal services on the Tallahassee-Leon County area user households.

Although the system alternatives have been planned in some detail and every effort has been made to ensure that the costs of each alternative are reasonable, it should be recognized that uncertainty is inherent in any attempt to plan for the future. Indeed, with the level of detail used in a study like this one, error limits of 30 percent can be expected. The objective of the cost-effectiveness evaluation was not to define what the actual charge to the users of each system would be, but rather to develop costs that would be internally consistent and allow a valid comparison of alternatives.

3.1.1.1 Project Costs

Cost estimates in this section were based on 1989 dollars.

3.1.1.1.1 System Alternative 1: Treatment South, SE Agricultural and Golf Course Spray Irrigation

The treatment components of Alternative 1 consist of improving the LBR Plant and improving and expanding the TPS Plant for a total capital cost of $15,665,000. The expanded conveyance system which is to transport collected sewage from new development to these plants is estimated to cost $52,586,000.

The effluent disposal system, which includes expanding the existing SE Agricultural Spray Irrigation operations by 1,410 acres and using spray irrigation at four (4) golf courses, is estimated to have a capital cost of

$17,455,000. These costs include the $8,733,000 for conveying treated effluent to the disposal sites.

The total capital and annual Operations and Maintenance (O&M) costs for Alternative 1 are estimated to be $85,706,000 and $3,659,000, respectively. These costs were summarized in Table 2-11.

3.1.1.1.2 System Alternative 2: Treatment South, SE Forest and Golf Course Spray Irrigation

The project costs for Alternative 2 are similar to those of Alternative 1 except for the effluent disposal system which includes expanding the existing SE disposal site by 1,475 acres, but using forest spray irrigation on these acres instead of agricultural spray irrigation. The total capital costs for the disposal components are $23,987,000 which include $8,733,000 for conveying treated effluent to the disposal sites.

The total capital and annual O&M costs for Alternative 2 are estimated to be $92,238,000 and $2,998,000, respectively. These costs were summarized in Table 2-12.

3.1.1.1.3 System Alternative 7: Treatment North and South, SE and NE Artificial Wetlands

The treatment components of Alternative 7 consist of improving and expanding the TPS Plant, and constructing a new NE Plant for a total capital cost of $26,309,000. The expanded conveyance system which is to transport collected sewage from new development to these plants is estimated to cost $36,207,000.

The effluent disposal system includes expanding the existing SE disposal site by 424 acres and developing a 580 acre NE disposal site. Disposal facilities at these sites include artificial (constructed) wetlands and rapid infiltration basins. These facilities are estimated to have a capital cost of $35,805,000 which includes $4,226,000 for conveying treated effluent to the disposal sites.

The total capital and annual O&M costs for Alternative 7 are estimated to be $98,321,000 and $2,469,000, respectively. These costs were summarized in Table 2-17.

3.1.1.1.4 System Alternative 9: Decentralized

The project costs for Alternative 9 were summarized in Table 2-19 and includes costs for improving the LBR Plant, expanding the Killearn Lakes Plant, constructing on-lot systems using septic tanks and soil absorption fields or sand mounds, expanding effluent conveyance capacity from the TPS Plant to the SE disposal site, and expanding the existing SE Agricultural Spray Irrigation operations by 469 acres. Total capital costs are estimated to be $99,779,000 and the total annual O&M costs are estimated to be $1,540,000.

3.1.1.2 Financing Options

The annual household costs presented in the following section assumes, for the sake of comparison, that the City finances the centralized system alternatives using the sale of revenue bonds. In addition to this financing mechanism, there are cost-sharing techniques including federal grants. The current status of the federal grant program is described below followed by a summary of municipal revenue bonds and privatization.

3.1.1.2.1 Federal Grants

Current USEPA construction grant regulations provide for federal funding of 55 percent of the allowable costs of wastewater treatment projects started after September 30, 1984. However, such projects must appear on the State's priority list. Projects with the highest priority receive grants and then, if funds are available, the other projects are funded in descending order of priority. The priority list is assembled each year. No Construction Grant funds are currently available. To replace this lost funding source, the USEPA has assisted the states in establishing revolving loan fund programs. In any case, the costs in this study are presented assuming no grant participation.

3.1.1.2.2 Municipal Revenue Bonds

Revenue bonds are tax exempt debt instruments which are used to construct capital projects and are retired by payments from user charges collected by the City.

The tax exempt status of municipal revenue bonds will not be affected by new tax laws. However, the traditional purchasers of municipal revenue bonds (large banks, insurance companies and retirement funds) will be restricted as to the amount of tax exempt securities that they purchase. Therefore, the cost of selling municipal revenue bonds and the interest rates paid may increase.

Another issue affecting the use of municipal revenue bonds by the City for construction projects in Leon County is debt service coverage. Debt service coverage is expressed as a multiplier or percentage of net revenue. In order for the City to sell revenue bonds, it will have to demonstrate that it generates a net revenue approximately 1.1 times its annual debt.

3.1.1.2.3 Privatization

Privatization is a concept that has been created as a result of the emphasis by local, state and federal governments to reduce the deficit and any grant-in-aid programs. Under this approach, a private firm could be contracted to design, finance, construct, own and operate facilities.

Privatization is not intended to be synonymous with a single financing approach. Privatization applies to the range of techniques which a public agency may utilize in order to engage private companies in the solution to its problems. It can apply to: municipal leasing, wherein no tax benefits arising from ownership are intended to be realized; the creative sale of future user rights as a basis of security for future purchases; the development and application of the infrastructure bank concept; and a system of revolving, repayable grants. It can also apply to other creative concepts not yet formulated.

3.1.1.3 Annual Household Costs

For evaluation purposes, user charges are defined as the average total annual household costs for the wastewater management system. This average annual cost is a weighted average of costs for the existing sewered, existing unsewered to be served, and future households to be served.

3.1.1.3.1 Household Characteristics

Table 3-1 presents the household projections by service area for the Tallahassee-Leon County study area. Using the 1980 census household statistics, the service areas' average household sizes (persons per household) were determined. Generally, the areas on the outskirts and outside of the City tend to have larger households. Since most of the development is occurring at these locations, particularly in areas north of the center of the City, the overall study area's household size increases slightly for the design years.

TABLE 3-1

HOUSEHOLD PROJECTIONS BY SERVICE AREA

Service Area	Household Size (Persons/HH)	CENTRALIZED SEWERED HOUSEHOLDS 1987	1990	2000	2010	UNSEWERED HOUSEHOLDS (1),(2) 1987	1990	2000	2010	TOTAL HOUSEHOLDS 1987	1990	2000	2010
Lake Bradford Road	2.03	18,038	17,987	17,957	17,952	0	0	0	0	18,038	17,987	17,957	17,952
P.S. No. 12	2.57	12,199	14,479	18,870	21,506	5,228	3,620	2,097	1,132	17,428	18,099	20,967	22,638
Riggins Road	2.76	6,447	7,276	8,355	10,723	0	0	0	0	6,447	7,276	8,355	10,723
Northeast	3.15	1,951	2,562	3,935	5,377	2,211	2,479	2,689	2,663	4,133	5,041	6,624	8,040
Springhill Rd	2.70	8,997	9,507	10,449	11,269	0	0	0	0	8,997	9,507	10,449	11,269
T.P. Smith	2.80	178	371	549	696	534	371	235	174	712	742	784	870
Southeast	2.66	212	594	840	1,796	2,711	2,815	4,849	6,554	2,923	3,409	5,689	8,350
Buck Lake	3.03	146	333	964	3,036	1,312	1,333	1,446	759	1,458	1,666	2,409	3,795
Totals		48,168	53,109	61,919	72,355	11,996	10,618	11,316	11,282	60,136	63,727	73,234	83,637
Average Household Size		2.44	2.47	2.51	2.55	2.76	2.80	2.81	2.79	2.51	2.52	2.55	2.58

(1) Includes households using on-lot and small community wastewater treatment and disposal facilities.

(2) Based on service percentages provided in the City Master Sewer Plan, 1987-2010, Table 4.1-B.

As stated previously the objective of calculating annual household costs is not to define what the actual user charges of each system will be, but rather to develop costs that would be used to provide a valid comparison of alternatives. In addition, the calculation of the average annual payment is necessary to determine whether a project is too expensive by USEPA guidelines.

The USEPA considers wastewater management projects to be expensive when the average annual household cost exceeds the following percentages of median annual household income (values were adjusted using the U.S. Department of Labor Consumer Price Index to reflect 1989 dollars):

- 1.0 percent when the service area's median income is less than $15,000,
- 1.5 percent when the service area's median income is between $15,000 and $26,000; and
- 1.75 percent when the service area's median income is greater than $26,000.

Table 3-2 lists the estimated 1989 median household income for the service areas along with the calculated maximum annual household cost as recommended by the USEPA.

The total annual household costs calculated for the EIS Supplement consist of three components: annual debt payment, annual assessment payments, and annual operating, maintenance, and replacement costs. These cost components and the assumptions used to calculate their values are described below. The costs estimates assume no federal grant funding.

3.1.1.3.2 Annual Debt Payment

For the purpose of this cost-effectiveness evaluation, it is assumed that the City would float one revenue bond to raise capital funds to cover the costs of facility planning, design, and construction for a centralized system. The bond would be amortized over a 20-year period at an interest rate of 9 percent. Therefore, the annual debt payment is the capital recovery factor, 0.10955, times the bond amount which is the total project cost. Table 3-3 displays the debt payment calculation for the three (3) selected centralized alternatives plus Alternative 9.

Generally, it is assumed that the costs for area systems, such as those proposed in Alternative 9 (decentralized alternative), will be paid for by the developers who, in turn, will recover them as part of the selling price of the house or other types of structures. Therefore, the cost for on-lot systems will be a part of the selling price of a new house or a structure not connected to either an area system or a large centralized system. To account for these "hidden" costs in the cost-effectiveness analysis, it was assumed that the capital costs for area and on-lot systems would be amortized over a 30-year period at a 9.5 percent interest rate, based on a typical 1989 market rate for first mortgages (capital recovery factor = 0.10168). The annual debt payments for those future households of Alternative 9 are presented in Table 3-5, for "expansion areas".

3.1.1.3.3 Annual Operating, Maintenance, and Replacement Costs

This component includes annual costs for operating, maintaining and replacing "perishable" equipment (defined below). The annual replacement cost is the yearly investment over a 20-year period (the assumed life of the "perishable" parts of the facility) at a fixed rate of return, required to pay the replacement cost at the end of the 20-year period. In actuality, the service provider may choose to finance equipment replacement at the time of purchase

TABLE 3-2

ESTIMATED MEDIAN ANNUAL HOUSEHOLD INCOMES
AND USEPA RECOMMENDED MAXIMUM COSTS
(1989 DOLLARS)

Service Area	Median Annual Household Income (1)	Maximum Annual Household Cost (2)
Lake Bradford Road	$11,200	$ 112
P.S. No. 12	24,600	369
Riggins Road	32,400	567
Northeast	43,000	753
Springhill Road	15,900	239
T.P. Smith	20,700	311
Southeast	24,700	371
Buck Lake	36,800	644
Service Area-wide	24,000	360
City-wide	17,900	269
County-wide	21,900	329

(1) Based on data from the 1980 Census of Population and Housing of the U.S. Department of Commerce and the Consumer Price Index (all urban consumers, U.S. City average, all items) of the U.S. Department of Labor.

(2) Calculated maximum allowable costs for wastewater management systems.

TABLE 3-3

CALCULATION OF DEBT PAYMENT FOR SEWERED POPULATION
(Thousands of 1989 Dollars)

	Alternatives Selected For Further Consideration in the Alternatives Analysis			
	1	2	7	9 (3)
Project Cost	85,706	92,238	98,278	4,343
Annual Debt Payment	9,389	10,105	10,766	476
Average Household Annual Household Debt Payment (Dollars)	130 (1)	140 (1)	149 (1)	9 (2)

(1) Assumes a service area of 72,355 households in the year 2010.

(2) Assumes a service area of 54,256 households in the year 2010.

(3) Excludes the on-lot systems proposed to serve future populations.

rather than establish a replacement fund as illustrated here. The replacement costs are included in the annual cost for this analysis to maximize the household cost and provide a "worst-case" comparison against USEPA's expansiveness criteria. The interest rate used for the fixed rate of return is 8-7/8 percent, which was the current interest rate used by the USEPA for present worth analysis at the time of the evaluation (1989).

Estimates for replacement costs assumed equipment (perishable parts) consisted of the following:

- One hundred percent of the treatment plant electrical; heating, ventilation and air conditioning (HVAC), instrumentation, and piping components;
- Ten percent of the treatment plant major structures (appurtenances and process equipment); and
- Ten percent of both the sewer line components (both collectors and interceptors) and the major components of the conveyance pumps.

Table 3-4 lists the estimated average annual household costs for operation, maintenance, and replacement (OM&R) and the breakdown of these costs of facility components. Replacement costs are not included in the annual O&M costs for on-lot and area systems because all "parts" are assumed to last the service life of the system provided proper maintenance procedures are followed. The annual O&M costs for area systems and on-lot systems for Alternative 9 are included in Table 3-5.

3.1.1.3.4 Assessment

For this analysis it is assumed that the City would finance the construction of collection systems for the existing unsewered expansion areas by assessment of costs against benefitted properties. The estimated average per-household cost of collection systems, including house connection, is $8,180 in 1989 dollars. Assuming a 9.5 percent interest rate, based on a typical 1989 market rate for first mortgages, a 30-year loan for $8,180 would have annual payments of $831. For the purpose of this evaluation, the annual household cost for households in expansion areas includes the $831 yearly assessment cost. The cost of collectors for these households is likely to be a part of the price of the house and would be included in the mortgage amount. Unsewered households in "infill" areas do not incur significant costs for collection and therefore do not have costs included here.

3.1.1.3.5 Total Annual Cost

The total annual household costs for system customers are shown in Table 3-5. The average total annual payment is a weighted average of the existing sewered, future infilling, future expansion, and future on-lot households. The range of average annual payment is from $149 (for Alternative 9) to $274 (for Alternative 7), excluding hook-up costs (Note: Hook-up costs are addressed in the "Project Updates Summary" Chapter of this FEISS. In general, the total City connection fee (FY 94 dollars) for residents inside the City limits is $2,970 and $4,305.60 outside the City limits, plus actual on-lot connection costs for individual residences (plumber's fee) of approximately $1,000 (1994 dollars) can also be expected; the City also charges a monthly user fee (FY 94 dollars) of $2.60 per 1,000 gallons of sewage for City residents and $3.90 per 1,000 gallons of sewage for residents outside the City). Table 3-2 listed the median annual household income for the Leon County Area which resulted in a recommended maximum household cost for wastewater management of $360. All alternative systems are within this level. It should be noted that any large centralized system would be done in phases and should lessen the burden on existing, sewered households.

TABLE 3-4

ESTIMATED ANNUAL OPERATION, MAINTENANCE AND REPLACEMENT COSTS
(Thousands of 1989 Dollars)

	Alternatives Selected For Further Consideration in the Alternatives Analysis			
	1	2	7	9 [1]
Conveyance O&M	404	404	333	-
R	439	439	302	-
Treatment O&M	2,010	2,010	1,098	94
R	399	399	540	6
Disposal Conveyance				
O&M	122	122	72	22
R	73	73	35	14
Disposal O&M	1,123	462	966	349
R	72	125	205	15
Total	4,642	4,034	3,551	500
Average Annual Household Cost (Dollars)	64[2]	56[2]	49[2]	9[3]

(1) Excludes the on-lot systems proposed to serve future populations.

(2) Assumes a service area of 72,355 households in the year 2010.

(3) Assumes a service area of 54,256 households in the year 2010.

TABLE 3-5

ESTIMATED ANNUAL HOUSEHOLD COSTS
(in Third Quarter 1989 Dollars)

	Alternatives Selected For Further Consideration in the Alternatives Analysis			
	1	2	7	9
Annual Debt Payment for Treatment & Interceptor				
Existing Sewered Areas	130	140	149	9
Future Infilling	130	140	149	9
Future Expansion				
Centralized	130	140	149	0
On-lot	0	0	0	540
Area	0	0	0	410
Annual OM&R Cost for Treatment and Conveyance				
Existing Sewer Areas	64	56	49	9
Future Infilling	64	56	49	9
Future Expansion				
Centralized	64	56	49	0
On-lot	0	0	0	52
Area	0	0	0	291
Assessment for Collection System				
Existing Sewered Areas	0	0	0	0
Future Infilling	0	0	0	0
Future Expansion				
Centralized	831	831	831	0
On-lot	0	0	0	0
Area	0	0	0	831
Total Annual Payment				
Existing Sewered Areas	194	196	198	18
Future Infilling	194	196	198	18
Future Expansion				
Centralized	1025	1027	1029	0
On-lot	0	0	0	592
Area	0	0	0	1532
Average Annual Payment (1)	270	272	274	168

USEPA Maximum Annual Household Cost for Service Area = 360

(1) Weighted average of the existing sewered, existing unsewered to be served, and future households to be served. Values used are:

	Alternatives 1, 2, and 7	Alternative 9
Existing Sewered	48,168	48,168
Future Infilling	17,605	6,088
Future Expansion		
Centralized	6,582	0
On-lot	0	17,569
Area	0	530
Total	72,355	72,355

TABLE 3-6

COST-EFFECTIVENESS ANALYSIS RATING
(in Third-Quarter 1989 dollars)

Cost-Effectiveness[1] Characteristics	Alternatives Selected For Further Consideration in the Alternatives Analysis			
	1	2	7	9
Capital Costs	4	3	2	1
Annual O&M Costs	1	2	3	4
Present Worth Values	3	2	1	4
Annual Household Costs	3	2	1	4
Total	11	9	7	13
Average	2.75	2.25	1.75	3.25
Ranking[2]	3	2	1	4

(1) Rating scale for characteristics goes from high cost/low value (=1) to low cost/high value (=4)

(2) Ranking of alternatives goes from least preferred (=1) to most preferred (=4). When a tie exists for a category, both alternatives are assigned the same numerical ranking. Ranking is not statistically treated.

3.1.1.4 Alternative Cost-Effectiveness Summary

Table 3-6 presents a simple rating of the four alternatives selected for further consideration for cost-effectiveness. This matrix was developed at the DEISS preparation stage (1989). Based on this analysis, Alternative 9 is considered the most cost-effective followed by Alternative 1 and Alternative 2, respectively. Alternative 7 is considered the least cost-effective alternative.

3.1.2. Implementability

The engineering and technical expertise necessary to implement the selected alternatives is generally well established and available for agricultural and forest spray irrigation, treatment plant upgrades and effluent conveyance, and on-lot (septic tank) systems. The technology for artificial (constructed) wetlands is also established and available, although it is still a somewhat recent technology in terms of implementation in the United States. Implementability of alternatives is also related to public acceptance, public agency approval, and City and County selection.

The following conclusions summarize some inputs from public participation programs undertaken by the 1983 USEPA EIS and inputs at the DEISS preparation stage of the EIS Supplement:

1. Low annual costs to households are preferred and it is generally assumed that the project will not receive federal grant funds. The Leon County Board of Commissioners has established as their Goal Number 4, for development of services in the unincorporated area of the County - Provide water and sewer services at lowest possible costs.

2. Distribution of costs is a major concern to many citizens and should be based on use. Generally, centralized wastewater management system costs are spread over all utility customers beginning when facilities are added. Consequently, the capital cost of carrying significant amounts of over-capacity would have to be borne by existing customers until new customers connected to the system and the facility reached user capacity. On the other hand, most of the costs of on-site facilities (a decentralized system) would be incurred by the user leaving a small balance to be passed on to the public, i.e., equitable cost allocation. Also, on-site facility costs would be incurred simultaneously with the need for the facilities resulting in a more efficient use of invested capital.

3. Compatibility of the management system with existing land use is a major concern to many citizens. The Leon County Board of Commissioners has established as their Goal Number 1 for development of services in the unincorporated area of the County - Manage the impact of growth.

4. A management system that is flexible to meet the changing needs of a developing area and that increases the availability of sewer management systems is preferred. The Leon County Board of Commissioners has established as their Goal Number 2 for development of services in the unincorporated area of the County - Increase ability to respond to citizens needs.

5. A management system that simplifies the procedures needed to monitor the operations and maintenance of a system is desirable to ensure that the system functions properly. The Leon County Board of Commissioners has established as their Goal Number 3 for development of services in the unincorporated area of the County - Develop tools for managing services.

6. The City prefers expansion of the T. P. Smith Facility to 27.5 mgd and expansion of the Southeast Agricultural Spray Irrigation operations to handle the additional effluent. (Update: The USEPA understands from the City of Tallahassee that the City's 7.5 mgd expansion of the T.P. Smith Treatment Plant was completed in January 1993. Design of the potential expansion of the City's Southeast Sprayfield has not begun due to the Leon County Board of Commissioners' denial of the City's application for sewer franchises for right-of-way placement points for the expansion of the sprayfield. Also see "Project Updates Summary" of this FEISS).

7. Citizens of southwestern Leon County (Munson Area Preservation, Inc.) oppose expanding treatment and disposal facilities in the south to accept wastewater from development in the north, particularly the northeastern areas of the County.

8. Citizens of southwestern Leon County (Munson Area Preservation, Inc.) expressed concerns over the environmental impact of effluent spray irrigation operations. Specific concerns include groundwater contamination and transmittal of disease by spray aerosols and animal vectors. Citizens of Springhill Road expressed concern over the limited ability of sprayfield crops (forests or agricultural) to absorb pollutants during periods of germination and during times of inactivity when the field is left fallow such as in the winter season. Also people are concerned with the potential for ponding in saturated or unsuitable soils.

9. Citizens of Springhill Road expressed doubt regarding the successful use of artificial wetlands citing the failure of Lake Jackson's artificial wetlands to prevent pollution of the lake, the high percolation rates of SW Kershaw sands in the area, and the limited growing season for bulrushes (approximately 6 months of the year).

10. Failure of on-lot systems is a concern to the County and the City. Many citizens believe on-lot system failures are due to poor location and are not inherent in the design of septic tanks and soil absorption fields.

11. Non-point-source pollution resulting primarily from storm water runoff has been a growing concern to the public in that it contributes to the fouling of surface and ground waters. Uncontrolled runoff from agricultural sites and malfunctioning on-lot systems are primary issues.

Table 3-7 presents a simple rating of the four alternatives selected for further consideration for implementability. The implementability rating involved the City's approval of the technologies/alternatives, equitable cost distribution, certain public concerns such as land-use compatibility, and various other considerations. This matrix analysis was developed at the DEISS preparation stage (1989) and therefore does not include more recent developments. It should also be noted that this implementability analysis does not account for a "weighting" of implementation characteristics, in that all characteristics are considered of equal importance. From Table 3-7, centralized Alternatives 1, 2, and 7 are considered to have a slight and equal advantage in regards to potential implementability over the decentralized alternative, Alternative 9.

More recent developments since the analysis at the DEISS preparation stage include the specific public comment letters on the DEISS and the USEPA Public Hearing in Tallahassee on August 9, 1990. A copy of the DEISS comment letters, the public hearing transcript with speaker comments, and associated USEPA responses are provided in Chapter 5 of this FEISS. Some of these concerns were similar to those items provided above (e.g., Item #7: preference for wastewater

TABLE 3-7

IMPLEMENTABILITY ANALYSIS RATING

Implementation Characteristics[1]	Alternatives Selected For Further Consideration in the Alternatives Analysis							
	1		2		7	9		
1. Low annual household costs		2		2	2	3		
2. Equitable distribution of costs		2		2	2	3		
3. Compatible with existing land use			2		3	1	2	
4. Able to respond to the needs of development			3		3	3	1	
5. Provides easy management of facilities		3		3	2	1		
6. City's approval		3		2	2	1		
7. Treatment and disposal of waste-water near generation site		1		1	3	3		
8. Reduce potential environmental impact due to spray irrigation of effluent			1		1	3	3	
9. Reduce potential operation failure of artificial wetlands			3		3	1	3	
10. Reduce on-lot system failures	3		3		3	1		
11. Minimize non-point-source pollution			2		2	2		1
Total	25		25		25	22		
Average		2.27			2.27		2.27	2
Ranking (2)		4		4	4	3		

(1) Rating scale for characteristics is as follows:

1 - Low implementation potential.
2 - Medium/conditional implementation potential.
3 - High implementation potential.

(2) Ranking of alternatives goes from least implementable (=1) to most implementable (=4). When a tie exists, both alternatives are assigned the same numerical ranking. Ranking is not statistically treated.

treatment in northern Tallahassee as opposed to southern Tallahassee). In addition, the USEPA understands from the City that Leon County held a public hearing in Tallahassee on July 23, 1991. Some 20 speakers voiced concerns regarding aerosol spray drift, odor, and decreased property value. These speakers were primarily citizens with residences east (and north) of the Eastern Expansion area of Alternative 1 proposed by the City for near-future construction. As a result of the July 23 public hearing comments, the County Commissioners of Leon County have unanimously denied the City issuance of Leon County sewer "franchise" which the County maintains is needed for the expansion of the existing SE Sprayfield. As a consequence, the City's proposed expansion to the Eastern Expansion area is presently denied by Leon County. The County has furthermore requested that the City revise/update the 1988 City Master Sewer Plan and that the City present various wastewater alternatives with cost estimates to the County for consideration.

3.1.3 Reliability

The reliability evaluation estimated the degree to which each wastewater management system could consistently achieve and maintain effluent limits for which the system was designed, which included the City staff's experience in using the technologies. The general consensus is that larger centralized treatment facilities are more reliable than smaller area facilities. Experience suggests that the duration of malfunctions resulting in violations would be greater at small treatment plants because of limited operational flexibility and less frequent inspection and maintenance. The frequency of malfunctions at large plants may not be less than at small plants, but the ability to identify, isolate, and correct a malfunctioning unit at a large plant would reduce the probability of unacceptable discharges.

To provide a method for evaluating the reliability of Alternatives 1, 2, 7 and 9 in this cost-effectiveness analysis, the characteristics that affect a system's reliability have been defined as follows:

1. On-site personnel - provides timely response to problems that may occur at treatment and disposal facilities including equipment failure and wet-weather wash-outs.

2. Large operating budget - allows facility to attract and pay higher-caliber supervisory personnel and more competent operators.

3. Maintenance program - A structured program provides a systematic approach to performing maintenance tasks including routine and emergency tasks. This ensures they are done correctly and in a timely fashion to minimize downtime and both operation and maintenance costs.

4. Equipment redundancy and spare capacity - provides for equipment failure and flow variations and includes standby generators, standby treatment units, and flow equalization basins.

5. Length of sewer - the longer the sewer collection/interceptor system the more susceptible it is to inflow and infiltration problems.

6. Number of pumps and force mains in sewer system - the more pumps and force mains in a sewer collection/interceptor system the more susceptible it is to have mechanical problems.

7. Complexity of facility's technology and hardware - the more complex a system is the more susceptible it is to breakdowns with longer downtimes required to determine and correct reason for failure.

8. Experience in using technology - the more experience in using a particular technology the less likely a facility with this technology

will experience operation problems and failure and the more rapidly a breakdown can be corrected. Likewise a new and innovative technology with little test cases may experience more operation problems.

These characteristics are summarized and rated in Table 3-7. The reliability analysis was developed at the DEISS preparation stage (1989). It should also be noted that this reliability analysis does not account for a "weighting" of the reliability characteristics, in that all the characteristics are considered of equal importance. The ratings listed in the table are based on the following assumptions:

1. The City will operate any centralized facilities. Therefore, they will supply supervisory personnel and operators for these components.

2. The Talquin Electric Cooperative, Inc. (TECO) will operate any area facilities. Therefore, they will supply supervisory personnel and operators for these components.

3. Treated effluent for all alternatives will be disposed via some type of land application.

From Table 3-8, Alternative 1 with its proposed expansion of the T.P. Smith Facility and adjacent expansion of the SE Agricultural Spray Irrigation Operations was considered to have an advantage over the other alternatives in terms of reliability (and was considered the same in terms of implementability compared to the other centralized system alternatives). The City of Tallahassee is familiar with and has used the agricultural spray irrigation technology at the existing SE Sprayfield facility.

It should be noted that use of artificial (constructed) wetlands, a relatively new wastewater disposal technology in the United States, has shown increasing reliability in the United States in areas such as nearby Orlando, Florida. The reliability of constructed wetlands has probably increased even since the 1989 matrix evaluation for the DEISS. The Orlando facility, for example, has been functional for several years and the Tennessee Valley Authority (TVA) operates facilities in Kentucky and Alabama, and possibly other areas. Constructed wetlands also exist in other states such as Mississippi, California and Maryland (Also refer to Section C-13 entitled "Artificial (Constructed) Wetlands" in Appendix C of this FEISS). However, success in the United States (compared to Europe) is still fairly recent, the effluent treatment method (i.e., treatment subsequent to wastewater treatment plant treatment) has not been used in the study area, and City personnel are not familiar with the technology -- particularly when compared to the agricultural spray irrigation technology. Reliability and acceptance in the United States would be expected to continue to increase with time and implementation experience. Subsequent to artificial wetland treatment, it should be noted that the treated effluent discharged from the artificial wetlands must be disposed via an environmentally appropriate and feasible disposal method.

3.2 ENVIRONMENTAL EVALUATION

The environmental impacts caused by the four (4) further-considered alternatives (1, 2, 7 and 9) were categorized as primary and secondary. Primary impacts are characterized as being directly affected by the implementation of the wastewater management system. Secondary impacts occur as indirect results of system implementation.

3.2.1 Primary Impacts

3.2.1.1 Surface Water Resources

Surface water degradation may occur as a direct result of construction activities or during the effluent disposal process. Each of the four alternatives

TABLE 3-8

RELIABILITY ANALYSES RATING

Reliability Characteristics (1)	Alternatives Selected For Further Consideration in the Alternatives Analysis			
	1	2	7	9
1. On-Site Personnel	3	3	3	1
2. Large Operating Budget	3	3	3	1
3. Structured Maintenance Program	3	3	3	1
4. Equipment Redundancy	3	2	2	1
5. Length of Sewer	1	1	2	3
6. Number of Pumps in Sewer System	1	1	1	3
7. Complexity of Technology and Hardware	2	2	1	3
8. Experience in Using Technology	3	2	1	3
Total	19	17	16	16
Average Ranking (2)	2.38 4	2.13 3	2.00 2	2.00 2

(1) Rating scale for charcteristics is as follows:

1 - Poor reliability
2 - Average or conditional reliability
3 - Good reliability

(2) Ranking of alternatives goes from least reliable (=1) to most reliable (=4). When a tie exists, both alternatives are assigned the same numerical rankings. Ranking is not statistically treated.

involve the construction of conveyance pipelines, but little impact on surface waters is anticipated due to the use of existing rights of way. There may be areas when an existing right of way cannot be used, but adequate erosion and sedimentation control measures should protect adjacent surface waters.

The application of effluent on golf courses, as proposed in Alternatives 1 and 2, will not likely impact surface water resources. The position, trajectory, and area coverage of sprinkler systems should be designed to avoid direct application to surface waters.

Agricultural and forest spray application could cause degradation if systems are constructed in areas having low infiltration/percolation rates, or where the application rate exceeds the intake capability of the soil. The alternative SE agricultural and forest spray sites are located adjacent to the existing SE agricultural irrigation facility. Portions of these sites are wetlands and lakes and drain into numerous Karstic depressions, as well as Shepherd Branch and Chicken Branch. Clearly, there is an opportunity for degradation of surface waters by spray irrigation systems used in Alternatives 1 and 2. Careful design and orientation must be used if these sites are to be adapted to land application facilities to avoid water quality problems such as waterbody eutrophication.

When Rapid Infiltration Basins (RIBs) are used in conjunction with constructed wetlands, they should not be allowed to cause significant surface water impacts. Therefore, effluent disposed via RIBs should be adequately treated and RIBs designed to avoid surface water runoff. As a precaution, however, such facilities should probably also not be located near surface waters within the alternatives sites.

There would be an increase in surface water flow due to the operation of any of the alternatives. The increase would likely occur due to groundwater mounding and the subsequent movement into the adjacent surface waterbodies. No significant impacts due to increased surface water flows would be anticipated.

3.2.1.2 Groundwater Resources

Groundwater quantity and quality would most likely be affected by any of the land application or infiltration systems. Wastewater constituents not used by plants, degraded by microorganisms, or fixed in the soil may leach to the groundwater. Constituents of concern are bacteria, viruses, nitrate-nitrogen, heavy metals, phosphorous, and organics.

Sites using slow-rate land application techniques pose a minimal bacterial contamination threat to the groundwater. The combination of high bacterial densities and a high water table should be avoided even when using a slow-rate technique to prevent undesirable surface seepage. High-rate land application techniques, such as rapid infiltration, may experience penetration of bacteria about 10 meters vertically and at variable distances laterally.

Based on the "General Soil Map" for Leon County in the 1981 Soil Survey, Leon County is dominated by three soil associations: the Orangeburg-Lucy-Norfolk association in the northern part of Leon County and the Kershaw-Ortega-Alpin and the Dorovan-Talquin-Chipley associations in the southern part of Leon County. The Orangeburg-Lucy-Norfolk soils and the Kershaw-Ortega-Alpin soils are generally well-drained while the Dorovan-Talquin-Chipley soils are generally not well-drained. Specifically, the 1981 Soil Survey classifies the Orangeburg-Lucy-Norfolk soils as "well drained soils" and the Kershaw-Ortega-Alpin soils as "excessively drained and moderately well drained soils," while the Dorovan-Talquin-Chipley soils are considered "somewhat poorly drained to very poorly drained soils." Of the two well-drained soil associations, the depths of these sandy associations differ significantly: the Orangeburg-Lucy-Norfolk soils are sandy to only 20-inch depths with loam below, compared to sandy 20-40 inches deep with loam below or are loamy throughout (Note: "loam" is a soil type that is defined in the 1981 Soil Survey as a mix of clay (7-27%), silt (28-50%), and sand (<52%) particles.) By contrast, the Kershaw-Ortega-Alpin soils are sandy to 80 inches or more, with some having loamy layers (lamellae) below 45-inch depths.

Regarding the suitabilities of these soil associations for septic tank absorption fields, Table 11 of the 1981 Soil Survey presents the "restrictive soil features" of existing soil types. All listed Orangeburg, Lucy and Norfolk soil types are classified as "moderate: percs slowly" and/or "moderate: wetness," with "moderate" being defined as having unfavorable soil properties for the given activity. The Kershaw soils are classified as "slight" which is defined as soil properties generally favorable for the activity. Oretega and Alpin soils are classified as "severe: poor filter," with "severe" being defined as soil properties very unfavorable for the activity. The Dorovan, Talquin and Chipley soils are classified as "severe: wetness" or "severe: floods, wetness." These classifications indicate that only the Kershaw soils have properties favorable for septic tank absorption field infiltration while the others do not adequately drain or drain too well and therefore do not provide proper filtration (i.e., adsorption of inorganics (metals), microbes, etc.). Leon County therefore appears to be a mix of soil types with "slight," "moderate" or "severe" classifications regarding the suitability for septic tank activity. The preliminary 1988 Leon County MW&SSP also addresses the issue of soil suitability for septic tanks within Leon County.

The USEPA understands that the Leon County Public Works Department apparently conducted a site assessment of the alternate sites in 1989 and determined that the clayey soils of the Northeast sites, with their lower permeability, would require much more land to dispose the same quantity of effluent than what would be needed for a similar operation in the Southeast sites with their more permeable sandy soils. This trend also generally agrees with Table 2-9 of this FEISS. When the acreage predicted to be required for agricultural spray irrigation in the SE (component D1) is compared to agricultural spray irrigation in the NE (component D2), the average acreage needed per effluent flow (mgd) is much greater in the NE (430 acres/mgd) than in the SE (188 acres/mgd). The same trend also exists for the NE forest irrigation site (component D4: 524 acres/mgd) compared to the SE forest irrigation site (component D3: 197 acres/mgd). (This trend, however, is not true in every instance since the artificial wetlands with RIBs disposal in the SE (components D11 and D16) are predicted to require the same amount of acreage as in the NE (components D12 and D17), i.e., 111 acres/mgd). For Table 2-9, the maximum application rate was used to estimate acreages and was based on the soils in the 1981 Leon County Soil Survey at the given sites. However, the USEPA recommends that soil percolation testing be conducted at any site proposed for irrigation be implementation to determine actual soil percolation rates.

Data collected from selected monitoring wells near the City's existing sprayfields indicate an increase in chloride and nitrate-nitrogen concentrations. Chloride (Cl) levels at the City's existing SE sprayfield increased from a background concentration of 3 mg/l to 20 mg/l and nitrate-nitrogen (No_3-No_2) concentrations increased from 0.5 mg/l to 4.0 mg/l. City monitoring has shown nine (9) exceedances of the State of Florida (FDER) water quality standard for nitrate-nitrogen (10 mg/l) in two of its compliance wells for the SE and SW sprayfields. The current level is below the FDER standard. Chapter 4 and Section 3.3.7 of this Chapter 3 provides an expanded explanation of these exceedances. The standard for class G-II groundwaters (public drinking water supply) as established by FDER is 250 mg/l for chlorides and 10 mg/l for nitrate-nitrogen.

The use of artificial (constructed) wetlands and RIBs in the alternative NE and SE sites will not likely result in the degradation of groundwater unless the effluent disposed is not adequately treated in terms of microbes, metals, and nutrients in the treatment plan and/or the constructed wetlands. Such systems should not be located near Karstic features.

Groundwater levels would likely be affected to a greater extent than quality. Application by any of these methods, whether by agricultural or forest spray, golf course spray, RIBs, or on-lot systems, would cause local groundwater mounding. The additional wastewater would cause greater recharge to the Floridan Aquifer as well as increased baseflow to the lakes, streams, wetlands and Karstic depressions. This increase in flow would not likely cause significant distortion of the regional pattern of groundwater movement or surface waters.

3.2.1.3 Ecological Resources

Any site development would significantly alter existing terrestrial ecosystems. The County supports several ecologically-sensitive and threatened or endangered species (or their suitable habitat) which would likely be affected by any of the system alternatives. For example, there are 26 species or groups of plants in the County which are protected by Florida law as threatened or endangered. Nine amphibians and reptiles, eleven bird species, 29 mammals, one species of fish, and two invertebrate types in the County are also protected by Florida law. In addition, there are a multitude of species of special concern in the County and protected by Florida law.

Protected federal and State-of-Florida faunal and floral that range in the general alternative sites project area are the Eastern Indigo Snake, Florida Pine Snake, Gopher Tortoise, Gopher Frog, Panhandle Golden Aster, and Panhandle Meadow Beauty. These species are classified as Florida-listed faunal species of special concern (Eastern Indigo Snake, Florida Pine Snake, Gopher Tortoise, and Gopher Frog); Florida-listed and federally-listed threatened faunal species (Eastern Indigo Snake); federal Category 2 candidate faunal species for federal listing as threatened or endangered (Florida Pine Snake, Gopher Tortoise, and Gopher Frog); federal Category 2 candidate floral species for federal listing as threatened or endangered (Panhandle Meadow Beauty); and/or Florida-listed endangered floral species and federal candidate floral species for federal listing as threatened or endangered (Panhandle Golden Aster) (Also refer to Table 2-27 and Section 4.4.1).

Even if no species of special concern or threatened and endangered individuals would be lost during construction of these facilities, the permanent alteration of a habitat would cause population reductions. This is particularly true for the Gopher Frog (Rana areolata aesopus) because this amphibian is known to migrate over long distances to breed in waterbodies, and is dependent on the Gopher Tortoise burrow for protection. There is documented evidence of Gopher Frogs migrating 1.2 miles (Herpetological Review, 1988) in order to reach shallow breeding ponds. Consequently, if migratory paths are disturbed, the Gopher Frog's breeding may be circumvented. In addition, the loss of the Gopher Tortoise habitat, is to be considered. If the Gopher Tortoise is driven out of its current range, the threatened Gopher Frog is certain to be lost as well.

In addition to threatened or endangered plant and animal species, the existing ecosystems at the alternative SE and NE Sprayfields would experience impacts in some or all of the following categories: species diversity, breeding grounds, food chain integrity, degree of naturalness, degree of the replaceability of community, ecosystem uniqueness and fragility, interaction with other ecosystems, and wetlands. The Leon County Public Works Department (1989) conducted a site assessment of the Southeastern and Northeastern alternate sites. The environmental analyses of the sites concluded that the Northeastern site contains large portions of high quality upland areas whereas the Southeastern sites are primarily covered with lower quality slash pine and sand pine forests.

It is important to consider the size of the land areas which would be potentially impacted by proposed construction and operation. Based on the assessment performed by the County Public Works, the alternative SE Sprayfield sites were determined to be less environmentally sensitive than the alternative NE Sprayfield site, but the land areas required at these sites are vastly different, and merit careful review. The SE agricultural and forest spray sites of Alternative 1 and 2, respectively, require approximately 1,450 acres, but the artificial (constructed) wetlands and RIBs of Alternative 7 need only approximately 1,000 acres. These 1,000 acres would be divided between the alternative NE site (580 acres) and the alternative SE site (424 acres) (Refer to Table 2-9). The larger land area specified for the alternative NE site would be required because the flow to be treated at the alternative NE Plant (5.2 mgd) is greater than the flow to be disposed at the SE site (3.8 mgd). (Note: Estimated acreage requirements in Table 2-9 were calculated based on the maximum application rate for given sites, which was based on site soils in the 1981 Leon County Soil Survey (1981); however, actual on-site soil infiltration studies would be needed to determine more specific acreage requirements before any alternative would be implemented. While the acreage requirements per flow (mgd) ratios are the same for NE and SE sites (111 acres/mgd) for the above artificial wetland with RIBs alternatives, the ratios for agricultural spray irrigation in the NE (430 acres/mgd) is greater than in the SE (188 acres/mgd), suggesting the sprayfield soils at the NE site have a slower percolation rate and more acreage is needed per mgd. The same trend also exists for the NE forest irrigation site (524 acres/mgd) compared to the SE forest irrigation site (197 acres/mgd)).

The general health of an ecosystem usually has a strong negative correlation with the amount of human intervention and a strong positive correlation with undisturbed land area. Land disturbance and increased human management intensity on any of these proposed sites would result in site degradation. This would be especially true where both the alternative NE and SE Sprayfield disposal sites are developed as proposed for Alternative 7. It must be understood, however, that no matter which alternative is chosen, further loss of habitat and ecosystem destruction would take place due to residential and commercial development. Regardless of which alternative is chosen, measures must be taken to reduce the impacts of construction and operation on existing plant and animal communities.

3.2.1.4 Floodplains and Wetlands

Wetlands at the SE sites are of good-to-high quality. Any use of agricultural or forest spray facilities should be located carefully to avoid direct and harmful contact with wetlands. Because the sprayfields proper would be located on uplands with appropriate evergreen buffer zones, impacts on wetlands should be minor. Creation of 6- to 8-inch earthen berms around designated spray irrigation areas within the sprayfields would contain sprayed effluent runoff and allow for percolation and filtration in these designated areas, i.e., separated from wetlands and surface waterbodies.

Floodplains along the St. Marks Lowlands include marshes and outstanding-quality, mature, cypress-gum swamps. It is conceivable that surface water quality could be degraded during operation of the spray facilities, but impacts to the floodplains due to quality degradation should be reduced or eliminated by proper location and design of the facilities. It is not anticipated that major structures would be built within floodplains at the NE or SE sites.

3.2.1.5 Archeological, Historical, and Recreational Resources

The EIS review for the presence of known listed archeological sites was limited to Alternative 1 and the alternate SW Sprayfields. Alternative 1, the preferred alternative, consists of the existing TPS plant site and SE Sprayfield site. Based on recent coordination with the Florida State Historic Preservation Officer (SHPO), three known listed sites (8LE546, 8LE548, and 8LE1436) were determined to exist within the preferred alternative project site and the existing facility sites. A nearby fourth known site (8LE1681) was determined to be outside these areas. The City has retained a professional archeologist and has completed a survey of these three known sites. The survey also included a search for potential, as yet uncovered/ unrecorded sites within the Eastern Expansion of the existing SE Sprayfield and the TPS Plant facility site, where collectively most of the near-future construction proposed by the City of Tallahassee related to the preferred alternative is planned. Preliminary findings from this survey identify 26 newly recorded archeological sites in the Eastern Expansion area. Of these sites, five (SF1, SF2, SF3, SF7, and SF9) have been determined to be significant enough to warrant further consideration. Archeological impacts of the preferred alternative are more thoroughly discussed in Section 4.6.1. (Also see Figures ES-5, 2-9, and 4-2).

Recreation resources are plentiful in and around the numerous ponds and small lakes in the alternative SE site. Fishing and boating are common in this area, but these would probably not be affected by spray facilities. The recreational use of forested lands of the alternative disposal sites would be diminished not only if it was developed for agricultural spray irrigation, but also if a forest spray facility was established. Hiking, hunting, and similar outdoor activities would be restricted from the irrigated forest sites in order to avoid direct contact with potentially harmful bacteria and viruses in the spray effluent. (Also refer to Section 3.2.1.7 below for a human health effects summary.)

3.2.1.6 Noise, Odor, and Air Quality

Construction of the conveyance lines would produce a temporary increase in noise and odors, as well as some local reduction in air quality. The use of diesel-powered and gasoline-fueled equipment would be the major contributors to the noise, odor, and air quality short-term impacts.

A greater short-term impact would occur at the alternative NE plant construction site. Excavation and materials transport would cause some annoyance and disturbance to local residents and wildlife. Documented noise levels from common construction equipment (USEPA, 1971) are: front loader - 79 dB; truck - 91 dB; bulldozers - 80 dB; graders - 85 dB; and pile drivers - 101 dB (all values are reported at 50 feet from the source). A general EPA guideline for an acceptable noise level at a property line is 55 dB. Average noise levels of up to 62 dB (Leq = 62 dB) are perceived by people as "normally acceptable" (USEPA, 1971). These potential impacts may be reduced by the appropriate use of environmental protection measures (Refer to Section 3.3).

Noise, odors, and air quality would not be anticipated to be problems at the agricultural or forest spray irrigation sites. Proper pretreatment of wastewater effluent would eliminate odor nuisances. There would be some low-level noise associated with the continuous operation of the NE plant. The local impacts, however, may be significantly reduced by the use of buffer zones, planted in evergreen tree species.

Golf course spray irrigation has a potential for causing a localized increase in airborne pathogens carried via aerosols. Proper treatment of the wastewaters prior to spray irrigation and selective operation times should minimize this impact. Viral pathogens may not be killed by conventional pretreatment methods.

On-lot systems would not cause significant odor problems unless there are malfunctions resulting from poor planning or design. This includes undersizing the system and constructing the system on improper soil types or over a high water table.

3.2.1.7 Human Health Effects

It is generally documented (Crook, 1990; Asano et al., 1992) that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater. However, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious.

Spray irrigation of wastewater effluent has the potential to produce aerosols, and proper treatment relies on microbial contact in the soil to remove constituents such as metals, salts, nitrogen, phosphorus, non-pathogenic bacteria and pathogens (pathogenic bacteria, viruses, protozoans and other infectious microbes). The aerosols have the potential to reach and potentially infect humans via the atmosphere.

Humans may also be affected via potable groundwater wells near irrigation sprayfields. After application of the effluent to the land surface, the wastewater infiltrates into the soil and interacts physically and chemically to remove the potentially harmful constituents not removed by effluent treatment. It is possible that some of these constituents could move quickly through the soil (depending on the soil characteristics and depth) and into the groundwater. Once this occurs, groundwater flows can carry the untreated metals, pathogens, nitrogen, etc. to wells which are used by humans as a drinking water source.

3.2.2 Secondary Impacts

3.2.2.1 Land Use

Existing land use would be most altered at the disposal locations. Because of the use of existing rights-of-way, conveyance pipeline construction would not create changes in land use. The installation of spray irrigation systems, artificial (constructed) wetlands, rapid infiltration basins, and the NE plant would create significant land use changes. Much of the proposed disposal sites in the SE are currently used as silvicultural operations in sand pine and slash pine. The alternative NE site has uplands characterized by a mixture of cultivated crop and pasture, mature oak-pine-hickory forest, mature live oak forest, successional pines and hardwoods, old-field pine forest, and pine plantation. A transition to constructed wetlands and rapid infiltration basins would constitute significant land use alterations unless located in areas which are currently similar to the proposed use.

In the general existing and alternative SE disposal site area, intensive or semi-intensive silvicultural activities is expected to continue, but several low-density residential subdivisions already exist near the east parcel and approximately one-half mile south of the west parcel. The proximity of lakes and the St. Marks River system make the SE disposal site area a prime target for future residential development.

The alternative NE plant site and the artificial wetlands and rapid infiltration basins would be located in an area that includes the Welaunee Plantation and other developable parcels. Some smaller parcels in this area have recently become active residential subdivisions. Current plans at Welaunee Plantation are for a mixed commercial/residential development.

The predominant use of septic tank/drainfield systems under the on-lot alternative would require larger lot sizes and larger cleared areas in order to accommodate drainage fields. This could lead to more acres being converted to residential land use.

3.2.2.2 Economics and Employment

The location of industrial, commercial, and residential development is often influenced by the availability and extent of public services. The availability of public wastewater facilities in the NE region would make the area more attractive for future development, possibly resulting in more numerous and diverse employment opportunities. The construction of any of the alternatives would be expected to also create at least a short-term economic and employment boost, especially if local contractors are selected.

3.2.2.3 Transportation

Transportation resources would not likely be affected to any great extent. In the short-term, additional construction vehicles may create traffic bottlenecks, and a certain amount of temporary fugitive dust would likely annoy some drivers. Long-term transportation could be affected if the increased wastewater facilities create large increases in local populations and hence greater traffic congestion.

3.2.2.4 Community Services and Facilities

Growth and development served by expanded sewer service has the potential to cause a need for increased public facilities such as fire and police, health, recreation, education, library facilities and utilities. The NE site could have a particularly strong effect on local expansion and associated community services. The alternative NE site is one of the few remaining undeveloped areas to the northeast of Tallahassee. (The USEPA understands from the City of Tallahassee that at least 100 square miles of undeveloped land exits in Leon County northeast of the NE alternative sites). Construction of the alternative NE Plant would have a significant effect on local development because it would encourage further expansion of residential and commercial property. However, expansion of the southeast treatment facilities to include conveyance of effluent from the northeast would similarly encourage such development in the northeast. Also, the land application disposal sites themselves, whether in the southeast or northeast, would require relatively large land areas which would decrease the land area available for residential or commercial development.

3.2.2.5 Water Quality

Water quality at any of the sites should not be adversely affected, given the proper maintenance and operation of the treatment and disposal systems. On-lot systems, however, present a scenario where surface and groundwater quality could be degraded. On-lot system failures have been documented in the Killearn Lakes Subdivision area in the northeast area of Leon County (See Section 2.1.4). The inventory of failures currently being compiled by the County only includes "new" failures. Neither the City nor the County has statistics on the percentage or number of failures or information to identify problem areas. The 1981 Soil Survey for Leon County (See Section 2.3.5.1) does indicate that large portions of the County have soils limiting the operation of septic tank drainfields.

Expansion of wastewater facilities has the potential to increase the level and density of local population and residential development. The associated increase in traffic could cause a rise in petroleum oils and various other chemical materials washed from roadways. These chemicals could make their way via overland routes into surface waters, or move directly into the groundwater. In addition, increased residential development generally produces increases in the use of lawn fertilizer and pesticides. This in turn usually leads to pollution of storm water runoff flowing to surface waters or to the direct pollution of groundwater via Karstic depressions (sinkholes).

3.2.2.6 Ecological Resources

Secondary impacts to ecological resources are often difficult to quantify. Adverse impacts would result primarily from the direct effect of wastewater application, and the indirect impact of habitat removal caused by growth and development. Other secondary concerns are: 1) the production of new sinkholes, or deepening of existing ones due to additional water entering the groundwater from land application and rapid infiltration basin; 2) the creation of a nutrient imbalance within ecosystems receiving spray effluent; and 3) the alteration of forested or agricultural systems because of the varied abilities of different plant species to adapt to the introduced conditions.

3.2.2.7 Environmentally-Significant Agricultural Lands

There would be some conversion of agricultural and silvicultural land to spray irrigation facilities, wetlands, RIBs, and the NE Plant. The NE site has substantial amounts of open agricultural land. The SE sites are mainly paper-company-owned lands currently in silviculture for pulp production. There is also a relatively new concern over the impacts of global climate change due to deforestation. The forest acts to remove carbon dioxide, a major contributor to the greenhouse effect, from the atmosphere. Deforestation would increase the rate at which the greenhouse effect affects the atmosphere. Every attempt should be made to avoid forest destruction in conjunction with any of the alternatives studied here. Alternatives involving irrigation of vegetation (agricultural and/or forest sprayfields) would somewhat reduce global climate change effects generated by land clearing.

3.2.2.8 Archeological, Historical, and Recreational Resources

Archeological resources should not be damaged or destroyed by construction activities, if: 1) appropriate pre-construction coordination is made with the Florida State Historic Preservation Officer (SHPO) to determine the presence of any known listed archeological sites; 2) a site-specific pre-construction archeological survey is conducted to the satisfaction of the Florida SHPO; and 3) construction is stopped if an unrecorded/unsurveyed site is discovered during construction and the SHPO is contacted for a determination. Major archeological sites are most likely to exist near large or permanent water sources. Well-developed floodplains and terraces would be the most sensitive areas.

Historical resources are not anticipated to receive direct damage or natural setting disruption. Future development may cause encroachment on these resources, and proper protection should be enforced when that need arises.

An increase in population due to increased sewer service would affect the way local recreational resources are used. City and County parks would receive greater visitor pressure, as would areas that support fishing and boating. Presumably, the City and the County will plan appropriately for future anticipated growth. Parks and open spaces are important cultural resources, and should be planned with the use of adequate foresight.

3.2.3 Alternatives Impacts Summary

Environmental damage occurs whenever and wherever man-made development occurs. The alternative methods of effluent disposal are agricultural spray irrigation, forest spray irrigation, golf course irrigation, artificial (constructed) wetlands with rapid-infiltration basins (RIBs), and/or on-lot systems.

Damage to floodplains and wetlands, and to archeological, historical and recreational sources could be minimal or avoidable if proper planning is implemented. Human health concerns could also be reasonably addressed through proper design and implementation of appropriate effluent treatment methods, frequent effluent monitoring of treated wastewater prior to irrigation, natural ultraviolet light (sunlight) disinfection, prudent spraying operations, use of evergreen forested buffer areas along external borders of sprayfields, use of forested corridors within the general sprayfield area, and groundwater monitoring. (However, although it is generally documented (Crook, 1990; Asano et al., 1992) that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious.)

The primary environmental concern would be impact on ecological resources. Man-induced changes, due to implementation of any of the alternatives, would surely affect the ability of the ecosystem to perform normally. The following points should be key in choosing an alternative:

1) Agricultural and forest spray irrigation are proven disposal methods, but require a relatively large land area.

2) Artificial (constructed) wetlands for effluent treatment (i.e., treatment subsequent to wastewater treatment plant treatment) have been successfully used in Europe and are showing increasing reliability in the United States (e.g., Orlando, Florida) and require less land area than spray irrigation methods. RIBs have been successfully used for effluent disposal (from constructed wetland discharges) and also require less area.

3) No wastewater discharges are permitted to flow into Lake Lafayette; therefore, no alternatives should include such a discharge.

4) In general, centralized disposal methods would be subject to NPDES permitting for point source storm water discharges to waters of the United States for construction sites (five acres or more), for regulated treatment facilities actually treating domestic wastewater (at least 1 mgd), and for other regulated sites. Construction activities needing NPDES permit coverage can be made through a general permit recently issued by EPA/Region IV. The operation of certain disposal methods involving point source discharges to waters of the United States would also require NPDES permit coverage. The operation (spray irrigation) of agricultural and silvicultural spray irrigation sites is exempt from NPDES permitting if sites are consistent with 40 CFR 122.3(e). Storm water point source discharges to waters of the United States from the operation (spray irrigation) of non-agricultural/non-silvicultural land application sites (such as golf courses, rights-of-way, and landscape areas) receiving domestic wastewater treated to the quality required by Chapter 17-610 F.A.C. for the land application of reclaimed water are not required to be covered by NPDES permits, unless the USEPA specifically requires a facility to submit an application on case-by-case basis. However, dedicated discharges of reclaimed water, without land application, are required to be covered by NPDES permits. Included in the spray irrigation of wastewater effluent is the land application of wastewater sludge. Section 405(d) of the Clean Water Act requires that the disposal or reuse of sewage sludge be regulated. This regulatory activity is to be accomplished through the utilization of permits based upon technical federal regulatory standards. The USEPA established federal sludge disposal/reuse standards which were promulgated in the Federal Register at 40 CFR 503 on February 19,1993. In general, these standards must be complied with by all treatment works treating domestic sewage by February 19, 1994. Violation of these standards would be a violation of the Clean Water Act. It is anticipated that current and proposed sludge disposal/reuse activities would be regulated through an NPDES permit, where applicable, or through issuance of a "Sludge-Only" permit. This federal permitting activity would be issued by the USEPA/Region IV until program

authorization is given to the State of Florida. Therefore, the newly promulgated federal regulations are in addition to the State of Florida sludge disposal/reuse regulations. (Note: Also see Section 2.2.1.2 on permitting and Sections 2.4.3.1 to 2.4.3.9 (Chapter 2) and Sections C-1 to C-13 (Appendix C) on permitting for alternatives.)

The centralized disposal method (on-lot systems) would not, by itself, require an NPDES permit. However, any associated centralized methods supplementing such on-lot systems would in general be subject to NPDES permitting as described above.

5) The construction and operation of the alternative NE Plant would produce a relatively large impact because of the permanent loss of that land area. By comparison, the disposal options, such as artificial wetlands, may be used by wildlife after construction is completed.

6) Golf course spray irrigation acts to protect sensitive ecosystems because it reduces the land area required to dispose of the projected effluent volume.

7) On-lot systems initially act to avoid environmental damage because they eliminate the need for construction of large collection, treatment and disposal facilities. On-lot systems, however, are known to fail, creating serious environmental impacts. Corrections of these failures and their detrimental impacts can be expensive.

To summarize the environmental impacts of each system alternative for evaluation purposes, a simple rating of the alternatives selected for further consideration for environmental impacts was developed at the DEISS preparation stage (1989). This alternative rating is presented in Table 3-9. It should be noted that this environmental impact analyses does not account for a "weighting" of the environmental impact characteristics, in that all the characteristics are considered of equal importance. From the table, Alternative 2 with its expansion of the T.P. Smith Facility and the SE Forest Spray Irrigation Operations, was considered to have an advantage over the other system alternatives. This is primarily due to the use of privately-owned forest lands for a spray irrigation disposal site. The use of the privately-owned forest lands maintains the existing land use type and allows continued use of the area for wildlife habitats. Alternative 9 was considered to have the next highest ranking primarily because the use of on-lot facilities of a decentralized system eliminates the need for construction of large wastewater management facilities which immediately impact the construction areas. As noted in Item 7 listed above, this positive impact may be only an initial, temporary attribute. As the installation of on-lot facilities proliferate, so do failures of the drainfields. These failures are often difficult to locate and correct and, as they accumulate, can create serious negative environmental impacts. Alternatives 1 and 7 were considered to have equal ranking which results from receiving average ratings. Alternative 1 would eliminate the need for constructing a new, separate regional treatment plant and disposal site, because it consists primarily of expanding existing facilities with impacts that can be reasonably minimized or mitigated. Alternative 7 would require the construction of a new separate regional treatment plant. The negative impacts resulting from this component may be off-set by the use of area-conserving artificial (constructed) wetlands with bottom liners followed by RIBs.

3.3 ENVIRONMENTAL PROTECTION MEASURES

The construction and continued operation of any wastewater collection, treatment, and disposal system would create environmental impacts. Environmental protection measures can often be implemented to lessen these impacts. The

TABLE 3-9

ENVIRONMENTAL IMPACT ANALYSES RATING

Impact Characteristics[1]	Alternatives Selected for Further Consideration in Alternatives Analysis			
	1	2	7	9
1. Surface Water Quality	1	1	2	2
2. Groundwater Quality	1	1	1	1
3. Protected Species/Habitat	1	1	1	1
4. Floodplains and Wetlands	2	2	2	2
5. Forested Lands	1	3	1	2
6. Parks and Open Space	2	2	2	2
7. Archeological and Historical Resources	2	2	2	2
8. Noise, Odor, and Air Quality	2	2	1	2
9. Land Use	1	3	1	2
10. Socio-economics	3	3	3	2
11. Aesthetics	2	2	2	2
12. Public Health	2	2	2	2
Total	20	24	20	22
Average	1.67	2.00	1.67	21.83
Ranking [2]	2	4	2	3

(1) Rating scale for characteristics is as follows:

1 - "Negative" impact
2 - "Neutral" impact
3 - "Positive" impact

These three ratings are made from the perspective of the resource use/management of the alternative area involved, e.g., Alternative 2 may have a "positive" or "neutral" impact on forested lands (item #5) since forest irrigation is proposed for Alternative 2, but could also have a "negative" secondary impact if, as a result of such effluent disposal, local development is encouraged and results in land clearing and loss of forested areas. These three ratings could in some cases perhaps also be termed as "negative" (1), "moderate" (2), and "minimal/neutral" (3) impacts.

(2) Ranking of alternatives goes from most negative impact (=1) to most positive impact (=4). When a tie exists, both alternatives are assigned the same numerical ranking. Ranking is not statistically treated.

environmental protection measures discussed below are not intended as the only available possibilities.

3.3.1 Surface Water

The integrity of surface water resources is of prime concern during the wastewater disposal process, but degradation can also occur during construction of the wastewater collection and treatment facilities. Adequate erosion and sedimentation control measures should be implemented whenever appropriate. This is particularly relevant at the alternative NE Plant site, and for the pipeline from the TPS Plant to the alternative SE disposal site.

The locating of sprayfield areas within the alternative disposal sites with careful regard to local topography, slope, and soil conditions is critical. A 400-foot wide buffer zone with dense vegetative cover is recommended, and should be maintained around each area. Such a remaining or planted buffer would act to reduce or eliminate any surface water flow originating at the disposal facilities in the field areas. The use of appropriate wastewater application rates at the agricultural and forest sprayfields would aid in decreasing direct surface water contact along with the prudent timing of applications to avoid, when possible, spraying immediately prior to and during storm events.

3.3.2 Groundwater

The groundwater quality at any of the wastewater effluent disposal sites could be degraded if normal soil-wastewater interaction is not complete. This is of special concern if the applied effluent has high levels of bacterial, viral, and nutrient concentrations. Minimization of this potential is best made with the use of appropriate application rates on acceptable soil types and effective secondary wastewater treatment.

3.3.3 Ecological Resources

As discussed in section 3.2.1.3, there would be at least two key impacts to existing terrestrial and aquatic ecosystems: loss of habitat and human contact. Both of these can be reduced, depending on which alternative is chosen. For example, golf course irrigation would itself be a form of environmental protection because it eliminates the need for additional disposal areas. With the use of artificial (constructed) wetlands and rapid infiltration basins, as in Alternative 7, not only is the total land requirement reduced but valuable terrestrial and aquatic ecosystems can actually be created. Environmental protection measures would be most needed in conjunction with the SE agricultural spray irrigation facilities. Removal of the existing forest cover and native vegetation would create wildlife losses, but additional impacts can be reduced by the use of wildlife movement corridors, buffer zones, and the absence of fences. A corridor would consist of a strip of essentially undeveloped land connecting areas of high ecological value, such as cypress swamps. Buffer zones would serve as wildlife food and cover areas, and would be retained/created around all sides of the agricultural field areas, if possible. Also, by eliminating the use of fences, wildlife would be relatively free to move about their home range or migrate to breeding grounds as necessary. The elimination or diminished use of human contact in any of these areas would also aid in reducing the impact to wildlife.

Environmental protection during the construction phase should involve avoiding the unnecessary destruction of vegetation and other wildlife cover by keeping heavy construction equipment within a limited number of designated areas. Construction should also be carried out during periods which would not impair the reproductive behavior or migratory movement of Gopher Frogs, Gopher Tortoises, and other native wildlife.

3.3.4 Floodplains and Wetlands

The use of construction equipment in floodplains and wetlands should be avoided, and ideally, a buffer zone should be maintained between construction areas and these sensitive areas. Surface water resources within wetlands can be protected by the appropriate use of erosion and sedimentation control measures. If any alteration of wetlands is to take place during construction, the appropriate wetland permits must be obtained from the FDER and the U.S. Army Corps of Engineers (COE), Jacksonville District. Compliance with the State of Florida and any Leon County regulations regarding wetland dredge-and-fill activities would also be necessary.

3.3.5 Archeological, Historical, and Recreational Resources

Avoidance and minimization of impacts on archeological and historical sites should be achieved by preceding any construction with a professional archeological survey so that proper assessments of known sites and potential new, yet uncovered/unrecorded sites can be realized. If additional sites not identified in the survey are found during actual construction, construction should be stopped and the Florida SHPO contacted. In addition to site avoidance and proposed project design modification, measures such as evaluation, excavation, and relocation of certain identified sites may be possible through coordination with the Florida SHPO.

Recreational resources are abundant in the areas surrounding Tallahassee. Numerous lakes and ponds serve as fishing, boating, and swimming resources, and attempts should be made to avoid impacts to them. The buffer zones could be established for these areas when considering pipeline corridors and disposal sites so that current recreational activities could continue.

3.3.6 Noise, Odor, and Air Quality

Construction of wastewater conveyance, treatment, and disposal systems would create unavoidable but temporary noise and air quality degradation. Environmental protection measures should meet the rules established by the FDER and the Florida Division of Forestry. These measures include the following:

- The use of heavy equipment to be limited to daytime hours during the construction period.
- All earth moving and construction equipment to use factory specification noise suppression equipment (mufflers, engine enclosures, etc.)
- Fugitive dust production from grading and clearing operations and on dirt roads to be controlled using asphalt or water.
- Open burning of debris to be performed at locations at least 50 yards from the nearest occupied building or public highway. Moisture content and composition to be favorable for good burning. All open burning must be consistent with federal, state and county particulate matter (PM) guidelines and any other appropriate regulations. The 24-hour National Ambient Air Quality Standards (NAAQS) PM Standard (PM_{10}) is 150 $\mu g/m^3$, while the annual standard is 50 $\mu g/m^3$.

Operation of the disposal systems is not likely to cause significant noise, odor, or air quality impacts. Odor should be minimized since the effluent would be treated prior to spray irrigation. Buffer zones of dense forest vegetation would aid in minimizing noise effects and further minimize odor effects.

3.3.7 Human Health Effects

Public health issues are primarily a concern to residents living adjacent to or downgradient/downstream/downwind of effluent sprayfields and golf courses utilized for spray irrigation. For example, residents living east (and north) of the proposed sprayfield of the preferred alternative (Refer to Section 4.1), have voiced complaints during the public hearing held by Leon County in Tallahassee on July 23, 1991, concerning aerosol spray drift, odor, and decreased property values. Potential public health risks are related to aerosols containing non-pathogenic bacteria and pathogens (e.g., pathogenic bacteria, viruses, protozoans, and other infectious microbes) traveling away from a sprayfield area and the potential groundwater contamination of the Floridan Aquifer, a drinking water source. For example, groundwater concerns were voiced by the public during the USEPA Public Hearing held in Tallahassee on August 9, 1990. Post-irrigation use of the golf courses may also be of concern if effluent pathogens are not completely disinfected.

It is generally documented (Crook, 1990; Asano et al., 1992) that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater. However, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious. However, several precautions can be taken to reduce the human health risk at spray irrigation sites. These include effluent treatment, effluent monitoring, on-site containment of aerosols, and groundwater monitoring.

The USEPA understands from the City that City effluent is disinfected in accordance with State of Florida standards and permit requirements. The City's wastewater treatment processes are the activated sludge process, chlorination, and natural ultraviolet light (sunlight) treatment in the holding ponds. Prior to effluent spray irrigation, the City also monitors its effluent for 40 parameters including 17 metals on a monthly basis; monitors for 11 parameters (biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen, chlorine residual, chlorides, pH, fecal coliforms, and other parameters) on a twice a week basis; and monitors for the six (6) above parameters on a daily basis.

Studies have shown that the health risk associated with aerosols from sewage effluent spray irrigation sites is extremely low, particularly for irrigation with wastewater that has been disinfected. Effluent sprayer nozzle design can also help minimize aerosol drift effects. The dispersal of aerosols is also directly related to wind velocities. Other factors which prolong pathogen viability and increase the distance of aerosol travel are increased relative humidity, lower temperature, and darkness. Studies also indicate that pathogens tend to survive longer in an aerosol than do the traditional indicator organisms. The use of dense evergreen forested buffer areas should greatly reduce the spread of aerosols off site by acting as a barrier and by reducing wind velocities. Wildlife corridors left within site boundaries of an agricultural sprayfield area consisting of natural vegetation should further reduce the off-site migration of spray effluent aerosols. However, in general, reasonable protection of residents neighboring a sprayfield should be possible through the proper design and implementation of appropriate effluent treatment methods, frequent effluent monitoring of treated wastewater prior to irrigation, natural ultraviolet light (sunlight) disinfection, prudent spraying operations, use of evergreen forested buffer areas along external borders of sprayfields, use of forested corridors within the general sprayfield area, and groundwater monitoring. If effluent is directly applied to forested areas, as opposed to open agricultural fields, the human health risk associated with aerosols should be further reduced (since aerosols should be further contained on site).

The USEPA understands from the City of Tallahassee that fecal coliform levels are monitored by the City before effluent is spray irrigated on sprayfields and after irrigation via groundwater monitoring. The USEPA also understands from the City that the water quality limits for fecal coliform levels used by the City for effluent prior to sprayfield irrigation is the State of Florida standards defining "secondary treatment" of wastewater, i.e., <200 organisms per 100 ml of effluent. Although there are no USEPA or federal standards for fecal coliforms for spray irrigated effluent, this criterion is consistent with USEPA guidance from the Requirements Memorandum #79-3 dated November 15, 1978 of the former Construction Grants Program (USEPA, 1978). The concepts of this memorandum were incorporated in a USEPA Technology Transfer manual entitled "Land Treatment of Municipal Wastewater" (USEPA No. 625-1-81-013) (USEPA, 1981). The 200 counts/100 ml of effluent criterion is USEPA's fecal coliform criterion for bathing (swimming) waters. It is presumed that water considered safe enough for swimming (which could include incidental drinking) would be adequate for irrigation of sprayfields, particularly with vegetated buffers. In the absence of federal standards regarding acceptable remaining levels of fecal coliforms in sprayed effluent, the USEPA recommends that the State of Florida the use, at a minimum, the above federal guidance (USEPA, 1981) to help protect public health and the environment during their permitting decision for effluent sprayfields in addition to any appropriate State of Florida regulations (Chapter 17-640 F.A.C.) for public access areas.

The spray application of wastewater to golf courses and other public access areas, which would provide greater public exposure than agricultural or forest sprayfields, requires additional treatment for suspended solids removal and high-level disinfection under State of Florida regulations. Compliance with these regulations should greatly reduce the health risks associated with aerosols at golf courses. Irrigation of golf courses using wastewater effluent is also not an uncommon practice since 84 golf courses in Florida were being irrigated with wastewater as of 1991. In addition, golf course spray irrigation would require, per FDER stipulation that an alternate disposal method be made available as a back-up.

Potential public health effects from animal vectors at spray irrigation sites would be minimized through effluent disinfection. Such effects could be further minimized through prudent spraying operations that allow acceptable effluent soil infiltration rates that avoid ponding.

Human health concerns also exist for potential groundwater contamination of the Floridan Aquifer drinking water source. After application of the wastewater effluent to land surfaces, the wastewater infiltrates into the soil and interacts physically and chemically to remove the potentially harmful constituents not removed during effluent treatment. It is possible that some of these constituents could move quickly through the soil (depending on soil characteristics and depth). Once this occurs, groundwater flows can carry the untreated metals, pathogens, nitrogen, etc. to wells which are used by humans as a drinking water source.

The City is conducting an on-site groundwater monitoring program for its existing effluent sprayfields. Historically, over 60 monitoring wells have been drilled and tested at the SE Sprayfield site during interagency cooperative studies. Although the City has been monitoring wells for some time, the State of Florida required monitoring via a Groundwater Monitoring Program by permit condition since November 1, 1984. The City now quarterly monitors seven (7) compliance wells at the SE Sprayfield for six (6) parameters: NO_2 (nitrite) and NO_3 (nitrate) as nitrogen; nitrites; total Kjeldahl nitrogen; chlorides; dissolved organic carbon (DOC); and fecal coliforms. Pesticides and herbicides are also monitored annually.

Based on this monitoring program, the USEPA understands from the City that the City discovered five (5) nitrate-nitrogen groundwater quality violations in the seven compliance wells at the City's SE Sprayfield. Expected causes of these violations included a faulty well construction, application techniques for additional (non-effluent) fertilizer, and possibly on-site cattle burial. Overall, four (4) other violations (also for nitrate-nitrogen) were monitored in one of the two compliance wells at the City's SW Sprayfield. Expected causes for these violations included the fact that a stockpile of dewatered sludge was placed near a compliance well. The USEPA further understands from the City that the exceedances in these two wells were reported to the FDER by the City as part of their quarterly reports and that the FDER responded by writing a letter and by discussing some of the violations with the City. The discussed exceedances involving the faulty well, additional fertilizer, dewatered sludge, and possibly on-site cattle burial were resolved by constructing a new nearby well and adjusting farming techniques at the SE Sprayfield, and by removing the sludge at the SW Sprayfield, and that monitoring has shown no additional groundwater quality violations since 1991 for the parameters monitored. As a rule, nutrient groundwater quality problems can be minimized or prevented.

3.3.8 Land Use

The impacts to land-use change would require compensation to landowners whose properties would be directly converted by construction. Landowners would be financially compensated as per the standard for eminent domain in return for land that would be used for the NE Plant and any of the NE or SE disposal systems.

The change in land use from a natural setting to a sprayfield disposal area, for example, could be minimized by establishing vegetative buffer strips along the borders of an agricultural sprayfield and retaining wildlife corridors within the boundaries of an agricultural sprayfield, or by converting the area to a forest sprayfield. As such, the change in land use would not be as dramatic and losses in habitat and global climate change effects due to loss of vegetation would be somewhat reduced.

3.3.9 Economics and Employment

The impacts to economics and employment are considered positive and, therefore, require no environmental protection measures.

3.3.10 Transportation

The direct and indirect impacts to transportation in the Tallahassee area are considered minimal, but could be reduced even further by controlling the movement of heavy equipment during construction. This control can take the form of designating certain roadways to be used at specified times.

3.3.11 Community Services and Facilities

The expansion of the wastewater facilities in the Tallahassee area to serve projected population growth should be parallelled by development of community services and facilities. These include fire and police protection, recreation, health, education, and library facilities and other utilities. These are all part of the normal growth scenario, and environmental protection measures are not pertinent.

3.3.12 Summary of Alternatives Environmental Protection Measures

As previously stated, the construction and operation of wastewater collection, treatment, and disposal systems would create environmental impacts. These impacts range from traffic congestion to surface water and groundwater quality degradation to the loss of wildlife habitat.

One of the keys to reducing these impacts is to incorporate golf course spray irrigation as an effluent disposal method. Golf course irrigation is a proven disposal alternative and effectively reduces the land area required by other disposal methods such as agricultural irrigation, forest irrigation, and artificial (constructed) wetlands.

Another key to reducing potential impacts is to use proper caution when locating the disposal facilities. For example, agricultural and forest spray irrigation facilities should be placed 1) as far as possible from wetlands or other surface waterbodies, 2) in upland areas, where infiltration and percolation rates are more favorable, and 3) in areas where large buffer zones possessing dense vegetation can be maintained as sheet-flow reduction areas and as wildlife corridors. Specific environmental protection measures for the preferred alternative (Alternative 1) are provided in Chapter 4.

In summary, the best environmental protection measures are those that create the most environmental protection while allowing the designed facilities to operate properly.

CHAPTER 4

PREFERRED ALTERNATIVE

CHAPTER 4 PREFERRED ALTERNATIVE

4.1 SELECTION OF THE PREFERRED ALTERNATIVE

Given the nine alternatives considered and the four alternatives (1, 2, 7 and 9) selected for further study in the EIS Supplement, the USEPA finds Alternative 1 to be an acceptable alternative. Alternative 1 is a practical alternative that represents a continuation of the City's successful agricultural spray irrigation approach to the disposal of treated effluent through an expansion of the City's SE Sprayfield, as well as the irrigation of existing golf courses. As such, the USEPA considers Alternative 1 as the preferred alternative for the EIS Supplement. However, the USEPA is not requiring the implementation of Alternative 1 since this EIS Supplement is discretionary and there are no federal funds and no major federal action proposed for Alternative 1 (or for Alternatives 2, 7 or 9) at this time. Unless the proposed project becomes a major federal action, the selection of an appropriate alternative for the City of Tallahassee wastewater management would be a local decision.

The USEPA selection of Alternative 1 as the preferred alternative was based on the ratings for the cost-effectiveness, reliability, implementability, and environmental impact categories presented in Chapter 3. Table 4-1 is a matrix summary of the rankings for these categories for each of the four system alternatives (1, 2, 7 and 9) selected for further consideration in the EIS Supplement. This matrix evaluation was developed at the DEISS preparation stage (1989). Although a somewhat subjective analysis, it should be noted that all of the characteristics addressed during the category rating process and all of the categories addressed during the ranking process were considered of equal importance. Weighting of the items would have been difficult to justify because, although certain items could be considered more "important" than others, the determination of a specific weighting value is highly subjective and dependent on the wants and needs of an individual or organization.

TABLE 4-1

SUMMARY OF SELECTED SYSTEM ALTERNATIVE RANKINGS (1)

	SYSTEM ALTERNATIVE			
Category	1	2	7	9
Cost-effectiveness	3	2	1	4
Reliability	4	3	2	2
Implementability	4	4	4	3
Environmental Impacts	2	4	2	3
Total	13	13	9	12
Overall Ranking	4	4	2	3

(1) Ranking of alternatives goes from least preferred (=1) to most preferred (=4). When a tie exists for a category, both alternatives are assigned the same numerical ranking. Ranking was not statistically treated.

Table 4-1 indicates that Alternatives 1 and 2 were equally ranked highest among the four alternatives and Alternatives 7 and 9 were ranked as less desirable. In general, the USEPA selected Alternative 1 as the preferred alternative for the EIS Supplement due to: 1) projected relatively low capital costs, 2) the City's successful experience in operating agricultural spray irrigation facilities for effluent disposal, and 3) negative environmental impacts could be expected to be reasonably minimized. Alternative 1 is also a practical approach since it would not only utilize the City's successful experience in agricultural spray irrigation, it also proposes to expand the City's existing SE Sprayfield as opposed to developing a new, separate sprayfield facility or a new disposal approach. Of the final four alternatives considered, Alternative 1 was rated the most cost-effective of the three centralized alternatives considered; was rated the most reliable given the City's success in agricultural spray irrigation at the existing SE Sprayfield; was rated as one of the three most implementable given that the proposed project would expand the City's existing SE Sprayfield as opposed to developing a new, separate sprayfield facility; and negative environmental impacts could be expected to be reasonably minimized despite the fact that the proposed project was rated as one of the two least environmentally preferable. Despite the equal, most favorable ranking of Alternative 1 and 2, Alternative 1 is considered the preferred alternative for the EIS Supplement since the City has had successful experience in agricultural spray irrigation proposed in Alternative 1 as opposed to forest spray irrigation proposed in Alternative 2. However, as indicated above, forest irrigation is to be tried as a demonstration project by the City for Alternative 1 on a proposed small portion of the Eastern Expansion spray area of the agricultural sprayfield expansion.

Although the USEPA considers Alternative 1 the preferred alternative from a practical perspective, the other three system alternatives further considered in the EIS Supplement (Alternatives 2, 7 and 9) also have attributes that the local decision-makers may or may not wish to further consider in their selection of a preferred alternative. Of these alternatives, Alternative 2 is noteworthy from an environmental perspective. Alternative 2, as indicated above, is similar to Alternative 1 except that it proposes forest irrigation rather than agricultural irrigation. Overall, it was ranked equal to Alternative 1 in the 1989 matrix evaluation, but was ranked higher environmentally. Global climate change impacts, for example, due to land clearing of vegetation at the Eastern Sprayfield Area, would be offset to a greater degree through the irrigation of a forest crop than an agricultural crop due to the greater biomass of the tree crop. If the existing young pines on site could be irrigated (i.e., the site is not cleared and replanted with a new crop of pines), global climate change impacts would be further minimized and the existing silvicultural land use of the Eastern Expansion Area would essentially be unaltered. In addition, the potential for soil erosion would be significantly reduced if the existing trees would be irrigated or if the existing trees are harvested and replanted with a new crop of trees without the clearing and grubbing (stump removal) required for an agricultural crop. The City and the pulp and paper company that owns the land may reach a mutually beneficial agreement involving effluent utilization for silviculture. On the other hand, disadvantages for Alternative 2 would appear to be the City's inexperience in forest irrigation (although forest irrigation is being successfully used at 66 sites in the southeast, including 31 in Florida) and operational considerations such as understory maintenance of the tree crop and use of "drip" irrigation as opposed to "spray" irrigation (which may reduce the per-acre effluent disposal capacity of the operation and therefore require a larger sprayfield land area). The small forest irrigation demonstration project that the City is to try as part of Alternative 1 (if implemented), should provide an excellent opportunity for local decision-makers to compare the merits of agricultural irrigation versus forest irrigation. Operational, environmental and nutrient uptake (crop nitrogen demand) aspects of each technique would need to be considered.

4.2 SUCCESS OF CITY'S SE AND SW SPRAYFIELD OPERATIONS

The City's experience with agricultural spray irrigation disposal operations has been successful at the existing SE Sprayfield, and the production of animal feed crops and/or processed foods for humans has reduced operational costs. The

USEPA understands from the City that the City has been continuously spraying its SE Sprayfield since January 1981 (experimental spraying was initiated in fall of 1980). Continuous spraying at the SW Sprayfield for effluent disposal was begun in 1978, with experimental spraying starting in 1972. As such, the SE sprayfield has been successfully used for continuous spraying for some 13 years and the SW sprayfield for some 15 years. In regard to environmental impacts of the operation, the City disinfects its wastewater at the expanded T.P. Smith Treatment Plant and the LBR Treatment Plant, further treats the treated effluent before it is spray irrigated, and also conducts a groundwater monitoring program.

The USEPA understands from the City that City effluent is disinfected in accordance with State of Florida standards and permit requirements. The City's wastewater treatment processes are the activated sludge process, chlorination, and natural ultraviolet light (sunlight) treatment in the holding ponds. Prior to effluent spray irrigation, the City also monitors its effluent for 40 parameters including 17 metals on a monthly basis; monitors for 11 parameters (biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen, residual chlorides, pH, fecal coliforms, and other parameters) on a twice a week basis; and monitors for the six (6) above parameters on a daily basis.

The City is also conducting an on-site groundwater monitoring program for its existing effluent sprayfields. Historically, over 60 monitoring wells have been drilled and tested at the SE Sprayfield site during interagency cooperative studies. Although the City has been monitoring wells for some time, the State of Florida required monitoring via a Groundwater Monitoring Program by permit condition since November 1, 1984. The City now quarterly monitors seven (7) compliance wells at the SE Sprayfield for six (6) parameters: NO_2 (nitrite) and NO_3 (nitrate) as nitrogen; nitrites; total Kjeldahl nitrogen; chlorides; dissolved organic carbon (DOC); and fecal coliforms. Pesticides and herbicides are also monitored annually.

Based on this monitoring program, the USEPA understands from the City that the City discovered five (5) nitrate-nitrogen groundwater quality violations (1989, 1990 and 1991) in one of the seven compliance wells at the City's SE Sprayfield, and four (4) nitrate-nitrogen groundwater quality violations (1986, 1987 and 1988) in one of the two compliance wells at the City's SW Sprayfield. These exceedances have been resolved by the City through corrective actions and monitoring has shown no additional groundwater quality violations since 1991 for parameters monitored. As a rule, nutrient groundwater quality problems can be minimized or prevented. (Additional discussion on the City's groundwater monitoring program is presented below in Section 4.6.)

4.3 STATUS OF LOCAL DECISION-MAKERS SELECTION PROCESS

As indicated previously, the USEPA is not requiring implementation of Alternative 1 as the preferred alternative since this EIS Supplement is discretionary and there are no federal funds and no major federal action proposed for Alternative 1 (or for Alternatives 2, 7 or 9) at this time. Unless the proposed project becomes a major federal action, the selection of an appropriate alternative for the City of Tallahassee wastewater management would be a local decision.

At the time of issuance of this FEISS, a proposed Tallahassee wastewater management alternative had not been finalized. Local decision-makers including the City of Tallahassee, City Commission, Leon County Board of County Commissioners (County Commission), Citizens Advisory Committee (for a NE treatment plant), Citizens Advisory Committee (for effluent disposal) and the general public were continuing to locally review the project in terms of acceptability, design, prioritization, and implementation. As such, the contents of this FEISS may not include any or all aspects of the ultimate approach locally selected. The FEISS will serve, however, to provide technical guidance to local decision-makers and the public.

The USEPA understands from the City of Tallahassee that the Leon County Board of County Commissioners has denied (July 23, 1991) two Leon County sewer "franchise" applications for right-of-way placement permits for the proposed

City's expansion of the SE Sprayfield and the associated expansion of an effluent force main from the T.P. Smith Treatment Plant to the SE Sprayfield. The USEPA understands from the City that the County's actions are made in response to citizen concerns regarding aerosol spray drift, odor, and decreased property value were voiced by some 20 speakers in a public hearing held by Leon County in Tallahassee on July 23, 1991. As a consequence, the City's proposed Eastern Expansion area (part of Alternative 1) is presently denied by Leon County. The County has requested that the City revise/update the 1988 City Master Sewer Plan (MSP) and that the City present various wastewater alternatives with cost estimates to the County for consideration.

Additional project updates related to the preferred alternative and Tallahassee wastewater management in general are provided in the "Project Updates Summary" Chapter following the Executive Summary of this FEISS. Updated topics include: treatment plant and sprayfield capacity reratings and/or expansion, Leon County action on NE treatment plant, Leon County action of SE sprayfield expansion, City of Tallahassee Action on T.P. Smith Plant expansion, Citizens Advisory Committee action on disposal site priorities, City Commission action of SE Sprayfield expansion, artificial wetlands alternatives, USEPA action on storm water regulations, and USEPA action on sludge permitting.

4.4 DESCRIPTION OF THE PREFERRED ALTERNATIVE

Alternative 1 is referred to as a centralized "treatment south" alternative. This means that all untreated sewage effluent flows would be conveyed to southwest Leon County to receive secondary treatment at either the improved LBR Wastewater Treatment Plant or the expanded TPS Wastewater Treatment Plant. The preferred alternative proposes disposal of the treated water from the LBR Plant via a spray irrigation operation at four (4) local existing golf courses: Florida State University, Jake Gaither, Capital City Country Club, and Hilaman Municipal. Alternative 1 further proposes that the treated wastewater from the TPS Plant would be transported to the proposed expanded SE Sprayfield for final disposal. The sprayfield expansion proposed in Alternative 1 consists of Eastern and Western Expansion Areas.

The Eastern Expansion Area is being leased by the City from a forest-products company (St. Joseph Land and Development Company) and consists of approximately 1,830 total acres. The preferred alternative proposes that approximately 909 acres are to be utilized for spray irrigation (<u>Update</u>: The USEPA understands from the City of Tallahassee that the 909 acreage figure and/or the configuration of the spray areas may be changed by local decision-makers if Alternative 1 is implemented). Although forest spray irrigation is to be tried for an undetermined number of acres by the City for Alternative 1 on a small demonstration project basis, the majority of the 909 acres are to be utilized for agricultural spray irrigation. The agricultural crop rotation is expected to include corn, soy beans, canola, and rye/rye grass for hay. All agricultural crops produced from effluent sprayfields are not for direct human consumption and must be utilized consistent with the State of Florida regulations. Accordingly, irrigated crops produced by the City from the proposed Alternative 1 may only be utilized as animal feed (e.g., cattle feed) and/or as processed food for humans (e.g., canola oil: soy bean oil) to the extent consistent with Chapter 17-610 F.A.C. The remaining acreage of the 1,830 total acres would either be actively managed by the St. Joseph Land and Development Company or set aside as wildlife corridors.

As previously indicated, an undetermined number of acres proposed for spray irrigation at the Eastern Expansion area are to be used by the City for forest spray irrigation as a small demonstration project. The forest spray irrigation acreage is planned for cultivation in the northwest portion of the Eastern Expansion Area. The tree species in this small demonstration project would utilize the typical existing St. Joseph Land and Development Company's pine plantation species (primarily young slash and sand pine), so that land conversion in this area would not be needed for the forest spray irrigation. The City plans to operate the demonstration project site initially and is investigating existing forest spray irrigation operations in Clayton County, Georgia for guidance (the Clayton County site is currently one of 66 forest application sites in the southeast including 31 in the State of Florida). It is anticipated that in the future, the City would involve a private entity for harvesting trees. Specifics on crop management practices have not yet been finalized.

The Western Expansion area proposed in the preferred alternative consists of approximately 1,280 total acres. Although part of the Alternative 1 proposal to expand the City's SE Sprayfield, the USEPA understands form the City that the land for the Western Expansion area has not been acquired, no near-future construction plans have been made for the site, and no future activity is planned there.

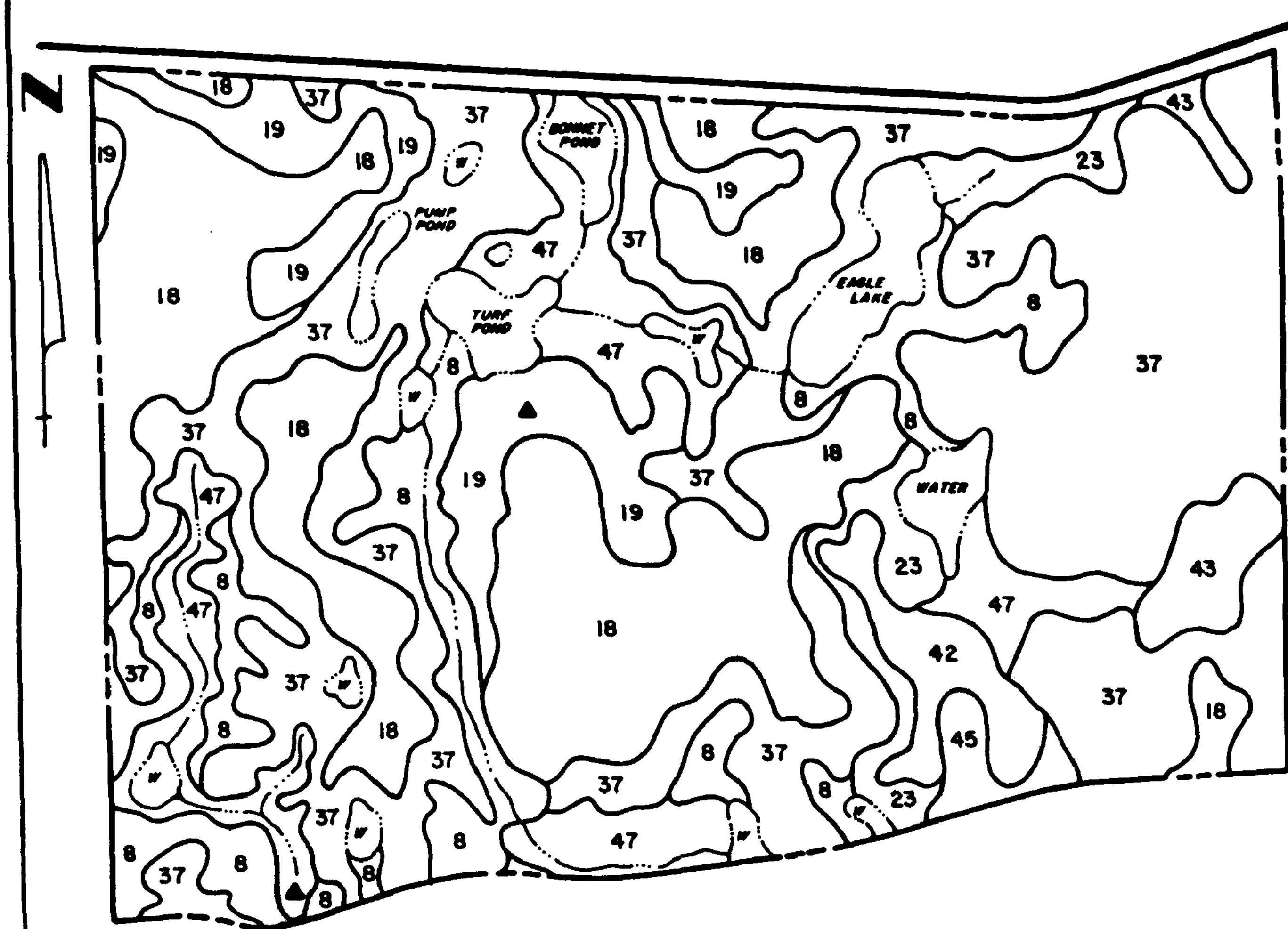
Figure 4-1 presents the soil associations of the Eastern Expansion Area based on the 1981 Leon County Soil Survey (USDA [SCS] and USFS, 1981). Figure 4-2 illustrates the "proposed" wildlife corridors as well as sensitive resources such as surface waterbodies and archaeological sites in the Eastern Expansion Area of Alternative 1. Because the Western Expansion Area is not proposed for development by the City at this time, it was also considered in Figure 4-3, although to a lesser degree. As a part of Alternative 1 and in the event of any potential future land acquisition, wildlife corridors and a pivot irrigation area for the Western Expansion area have been "suggested" and are depicted in Figure 4-3 along with associated selected sensitive resource areas. No site-specific cultural resource inventory was conducted for the Western Expansion area.

4.5 SOIL ASSOCIATIONS OF THE PREFERRED ALTERNATIVE

Based on the 1981 Soil Survey (USDS [SCS], USFS) the soils of the Eastern Expansion Area sprayfield site proposed by the City are dominated by Ortega Sand, Kershaw Sand with a 0-5% slope, Talquin Fine Sand, Chipley Fine Sand and Kershaw Sand with a 5-8% slope, respectively (Fig. 4-1). Of these, only the Kershaw sands are classified in the Soils Survey as favorable for septic tank absorption fields (classified as "slight," i.e., having favorable soil properties for the activity).

Of the portions of the proposed Eastern Expansion Area sprayfield proposed for irrigation (i.e., center pivot irrigation Areas A-E and adjacent fixed head irrigation areas: Fig. 4-2), irrigation areas associated with and adjacent to Areas A, B, and D primarily contain Kershaw Sands while irrigation areas associated with and adjacent to Areas C and E primarily contain Ortega Sand. As indicated, Kershaw Sands are considered suitable soil types for septic tank absorption fields while Ortega Sand would not be favorable due to poor filtration capabilities (too well-drained sands). However, it should be noted that the City's proposed project is not septic tank disposal of raw sewage, but rather spray irrigation of monitored, secondarily-treated sewage effluent. As such, spray irrigation would disperse effluent over a greater area than septic tank disposal and also would dispose wastewater of a considerably higher water quality than untreated raw sewage wastewater of septic tanks. (Specifically, all of the vertical soil horizons are utilized for filtration during spray irrigation whereas several inches of soil filtration are not utilized in septic tank drainage fields, since drainage lines are buried several inches below the surface; spray irrigation utilizes the entire horizontal soil surface area whereas septic tank fields only utilize soil areas associated with the drainage lines; and secondarily-treated spray effluent requires considerably less soil filtration for purification than untreated septic tank raw sewage wastewater.)

Because of the filtration limitations of the Ortega Sand in the proposed irrigation areas associated with and adjacent to Areas C and E as well as some unfavorable soils interspersed in irrigation areas associated with and adjacent to Areas A, B and D, the USEPA recommends reduced irrigation application (inches/week) in these areas. If monitoring exhibits compliance with State of Florida groundwater quality standards and monitoring is conducted to the satisfaction of the State of Florida, additional application can be tried if commensurate with groundwater quality compliance. Groundwater monitoring is also essential since the entire Eastern Expansion Area lies in the Woodville Karst Plain, i.e., Karstic geology that is subject to water dissolution and collapse (sinkholes). In any areas of collapse, irrigation should be stopped immediately



LEGEND

- 8 CHIPLEY FINE SAND 0-2% SLOPES
- 18 KERSHAW SAND 0-5% SLOPES
- 19 KERSHAW SAND 5-8% SLOPES
- 37 ORTEGA SAND 0-5% SLOPES
- 43 RUTLEGE LOAMY FINE SAND
- 39 PELHAM FINE SAND
- 47 TALQUIN FINE SAND
- 5 BLANTON FINE SAND 0-5% SLOPES
- 1 ALBANY LOAMY SAND 0-2% SLOPES
- 48 TROUP FINE SAND 0-5% SLOPES
- 24 LUCY FINE SAND 0-5% SLOPES
- 23 LEON SAND
- 42 PLUMMER MUCKY FINE SAND DEPRESSIONAL
- 45 SAPELO FINE SAND
- ▲ SINK OR DEPRESSIONAL AREA

TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT
EASTERN EXPANSION SPRAYFIELD

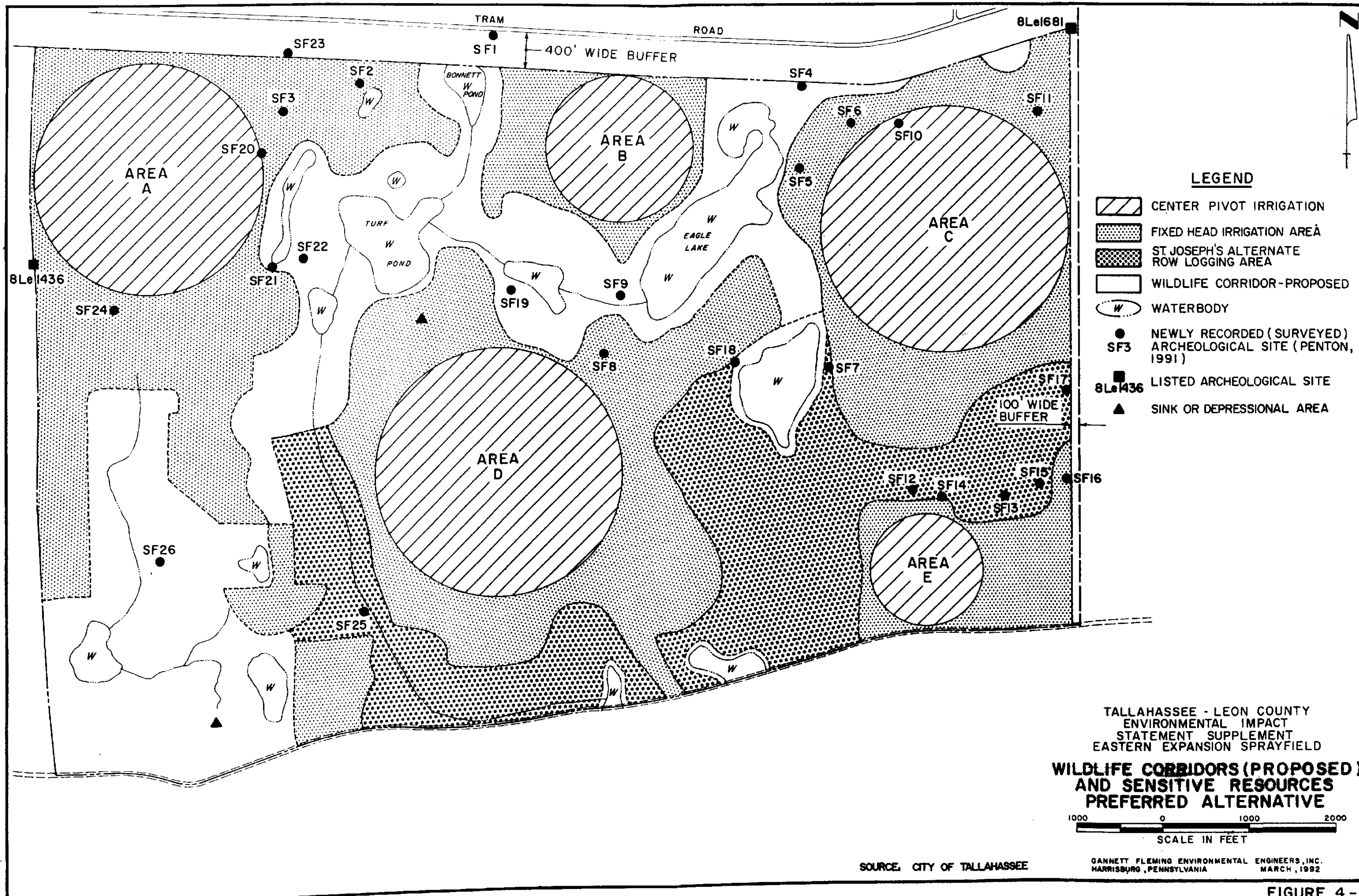
SOILS MAP
PREFERRED ALTERNATIVE

1600 0 1600 3200
SCALE IN FEET

SOURCE : TAKEN FROM USDA SCS,
LEON COUNTY SOIL SURVEY, 1981

GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA FEBRUARY, 1991

FIGURE 4-1



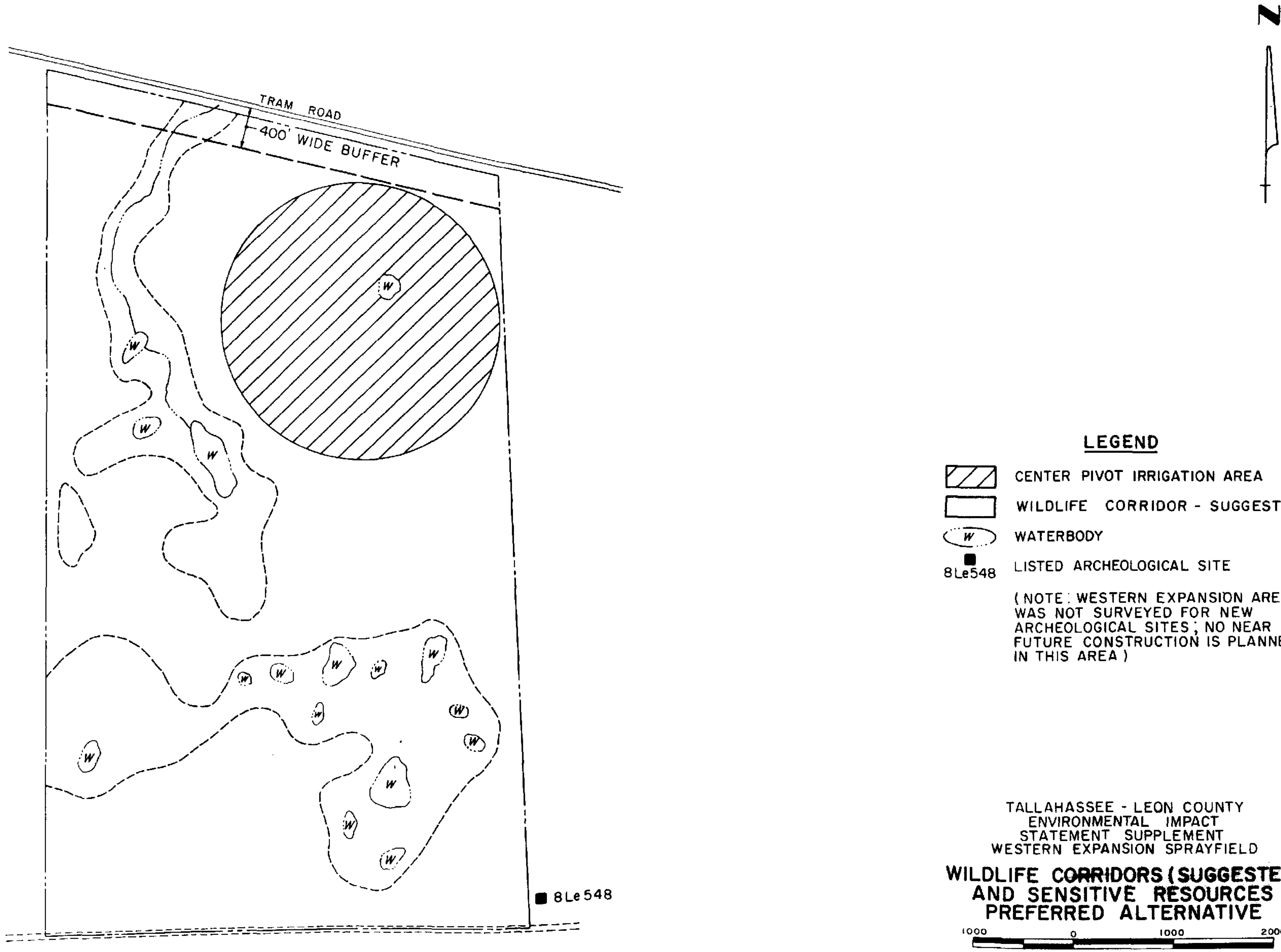
TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT
EASTERN EXPANSION SPRAYFIELD

WILDLIFE CORRIDORS (PROPOSED) AND SENSITIVE RESOURCES PREFERRED ALTERNATIVE

SOURCE: CITY OF TALLAHASSEE

GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA
MARCH, 1992

FIGURE 4-2



LEGEND

CENTER PIVOT IRRIGATION AREA

WILDLIFE CORRIDOR - SUGGESTED

W WATERBODY

8Le548 LISTED ARCHEOLOGICAL SITE

(NOTE: WESTERN EXPANSION AREA WAS NOT SURVEYED FOR NEW ARCHEOLOGICAL SITES; NO NEAR FUTURE CONSTRUCTION IS PLANNED IN THIS AREA)

TALLAHASSEE - LEON COUNTY
ENVIRONMENTAL IMPACT
STATEMENT SUPPLEMENT
WESTERN EXPANSION SPRAYFIELD

WILDLIFE CORRIDORS (SUGGESTED) AND SENSITIVE RESOURCES PREFERRED ALTERNATIVE

1000 0 1000 2000
SCALE IN FEET

SOURCE: CITY OF TALLAHASSEE

GANNETT FLEMING ENVIRONMENTAL ENGINEERS, INC.
HARRISBURG, PENNSYLVANIA
FEBRUARY, 1991

FIGURE 4-3

in those areas and the State of Florida notified. The USEPA recommends that no effluent be sprayed in a reasonable surrounding area of the existing sinkhole depressional area located within the proposed fixed head irrigation area adjacent to Area D, as well as any other potentially discovered sinkhole areas (See Fig. 4-1). The USEPA further recommends that the State of Florida consider the existing soil characteristics and Karstic conditions of the proposed Eastern Expansion Area in their permitting decision for the City's proposed sprayfield expansion.

Although the Western Expansion area of preferred Alternative 1 is not, as indicated above, proposed by the City for near-future construction, it may be noted that this area is characterized by Kershaw Sands based on the Leon County Soil Survey (USDA [SCS] and USFS, 1981). As indicated above, the Kershaw Sands have excellent drainage and filtration characteristics.

4.6 ENVIRONMENTAL IMPACTS OF THE PREFERRED ALTERNATIVE

Environmental impacts of the preferred alternative include water quality (groundwater, surface water, and wetlands), habitat loss, protected species, archeological, public health, and land-use concerns. Primary/secondary environmental impacts and environmental protection measures for Alternative 1 are described below in Subsections 4.6.1/4.6.2 and Section 4.7, respectively.

4.6.1 Primary Environmental Impacts

The most critical primary impacts of the preferred alternative would be potential groundwater and surface water contamination; the removal of trees in the sprayfield area; loss of habitat for protected faunal species in the area (Gopher Frog, Gopher Tortoise, Eastern Indigo Snake, and Florida Pine Snake); the possible disruption of the Gopher Frog migration paths for breeding in waterbodies; the possible disruption of habitat suitable for the Panhandle Golden Aster, a protected floral species in the area; and the Panhandle Meadow Beauty, a candidate protected floral species in the area; impacts to known and possibly to potential, uncovered/unrecorded archeological sites; and possible human health effects.

Groundwater and surface water contamination could result from the spray irrigation of effluent at the expanded SE Sprayfield (and the four golf courses). Factors that could lead to this include the following:

- Inadequately treated wastewater coming from the TPS Plant or LBR Plant.
- Inadequate farm operations which include incomplete harvesting to remove all vegetation from the fields and improper cultivation resulting in low crop yields and therefore low nutrient uptake.
- Excessively high effluent application rates.
- Application of effluent immediately prior to, after, or during storm events.
- Location of sprayfield areas over "live" Karstic sinkholes (depressions with standing water) and other unfilled Karstic depressions (potential groundwater contamination).
- Location of field areas on soils with high clay content (potential surface water contamination) (Refer to Figure 4-1 for soils map of Eastern Expansion Area of SE Sprayfield).
- Inadequate storm water management facilities (potential surface water contamination).

As indicated above, the City is conducting an on-site groundwater monitoring program for its existing effluent sprayfields. Historically, over 60 monitoring wells have been drilled and tested at the SE Sprayfield site during interagency cooperative studies. Although the City has been monitoring wells for some time, the State of Florida required monitoring via a Groundwater Monitoring Program by permit condition since November 1, 1984. The City now quarterly monitors seven (7) compliance wells at the SE Sprayfield for six (6) parameters: NO_2 (nitrite) and NO_3 (nitrate) as nitrogen; nitrites; total Kjeldahl nitrogen; chlorides; dissolved organic carbon (DOC); and fecal coliforms. Pesticides and herbicides are also monitored annually.

Based on this monitoring program, the USEPA understands from the City that the City discovered five (5) nitrate-nitrogen groundwater quality violations in one of the seven compliance wells at the City's SE Sprayfield. The USEPA further understands from the City that these violations occurred at Compliance Well No. SE-22 during 1989, 1990 and 1991 and that expected causes included a faulty well construction, application techniques for additional (non-effluent) fertilizer, and possibly on-site cattle burial. The nitrate concentrations in Compliance Well No. SE-22 during those sampling periods were 10.7 mg/l and 10.1 mg/l (1989), 10.3 mg/l and 10.8 mg/l (1990) and 10.2 mg/l (1991), compared to the 10.0 mg/l State of Florida limit for groundwater nitrate-nitrogen. Overall, four (4) other violations were monitored (also for nitrate-nitrogen) at one of the two compliance wells at the City's SW Sprayfield during 1986, 1987 and 1988. The USEPA understands from the City that expected causes included the fact that a stockpile of dewatered sludge was placed near Compliance Well No. LS-25. The nitrate concentrations in Compliance Well LS-25 were 11.8 mg/l (1986), 10.3 mg/l and 11.0 mg/l (1987) and 11.2 mg/l (1988). The USEPA understands from the City that the exceedances in these two wells were reported to the FDER by the City as part of their quarterly reports and that the FDER responded by writing a letter and by discussing some of the violations with the City. The USEPA also understands from the City that the above exceedances involving the faulty well, additional fertilizer, dewatered sludge, and possibly on-site cattle burial were resolved by the corrective actions of constructing a new nearby well and adjusting farming techniques at the SE Sprayfield, and by removing the sludge at the SW Sprayfield, and that monitoring has shown no additional groundwater quality violations since 1991 for the parameters monitored. As a rule, nutrient groundwater quality problems can be minimized or prevented.

As exemplified above by Compliance Well No. LS-25, the disposal fields for sludge generated during the treatment of the wastewater would also have the potential for groundwater contamination. Generated sludge would be disposed by land application near the TPS Facility, the SW Sprayfield for dewatered sludge disposal, and an expanded airport site for liquid sludge disposal. The City has a groundwater monitoring program in effect for the airport sludge fields. The wells are tested quarterly, with results reported to the FDER. Data from groundwater monitoring wells have shown some nitrogen exceedances, which have been addressed and corrected for areas outside the sludge field property line. The FDER apparently believes that the sludge field is in compliance outside of the property line in terms of the nitrogen parameter. According to the City, the compliance wells located down-gradient of the sludge field and in the Floridan Aquifer, a drinking water source, have shown no violations of drinking water standards. The sludge field site, however, is apparently at capacity based on FDER nitrogen level determinations.

The environmental concerns associated with potential contamination of surface water from spray irrigation include the generation of nutrient-rich surface water runoff. Such runoff could potentially cause eutrophication of surface waterbodies and wetlands in the sprayfield (e.g., Eagle Lake, Turf Pond, Bonnett Pond in the Eastern Expansion area), of the St. Marks River system adjacent to and south of the Eastern Expansion Sprayfield (the St. Marks River is classified as an Outstanding Florida Water), and of the groundwater via Karstic sinkhole direct access areas. Agricultural practices should therefore include creation of 6- to 8-inch earthen berms along the sprayfield area/wildlife corridor boundaries (See Figure 4-2 for proposed boundaries within the Eastern Expansion area) as part of the leasing farmer's initial field plowing preparations. For stability, the berms should be vegetated (herbaceous ground cover) as soon as practical. Such berms would help contain surface water runoff and allow percolation and soil filtration of the applied effluent in designated sprayfield areas. Slightly higher berms (10-12 inches) should also be created around identified sinkholes (See Figure 4-1 and 4-2 for Eastern Expansion area), to divert flows away from such direct groundwater access areas. City spray application rates must be in compliance with State of Florida permit conditions and should be adjusted according to weather conditions, which would help prevent effluent over-application and reduce surface water runoff if these conditions would be expected to cause detrimental environmental or human health effects or be considered to be ineffective from an effluent disposal perspective (Also refer to Section 4.6.2 for human health effects under "Secondary Environmental Impacts").

The loss and disruption of contiguous wildlife habitat would result from conversion of the land area of the proposed Eastern Expansion to a sprayfield area. The loss of suitable habitat for wildlife such as the protected Gopher Tortoise, Indigo Snake, and Florida Pine Snake, as well as the disruption of Gopher Frog reproductive migration routes, would be of concern. The acreage to be converted to spray irrigation area would consist of approximately 909 acres, which presently supports young slash pine (25% of area) and sand pine (75% of area). The majority of the 909 acres would be cleared in preparation for the agricultural sprayfield. The remaining acres would not need to be cleared for conversion since this acreage (around Center Pivot Area A in the northwest portion of the Eastern Expansion area; See Figure 4-2) is to be used for the small forest irrigation demonstration project to be tried by the City, which would utilize the existing young pines for forest irrigation.

As a consequence of the land-clearing activities proposed for the Eastern Expansion area, approximately 85% of the existing on-site Gopher Tortoise habitat (sandy, upland areas) would be converted to a spray irrigation field. However, the remaining 15% of the suitable habitat areas is to be protected by inclusion in the proposed wildlife corridors, i.e., the natural vegetation areas contiguous to spray irrigation areas within the Eastern Expansion area depicted in Figure 4-2. Protection of the remaining 15% of suitable habitat was recommended by the Florida Game and Fresh Water Fish Commission (FG&FWFC) "to ensure the continued on-site existence" of the protected Gopher Tortoise, Gopher Frog, Eastern Indigo, and Florida Pine Snake. (See FG&FWFC letter dated February 6, 1991 in Chapter 5 included as part of USEPA's response to DEISS Letter #5, based on the FG&FWFC's field observations on January 23, 1991). (Note: If the 909 acreage figure and/or their configuration proposed in this FEISS for spray irrigation in the Eastern Expansion area is changed by local decision-makers, adequate on-site sandy areas must still remain for the Gopher Tortoise. The USEPA recommends additional coordination with the FG&FWFC, as appropriate.)

In addition to the land clearing for the Eastern Expansion spray irrigation area, the St. Joseph Land and Development Company plans to timber portions of the southern half of the proposed wildlife corridors of the Eastern Expansion area leased to the City. This timbering is to exclude jurisdictional wetlands designated by the U.S. Army Corps of Engineers (COE) and/or the FDER. As specified by the FG&FWFC, timbering should also be limited to the thinning of alternate rows of planted pines in the proposed wildlife corridors, with vegetation in exposed areas between remaining trees being moderately maintained in coordination with the FG&FWFC through periodic control burns or perhaps mowing to benefit Gopher Tortoise habitat (See Figure 4-2).

Habitat loss and disruption from land conversion would not only impact wildlife species and/or suitable habitat, but would also impact vegetative species and/or suitable habitat. The protected Panhandle Golden Aster and the protected (candidate species) Panhandle Meadow Beauty, or their suitable habitat would be affected. However, both would be provided some degree of protection within the designated wildlife corridors. Wiregrass, although not legally a protected species, would also receive similar protection within these corridors. Wiregrass comprises a remnant portion of the herbaceous layer in the Eastern Expansion area and is important in the succession of longleaf pines.

The previously-mentioned wildlife corridors would help minimize the effects of the habitat losses projected from converting the land of the Eastern Expansion area to a sprayfield. The corridors are designed to maintain a portion of the natural vegetation of upland and wetland habitats in the sprayfield expansion area. The corridor areas would be contiguous to the spray irrigation areas proposed for the Eastern Expansion area (Areas A-E; See Figure 4-2), which is intended to allow undisturbed movement of wildlife around these irrigation areas. The Eastern Expansion wildlife corridors are to include an isthmus area (maximum of 300-500 feet wide) west of center pivot Area C to maintain corridor interconnection for north-south wildlife movement. The wildlife corridors are to essentially be continuous, although occasionally would be crossed by dirt, gravel or paved access roads. (Note: If the configuration of the areas to be irrigated are changed from those shown in Figure 4-2 by local decision-makers if Alternative 1 is implemented, the USEPA recommends that an appropriate north-south wildlife corridor should still be maintained.)

Protected federal and State-of-Florida faunal and floral species that range in the preferred alternative area are the Eastern Indigo Snake, Florida Pine Snake, Gopher Tortoise, Gopher Frog, Panhandle Golden Aster, and Panhandle Meadow Beauty. These species are classified as Florida-listed faunal species of special concern (Eastern Indigo Snake, Florida Pine Snake, Gopher Tortoise, and Gopher Frog); Florida-listed and federally-listed threatened faunal species (Eastern Indigo Snake); federal Category 2 candidate faunal species for federal listing as threatened or endangered (Florida Pine Snake, Gopher Tortoise, and Gopher Frog); federal Category 2 candidate floral species for federal listing as threatened or endangered (Panhandle Meadow Beauty); and/or Florida-listed endangered floral species and federal candidate floral species for federal listing as threatened or endangered (Panhandle Golden Aster) (Also refer to Table 2-27).

The U.S. Fish and Wildlife Service (USFWS) was contacted to fulfill the interagency cooperation requirements of Section 7 of the Endangered Species Act (Refer to Appendix F for record of contacts for federally-protected flora and fauna in the project area: Mr. Dave Martin [USFWS; Jacksonville, FL] and Mr. Jay Troxel [USFWS; Panama City, FL]). Section 7 requires federal agencies to ensure that their proposed actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of such species. In addition to the USFWS, the State of Florida, notably the FG&FWFC, was also contacted. Cooperation included a field inspection of the Eastern Expansion area on January 23, 1991, to review suitable, on-site habitat for State-of-Florida-listed fauna ranging in the area: (Refer to Chapter 5 of this FEISS in the USEPA response section for the DEISS Comment Letter #9 from the U.S. Department of the Interior for a copy of the FG&FWFC letter dated February 6, 1991, regarding the field survey; also refer to Appendix F for a record of contact for Florida-listed flora of the area: Mr. Dennis Hardin [Florida Department of Agriculture; Tallahassee, FL]).

Based on coordination with the Florida State Historic Preservation Officer (SHPO), three (3) known listed archeological sites were determined to exist in the preferred alternative project site and the existing SE Sprayfield. These sites are: Site 8LE1436 which is located within the proposed Eastern Expansion of the existing SE Sprayfield; Site 8LE546 which is located within the TPS Plant site, and Site 8LE548 which is located in the existing SE Sprayfield. An additional archeological site (Site 8LE1681) was determined to be located nearby but outside the proposed Eastern Expansion of the SE Sprayfield. The SHPO has indicated that Sites 8LE546 and 8LE1436 should be relocated and evaluated, Site 8LE548 should not be affected if project construction (drilling of a groundwater monitoring well) avoids the site, and that Site 8LE1681 lies outside the proposed Eastern Expansion area (See Figure 2-9). The City recently retained a professional archeologist to conduct a cultural resource inventory and assessment of the TPS Plant area and the Eastern Expansion area of the SE Sprayfield (See Penton, 1991). The Phase I archeological study identified 26 newly recorded sites of which five (SF1, SF2, SF3, SF7, and SF9) have been determined to be significant enough to warrant further consideration (See Figure 4-2). Additional City coordination with the Florida SHPO should be provided, as appropriate.

In addition to the Eastern Expansion area, preferred Alternative 1 also includes the Western Expansion area of the City's existing SE Sprayfield (1,280 total acres). As indicated previously, it is USEPA's understanding from the City that the City has not acquired the land in this area and acquisition of and construction at the Western Expansion area appears unlikely at this time. Nevertheless, as a part of Alternative 1 and in the event of any potential future land acquisition, wildlife corridors and a pivot irrigation area for the Western Expansion area have been "suggested" and are depicted in Figure 4-3 along with associated selected sensitive resource areas. No site-specific cultural resource inventory was conducted for the Western Expansion area.

4.6.2 Secondary Environmental Impacts

The secondary environmental impacts of the preferred alternative which generate the most concern are the impacts on public health and land-use changes.

Public health issues are primarily a concern to residents living adjacent to or downgradient/downstream/downwind of the SE Sprayfield and the adjacent proposed Eastern Expansion area as well as golf courses, should they be utilized for spray irrigation. Residents living east (and north) of the proposed Eastern Expansion area have voiced complaints during the public hearing held by Leon County in Tallahassee on July 23, 1991, concerning aerosol spray drift, odor, and decreased property values. Potential public health risks are related to aerosols containing non-pathogenic bacteria and pathogens (e.g., pathogenic bacteria, viruses, protozoans and other infectious microbes) traveling away from the sprayfield area and the potential groundwater contamination of the Floridan Aquifer, a drinking water source. Groundwater concerns were voiced by the public during the USEPA Public Hearing held in Tallahassee on August 9, 1990. Post-irrigation use of the golf courses may also be of concern if effluent pathogens are not completely disinfected.

It is generally documented (Crook, 1990; Asano et al., 1992) that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater. However, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious. However, several precautions can be taken to reduce the human health risk at spray irrigation sites. These include effluent treatment, effluent monitoring, on-site containment of aerosols, and groundwater monitoring.

As indicated previously, the USEPA understands from the City that City effluent is disinfected in accordance with State of Florida standards and permit requirements. The City's wastewater treatment processes are the activated sludge process, chlorination, and natural ultraviolet light (sunlight) treatment in the holding ponds. Prior to effluent spray irrigation, the City also monitors its effluent for 40 parameters including 17 metals on a monthly basis; monitors for 11 parameters (biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen, residual chlorides, pH, fecal coliforms, and other parameters) on a twice a week basis; and monitors for the six (6) above parameters on a daily basis.

Studies have shown that the health risk associated with aerosols from sewage effluent spray irrigation sites is extremely low, particularly for irrigation with wastewater that has been disinfected. Effluent sprayer nozzle design can also help minimize aerosol drift effects. The dispersal of aerosols is also directly related to wind velocities. Local prevailing winds average 7.7 miles per hour and are from a southerly direction in the spring and summer and shift toward a more northerly direction near the end of the year. Other factors which prolong pathogen viability and increase the distance of aerosol travel are increased relative humidity, lower temperature, and darkness. Studies also indicate that pathogens tend to survive longer in an aerosol than do the traditional indicator organisms. The use of dense evergreen forested buffer areas, which is proposed by the City along the external borders of the Eastern Expansion area for Alternative 1, should greatly reduce the spread of aerosols off site by acting as a barrier and by reducing wind velocities. Wildlife corridors within site boundaries of the proposed Eastern Expansion area consisting of natural vegetation, should further reduce the off-site migration of spray effluent aerosols. However, in general, reasonable protection of residents neighboring a sprayfield should be possible through the proper design and implementation of appropriate effluent treatment methods, frequent effluent monitoring of treated wastewater prior to irrigation, natural ultraviolet light (sunlight) disinfection, prudent spraying operations, use of evergreen forested buffer areas along external borders of sprayfields, use of forested corridors within the general sprayfield area, and groundwater monitoring. Direct application of effluent to forested areas, which is to be tried by the City as a small demonstration project (forest irrigation) for the preferred Alternative 1, should further reduce the human health risk associated with aerosols, since aerosols should be further contained on site (in the demonstration project area).

The USEPA understands from the City of Tallahassee that fecal coliform levels are monitored by the City before effluent is spray irrigated on sprayfields and after irrigation via groundwater monitoring. The USEPA also understands from the City that the water quality limits for fecal coliform levels used by the City for effluent prior to sprayfield irrigation is the State of Florida standards defining "secondary treatment" of wastewater, i.e., <200 organisms per 100 ml of effluent. Although there are no USEPA or federal standards for fecal coliforms for spray irrigated effluent, this criterion is consistent with USEPA guidance from the Requirements Memorandum #79-3 dated November 15, 1978 of the former Construction Grants Program (USEPA, 1978). The concepts of this memorandum were incorporated in a USEPA Technology Transfer manual entitled "Land Treatment of Municipal Wastewater" (USEPA No. 625-1-81-013) (USEPA, 1981). The 200 counts/100 ml of effluent criterion is USEPA's fecal coliform criterion for bathing (swimming) waters. It is presumed that water considered safe enough for swimming (which could include incidental drinking) would be adequate for irrigation of sprayfields, particularly with vegetated buffers. In the absence of federal standards regarding acceptable remaining levels of fecal coliforms in sprayed effluent, the USEPA recommends that the State of Florida the use, at a minimum, the above federal guidance (USEPA, 1981) to help protect public health and the environment during their permitting decision for effluent sprayfields in addition to any appropriate State of Florida regulations (Chapter 17-640 F.A.C.) for public access areas.

The spray application of wastewater to golf courses and other public access areas, which would provide greater public exposure than agricultural or forest sprayfields, requires additional treatment for suspended solids removal and high-level disinfection under State of Florida regulations. Compliance with these regulations should greatly reduce the health risks associated with aerosols at golf courses. Irrigation of golf courses using wastewater effluent is also not an uncommon practice since 84 golf courses in Florida were being irrigated with wastewater by 1991. In addition, golf course spray irrigation would require, per FDER stipulation, that an alternate disposal method be made available as a back-up. It is the USEPA's understanding from the City that such a contingency does not presently exist.

Potential public health effects from animal vectors at spray irrigation sites would be minimized through effluent disinfection. Such effects could be further minimized through prudent spraying operations that allow acceptable effluent soil infiltration rates that avoid ponding.

Human health concerns also exist for potential groundwater contamination of the Floridan Aquifer drinking water source. After application of the wastewater effluent to land surfaces, the wastewater infiltrates into the soil and interacts physically and chemically to remove the potentially harmful constituents not removed during effluent treatment. It is possible that some of these constituents could move quickly through the soil (depending on soil characteristics and depth) and into the groundwater used for as a public drinking water source. As previously indicated, the City also monitors the groundwater in compliance wells at the existing SE Sprayfield.

The impact of land-use changes at the Eastern Expansion area is related to the change of silvicultural operations to agricultural operations. The concern is not so much for aesthetics or restriction of future land use potential, but rather for global climate change impacts. Deforestation reduces the capacity of an area of the earth to absorb carbon dioxide from the atmosphere. Carbon dioxide is the major contributor to the greenhouse effect. However, retaining or creating vegetated areas in the sprayfield area is expected to help minimize the impact of deforestation due to converting forested land to sprayfields (e.g., use of agricultural sprayfields (i.e., vegetation) to replace cleared forested areas, implementation of the small forest irrigation demonstration project which would retain some existing forested area, retention of additional forested areas within the project area as wildlife corridors, and use of evergreen buffer strips along external sprayfield borders which would retain or create forested areas).

4.6.3 Permitting Requirements

Pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124) and to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), an NPDES permit is required for point source storm water discharges to waters of the United States from the facility actually treating domestic wastewater. This provision applies to domestic wastewater treatment facilities that have design flows of at least 1.0 mgd. The NPDES storm water regulations of November 16, 1990, also require that point source storm water discharges to waters of the United States from all construction activities (including the initial clearing, until revegetated, of spray irrigation sites) disturbing a total of five or more acres must be permitted under the NPDES program. The permit application deadline for these discharges is 90 days prior to commencement of construction. Construction activities needing NPDES permit coverage can be made through a general permit recently issued by EPA/Region IV.

Relevant to NPDES permitting for the preferred Alternative 1, application for an NPDES permit would need to be made by the City for point source storm water discharges to waters of the United States from regulated treatment facilities actually treating domestic wastewater under the above-noted criteria. Application by the City for a separate NPDES permit would also be needed by the above-noted deadline for point source storm water discharges to waters of the United States for all construction sites associated with and actually involving the effluent land application site (including the initial clearing, until revegetated, of the proposed Eastern Expansion area of the SE Sprayfield and the proposed Western Expansion area (if implemented) of the preferred Alternative 1) disturbing a total of five or more acres of land. These permit requirements would be relevant for the preferred Alternative 1 as well as any existing unpermitted City sites.

Storm water point source discharges to waters of the United States from the operation (spray irrigation) of non-agricultural/non-silvicultural land application sites (such as golf courses, rights-of-way, and landscape areas) receiving domestic wastewater treated to the quality required by Chapter 17-610 F.A.C. for the land application of reclaimed water are not required to be covered by NPDES permits, unless the USEPA specifically requires a facility to submit an application on a case-by-case basis. Therefore, no NPDES permit is needed for the operation of such land application sites for the City's proposed project (if storm water point source discharges exist to waters of the United States for such sites) unless specifically requested by the USEPA. However, dedicated discharges of reclaimed water, without land application, are required to be covered by NPDES permits. It may also be noted that storm water discharges from the land application of wastewater effluent on agricultural and silvicultural sites are exempt from the NPDES permitting program if the sites are consistent with 40 CFR Part 122.3(e), so that the operation of such sites for the City's proposed project would not require an NPDES permit if consistent with 40 CFR 122.3(e). Therefore, no NPDES permit would be needed by the City for the operation of the four golf courses (if implemented) proposed in the preferred Alternative 1, as well as any similar existing City application sites (if such storm water point source discharges to waters of the United States exist at these sites). Additionally, since the land application of wastewater effluent on agricultural sites is exempt from the NPDES permitting program, the operation of the Eastern Expansion of the SE Sprayfield and the Western Expansion thereof (if implemented) proposed in the preferred Alternative 1, as well as any existing City application sites such as the SE Sprayfield (if such storm water point source discharges to waters of the United States exist at these sites), would not require an NPDES permit if these sites are consistent with 40 CFR 122.3(e).

Included in the proposed spray irrigation of wastewater effluent in the preferred Alternative 1 is the generation of and land application of wastewater sludge. Section 405(d) of the Clean Water Act requires that the disposal or reuse of sewage sludge be regulated. This regulatory activity is to be accomplished through the utilization of permits based upon technical federal regulatory standards. The USEPA established federal sludge disposal/reuse standards which were promulgated in the Federal Register at 40 CFR 503 on February 19, 1993. In general, these standards must be complied with by all treatment works treating domestic sewage by February 19, 1994. Violation of these standards would be a violation of the Clean Water Act. It is anticipated that current and proposed sludge disposal/reuse activities would be regulated through an NPDES permit, where applicable, or through issuance of a "Sludge-Only" permit. This federal permitting activity would be issued by the USEPA/Region IV until program authorization is given to the State of Florida. Therefore, the newly promulgated federal regulations are in addition to the State of Florida sludge disposal/reuse regulations. Relative to the preferred Alternative 1, the City must also make application for a Sludge Only permit for the current and proposed sludge disposal/reuse activity associated with the SE Sprayfield and the Alternative 1 proposal, as well as any other City sludge disposal/reuse practice. These federal regulations are in addition to the State of Florida sludge disposal/reuse regulations.

Specific to the City of Tallahassee, the USEPA last issued an NPDES permit for land application to the City of Tallahassee for the City's Thomas P. Smith Wastewater Treatment Plant in 1980. This federal permit was to expire in 1983 but was inactivated by the USEPA on April 6, 1981.

Failure to obtain prior authorization for discharges under the NPDES program may result in the USEPA assessment of administrative, civil, and/or criminal penalties under Section 309 of the Clean Water Act.

In addition to the NPDES permitting, the preferred alternative would also be subject to the requirements of a Section 404 (Clean Water Act) permit, which would include any unavoidable direct losses of wetlands through dredge-and-fill activities such as land clearing and construction activities. However, proposed spray irrigation areas within the proposed Eastern Expansion Area of Alternative 1 were selected to avoid wetland areas since hydric (wetland) soils would not be suitable/desirable for effluent disposal. Nevertheless, any project wetland losses would be subject to 404 permit determinations by the Jacksonville District COE, as well as wetland determinations by the State of Florida and Leon County, as appropriate. Conveyance pipeline crossings of wetlands would likewise also be subject to Section 404 permitting. Also, the USEPA reviews 404 permit applications for the COE. Secondary impacts to wetlands and surface waterbodies could also occur. Periodic water quality monitoring of surface waters and selective application measures would help minimize such secondary impacts. Surface waters should not be allowed to become eutrophic due to spray irrigation of wastewater nutrients.

The permitting guidance outlined in this document is very general and is not intended to be used to make final decisions on the applicability of the NPDES or sludge regulations, or Section 404 of the Clean Water Act. Site-specific conditions are always important factors in making these determinations.

4.7 ENVIRONMENTAL PROTECTION MEASURES

In addition to the environmental protection measures described in Section 4.6, the following measures are intended to lessen the potentially detrimental impacts of the preferred alternative. These measures are recommended by the USEPA for implementation by the City of Tallahassee if the preferred alternative is pursued for implementation by the City. They are categorized as to the likelihood of implementation:

Measures that will be implemented -

- Comply with the existing National Pollutant Discharge Elimination System (NPDES) permitting program (40 CFR Parts 122 and 124) and the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), which require an NPDES permit for:

  * Point source storm water discharges to waters of the United States from regulated domestic wastewater treatment facilities actually treating domestic wastewater that have design flows of at least 1 mgd;
  * Point source storm water discharges to waters of the United States from all construction activities associated with the spray irrigation project (including initial clearing of the application site until revegetated) disturbing a total of five or more acres of land -- application by 90 days prior to commencement of construction.

  Pursuant to Section 405(d) of the Clean Water Act, the City must also make application for a Sludge Only permit for the current and proposed sewage sludge disposal/reuse activity associated with the proposed project, as well as any other City sludge disposal/reuse practice. Also, standards promulgated in 40 CFR 503 (February 19, 1993) must, in general, be complied with by all treatment works treating domestic sewage by February 19, 1994. Permit application should therefore also be made by the City with the USEPA/Region IV for:

  * All current and proposed activities involving the land application of sludge.

- Conduct monitoring of the water quality of the effluent leaving the wastewater treatment plants (i.e., prior to effluent spray irrigation) for the parameters and at the frequency currently being conducted (40 parameters including 17 metals on a monthly basis; 11 parameters such as biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen, chlorine residual, chlorides, pH, fecal coliforms, and other parameters on a twice a week basis; and the six (6) above parameters on a daily basis). If pollutant concentrations exceed permit limitations, correct problems in the treatment operations and/or design as soon as possible.

- Conduct monitoring of the water quality of groundwater wells within one-half mile of the preferred Alternative 1 spray irrigation site for the six (6) parameters and at the quarterly frequency currently being conducted (nitrite and nitrate as nitrogen, nitrites, total Kjeldahl nitrogen, chlorides, and dissolved organic carbon (DOC), as well as any other water quality parameters specified by the State of Florida in order to detect any exceedances of relevant water quality standards. If monitoring data exhibit concentrations exceeding State of Florida water quality standards for groundwater and/or permit limitations, correct problems with irrigation operation and/or design as soon as possible.

- Conduct frequent monitoring of the water quality of surface waters. Surface waterbodies, for example, should not be allowed to become eutrophic.

- Retain wildlife corridors within the Eastern Expansion area proposed by the City for near-future construction (and in the Western Expansion area if ever developed). Wildlife corridors should maintain a portion of the natural vegetation of the on-site upland and wetland habitats. Corridors are intended to provide habitat areas contiguous to spray irrigation areas to allow undisturbed movement of wildlife around these irrigation areas, including Gopher Frog reproductive migrations. The Eastern Expansion Area wildlife corridors should include an isthmus area (a minimum of 300-500 feet wide) west of center pivot Area C to maintain corridor interconnection for north-south wildlife movement. The wildlife corridors should essentially be continuous, although occasionally would be crossed by dirt, gravel or paved access roads. Proposed logging activities within portions of the corridors should be minimized and selective. (Note: If the configuration of the areas to be irrigated (Areas A-E) in the Eastern Expansion Area are altered by local decision-makers from those shown in Figure 4-2, the USEPA recommends that an appropriate north-south wildlife corridor still be maintained. Likewise, if the proposed spray irrigation acreage (909 acres) of these areas are changed, the USEPA recommends that adequate on-site sandy areas still be maintained for the Gopher Tortoise. Additional coordination with the FG&FWFC is recommended, as appropriate.)

- Retain/create a buffer zone around the field areas that is a minimum of 400 feet in width along Tram Road and 100 feet along the other sprayfield external boundaries to minimize perturbations attributable to the sprayfield expansion area, particularly aerosol spray drift. The buffer zone should act as a year-round, vegetative screen and as such must be a dense evergreen forested area. The use of evergreen buffer areas, in combination with the above-described forested wildlife corridor areas, should greatly reduce the spread of aerosols off site by acting as barriers and by reducing wind velocities. The southern boundary already has a densely-forested buffer as a result of an existing gas pipeline right of way. The southern buffer width would be at least 400 feet. Buffer strips should also be retained around on-site waterbodies and along streams for field runoff filtration.

- Protect and preserve archaeological sites located in buffer areas and designated wildlife corridors. For the examined Eastern Expansion, these include Sites SF1, SF4, SF9, SF19, SF21, SF22, SF23, and SF26. Of particular concern is Site SF9 (Eagle Lake Site). The primary protection zone for this site should be a 1400-foot diameter circle, the center of which is to be coordinated with and established by the Florida SHPO.

- Utilize all agricultural crops raised via spray irrigation (e.g., corn, soy beans, canola, and rye/rye grass) at the proposed sprayfield expansion site(s) and existing sprayfields only for animal feed and/or for processed food for humans (e.g., canola oil; soy bean oil), i.e., not for direct human consumption, to the extent consistent with the State of Florida (Chapter 17-610 F.A.C.). Grazing of cattle on proposed or existing irrigated sprayfields only to the extent consistent with Chapter 17-610 F.A.C., and utilization of crops grown for consumption (e.g., bermuda hay for livestock feed) on existing sludge fields (Class B or equivilent) only to the extent consistent with Chapter 17-640 F.A.C.

- Comply with sound agricultural practices such as field terracing and row crop contouring.

- Comply with all federal, State of Florida, Leon County and City of Tallahassee standards, permits and/or ordinances relevant to the proposed sprayfield expansion.

Measures that are planned for implementation -

- Consider any reasonable public complaints made before or during operation of the proposed sprayfield expansion regarding effluent aerosol dispersion or other operational impacts.

- Conduct agricultural operations with the primary goal being the proper disposal of effluent.

- Conduct frequent monitoring of the water table level at the spray irrigation areas and adjust the effluent application rates accordingly. Application rates are not to exceed State of Florida permit conditions. The City's existing SE Sprayfield is currently permitted by the State of Florida to spray irrigate at a rate of 3.16 inches per week.

- Monitor weather conditions to avoid spraying effluent during crop harvesting and during inclement weather conditions (e.g., rainy, wet, windy, freezing conditions) if spraying during those conditions would be expected to cause detrimental environmental or human health effects, or be considered ineffective from an effluent disposal perspective. Similar prudent spraying operations should also be undertaken to the extent feasible during periods of increased relative humidity, lower temperature, and darkness since studies have shown that these conditions prolong pathogen viability and increase the distance of aerosol travel. Spraying should also not result in effluent ponding in order to minimize any human health effects from animal vectors. Application rates should be adjusted in any areas where ponding persists (ponding has apparently occurred in the SE corner of the existing SE Sprayfield).

- Create 6- to 8-inch vegetated (herbaceous ground cover) earthen berms along the sprayfield area/wildlife corridor boundaries as part of the leasing farmer's agricultural practices. Such berms would help contain surface water runoff and allow percolation and soil filtration of the applied effluent in designated spray irrigation areas. This would help reduce the probability of wetland and other surface waterbodies within the sprayfield expansion area (as well as the adjacent St. Marks River System) from becoming eutrophic.

- Create 10- to 12-inch vegetated (herbaceous ground cover) earthen berms around "live" sinkholes within the sprayfield expansion area to divert surface water runoff flows from direct access to groundwater and thereby help protect groundwater quality.

- During the design and proposed construction phases, Karstic depressions (other than the discussed "live" Karstic sinkholes) should also be avoided If avoidance is infeasible, filling depressions with native soils could be tried unless these depressional areas are wetlands. The fill soils should only be moderately well-drained, so that drainage into the Karstic areas would not be encouraged. Native soils should also preferably be mixed with organic material to enhance spray irrigation effluent filtration and pollutant removal. Since such filled areas may subsequently subside, slight initial mounding may be advisable or additional filling using the same soil mix may subsequently be needed. Should the depressional area collapse and become a "live" sinkhole, spray irrigation in the area should be stopped and vegetated earthen berms created around the sinkhole as indicated above.

- Preserve as many trees at the site as possible. Tree clearing should be limited to the sprayfield areas and designated farm operation areas. This would minimize habitat losses, habitat disruption, and global climate change (greenhouse effect) impacts. Additional proposed silvicultural timbering by the St. Joseph Land and Development Company on land in the Eastern Expansion area leased to the City should be minimized, selective, and exclude jurisdictional wetlands designated by the COE and/or the FDEP due to reproductive migrations of the protected Gopher Frog. Also, as specified by the Florida Game and Fresh Water Fish Commission (FG&FWFC), timbering should be limited to the thinning of alternate rows of planted pines in the proposed wildlife corridors, with vegetation in exposed areas between remaining trees being moderately maintained in coordination with the FG&FWFC through periodic control burns or perhaps mowing to benefit the habitat of the protected Gopher Tortoise. Should land access to the Western Expansion area be obtained by the City and the site developed, timbering should be similarly limited there.

Measures that could be implemented -

- Protect cultural resources on the edge of irrigation fields by incorporating them into "protection areas" (wildlife corridors and buffer zones) as determined by the Florida SHPO. These include sites SF2, SF7, and SF18. Additional City coordination with the Florida SHPO should be provided, as appropriate.

- Protect cultural resources located in irrigation fields as determined by the Florida SHPO. These include sites SF3, SF5, SF6, SF8, SF10, SF11, SF12, SF13, SF14, SF15, SF16, SF17, SF20, SF24 and SF25. Of these sites only one, SF3, which is located in the fixed sprinkler irrigation area, appears to warrant additional systematic archeological examination. Additional City coordination with the Florida SHPO should be provided, as appropriate.

- Protect any listed or uncovered cultural resources located along pipeline corridors to the satisfaction of the Florida SHPO.

The preferred option for protection of cultural resources inside the irrigation areas is to limit construction activities on the sites to the placement of fill only (in non-wetland areas). This would provide additional protection without precluding their use as part of the sprayfield. This option also prohibits grading, ditching and other excavation at the sites. It appears that clearing and grubbing to a depth of 12 inches would be acceptable but is subject to review by the Florida SHPO.

It should be noted that the construction of groundwater monitoring wells is not expected to produce significant negative short- or long-term environmental impacts. Minor earth disturbance would be expected to occur due to operation of a drill rig. The overall effect would be environmentally beneficial because the wells would allow for monitoring of the groundwater resource.

CHAPTER 5

EIS COORDINATION

CHAPTER 5 EIS COORDINATION

5.1 INTRODUCTION

Public participation programs are mandated by federal regulations governing the preparation of Environmental Impact Statements. Public participation is an important and valuable part of the EIS process in that it provides for active public (includes interested groups, individuals, and private and governmental agencies) involvement in developing and evaluating wastewater management alternatives and in selecting a preferred alternative. Public participation was an integral part of the preparation of the 1983 USEPA EIS. A public participation program was also developed for the preparation of the EIS Supplement. Section 5.3 describes the public participation programs of the 1983 EIS and the EIS Supplement.

5.2 COORDINATION WITH LOCAL, REGIONAL, STATE AND FEDERAL AGENCIES

Many local, regional, state, and federal agencies were contacted for information during the preparation of the 1983 EIS and the EIS Supplement. They supplied information necessary to the decision-making process. Table 5-1 lists agencies that were contacted during one or both of the EIS studies.

5.3 PUBLIC PARTICIPATION PROGRAM

5.3.1 1983 EIS Public Participation

The public participation program included one public scoping meeting and four Review Committee meetings. The Review Committee was formed to serve in an advisory capacity to USEPA and their consultants. It was composed of 23 persons representing 10 public agencies and 13 private groups.

On November 29, 1978, a public hearing (scoping meeting) was held in the City of Tallahassee to describe the procedures the USEPA would use in preparing the 1983 EIS. The meeting included presentations on the purpose and background of the EIS, the 201 Study, the scope of the EIS and issues to be addressed, the EIS schedule, and a description of the public participation program. Afterwards, several citizens and officials made comments.

The first Review Committee meeting was held on May 16, 1979 in the City to review the EIS Plan of Study. Gaps in the existing data base for terrestrial and aquatic systems were discussed, and the design of a sampling program was presented. The Committee was asked to confirm if all major issues of the EIS had been identified and incorporated into the work effort.

The format of the first Review Committee meeting and all subsequent ones consisted of a presentation by the EIS consultants followed by the Committee dividing into two round table discussion groups. At the end of the evening, a representative from each table summarized the discussion for the benefit of the other table and observers.

The second Review Committee was held on January 9, 1980, in the City to review the Environmental Inventory task report and the Alternatives Development task report. During the discussion group sessions, Review Committee concerns centered on spray irrigation impacts, wastewater flow projections, the development potential of the northeast portions of the Tallahassee urban area, the desirability of a Northeast wastewater treatment plant, impacts to vegetation and wildlife, and the implementability of widescale use of on-lot disposal systems or small community systems.

The third Review Committee meeting was held on January 15, 1981, in the City to review the Alternative Evaluation task report. Each of the four alternatives was discussed in turn. Concern focused mainly on Alternative 1 (T.P. Smith/ Southwest and Northeast Plants) and Alternative 4 (No-Federal-Action). The widespread use of on-lot systems and their maintenance continued to be a matter of concern. Institutional management aspects of on-lot systems were perceived

TABLE 5-1

AGENCY CONTACTS

Local and Regional Agencies and Organizations

City of Tallahassee, Water and Sewer Department and Sewer Division
Environmental Science Engineering, Inc.
Leon County Environmental Services
Leon County Public Health Unit
Leon County Public Works Division
Munson Area Preservation, Inc.
Post, Buckley, Schuh & Jernigan, Inc.
Springhill Road Concerned Citizen
Tallahassee Historic Preservation Board
Tallahassee Leon County Planning Department
Tallahassee Office of Management and Budget
Tallahassee Water Quality Laboratory
Tall Timbers Research Station
Talquin Electric Cooperative, Inc.
Wm. M. Bishop Engineers, Inc.
W.V. McConnell, Land Management Planner/Forestor

State Government Agencies

Florida Department of Environmental Regulation, Bureau of Wastewater Management and Grants
Florida Department of State, Division of Archives, History, and Record Management
Florida Game & Fresh Water Fish Commission, Office of Environmental Services

Federal Government Agencies

U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of Commerce, Census Bureau
U.S. Department of Defense, Army Corps of Engineers
U.S. Department of Interior, Fish and Wildlife Service
U.S. Department of Interior, Forest Service
U.S. Department of Interior, Geological Survey
U.S. Department of Transportation, Federal Aviation Administration
Federal Emergency Management Agency

to be a serious problem. Other questions addressed cost analyses and wastewater flow projections.

The fourth Review Committee meeting was held on July 9, 1981 in the City to present a briefing paper describing the No-Federal-Action Alternative that was selected by the USEPA Region IV Regional Administrator. Discussion focused on the need for and responsibilities of a management agency for on-lot and small community systems. In addition, committee members requested an expanded discussion in the EIS of causes of system failure, corrective actions, and mitigative measures.

5.3.2 EIS Supplement Scoping Meetings and Public Hearings

The public scoping meeting for the EIS Supplement was held in the City on April 19, 1988. Section 1.2.1 of this document presents the list of concerns that was developed from discussions made during the meeting and from written comments received by the USEPA. Section 1.2.2 presents the EIS Supplement's issues that evolved from the concerns and from the 1983 EIS issues.

It was decided at the public scoping meeting that no Review Committee would be formed for the project. The public meetings would be held by the USEPA and would serve as the sole forum for advising the USEPA and their consultants of the needs and preferences of the concerned public. Other meetings between the USEPA, their consultants, and interested parties were held throughout the course of the study as needed. These meetings were primarily for exchange of information and for providing updates of the project's status.

The second public meeting was held November 15, 1988 in the City. The purpose of this meeting was to present the preliminary wastewater management alternatives developed by the USEPA and their contractors. This included an effluent disposal alternative utilizing a land exchange option with the U.S. Forest Service (USDA FS). These alternatives were discussed and additional alternatives were identified. These included golf course irrigation disposal, artificial wetlands disposal, conservation and effluent reduction, and higher treatment levels prior to disposal.

Two new and independent issues were raised at the second public meeting. The first was the use of public (USDA FS) land for effluent disposal by spray irrigation. Central to this issue was the USEPA's and the USDA FS's responsibility to assure all human and other environmental impacts are fully considered during the EIS process. The second issue concerned the evaluation of alternative wastewater management systems. The additional alternatives identified at this meeting were to be included in the on-going development of alternative systems and environmental impact assessment for the EIS Supplement.

The third public meeting was held on August 15, 1989 in the City. The purpose of this meeting was to present the results of the wastewater management alternative evaluation process. As a result of this meeting, the use of USDA FS's lands, both south of the TPS Plant and west of the Municipal Airport, were dropped from further consideration as alternative spray irrigation sites.

The USEPA released the Draft EIS Supplement (DEISS) to the public on June 29, 1990. A copy of the DEISS and/or a DEISS Public Notice was provided to numerous federal, state and local agencies and interested groups and individuals. Approximately 120 DEISSs and numerous public notices were mailed. The Notice of Availability (NOA) for the DEISS (EIS No. 900217) was noticed in the Federal Register (55 FR 28751 [June 29, 1990]). Written comments on the DEISS were received by the USEPA until the end of the NEPA-mandated 45-day comment period on August 24, 1990. Twelve (12) comment letters were received during this comment period, including a post card from the State of Florida Clearinghouse acknowledging receipt of copies of the DEISS for circulation within the State government (Table 5-2). A copy of the DEISS Public Notice and the set of 12 comment letters are provided at the end of this Chapter 5. Individual USEPA responses follow each comment letter in the set of letters. Comment letters and corresponding responses are ordered by number (1-12).

TABLE 5-2

COMMENT LETTERS RECEIVED BY USEPA FOR TALLAHASSEE-LEON COUNTY WASTEWATER MANAGEMENT DEISS DURING THE 45-DAY COMMENT PERIOD

NUMBER	DATE	SOURCE	AUTHOR
1	7/03/90	U.S. Department of Housing and Urban Development; Atlanta, GA	Ivar O. Iverson
2	7/10/90	Florida Department of Natural Resources; Office of Environmental Services; Tallahassee, FL	Grant Gelhardt
3	7/12/90	Florida Department of State; Division of Historical Resources; Tallahassee, FL	George W. Percy
4	7/12/90	U.S. Department of Agriculture; Soil Conservation Service; Gainesville, FL	T. Niles Glasgow
5	7/12/90	Florida Game & Fresh Water Fish Commission; Tallahassee, FL	Bradley J. Hartman
6	7/13/90 (recvd)	Florida State Clearinghouse; Office of the Governor; Tallahassee, FL	State of Florida
7	7/17/90	W.V. McConnell, Land Management Planner/Forester; Tallahassee, FL	W.V. McConnell
8	8/10/90	Department of Health and Human Services; Centers For Disease Control; Atlanta, GA	Kenneth W. Holt
9	8/14/90	U.S. Department of the Interior; Office of Environmental Affairs; Atlanta, GA	James H. Lee
10	8/22/90	Florida Department of Environmental Regulation; Facilities Planning Section; Tallahassee, FL	Van R. Hoofnagle
11	8/24/90	Florida Forestry Association; Tallahassee, FL	William Carol Lamb
12	8/24/90	W.V. McConnell, Land Management Planner/Forester; Tallahassee, FL	W.V. McConnell

During the DEISS comment period, a USEPA Public Hearing was held in Tallahassee, Florida. This Hearing occurred at 7:00 PM on August 9, 1990 at the City Commission Chambers, second floor, City Hall, 300 South Adam Street. The USEPA announced the Hearing via the above Public Notice in the "Legal Notices" of the Tallahassee Democrat on July 9, 1990. The USEPA also prepared a press release to announce the Hearing and provide it to the Florida media served by "PR Newswire" and also directly to the Tallahassee Democrat to use at their discretion.

Twenty-four (24) people attended the Public Hearing, including one who stayed only briefly and did not register (Table 5-3). Eight (8) people provided verbal comments, with one person (Elmer Leek) speaking twice (Speaker #4 and #9). The nine (9) speakers are presented in Table 5-4. Two (2) speakers (Speaker #3: Jessie Brown and Speaker #4 and #9: Elmer Leek) also provided associated written comments with their speeches. A copy of the Public Hearing Press Release and the Public Hearing Transcript with associated speaker written comments are included at the end of this Chapter 5, following the DEISS Public Notice and the 12 DEISS comment letters with USEPA responses. The set of individual USEPA responses to the nine speaker comments then follow the Transcript and associated speaker written comments and are ordered by number (1-9). USEPA transcript responses apply to both verbal and written Public Hearing speaker comments.

Copies of this FEISS document and/or notices of its availability are being circulated to numerous federal, state and local agencies as well as interested groups and individuals. All agencies and individuals that provided written comments on the DEISS and/or provided verbal comments at the USEPA Public Hearing held in Tallahassee on August 9, 1990, and/or were registered attendees of the Public Hearing and requested a copy of the FEISS, are being provided a copy of this FEISS and/or a notice of its availability.

The following is a partial list of the federal agencies that are being mailed one or more copies of this FEISS and/or a notice of its availability:

- U.S. Environmental Protection Agency - Washington, D.C.
- U.S. Department of Agriculture, Forest Service - Washington, D.C.
- U.S. Department of Agriculture, Forest Service - Atlanta, GA
- U.S. Department of Agriculture, Forest Service - Tallahassee, FL
- U.S. Department of Agriculture, Soil Conservation Service - Washington, D.C.
- U.S. Department of Agriculture, Soil Conservation Service - Gainesville, FL
- U.S. Department of Health and Human Services - Washington, D.C.
- U.S. Department of Health and Human Services, Centers for Disease Control - Atlanta, GA
- U.S. Army Corps of Engineers - Jacksonville, FL
- U.S. Food and Drug Administration - Washington, D.C.
- U.S. Department of Housing and Urban Development - Atlanta, GA
- U.S. Geological Survey - Reston, VA
- U.S. Department of the Interior - Washington, D.C.
- U.S. Fish and Wildlife Service - Atlanta, GA
- U.S. Fish and Wildlife Service - Jacksonville, FL
- Council of Environmental Quality - Washington, DC
- Advisory Council on Historic Preservation - Washington, D.C.
- Federal Highway Administration - Washington, D.C.
- Economic Development Administration - Atlanta, GA
- National Science Foundation - Washington, D.C.

Copies of this FEISS and/or notices of its availability are also being circulated to the State of Florida, primarily through the Florida State Clearinghouse which sends copies to divisions of the State deemed appropriate. However, to ensure that those State agencies that provided comment letters on the DEISS would also receive a copy of this FEISS and/or notice of its availability, the following State agencies in addition to the State Clearinghouse are being mailed a copy of this FEISS and/or notice of its availability (Note: FDER and FDNR replaced by FDEP for this circulation):

TABLE 5-3

ATTENDEES AT THE USEPA PUBLIC HEARING; CITY HALL;
CITY COMMISSION CHAMBERS; TALLAHASSEE, FLORIDA;
AUGUST 9, 1990

Number	Name	Representing
1	Jessie Brown	Munson Area Preservation, Inc.
2	Dexter Cherry	Lake Munson Preservation
3	John Dean	City of Tallahassee
4	C. Florko	Florida Department of Natural Resources
5	Margaret L. Fogg	Lake Munson Preservation
6	Guest of M.L. Fogg	Lake Munson Preservation or Self
7	Flo P. Gray	Self (wife of John Gray)
8	John Gray	Springhill Neighbors
9	Sharon Gray	Lake Munson Area Preservation
10	Carolyn E. Grimes	Munson Preservation Commission
11	Robert Grimes	Munson Preservation Commission
12	Mildred R. Hall	Self (South end of Tallahassee)
13	Judy Hancock	Florida Chapter of Sierra Club
14	Dan Hendrickson	Springhill Road Association & Big Bend Group Sierra Club
15	Van Hoofnagle	Florida Department of Environmental Regulation
16	Elmer Leek	Self
17	Maxine Leek	Self
18	Carla M. Perry	Florida Department of Environmental Regulation
19	Jim Peters	City of Tallahassee
20	Barbara Rambo	Self
21	John P. Strickland	City of Tallahassee
22	Richard Taylor	Self
23	Keith Turner	City of Tallahassee
24	Unident. Attendee	(only stayed briefly)
		***
NA	Heinz J. Mueller	USEPA Hearing Officer
NA	Cory W. Berish, Ph.D.	USEPA DEISS Proj. Monitor
NA	Christian M. Hoberg	USEPA FEISS Proj. Monitor

TABLE 5-4

PUBLIC HEARING SPEAKER COMMENTS PROVIDED AT THE USEPA PUBLIC HEARING; TALLAHASSEE-LEON COUNTY WASTEWATER MANAGEMENT DEISS; CITY HALL; CITY COMMISSION CHAMBERS; TALLAHASSEE, FLORIDA; AUGUST 9, 1990

Number	Speaker	Representing
1	Margaret L. Fogg	Lake Munson Preservation
2	John Gray	Springhill Neighbors
3	Jessie Brown	Munson Area Preservation, Inc.
4	Elmer Leek	Self
5	Barbara Rambo	Self
6	Judy Hancock	Florida Chapter of Sierra Club
7	Dan Hendrickson	Springhill Road Association & Big Bend Group Sierra Club
8	Mildred R. Hall	Self
9	Elmer Leek	Self

- Florida State Clearinghouse, Office of the Governor - Tallahassee, FL
- Florida Department of Environmental Protection, Facilities Planning Section - Tallahassee, FL
- Florida Department of Environmental Protection, Office of Environmental Services - Tallahassee, FL
- Florida Game and Fresh Water Fish Commission - Tallahassee, FL
- Florida Department of State, Division of Historical Resources - Tallahassee, FL

FEISS and/or notice of availability circulation to local entities is also being provided. The following is a partial list of regional/local/city agencies and private groups that are being mailed a copy of this FEISS and/or a notice of its availability:

- City of Tallahassee, Sewer Division - Tallahassee, FL
- Leon County Board of County Commissioners - Tallahassee, FL
- Leon County Public Health Unit - Tallahassee, FL
- Talquin Electric Cooperative, Inc. - Quincy, FL
- Leon County Public Works - Tallahassee, FL
- Florida Wildlife Federation - Tallahassee, FL
- Apalache Audubon Society - Tallahassee, FL
- Tallahassee-Leon County Planning Commission - Tallahassee, FL
- Sierra Club - Tallahassee, FL
- Florida Federal Women's Club - Tallahassee, FL
- Isaak Walton League of America - Palmetto, FL
- League of Women Voters - St. Petersburg, FL
- Florida Lung Association - Tallahassee, FL
- Florida Conservation Association - Tampa, FL
- Florida Forestry Association - Tallahassee, FL
- Mana-Sota 88 - Palmetto, FL
- Leon County Public Library - Tallahassee, FL
- Coleman Memorial Library, Florida A & M Univ. - Tallahassee, FL
- Robert Manning Strozier Library, Florida State Univ. - Tallahassee, FL

In addition, the following U.S. and State of Florida congressmen and local government officials representing the Tallahassee-Leon County area are being provided a copy of this FEISS and/or a notice of its availability:

- Honorable Bob Graham (U.S. Senate)
- Honorable Connie Mack (U.S. Senate)
- Honorable Pete Peterson (U.S. House of Representatives)
- Honorable Pat Thomas (Florida Senate)
- Honorable Charles D. Williams (Florida Senate)
- Honorable Hurley W. Rudd (Florida House of Representatives)
- Honorable Alfred Lawson, Jr. (Florida House of Representatives)
- Honorable Robert D. Trammell (Florida House of Representatives)
- Honorable Allen F. Boyd, Jr. (Florida House of Representatives)
- Honorable Dorothy Inman-Crews (Mayor of Tallahassee)

In addition to the above addressees, numerous individuals are also being provided a copy of this FEISS and/or a notice of its availability. These include, but are not limited to, the speakers (See Table 5-4) and other registered attendees of the USEPA Public Hearing (See Table 5-3) and individuals who provided written comments on the DEISS (W.V. McConnell, Planner/Forester).

The USEPA understands from the City of Tallahassee that Leon County held a public hearing in Tallahassee on July 23, 1991. The County apparently held the hearing in response to citizen concerns for existing residents east (and north) of the Eastern Expansion area of Alternative 1, which the City proposes for near-future construction. The USEPA understands from the City that citizen concerns regarding aerosol spray drift, odor, and decreased property value were voiced by some 20 speakers in the public hearing.

PUBLIC NOTICE

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV, 345 COURTLAND STREET, NE
ATLANTA, GEORGIA 30365

Availability of the Draft Environmental Impact Statement Supplement (DEISS) entitled "Tallahassee-Leon County, Wastewater Management, Tallahassee, Leon County, Florida" is being noticed in the Federal Register by the United States Environmental Protection Agency (EPA). The DEISS concludes that the preferred alternative is a centralized approach. Wastewater will be conveyed to the south to be treated at the improved Lake Bradford Road Plant and the improved and expanded T.P. Smith Facility. Effluent disposal will be handled by spray irrigation at the expanded Southeast Agricultural Sprayfield and local golf courses. The preferred alternative is cost effective, readily implementable and has few environmental impacts.

In order to solicit further public participation on the proposed project, a Public Hearing is scheduled for August 9, 1990, and will begin at 7:00 p.m. at the City Commission Chambers, Tallahassee, Florida. Both oral and written comments will be accepted, and a transcript of the proceedings will be made. For accuracy of the record, written comments are encouraged. The Hearing Chairman reserves the right to fix reasonable limits on the time allowed for oral statements.

Persons who do not provide comments at the public hearing may respond in writing before the close of the public comment period on August 24, 1990 to Heinz J. Mueller, Chief, Environmental Policy Section, Federal Activities Branch, U.S. Environmental Protection Agency, Region IV, 345 Courtland Street, NE, Atlanta, Georgia 30365. Facsimile transmittals may be sent to EPA at (404) 347-5056.

A Final EISS (FEISS) will be published after the close of the public comment period. Reviewers should be aware that EPA will not reprint the material contained in the DEISS for the FEISS. The FEISS will comprise the following: a summary of the DEISS, EPA's decision on the preferred alternative, responses to comments received on the DEISS, the transcript of the public hearing (or a summary thereof), and any other relevant information or evaluations developed after publication of the DEISS.

(MORE ON BACK)

Copies of the DEISS are available for review at the following locations:

Leon County Public Library
1940 N. Monroe Street
Tallahassee, FL 32301
ATTN: Ms. Linda Barber
(904) 487-2665

Coleman Memorial Library
Florida A & M University
P.O. Box 78, Room 304C
Tallahassee, FL 32307
ATTN: Mrs. M. B. Crump
(904) 599-3370

Robert Manning Strozier Library
Florida State University
Tallahassee, FL 32306-2047
ATTN: Ms. Sharon Schwerzel
Head, Dirac Science Library
(904) 644-2706

A limited number of copies are available upon request from EPA at the afore referenced address.

#1

U.S. Department of Housing and Urban Development
Atlanta Regional Office, Region IV
Richard B Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303-3388

July 3, 1990

Mr. Heinz J. Mueller, Chief
Environmental Policy Section
Federal Activities Branch
U. S. EPA - Region IV
345 Courtland Street NE
Atlanta, Georgia 30365

Dear Mr. Mueller:

This refers to your Notice dated April 25, 1990, transmitting the Draft Environmental Impact Statement Supplement for the Tallahassee Leon County Wastewater Management project in Florida.

Our review indicates there will be no significant adverse impact on any HUD programs as a result of this action.

Thank you for the opportunity to review and comment on the proposed project.

Very truly yours,

Ivar O. Iverson
Regional Environmental
Clearance Officer

LETTER #1: U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT; ATLANTA, GEORGIA; JULY 3, 1990; IVAR O. IVERSON, REGIONAL ENVIRONMENTAL CLEARANCE OFFICER

Thank you for your comments. No response necessary.

State of Florida

Department of Natural Resources

Memorandum

RECEIVED
JUL 1 1 1990
Div. of Resource Mgmt.
Dept. of Natural Resources

ENVIRONMENTAL ASSESSMENT BRANCH

July 10, 1990

TO: Jack Woodard, Assistant Director
Division of Resource Management

FROM: Grant Gelhardt, Planner IV
Office of Environmental Services
Division of State Lands

SUBJECT: Consistency Review

FILE NO.: FL9006221695C

APPLICANT: Tallahassee - Leon County

PROJECT: Wastewater Treatment

I have conducted a review of the information supplied by the applicant for the above mentioned project. It does not appear, at this time, that any state owned upland resource will be impacted. If the project traverses any sovereignty submerged lands, an easement from the Board of Trustees of the Internal Improvement Trust Fund will be required. Any portion of the project that traverses sovereignty submerged lands should be designed to have minimal impacts to the submerged and wetland communities.

If you have any questions, please contact me at (904)488-6242.

GG/cw
Attachments
cc: Susan Radford

LETTER #2: STATE OF FLORIDA DEPARTMENT OF NATURAL RESOURCES; TALLAHASSEE, FLORIDA; JULY 10, 1990; GRANT GELHARDT, PLANNER IV; OFFICE OF ENVIRONMENTAL SERVICES, DIVISION OF STATE LANDS (LETTER PROVIDED BY STATE OF FLORIDA CLEARINGHOUSE)

Thank you for your comments.

In regard to State sovereignty submerged lands, one force main to the proposed Eastern Expansion Area of the existing City's SE Sprayfield is expected to traverse Munson Slough, and one possibly two additional crossings of the upper reaches of Munson Slough are expected relative to the proposed golf course irrigation. Munson Slough is a water course wider than 10 feet at the above points of crossing, which the USEPA understands from the Florida Department of Environmental Protection (FDEP) is a critical minimum width for inland recreationally-navigable waters. Also, Pump Pond, Bonnett Pond, Eagle Lake, Turf Pond and other wetland areas are located on the Eastern Expansion proposed for near-future construction by the City of Tallahassee. Regarding the need for an easement, this should be resolved through the wetland permit application process that would be initiated by the City of Tallahassee and involve the FDEP and the U.S. Army Corps of Engineers (COE). The crossing of Munson Slough will require an easement whereas the presence of ponded areas in the SE Sprayfield is not expected to require an easement.

FLORIDA DEPARTMENT OF STATE
Jim Smith
Secretary of State
DIVISION OF HISTORICAL RESOURCES
R.A. Gray Building
500 South Bronough
Tallahassee, Florida 32399-0250
Director's Office (904) 488-1480
Telecopier Number (FAX) (904) 488-3353

July 12, 1990

Ms. Karen K. MacFarland, Director
State Planning and Development
Clearinghouse
Office of Planning and Budgeting
The Capitol
Tallahassee, Florida 32399-0001

In Reply Refer To:
Laura A. Kammerer
Historic Sites
Specialist
(904) 487-2333
Project File No. 901780

RE: Cultural Resource Assessment Request
SAI# FL9006221695C
U.S. Environmental Protection Agency
Tallahassee-Leon County Wastewater Management
Draft Environmental Impact Statement (DEIS)

Dear Ms. MacFarland:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the above referenced project for possible impact to archaeological and historical sites or properties listed, or eligible for listing, in the National Register of Historic Places. The authority for this procedure is the National Historic Preservation Act of 1966 (Public Law 89-665), as amended.

It is the opinion of this agency that the above referenced DEIS is not complete or sufficient. It does not adequately address our concerns for the cultural resources that may be impacted by the proposed project. First, we note that the document indicates that "There are no known archaeological or historical resources within the proposed sites" (page 3-20). However, there is no reference as to how this conclusion was reached.

Using the general proposed activity sites location map (page 2-23), we have reviewed our data in the Florida Master Site File, and note the possibility that project activities may impact seven (7) known archaeological sites (see enclose map). In order for this agency determine adequately whether or not project activities will impact those sites or other previously unrecorded archaeological or historical sites, we request that the applicant submit to this office the final project alternative location areas plotted on U.S.G.S. topographic quadrangles.

Archaeological Research (904) 487-2299
Florida Folklife Programs (904) 397-2192
Historic Preservation (904) 487-2333
Museum of Florida History (904) 488-1484

Finally, we note that the proposed mitigation of impacts on cultural resources (page 3-28) does not indicate that a professional archaeological and historical survey will have been performed to locate and assess sites prior to initiating project site preparation, nor does it contain provisions to avoid or mitigate impacts to identified significant sites. This agency concurs that archaeological sites discovered during project related activities should be reported to the Florida SHPO and that ground disturbing activities affecting such discovered resources be discontinued pending their assessment and, if necessary, mitigation. However, relying on the discovery and reporting of archaeological resources <u>during</u> construction, in our opinion, does not satisfy s.106 review implemented by 36 CFR Part 800.

It is, therefore, the opinion of this office that there is a reasonable probability of project activities impacting known and unrecorded archaeological and historic sites or properties, potentially eligible for listing in the <u>National Register of Historic Places</u>, or otherwise of national, state, regional, or local significance. Since such archaeological and historic sites may be present, it is our recommendation that, prior to initiating any project related land clearing or ground disturbing activities within the project areas, they should be subjected to a systematic, professional archaeological and historical survey. The purpose of this survey will be to locate and assess the significance of cultural resources present. The resultant survey report must be forwarded to this agency in order to complete the process of reviewing the impact of this proposed project on archaeological and historic resources.

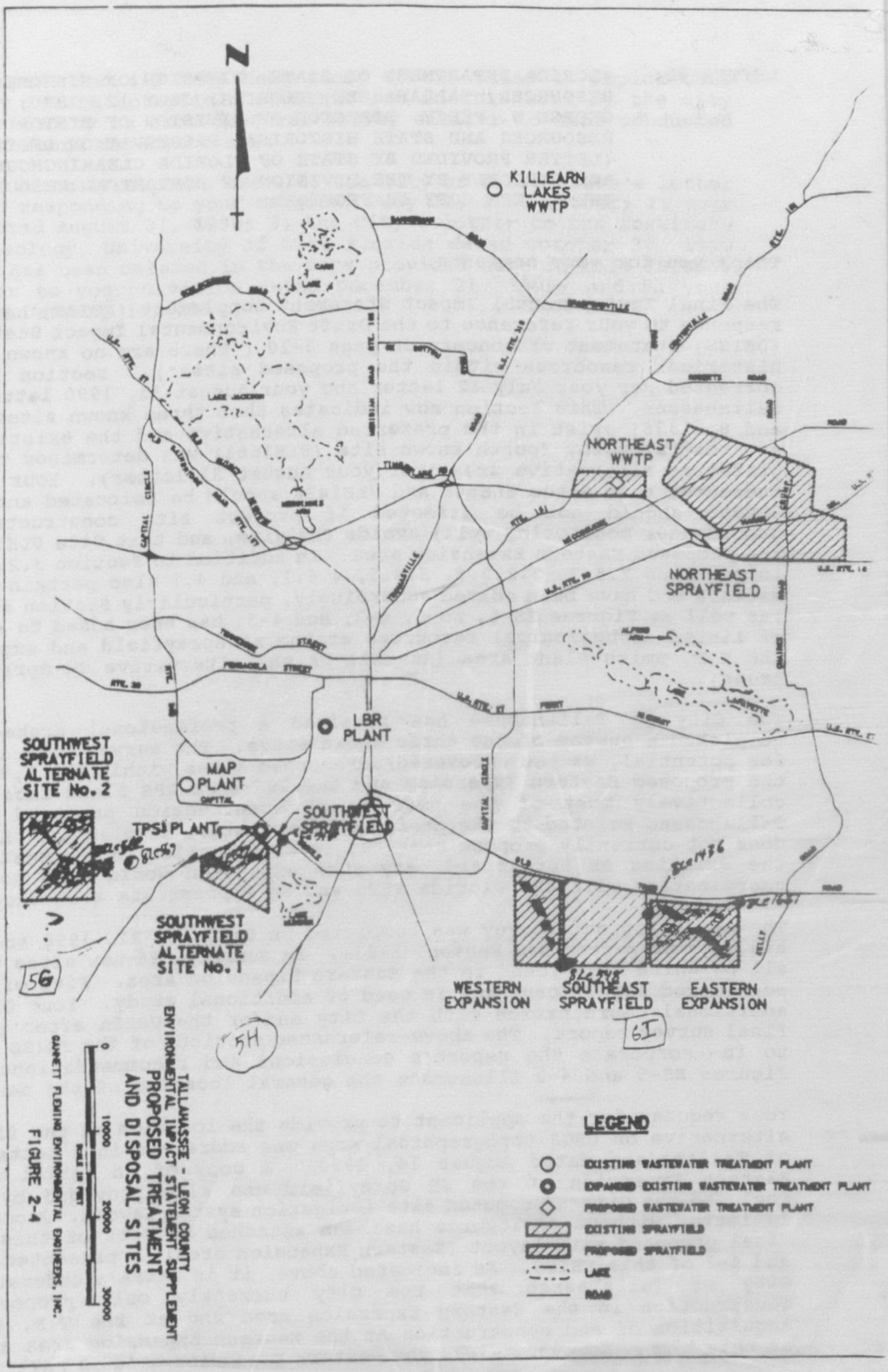
If you have any questions concerning our comments, please do not hesitate to contact us. Your interest in protecting Florida's archaeological and historic resources is appreciated.

Sincerely,

George W. Percy, Director
Division of Historical Resources
and
State Historic Preservation Officer

GWP/lak
xc: Heinz J. Mueller, EPA

Enclosures (1)



TALLAHASSEE - LEON COUNTY ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT
PROPOSED TREATMENT AND DISPOSAL SITES
FIGURE 2-4

LETTER #3: FLORIDA DEPARTMENT OF STATE; DIVISION OF HISTORICAL RESOURCES; TALLAHASSEE, FLORIDA; JULY 12, 1990; GEORGE W. PERCY, DIRECTOR OF DIVISION OF HISTORICAL RESOURCES AND STATE HISTORICAL PRESERVATION OFFICER (LETTER PROVIDED BY STATE OF FLORIDA CLEARINGHOUSE AND DIRECTLY BY THE DIVISION OF HISTORICAL RESOURCES; THE LATTER COPY IS PROVIDED)

Thank you for your comments.

The Final Environmental Impact Statement Supplement (FEISS) has been amended in response to your reference to the Draft Environmental Impact Statement Supplement (DEISS) statement of concern on page 3-20 ("There are no known archeological or historical resources within the proposed sites"). Section 3.2.1.5 has been corrected per your July 12 letter and your August 31, 1990 letter to the City of Tallahassee. This Section now indicates that three known sites (8LE546, 8LE548 and 8LE1436) exist in the preferred alternative and the existing SE Sprayfield and that a nearby fourth known site (8LE1681) was determined to be outside the preferred alternative area (per your August 31 letter). Your August 31 letter indicated that Sites 8LE546 and 8LE1436 should be relocated and evaluated, Site 8LE548 should not be affected if project site construction (drilling a groundwater monitoring well) avoids the site, and that Site 8LE1681 lies outside the proposed Eastern Expansion area. In addition to Section 3.2.1.5, information in Sections 2.5.2, 3.2.2.8, 3.3.5, 4.6.1, and 4.7 also pertain to archeological matters and have been edited accordingly, particularly Section 4.6.1. Figure 2-9 (as well as Figures ES-5, ES-6, 4-2, and 4-3) has been added to show the location of listed archeological resources at the SE Sprayfield and expansion areas and the T.P. Smith Plant area (as well as the alternative SW Sprayfield expansion areas).

The City of Tallahassee has retained a professional archeologist and has completed a survey of the three known sites. The survey also included a search for potential, as yet uncovered/unrecorded sites within the 1,803-acre site for the proposed Eastern Expansion and the 296-acre TPS Plant facility site, where collectively most of the near-future construction proposed by the City of Tallahassee related to the preferred alternative is planned. Although the City does not currently propose near-future construction in the Western Expansion of the existing SE Sprayfield, any such expansion would need to be preceded by coordination with the Florida SHPO and an appropriate archeological survey.

The archeological survey was completed on December 31, 1990 and a final report has been prepared (see Penton, 1991). In summary, 26 new sites were identified; all of which were found in the Eastern Expansion area. Five of these sites are considered significant and in need of additional study. Your Division may wish additional coordination with the City and/or the USEPA after your review of a final survey report. The above-referenced sections of the FEISS have been edited to in- corporate the report's conclusions and recommendations. In addition, Figures ES-5 and 4-2 illustrate the general location of the new sites.

Your request for the applicant to provide the location of the final (preferred) alternative on USGS topographical maps was addressed in a letter from the City of Tallahassee dated August 14, 1990. A copy of an aerial of the proposed Eastern Expansion of the SE Sprayfield was also provided by the City, and included the City's proposed site irrigation system layout. A copy of the August 14 letter without enclosures has been attached as part of this response. The final proposed site layout (Eastern Expansion area) is presented in Figures ES-5 and 4-2 of this FEISS. As indicated above, it is USEPA's understanding from the City of Tallahassee that the City currently only proposes near-future construction in the Eastern Expansion area and at the T.P. Smith facility; acquisition of and construction at the Western Expansion area appears unlikely at this time. However, since the Western Expansion area is part of the preferred alternative, Figures ES-6 and 4-3 have been added to the FEISS to depict this sprayfield area. Any future sprayfield construction in this area by the City would need to be preceded by an archeological survey similar to that conducted by the City for the Eastern Expansion area.

Also included as part of this response are: 1) the City of Tallahassee's letter dated August 14, 1990 responding to your original July 12, 1990 letter; 2) your letter to the City dated August 31, 1990; 3) the City's letter to the Institute of West Florida Archeology, University of West Florida dated October 30, 1990 (the contracted cost has been deleted in the copy provided here in this FEISS); 4) the USEPA's letter to your Division dated December 21, 1990; and 5) your letter to USEPA dated January 14, 1991.

CITY OF TALLAHASSEE

CITY HALL
TALLAHASSEE, FL
32301-1731
904/599-8100

DOROTHY INMAN
Mayor-Commissioner
STEVE MEISBURG
Mayor Pro Tem-Commissioner

BOB HIGHTOWER
Commissioner
DEBBIE LIGHTSEY
Commissioner
JACK L. McLEAN, JR
Commissioner

DANIEL A. KLEMAN
City Manager
ROBERT B. INZER
City Treasurer-Clerk

JAMES R. ENGLISH
City Attorney
RICARDO FERNANDEZ
City Auditor

Sewer Division
1815 Lake Bradford Road
Tallahassee, FL 32304

August 14, 1990

AUG 07 '90

Ms. Laura A. Kammerer
Historic Sites Specialist
Florida Division of Historical Resources
R. A. Gray Building
500 South Bronough Street
Tallahassee, FL 32399-0250

RE: Cultural Resource Assessment Request
SAI # FL9006221695C
U.S. Environmental Protection Agency
Tallahassee-Leon County Wastewater Management
Draft Environmental Impact Statement (DEIS)
Project File No. 901780

Dear Ms. Kammerer:

This is in response to your July 12, 1990, letter to Karen K. MacFarland regarding the referenced project. In that letter you advised Ms. MacFarland that the proposed project may impact some known archeological sites.

The map attached to your letter indicated the location of nine (9) archeological sites. The City of Tallahassee's construction activities in the near future will have the potential to impact only four (4) of those sites. While U.S.E.P.A. may need more information on the other five (5) sites in order to complete their Environmental Impact Statement, this is to request information on only those sites which may be impacted by the City's construction activities in the immediate future:

1. Construction will begin in about six months on an expansion to the Thomas P. Smith Wastewater Treatment Plant, in the vicinity of your Site No. 8Le546.

2. In late 1991, construction will begin on an eastern expansion of the Southeast Sprayfield near your Site Nos. 8Le1436 and 8Le1661.

3. In September, 1990, a groundwater monitoring well will be constructed near your Site No. 8Le548.

U.S.G.S. maps are attached for your use in more accurately determining the location of the City's proposed construction. An aerial photograph is also enclosed indicating in better detail the proposed Southeast Sprayfield expansion area. The white areas in the photograph are where St. Joe Paper Company clear cut the land about ten years ago. The City proposes to again clear cut everything inside the dashed line, and install an irrigation system. The circles indicate the location of proposed center pivot irrigation systems. Outside the circles, but within the dashed lines, will be fixed head sprinklers.

After reviewing this information, please advise me as to whether any further archeological assessment will be required before the City can begin construction. By copy of this letter to U.S.E.P.A., I am advising them that any further archeological assessment required for them to complete the E.I.S. should be coordinated through you.

Should you need to contact me by telephone, my number is 575-0114.

Sincerely,

John L. Dean

John L. Dean
Superintendent

JLD:jfm

Enclosures

xc: Heinz J. Mueller, Environmental Protection Agency
Corey Berish, Environmental Protection Agency
Chris Hoburg, Environmental Protection Agency
Skip Cook, Camp, Dresser & McKee
James H. Peters, Director - Water & Sewer Dept.
G. Keith Turner, Supervisor - Sewer Treatment
Frederick J. Dressel, Plant Supervisor
Randy Bond, Chief Plant Operator
William G. Leseman, Superintendent - Water Quality Lab

FLORIDA DEPARTMENT OF STATE
Jim Smith
Secretary of State
DIVISION OF HISTORICAL RESOURCES
R.A. Gray Building
500 South Bronough
Tallahassee, Florida 32399-0250
Director's Office (904) 488-1480
Telecopier Number (FAX) (904) 488-3353

EPA ...
SEP 10 2 15 PM '90
ENV... ASSE... ...NCH

August 31, 1990

Mr. John L. Dean
Superintendent, Sewer Division
City of Tallahassee
City Hall
Tallahassee, FL 32301-1731

In Reply Refer To:
Laura A. Kammerer
Historic Sites Specialist
(904) 487-2333
Project File No. 902383

RE: SAI #FL9006221695C
U.S. Environmental Protection Agency
Tallahassee-Leon County Wastewater Management
Draft Environmental Impact Statement (DEIS)
Refer. Project File No. 901780

Dear Mr. Dean:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed your letter and maps of August 14, 1990 which details the proposed construction schedule for three activities. The following comments discuss those activities individually and presently known sites are plotted on the enclosed maps.

1. <u>Expansion of the Thomas P. Smith Wastewater Treatment Plant</u>

   This office recommends a professional archaeological site assessment survey of the entire expansion area. Sites are expected to be found in association with Munson Slough. Previously recorded site, 8LE546, should be relocated and evaluated.

2. <u>Eastern Expansion of the Southeast Sprayfield</u>

   We recommend a professional archaeological site assessment survey of the entire expansion area. Sites are expected to be located in association with the ponds and Eagle Lake, and other sinkhole features. Site 8LE1436 located adjacent to Pump Pond should be relocated and evaluated. A review of the Florida Master Site File form and map for site 8LE1681 indicates that it is located outside the expansion area.

Archaeological Research (904) 487-2299 | Florida Folklife Programs (904) 397-2192 | Historic Preservation (904) 487-2333 | Museum of Florida History (904) 488-1484

3. <u>Groundwater Monitoring Well Construction</u>

Although we have insufficient information to adequately evaluate the potential impact of this activity on site 8LE548, if the site location is sufficiently avoided, there will be no effect.

In conclusion, we look forward to receiving a professional survey report(s) for the two expansion projects discussed above. The survey of these areas can be combined as one project or completed and evaluated individually in order of the proposed construction scheduling. When or if, alternative sprayfield sites other than these two are scheduled for construction, this office must be consulted to review the proposals.

If you have any questions concerning our comments, please do not hesitate to contact us. Your interest in protecting Florida's archaeological and historic resources is appreciated.

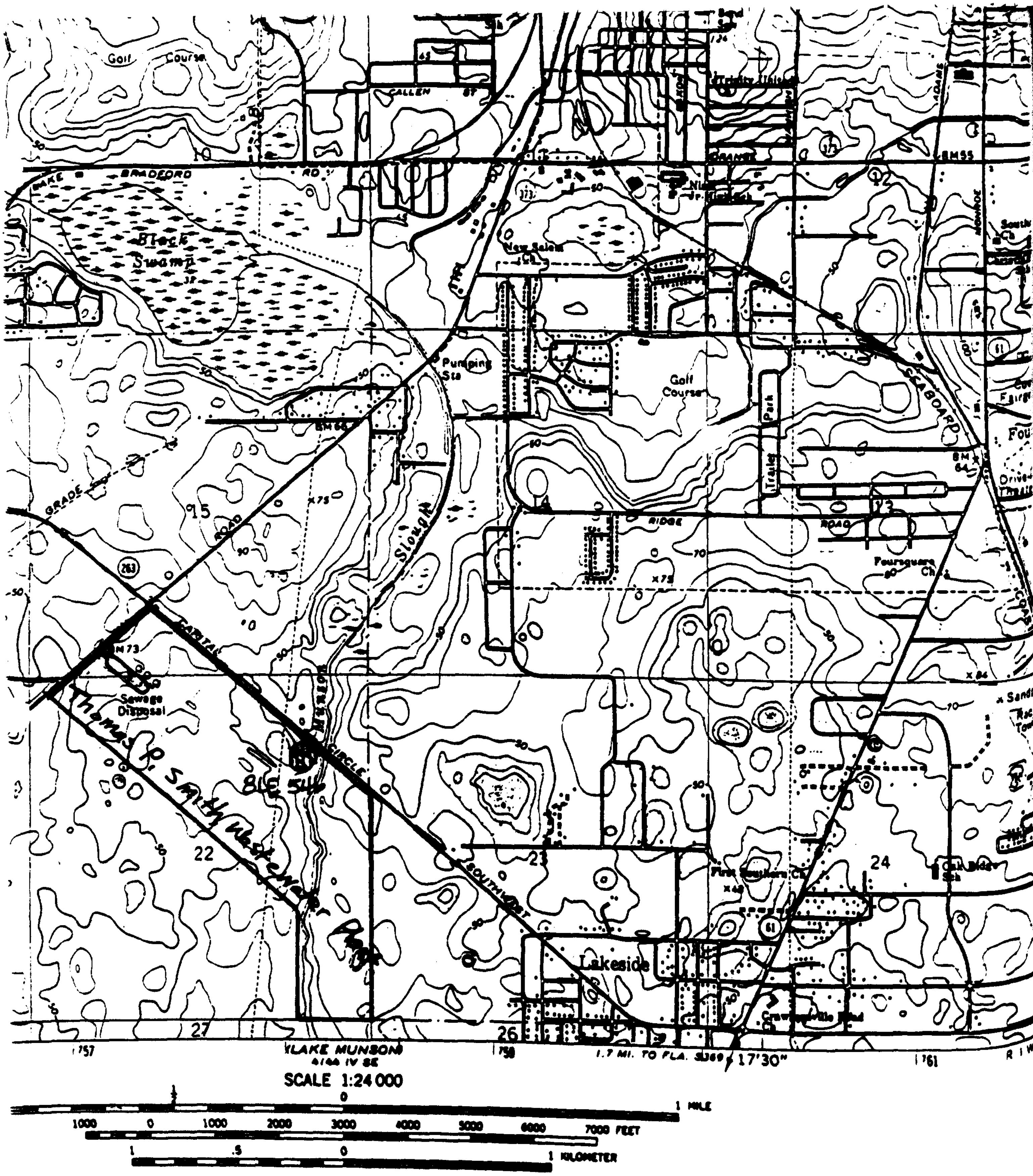
Sincerely,

Suzanne P. Walker

for George W. Percy, Director
Division of Historical Resources
and
State Historic Preservation Officer

GWP/lak
xc: Don Henningsen, OPB (W/Encl)
Heinz J. Mueller, EPA (W/Encl)

Enclosures (2)

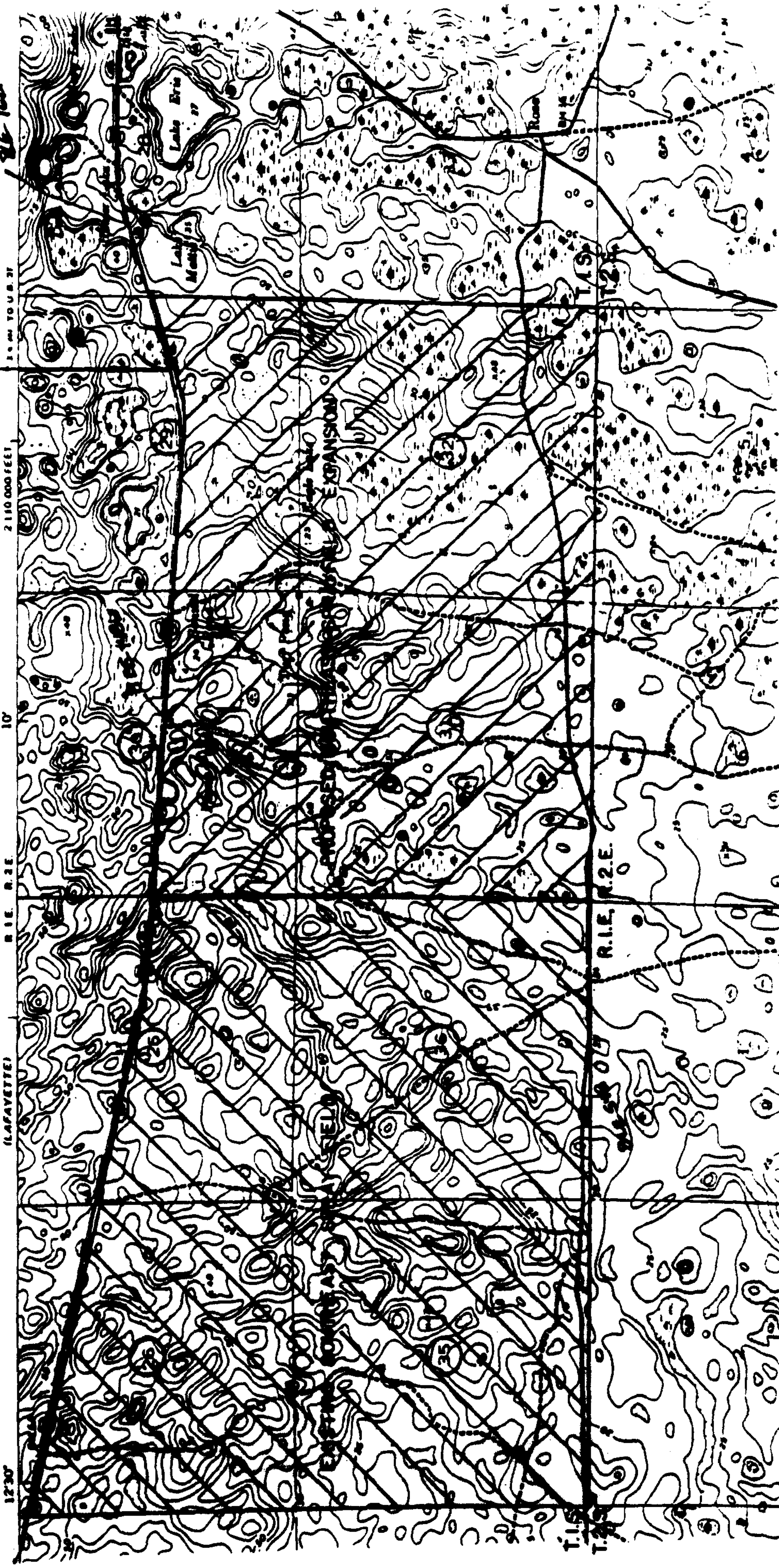


CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

WOODVILLE QUADRANGLE
FLORIDA
7.5 MINUTE SERIES (TOPOGRA



CITY OF TALLAHASSEE

CITY HALL
TALLAHASSEE, FL
32301-1731
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DANIEL A. KLEMAN
City Manager
ROBERT B. INZER
City Treasurer-Clerk

JAMES R. ENGLISH
City Attorney
RICARDO FERNANDEZ
City Auditor

Sewer Division
1815 Lake Bradford Road
Tallahassee, FL 32304

October 30, 1990

Dr. Judith A. Bense, Director
Institute of West Florida Archeology
University of West Florida
11000 University Parkway
Pensacola, FL 32514-5751

RE: Archeological Assessment of Thomas P. Smith Wastewater Treatment Plant and Southeast Sprayfield Expansion Sites

Dear Dr. Bense:

This is your authorization to proceed with an archeological assessment of the subject sites in accordance with the terms of your proposal dated September 28, 1990. Your fees are to be charged against City of Tallahassee Purchase Order #800068. Forward your invoices to me for approval. I will process them through the City's Accounts Payable Department. The sum of your fees shall not exceed *

Congratulations on your successful proposal, and thank you for your prompt attention to this project. You will receive a copy of the Purchase Order from the City Purchasing Division in the near future.

Sincerely,

John L. Dean

John L. Dean
Superintendent

JLD:jfm

xc: Laura A. Kammerer
Daniel T. Penton
Chris Hoberg
James H. Peters
G. Keith Turner
Frederick J. Dressel
Randy Bond

* Cost Deleted Here For This EIS Reproduction

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

December 21, 1990

Ms. Laura Kammerer
Historic Sites Specialist
Division of Historical Resources
Florida Department of State
500 South Bronough
Tallahassee, FL 32399-0250

RE: Project Files No. 901780 / 902383
SAI# FL9006221695C
Tallahassee-Leon County Wastewater Management
Draft Environmental Impact Statement Supplement (DEISS)

Dear Ms. Kammerer:

This is in response to Mr. George Percy's letter of July 12, 1990, concerning the above-referenced EIS project. The U.S. Environmental Protection Agency (EPA) is also aware of a City of Tallahassee letter to the Division of Historical Resources (DHR) dated August 14, 1990 and DHR's response letter dated August 31, 1990 regarding this matter. We have also discussed archaeological aspects of this project with you and the City of Tallahassee by telephone. As the lead Federal agency for this EIS, EPA understands our responsibilities under Section 106 of the National Historic Preservation Act and will strive to ensure that the following are accomplished:

1. An archaeologist, whose qualifications and proposed methods are approved by DHR, will be engaged to perform an archaeological survey to assess portions of the DEISS preferred alternative. We understand that the City of Tallahassee, as the applicant, has retained the archaeologist and that the archaeological survey has been initiated and is to be completed in the very near future.

2. The survey includes an assessment of known sites (8LE546, 8LE548 and 8LE1436) within the preferred alternative and the existing Southeast Sprayfield referenced in the DHR letters dated July 12 and August 31. Site 8LE546 is located at the Thomas P. Smith Wastewater Treatment Plant site, Site 8LE548 is located in th existing Southeast Sprayfield, and Site 8LE1436 is located in the proposed Eastern Expansion of the Southeast Sprayfield. Another nearby another site, 8LE1681, was determined to be outside the perferred alternative area per the August 31 letter. The survey also includes a search for potential sites as yet uncovered/unrecorded within the 296-acre Thomas P. Smith Wastewater Treatment Plant site and the 1803-acre site for the proposed Eastern Expansion of the existing Southeast Sprayfield. Most of the near future construction proposed by the City of

Tallahassee related to the EIS project is planned for these two areas, pending successful completion of the EIS process. The significance of all sites will be investigated in consultation with the DHR to determine their potential eligibility for inclusion in the National Register of Historic Places.

3. As sites and their relative significance are revealed, appropriate environmental protection and/or mitigative measures (i.e., avoidance, preservation, or other as directed by DHR) will be developed in consultation with DHR.

Although we understand that the City of Tallahassee does not currently propose near future construction in the Western Expansion area of the existing Southeast Sprayfield due to land acquisition difficulties, any such or other construction related to the preferred alternative would need to be preceded by coordination with the Florida SHPO and any appropriate archaeological survey.

I hope that these proposals address your concerns for the cultural resources that may be impacted by the proposed project. EPA requests to be copied on correspondence concerning this matter for documentation. EPA will continue to keep the Florida SHPO on the EIS mailing list, so that a copy of the Final Environmental Impact Statement Supplement will be sent to your Office for review.

Please contact me, Chris Hoberg or Marion Hopkins if you have any questions (404/347-3776). We greatly appreciate your cooperation.

Sincerely,

Heinz J. Mueller

Heinz J. Mueller, Chief
Environmental Policy Section
Federal Activities Branch

cc: Don Henningsen, Florida State Clearinghouse
John Dean, City of Tallahassee Sewer Division

FLORIDA DEPARTMENT OF STATE
Jim Smith
Secretary of State
DIVISION OF HISTORICAL RESOURCES
R.A. Gray Building
500 South Bronough
Tallahassee, Florida 32399-0250
Director's Office (904) 488-1480
Telecopier Number (FAX) (904) 488-3353

JAN 17 REC'D

January 14, 1991

Mr. Heinz J. Mueller, Chief
Environmental Policy Section
Federal Activities Branch
U.S. Environmental Protection
Agency, Region IV
345 Courtland Street, NE
Atlanta, GA 30365

In Reply Refer To:
Laura A. Kammerer
Historic Sites
Specialist
(904) 487-2333
Project File No. 903752

RE: SAI# FL9006221695C
Tallahassee-Leon County Wastewater Management
Draft Environmental Impact Statement Supplement (DEISS)

Dear Mr. Mueller:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the above referenced DEISS. We find that the DEISS proposals adequately address this agency's recommendations concerning cultural resources. The inclusion of the of your December 21, 1990 proposals in the final Environmental Impact Statement will satisfy this agency's considerations.

If you have any questions concerning our comments, please do not hesitate to contact us. Your interest in protecting Florida's archaeological and historic resources is appreciated.

Sincerely,

Louis D. Tesar
George W. Percy, Director
Division of Historical Resources
and
State Historic Preservation Officer

GWP/lak
xc: Karen K. MacFarland, OPB

United State
Department of
Agriculture

Soil
Conservation
Service

State Office, Room 248
401 S. E. First Avenue
Gainesville, FL 32601

July 12, 1990

Heinz J. Mueller, Chief
Environmental Policy Section
EPA, Region IV
345 Courtland St., N.E.
Atlanta, Georgia 30365

Dear Mr. Mueller:

We have reviewed your Draft Environmental Impact Statement (DEIS) for Tallahassee-Leon County Wastewater Management and have no comments to offer at this time.

We appreciate the opportunity to comment on this proposal.

Sincerely,

T. Niles Glasgow Acting
State Conservationist

cc: James B. Newman, SCS, NHQ, Director, Ecological Sciences Division

LETTER #4: UNITED STATES DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE; GAINESVILLE, FLORIDA; JULY 12, 1990; T. NILES GLASGOW, STATE CONSERVATIONIST

Thank you for your comments. No response necessary.

FLORIDA GAME AND FRESH WATER FISH COMMISSION

FARRIS BRYANT BUILDING
620 South Meridian Street
Tallahassee, Florida 32399-1600
(904) 488-1960

JUL 13 1990

July 12, 1990

Ms. Karen MacFarland, Director
State Clearinghouse
Office of Planning and Budgeting
Executive Office of the Governor
The Capitol
Tallahassee, Florida 32399-0001

RE: SAI# FL9006221695C, Draft Environmental Impact Statement Supplement, Tallahassee - Leon County Wastewater Management

Dear Ms. MacFarland:

The Office of Environmental Services of the Florida Game and Fresh Water Fish Commission has reviewed the referenced draft Environmental Impact Statement Supplement. We previously commented on a preliminary draft of this wastewater management project and recommended further consideration of Alternative 9 over the "preferred alternative", Alternative 1. The comments provided in our 16 February 1990 letter to the Environmental Protection Agency (enclosed) still apply.

Please contact Mr. Larry Perrin (904/488-6661) if you have any questions.

Sincerely,

Douglas B. Bailey

for Bradley J. Hartman, Director
Office of Environmental Services

BJH/LP
ENV 1-3-2
Enclosure

FLORIDA GAME AND FRESH WATER FISH COMMISSION

FARRIS BRYANT BUILDING
620 South Meridian Street
Tallahassee, Florida 32399-1600
(904) 488-1960

February 16, 1990

Dr. Cory W. Berish
U. S. EPA Region IV
EIS Preparation Section
345 Courtland Street
Atlanta, Georgia 30365

RE: **Tallahassee-Leon County Wastewater Management EIS Supplement**

Dear Dr. Berish:

The Office of Environmental Services of the Florida Game and Fresh Water Fish Commission has reviewed the referenced preliminary draft EIS Supplement and offers the following comments.

This EIS Supplement addresses the projected wastewater management needs for Tallahassee-Leon County through the year 2010. Nine wastewater management alternatives were developed. Eight of these were considered as centralized systems (large-scale facilities incorporating a network conveyance system). The remaining alternative was a decentralized system (a system which focuses primarily on small-scale, on-lot treatment facilities). The nine alternatives were narrowed down to four alternatives, three centralized alternatives and the one decentralized alternative. Following the evaluation of these four alternatives, the Environmental Protection Agency selected Alternative 1 as the preferred alternative. The selection of Alternative 1 over the other three alternatives was based on the ranking results of the four alternatives and the fact that the City has had experience operating this type of system.

Alternative 1 is a centralized system and consists of improving the Lake Bradford Plant, improving and expanding the T. P. Smith Plant, and increasing the size of the existing southeast agricultural sprayfield irrigation site by 1,410 acres. Sludge produced by treatment operations would be applied to the land around T. P. Smith, the existing Southwest sprayfield, and an expanded airport site.

In reviewing the ranking evaluation conducted for the four alternatives, three of the alternatives (Alternatives 1, 2, and 9) had essentially equal overall values. Alternatives 1 and 2 each had a ranking score of 13 and Alternative 9 had a score of 12. The remaining alternative evaluated, Alternative 7, had a ranking score of nine. Because of the subjectivity involved in this type of ranking method and the close scores of three of the alternatives, further evaluation of these options seems warranted. From this standpoint, both Alternative 1 and 2 were similar in almost every respect (costs, ranking evaluation, and "present worth value") except that Alternative 2 involved a forested sprayfield application rather than agricultural sprayfield irrigation.

Alternative 9 on the other hand, represents the decentralized alternative and would consist of improving the Lake Bradford Plant, expanding the Killearn Lakes Plant, expanding the Southeast Agricultural Sprayfield by 469 acres, and using on-lot treatment systems. From reviewing the information provided for this alternative, it appears that this option should receive greater consideration.

As previously mentioned, the ranking evaluation for Alternative 9 was similar to Alternatives 1 and 2. In addition, according to Table 2-20 this alternative has the lowest "present worth value" (value that incorporates both initial capital outlay and future annual costs) of any alternative. While the overall total system cost for this alternative is given as almost $100 million, $93 million of this total is projected for development of on-lot systems (Table 2-19). At the public meetings held for the discussion of wastewater management options, it was brought out that the development of on-lot systems do not have to be a public expenditure and these features could be made the responsibility of development interests. Such a position would result in an extremely large cost reduction for this alternative. Further, to reduce concerns with respect to the proper operation of on-lot systems, this report discusses the creation of a joint Tallahassee-Leon County wastewater management agency as a possible solution. It would seem likely that such a joint agency could also assist other areas of water management such as stormwater management, and inspection and enforcement programs. Additionally, this report notes that centralized systems are complex and difficult to operate while decentralized systems are simple to operate and maintain (Table 2-23). Moreover, decentralized systems are also reported to provide increased flexibility for handling future demands due to the large amount of suitable soils in the study area.

In conclusion, our agency is pleased that the alternatives considered in this report no longer include any proposals for use of the Apalachicola National Forest. Further, we recommend that Alternative 1 be reconsidered in view of some of the apparent benefits associated with Alternative 9. It seems likely that Alternative 9, if properly implemented, could reduce environmental impacts relative to centralized systems, lessen the need for extensive land areas, and place the responsibility for expanded wastewater facilities on those individuals that would benefit from these services, rather than have them provided at the expense of the general public and our natural resources.

We appreciate the opportunity to provide comments on this preliminary draft EIS. Please contact Mr. Larry Perrin (904/488-6661) if you have any questions.

Sincerely,

Bradley J. Hartman

Bradley J. Hartman, Director
Office of Environmental Services

BJH/LP
ENV 1-3-2
cc: Mr. Robert T. Jacobs, Forest Supervisor, U. S. Forest Service
Mayor Dorothy Inman, City of Tallahassee
Ms. Gayle Nelson, Chairman, Leon County Commission

LETTER #5: FLORIDA GAME AND FRESH WATER FISH COMMISSION; TALLAHASSEE, FLORIDA; JULY 12, 1990; BRADLEY J. HARTMAN, DIRECTOR OF ENVIRONMENTAL SERVICES (LETTER PROVIDED BY STATE OF FLORIDA CLEARINGHOUSE)

Thank you for your comments. The various items addressed in your letter are discussed in the following numbered sections:

1. <u>Soils</u>

   a. <u>North versus South Leon County soil types and septic tank failures</u>. References in this FEISS to soil characteristics and distribution patterns include the Executive Summary (Figure ES-4), the Project Updates Summary, and Sections 2.1.4, 2.2.2, 2.3.5.1, 2.5.2, 3.2.1.2, 4.5 (Figure 4-1), C-1, and the USEPA responses to USEPA Public Hearing comments in this Chapter 5 (speaker John Gray), as well as the cited Leon County Soil Survey (USDA [SCS] and USFS, 1981).

   From a soils suitability perspective, it appears from the 1981 Soil Survey of Leon County, Florida (USDA [SCS] and USFS, 1981) that the northern part of Leon County is generally less suitable for septic tank and spray irrigation wastewater disposal than the southern part. This is not to say, however, that favorable soils for septic tanks and spray irrigation do not exist in both northern and southern areas of Leon County or that unfavorable soils do not exist in southern Leon County. However, the USEPA understands that the Leon County Public Works Department apparently conducted a spray irrigation site assessment in 1989 and determined that more acreage would be needed to dispose the same quantity of effluent in the selected northern alternative sites than in the selected southern alternative sites due to soil types. This suggests a slower percolation rate at the northern sites.

   The USEPA understands from the City of Tallahassee that the City would concur with the County with such a trend for northern versus southern Leon County in general, since the northern portion of the County appears to be generally underlain by layers of clay and since sandy upper horizons are rather shallow. The City has conducted geohydrologic analyses by contractor for nine sites in northeastern Leon County in 1991. Core soil samples generally exhibited clay layers of varying degree in the samples collected. Such clay layers would affect the drainage capabilities of the area and thus its suitability for septic tank and spray irrigation disposal.

   This trend also generally agrees with Table 2-9 of this FEISS. When the acreage predicted to be required for agricultural spray irrigation in the SE (component D1) is compared to agricultural spray irrigation in the NE (component D2), the average acreage needed per effluent flow (mgd) is much greater in the NE (430 acres/mgd) than in the SE (188 acres/mgd). The same trend also exists for the NE forest irrigation site (component D4: 524 acres/mgd) compared to the SE forest irrigation site (component D3: 197 acres/mgd). (<u>Note</u>: This trend, however, is not true in every instance since the artificial wetlands with RIBs disposal in the SE (components D11 and D16) are predicted to require the same amount of acreage as in the NE (components D12 and D17), i.e., 111 acres/mgd). For Table 2-9, the maximum application rate was used to estimate acreages and was based on the soils in the 1981 Leon County Soil Survey at the given sites. However, the USEPA recommends that soil percolation testing be conducted at any site proposed for irrigation be implementation to determine actual soil percolation rates.

   Based on the "General Soil Map" for Leon County in the 1981 Soil Survey, Leon County is dominated by three soil associations: the Orangeburg-Lucy-Norfolk association in the northern part of Leon County and the Kershaw-Ortega-Alpin and the Dorovan-Talquin-Chipley associations in the southern part of Leon County. The Orangeburg-Lucy-Norfolk soils and the Kershaw-Ortega-Alpin soils are generally well-drained while the Dorovan-

Talquin-Chipley soils are generally not well-drained. Specifically, the 1981 Soil Survey classifies the Orangeburg-Lucy-Norfolk soils as "well drained soils" and the Kershaw-Ortega-Alpin soils as "excessively drained and moderately well drained soils," while the Dorovan-Talquin-Chipley soils are considered "somewhat poorly drained to very poorly drained soils." Of the two well-drained soil associations, the depths of these sandy associations differ significantly: the Orangeburg-Lucy-Norfolk soils are sandy to only 20-inch depths with loam below, compared to sandy 20-40 inches deep with loam below or are loamy throughout (Note: "loam" is a soil type that is defined in the 1981 Soil Survey as a mix of clay (7-27%), silt (28-50%), and sand (<52%) particles.) By contrast, the Kershaw-Ortega-Alpin soils are sandy to 80 inches or more, with some having loamy layers (lamellae) below 45-inch depths.

Regarding the suitabilities of these soil associations for septic tank absorption fields, Table 11 of the 1981 Soil Survey presents the "restrictive soil features" of existing soil types. All listed Orangeburg, Lucy and Norfolk soil types are classified as "moderate: percs slowly" and/or "moderate: wetness," with "moderate" being defined as having unfavorable soil properties for the given activity. The Kershaw soils are classified as "slight" which is defined as soil properties generally favorable for the activity. Oretega and Alpin soils are classified as "severe: poor filter," with "severe" being defined as soil properties very unfavorable for the activity. The Dorovan, Talquin and Chipley soils are classified as "severe: wetness" or "severe: floods, wetness." These classifications indicate that only the Kershaw soils have properties favorable for septic tank absorption field infiltration while the others do not adequately drain or drain too well and therefore do not provide proper filtration (i.e., adsorption of inorganics (metals), microbes, etc.). Leon County therefore appears to be a mix of soil types with "slight," "moderate" or "severe" classifications regarding the suitability for septic tank activity. The preliminary 1988 Leon County MW&SSP also addresses the issue of soil suitability for septic tanks within Leon County.

Specific to the proposed Eastern Expansion of the existing SE Sprayfield in southeastern Leon County, Figures ES-4 and 4-1 taken from the Leon County Soil Survey (USDA [SCS] and USFS, 1981), present a composite of the soil types in the Eastern Expansion area proposed by the City for near-future construction as part of preferred Alternative 1. Based on the 1981 Soil Survey, the soils of the Eastern Expansion Area sprayfield site proposed by the City are dominated by Ortega Sand, Kershaw Sand with a 0-5% slope, Talquin Fine Sand, Chipley Fine Sand and Kershaw Sand with a 5-8% slope, respectively. Of these, only the Kershaw sands are classified as favorable for septic tank absorption fields (classified as "slight," i.e., having favorable soil properties for the activity).

Of the portions of the proposed Eastern Expansion Area sprayfield proposed for irrigation (i.e., center pivot irrigation Areas A-E and adjacent fixed head irrigation areas: Refer to Fig. ES-5 or 4-2 of this FEISS), irrigation areas associated with and adjacent to Areas A, B, and D primarily contain Kershaw Sands while irrigation areas associated with and adjacent to Areas C and E primarily contain Ortega Sand. As indicated, Kershaw Sands are considered suitable soil types for septic tank absorption fields while Ortega Sand would not be favorable due to poor filtration capabilities (too well-drained sands). However, it should be noted that the City's proposed project is not septic tank disposal of raw sewage, but rather spray irrigation of monitored, secondarily-treated sewage effluent. As such, spray irrigation would disperse effluent over a greater area than septic tank disposal and also would dispose wastewater of a considerably higher water quality than untreated raw sewage wastewater of septic tanks. (Specifically, all of the vertical soil horizons are utilized for filtration during spray irrigation whereas several inches of soil filtration are not utilized in septic tank drainage fields, since drainage lines are buried several inches below the surface; spray irrigation utilizes the entire horizontal soil surface area whereas septic tank fields only utilize soil areas associated with the drainage lines; and secondarily-treated spray effluent requires considerably less soil filtration for purification than untreated septic tank raw sewage wastewater.)

Because of the filtration limitations of the Ortega Sand in the proposed irrigation areas associated with and adjacent to Areas C and E as well as some unfavorable soils interspersed in irrigation areas associated with and adjacent to Areas A, B and D, the USEPA recommends reduced irrigation application (inches/week) in these areas. If monitoring exhibits compliance with State of Florida groundwater quality standards and monitoring is conducted to the satisfaction of the State of Florida, additional application can be tried if commensurate with groundwater quality compliance. Groundwater monitoring is also essential since the entire Eastern Expansion Area lies in the Woodville Karst Plain, i.e., Karstic geology that is subject to water dissolution and collapse (sinkholes). In any areas of collapse, irrigation should be stopped immediately in those areas and the State of Florida notified. The USEPA recommends that no effluent be sprayed in a reasonable surrounding area of the existing sinkhole depressional area located within the proposed fixed head irrigation area adjacent to Area D, as well as any other potentially discovered sinkhole areas (Refer to Fig. ES-5 or 4-1 of this FEISS). The USEPA further recommends that the State of Florida consider the existing soil characteristics and Karstic conditions of the proposed Eastern Expansion Area in their permitting decision for the City's proposed sprayfield expansion.

As indicated in Section 2.1.4, septic tank drainfield failures have been investigated and documented for the Killearn Lakes Subdivision area located in the northeast portion of Leon County. Failures were generally due to a combination of slowly permeable soils, high water table elevations in confining layers, storm water runoff and drainage, and high density development. As a consequence, the Leon Public Health Unit recommended a central sewage system and adequate storm water collection system for the area. The Public Health Unit also advised restrictions for issuing on-lot sewage disposal system permits. However, this is not to say that such failures were documented throughout Leon County, since soil permeability and other conditions vary in the County, with some soils being suitable for septic tanks. The County is currently compiling a computer-based inventory of septic tank drainfield failures. However, this inventory only includes "new" failures and therefore cannot provide a historical record to quantify the problem caused by failures or to identify all specific problem areas.

It should also be noted that the Leon County Public Health Unit has indicated that the successful operation of septic tank drainfields in the study area is a function of available soil storage above a confining layer and not necessarily the capacity of the soil to move water. Accordingly, tests and the measuring of water table elevations before development may be misleading for determining the suitability of areas to accommodate drainfields.

b. <u>Centralized versus decentralized systems and water pollution</u>. It is often believed that public health and the environment are better protected with a centralized sewer system than with a decentralized septic tank/drainfield system. Factors contributing to this conclusion include:

- Centralized systems are maintained for preventative maintenance purposes on a regular basis whereas septic tank/drainfields generally are only "maintained" after a malfunction has occurred during which time nearby water resources are threatened.
- Centralized systems are operated and controlled to provide specific removal of pollutants and disinfection of the effluent whereas septic tanks are not "operated" and therefore do not provide a high level of control over treatment functions.

- A centralized system disposes of its effluent to a controlled and confined location (e.g., a point discharge to a surface water or a spray irrigation field); therefore, if problems arise leading to a malfunction, the problem is localized. In contrast, a region of septic tank/drainfield failures can affect a larger area.

- Centralized systems generally include water quality monitoring to check for water quality changes so that problems can be detected and corrected quickly before water resources are severely impacted. On the other hand, the proliferation of septic tank/drainfield systems over a large area makes implementation of an effective groundwater monitoring program virtually impossible. Since water quality changes are not monitored, septic tank/drainfield failures can go undetected for a long time. The cumulative impact of individual septic tank/drainfield failures can severely degrade the water quality of nearby water resources during this time and have the potential of spreading water-borne diseases. Once a water resource has been degraded in a decentralized system, it then takes a major effort to determine the specific source(s) of the problem and to correct the malfunctions.

- Decentralized systems have a greater tendency for generation of non-point source water quality problems, particularly in Florida due to a shallow water table and potential for contamination of surface waterbodies.

- Changeover from a decentralized system to a sewered system is a common pattern in urban and suburban areas. Costs associated with such a changeover are greater than if a centralized system was implemented initially.

One option for minimizing the number of failures is to fund a large joint Tallahassee-Leon County wastewater management agency that would regularly and rigorously inspect drainfield siting, installation, and operation in the region. The large "public expenditure" for funding this joint agency was not accounted for in the costs evaluation of the FEISS alternatives.

c. Flexibility of decentralized systems for handling future demands. As indicated above in Item 1.a., it is recognized that some soils in the study area are suitable for septic tank/drainfield systems. This same characteristic also promotes the flexibility of a spray irrigation system to expand and handle future flows. The use of septic tank/drainfield systems can be considered to be restrictive to development in that the systems require development to allocate specific areas of the property for the facility installation and operation. This became particularly apparent in the Killearn Lakes Subdivision where the large number of failures was attributed in part to small lot sizes (Refer to Sections CHECK 2.1.4 and 2.3.5.1). Centralized sewer-based systems, on the other hand, do not require specified lot sizes for development. Subsequently, a sewer system allows development to be consolidated instead of spread out to accommodate the area needs of individual drainfields. Consolidation of development in turn could potentially, if so-managed, preserve the remaining areas as "open space" thereby preserving valuable wildlife habitat that may otherwise be destroyed for less dense residential and commercial development. Sewering and septic tank/drainfield land area requirements can regulate development by encouraging development to occur where sewer lines are installed and by restricting development in areas not serviced by the lines. It should also be noted that the cost of replacing septic tanks with sewers in areas experiencing failures is up to four times the cost of installing sewers at the time of development.

2. Efficiency of centralized system. Efficiency of a system is related to its effectiveness in removal of pollutants. Since centralized systems are operated by trained staff, maintained for preventive rather than corrective purposes, and are constantly monitored, the efficiency of treatment of wastewaters are generally higher than septic tank/drainfield systems. The

treatment using vegetative uptake and soil infiltration at the effluent spray irrigation disposal site.

3. Concept of wastewater effluent as a water "resource" rather than a waste. The preferred alternative not only provides a highly efficient and effective treatment of wastewaters (See item 2 above), but it also provides a previously unavailable resource, a nutrient-rich water supply for irrigation of cash crops for animal feed and/or processed food for humans to the extent consistent with Chapter 17-610 F.A.C. In addition, the spray irrigation system and the septic tank/drainfield systems provide valuable recharge to the groundwater aquifers. Also, a component of the preferred alternative is the use of treated wastewater to irrigate golf courses. This replaces the need for using valuable potable water resources and has been successfully used in other areas, including the City of St. Petersburg, Florida, which sprays "gray" water onto local golf courses. If properly applied, spray irrigation of golf courses can reduce non-point source runoff problems since it would reduce the need for fertilizer application. (Although irrigation of golf courses is proposed by the preferred Alternative 1, it is USEPA's understanding from the City that the City does not plan any implementation in the near future.)

4. Per capita cost of the preferred alternative centralized system. Though the decentralized alternative has the lowest estimated present worth value of all the four further-considered alternatives, the preferred alternative has a low estimated average annual household cost ($270 in 1989 dollars). This estimated value is less than the USEPA-recommended maximum for the study area (Refer to Section 3.1.1.3.5). It should also be noted that, though the decentralized alternative has been assigned the lowest present worth value, there are unquantified costs that will be incurred if the alternative were implemented. These costs include the funding of a joint Tallahassee-Leon County wastewater management agency to inspect and enforce regulations for siting, installing, and operating septic tank/drainfield systems (See item 1.c above). Also the disposal of the septage flushed from septic tanks during regular maintenance cleaning would need to be addressed. The decentralized alternative would result in a large number of tanks needing regular cleaning to ensure proper functioning. Generally, septage needs to be hauled to and "processed" at a wastewater treatment facility prior to disposal. This could require special handling so as not to interfere with the facility's biological-based operations. Costs for septage hauling and handling were not included in the decentralized alternative's present worth value. On the other hand, connection fees (hook-up costs) were not considered for the centralized alternatives in the cost comparisons of the alternatives (Note: Hook-up costs are discussed in the "Program Updates Summary" Chapter following the Executive Summary of this FEISS and also briefly in Section 3.1.1.3.5).

The USEPA appreciates your Office's participation in the field survey on January 23, 1991 of the proposed Eastern Expansion site of the existing SE Sprayfield to help characterize specific areas proposed for spray irrigation relative to habitat value, especially relative to the protected Gopher Frog and Gopher Tortoise. Coordination with your Office was recommended by the U.S. Fish and Wildlife Service. (Also refer to DEISS comment letter #9 from the U.S. Department of the Interior and the associated USEPA response including the letter from your Office dated February 6, 1991. Also refer to Section 4.4.1 of this FEISS.)

Executive Office of the Governor
The Capitol
Tallahassee, FL
32399-0001

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SAI: FL9006221895
PROJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT
TALLAHASSEE - LEON COUNTY WASTEWATER MANAGEMENT - TALL
AHASSEE, LEON COUNTY, FLORIDA
RECEIVED: 06/22/90

...pondence requesting review ... correspondence has been assigned a **State Application Identifier (SAI) Number**, shown above, which should be used in all communications with this office concerning the application or project.

The State Clearinghouse will coordinate a review of the application or project pursuant to Presidential Executive Order 12372; Gubernatorial Executive Order Number 83-150; section 216.212, Florida Statutes; the National Environmental Policy Act; the Florida approved coastal management program; the Outer Continental Shelf Lands Act; and other federal or informational review requirements.

The review begins on the date the correspondence is received by the State Clearinghouse and normally is completed in 30 days, although longer review periods of 45 and 60 days are permitted by federal law for specific types of applications or projects. Completion of the review may be delayed if additional information is needed by reviewing agencies, in which case you will be notified. Please send three (3) copies of your application or project to the appropriate Regional Planning Council (RPC), if applicable.

FLORIDA STATE CLEARINGHOUSE
Executive Office of the Governor/OPB
Growth Management and Planning Policy Unit
The Capitol, Tallahassee, FL 32399-0001
(904) 488-8114; (SunCom) 278-8114

LETTER #6: FLORIDA STATE CLEARINGHOUSE; EXECUTIVE OFFICE OF THE GOVERNOR; TALLAHASSEE, FLORIDA; RECEIVED JULY 13, 1990

Thank you for your comments and circulating the Draft Environmental Impact Statement Supplement (DEISS) to appropriate offices within the State of Florida. No response necessary.

W. V. McCONNELL LAND MANAGEMENT PLANNER / FORESTER

[redacted] ROAD, TALLAHASSEE, FLORIDA 32304
[redacted]4

July 17, 1990

[redacted]
Env. Policy Se[redacted]

Hein[redacted] Mueller, Chief
[redacted]ntal Policy Section
[redacted] Region IV
345 Courtland Street N.E.
Atlanta, GA 30365

Dear Dr. Mueller:

You have my letter of March 16, 1990 pointing out deficiencies in the "Tallahassee-Leon County, Wastewater Management" preliminary DEIS. This letter is a re-statement of the observations made in that letter. As I will be unable to appear at the Public Hearing scheduled for August 9, this will constitute my formal comments on the DEIS.

CFR 1502.14(a) requires the preparing agency to "Rigorously explore and objectively evaluate all reasonable alternatives". In preparing this DEIS the USEPA, Region IV has not complied with this requirement.

Specifically, the DEIS fails to consider the alternative presented by me at the Public Hearing held on August 15, 1989. That alternative proposes that the U.S. Forest Service join with the City of Tallahassee in cooperative re-use of wastewater produced by the City: the City to furnish effluent and the Forest Service to use this effluent on its (FS) land in a research/demonstration project featuring the production of energy-wood in a multi-resource management system. This R&D project would focus on the production of woody biomass as a means of mitigating Global Warming. A copy of that alternative is attached to this letter.

This proposal, known as the "effluent to energy" or "biomass research" alternative, aroused considerable interest and support. You have received letters from the The Mississippi Forestry Association, the Florida Forestry Association, the National Wood Energy Association, the Department of Energy (Oak Ridge National Laboratory), the Southeastern Regional Biomass Energy Program (TVA), the Institute of Food and Agricultural Sciences (Univ. of Florida), and Dr. Andre Clewell (ecologist and perhaps the leading authority on the longleaf-wiregrass ecosystem) supporting the concept advanced in that alternative. Copies of these letters are attached.

In preparing the DEIS the USEPA made a decision to eliminate Forest Service land from consideration as a site for effluent disposal. The rationale for the decision is found in 2.3.3. A reading of this section reveals that the decision was not based on a rigorous exploration and objective analysis of the "effluent to energy" alternative as required by CFR 1502.14(a) but rather on unsupported comments relating to an earlier generic alternative which proposed, in unspecified terms, the use of Forest Service land.

According to section 2.3.3 the primary issues with regard to using USFS land are the concern over losing "valuable longleaf-wiregrass habitat" and the restriction of public access. Section 2.3.3 quotes the Florida Game and Freshwater Fish Commission as recommending that such habitat is critical to maintain and should be restored to the fullest extent possible. Under the "biomass research" alternative all of the existing longleaf pine-wiregrass ecosystem is to be maintained. The critical element in the longleaf pine-wiregrass community is wiregrass, a species extirpated on the areas proposed for treatment. Longleaf pine can be replanted and the Forest Service's policy is to replant this species on appropriate sites. The wiregrass component is another matter. Dr. Andre F. Clewell is a specialist in the restoration of native plant communities and their habitats on reclaimed and disturbed lands. He is the author of the 1971 report, THE VEGETATION OF THE APALACHICOLA NATIONAL FOREST, AN ECOLOGICAL PERSPECTIVE and a leading authority on the longleaf pine-wiregrass ecosystem. I'm attaching a reprint of his most recent publication, NATURAL HISTORY OF WIREGRASS (Aristida stricta, MICHX, GRAMINEAE). In a letter to me dated March 27, 1989, Dr Clewell states "At present, there is no technology available to restore wiregrass and its botanical compatriots of the longleaf pineland undergrowth. —- Until that time comes, I doubt that we have an economical shot at retoring the community." Clearly, the ecosystem restoration objective, while laudable, has little basis in reality.

Using this pie-in-the-sky vision of eco-restoration as a justification for blocking research into Global Warming mitigation becomes even more questionable when we consider the ecological consequences of Global Warming itself. The following abstract of a presentation made at the April 19-10 symposium "Forests in a Changing World" at Gainesville, Florida is one scenario for Florida's eco-future.

IMPACTS OF GLOBAL WARMING ON BIODIVERSITY

Stephen R. Humphrey
Curator in Ecology
Florida Museum of Natural History
University of Florida
Gainesville FL 32611

If oceanic and atmospheric scientists are correct, global warming will make Florida warmer, wetter, and smaller, at rates of change much higher than in past ice ages. Biotic communities will dissociate and form anew as species redistribute. Range limits will shift from Florida to the Piedmont or beyond. Saltmarsh will be vastly reduced; mangrove and tropical hardwoods will expand. Much of the Keys and coastal basins with little sediment will go under water. Interior wetland habitats will get wetter and displace one another upslope. Most animals' ranges will shift, but some plants will colonize too slowly to avoid extinction. Preserve-bound species unable to cross cultural landscapes will raise extinction rates far above recent levels. The scale of change will force redefinition of conservation and use of natural resources. Pre-emptive preserve design will fail because preserves will be too small for most species. Preserves will be used primarily for introduction of species that might have moved if they could have. New regimes of agriculture will have to be devised by matching future conditions with the ecological capabilities of species not present on-site today.

The restricting of access on .2% of the Apalachicola National Forest, which is cited as a "major concern", appears to be a modest sacrifice in view of the stakes involved.

The Council for Environmental Quality and your own agency, the USEPA, has identified Global Climate Change as an environmental issue needing more attention by Federal Agencies in preparing EISs. The "biomass research" alternative relates to the Global Warming Issue in 3 ways. First, through the quantifiable high volume sequestration of carbon in a rapidly growing energy plantation (as opposed to the low volume sequestration in non-intensively managed stands on the low-productivity sites involved in this proposal). Second, through the real and quantifiable reduction in carbon emissions which will occur through the production of renewable fuels as a replacement for fossil fuels. Finally, and most importantly, the non-quantifiable but vital contributions which this research and demonstration project can make towards world knowledge and use of non-fossil fuel energy sources.

You are required by law and rule to rigorously explore and objectively evaluate alternatives. I request that, as part of your decision making rationale, you specify, quantify and evaluate these 3 impacts for the "effluent to energy" (biomass research) alternative vis-a-vis other alternatives.

You may wish to consider recommending the use of either the east or the west Forest Service sites, but not both. This would reduce the Forest Service net acreage from 1,000 acres to 500 acres, enough to support an adequate research effort. This reduction in size, together with the mitigating measures suggested in the original alternative, should make this proposal acceptable to moderates on all sides of the issue.

The USEPA's February 1989 draft report to Congress POLICY OPTIONS FOR STABILIZING GLOBAL CLIMATE points out the critical need for research in energy biomass production, which is projected to be a key factor in global climate stabilization. In preparing the the EIS for the Tallahassee Wastewater system, Region IV can demonstrate that the USEPA means what it has been saying about the seriousness of the Global Warming threat. You have the opportunity to choose a resource management alternative on the basis of long-term, global issues rather than on short-term, local issues. Your decision will have far reaching consequences. We await it with interest.

Very truly yours,

W.V. McConnell

enclosures

cc City Commissioners
City of Tallahassee, Water and Sewer Dept.
U.S. Forest Service, N.Fs in Florida
Chief, U.S. Forest Service
USEPA Office of Policy, Planning and Evaluation
USDOE Office of Policy, Planning and Analysis
Miss. Forestry Commission
Florida Forestry Association
National Wood Energy Association
DOE (Oak Ridge Nat'l Laboratory)
Southeastern Region Biomass Energy Program (TVA)
Institute for Food and Agriculatural Sciences, (U of Fl)
Dr. Andre Clewell

THE EFFLUENT TO ENERGY ALTERNATIVE

A CONCEPT PROPOSAL
FOR
DEVELOPMENT OF AN ENERGY FARM
USING EFFLUENT FROM THE TALLAHASSEE WASTEWATER TREATMENT SYSTEM

INTRODUCTION

The US Environmental Protection Agency (USEPA) is preparing an Environmental Impact Statement (EIS) Supplement covering the proposed expansion of the City of Tallahassee's wastewater management system. A preliminary document, the Alternatives Report, transmitted by letter from EPA dated July 17, 1989, identifies 9 system alternatives which involve various combinations of wastewater conveyance, treatment, effluent conveyance and disposal. The discussion that follows explores the "Effluent to Energy" alternative, a specification and refinement of Alternative SS5 (Southwest Forest Spray Irrigation) shown on page D-11 of that report. In this alternative, 5.0 MGD of effluent from the T.P. Smith plant is used for forest spray irrigation on land now owned by the U.S. Forest Service and located south and west of the plant. In the energy production mode, as discussed below, the effluent is used to irrigate and fertilize hardwood trees grown under intensive management for energy purposes. EPA reviewers should note that the design and management measures suggested below for this system do not coincide with those shown under D-1, Page C-8 of the Alternatives Report.

"Energy-wood Production Using Sewage Effluent: A Wastewater Management Option for Florida" (attached) outlines the principles of, and rationale for, such use. The following discussion considers The application of these principles to the Tallahassee situation as conditioned by managerial and environmental considerations. It suggests action which is responsive to immediate community needs and current environmental interests. More importantly, it responds to long-term societal needs and to emerging issues that are of national and global concern. The most important of these issues (global warming and fossil fuel depletion) were not considered in the screening process used to evaluate alternatives in Table D-2 of the Alternatives Report.

THE PROPOSAL

The Effluent to Energy alternative proposes that the U.S. Forest Service, in cooperation with the City of Tallahassee install and manage an operational energy-wood farm irrigated and fertilized with sewage effluent. The farm will serve as a research/demonstration/education center focussing on the environmentally sound production of effluent-based woody energy biomass as a part of a larger multi-resource management system.

The principal features of this system will be:

AREA

1. A gross areas of about 2300 acres, with about 800 - 1000 acres under intensive energy production.

PLANNING AND OPERATION

1. To insure a high level of environmental coordination, overall planning for the project will be accomplished by an interdisciplinary team which will include an ecologist, an engineer and a forester. Other specialists (e.g. wildlife biologist, hydrologist, landscape architect, soil scientist) will contribute as required.

2. To insure management continuity and expertise, maintain proper program direction and control and to increase the probability of funding, all land will remain in Forest Service ownership. Land and resource management will be by the Forest Service. Effluent delivery and management (including water quality monitoring and EPA and Florida Department of Environmental Regulation compliance) will be by the City of Tallahassee.

3. The research effort will be under the overall direction of the USDA Southeastern Forest Experiment Station. The goal will be to participate fully with interested educational, governmental and industrial agencies in R & D projects concerned with biomass management and energy production, resource coordination, water and effluent management, and related matters.

4. The environmental community will participate in planning this project and in the the conception and design of programs for research and management.

RESOURCE COORDINATION

1. All lands currently in longleaf pine will be retained in longleaf pine. Only lands now occupied by off-site slash pine plantations will be managed for energy-wood production.

2. As part of the multi-resource management program, all undisturbed lands within the project and suitable to long-leaf pine production will be restored to that forest type.

3. Lands adjacent to water bodies, or in hammock hardwoods or in southern scrub oaks needed for wild-life or other resource coordination will be retained and managed for the the appropriate resource.

4. Appropriate mitigation measures will be taken to minimized adverse impacts on threatened and endangered species.

5. The effluent distribution system and plantation management will be adapted to the existing topography. No modification of the present land form will be needed.

6. To protect property values, effluent will not be applied within 1000 feet of private land.

An examination of F.S. records and a preliminary field examination of the candidate areas indicate that the area and distribution of soils, timber stand condition classes and vegetation cover lend themselves well to the resource coordination strategy described above.

ANALYSIS

Many factors including soil suitability, location and system cost influence the choice of an effluent disposal site. Increasingly, environmental and social factors play a major role in the decision. This paper does not compare alternatives nor does it deal with cost considerations. Rather, it deals with the characteristics of a single alternative with attention to how well that alternative addresses certain environmental and social issues.

We suggest the following set of these issues, ranked in approximate order of importance, as being pertinent to decision making with respect to the Tallahassee Energy Farm. Under each issue we discuss how well the Effluent to Energy alternative responds to that iss'"

LONG TERM/MAJOR

GLOBAL

- Global warming, the world carbon budget
- Energy management, fossil fuel depletion

The Feb. 1989 EPA draft report to congress "Policy Options for Stabilizing Global Climate" outlined the changes in world climate which are exected in the absence of drastic modification of our energy use habits and of our management of the global ecosystem. This issue is emerging as the over-riding environmental concern of the next century. The EPA projects that a major component of climate stabilization will be the establishment of 380 million hectares of energy-biomass plantations worldwide. The report points out the critical need for research in non-fossil fuel technology including technologies for producing and utilizing biomass.

The alternative responds directly to the research needs highlighted in the EPA report. Additionally, the 18,000 tons of energy-wood produced annually by the project will replace approximately 19,000 barrels of oil and reduce annual carbon emssions by 2,000 tons (Marland, 1989).

REGIONAL

- Air and Water quality considerations (acid rain, ground and surfacewater protection).
- Waste reclamation and re-use.

Wood fuel produces little NOx and SOx emissions and particulate emission is readily controlled by current technology (Fl. DER 1981). While an intermittant odor problem occurs at the treatment plant, no such problem has been reported at the existing effluent field on Tram Road. Nearly 20 years of effluent application at the existing Tallahassee effluent field, which uses field crops and grasses on similar soils, has produced no change in groundwater except a slight increase in nitrate and chloride concentrations (Dean, 1989). The expected higher nutrient uptake rate of trees as compared with grasses and crops, coupled with the lower application rates, should reduce even this minor impact. Surfacewater protection will be provided by lake side zoning.

LOCAL

- Endangered species habitat, the longleaf-wiregrass community
- Life quality of local residents
- Soil fertility
- Ecosystem diversity

The project will result in the loss of 1,000 acres of dry sand-hill soil, potential habitat for the gopher tortoise (a species of concern) and indigo snake (threatened). The present population of these species within the slash pine plantations scheduled for management is not known. About 42,000 acres of sand-hills occur within the Apalachicola N.F. (Soil Survey, A.N.F.) and several million acres occur in the southeastern U.S. No other threatened or endangered species are known to occur within the area to be intensively managed.

As a part of the total resource management proposed for this area the existing potential longleaf sites will be restored to productivity and the feasibility of increasing the wiregrass component will be determined.

Life quality of local inhabitats will be protected by application restrictions near private land.

The areas proposed for intensive management on this high stress xeric site have been drastically modified by past management and are of low productivity for both consumptive and non-consumptive uses. The suggested use, along with the restorative management proposed for the non-intensively managed areas, will greatly increase the effective soil fertility, site productivity and bio-diversity of the tract.

SHORT TERM/MINOR

- Impact on local economy and employment
- Impacts on production of conventional forest products, esthetics, consumptive and non-consumptive non-threatened wildlife, recreational and cultural values.
- Effect on local private property values.

Because of low soil fertility the project area has low productivity for all resources and makes minimal contribution to the local economy. The increased wood production from restored longleaf sites, project generated employment and increased biodiversity will result in substantial increase in the production of all resources.

With the restricted area of application the project will have no impact on private property values.

CONCLUSIONS

The project, combining as it does wastewater renovation with short rotation intensive culture management, will have application throughout Florida, the southeast and nationwide. As populations grow and environmental awareness increases, there will be fewer and fewer "out-of-sight" places to receive society's waste. The social and political problems which Tallahassee has experienced with respect to effluent disposal are being repeated again and again in other areas. This project will suggest ways to avoid these problems in the future.

The action suggested in this concept proposal responds to the issues which have been raised in the public hearings. The alternative offers high long-term social and environmental benefits . Its greatest value, of course, lies in its potential for contributing, through research, demonstration and education, to the store of information regarding climate stabilization and the production and use of re-newable energy.

We would expect that, should the Effluent to Energy alternative be selected as preferred, comments and suggestions by interested parties, as a part of the planning process, would refine and greatly enhance the usefulness of the raw concept as it has been presented above.

August 07, 1989

W.V. McConnell
Land Management Planner/Forester
1023 San Luis Road
Tallahassee, Florida 32304
(904) 576-7774

REFERENCES

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THE VOICE OF FORESTRY

SUITE 201
620 NORTH STATE STREET
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MISSISSIPPI FORESTRY ASSOCIATION

August 18, 1989

Dr. Cory W. Berish
Project Monitor
Environmental Policy Section
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Dr. Berish:

As a former resident of Tallahassee, Florida, from 1983 to 1988, and a national forest recreational user, I am pleased to support the proposal for an energy wood farm irrigated with sewage effluent. As a demonstration, such a project would be very useful to many small cities in the southeastern United States which are seeking low-energy and less expensive alternatives to conventional sewage treatment. The results would certainly be useful to communities in Mississippi.

The energy wood component is especially exciting because of the proximity of the site to the Arvah B. Hopkins Generating Station, a city utility power plant which is scheduled to convert to coal. This proposed fluidized bed facility may receive funds from the Federal Clean Coal Technology Program. If the coal conversion goes forward, the city would still be able to demonstrate its commitment to global warming mitigation by burning a few megawatts of wood in the same facility. The hauling distance for wood chips from the energy farm to the generating station would be five miles or less. Even if the Hopkins station did not become an option for the wood fuel, other good energy wood markets currently exist in the Florida Panhandle.

This project would also be a good opportunity for the Forest Service to demonstrate its commitment to reducing the problem of global warming. Short rotation forestry offers the opportunity to store and recycle more carbon than simple tree planting programs. Further, every megawatt of renewable energy used offsets energy that would have been provided by fossil fuel, providing a net benefit in reducing the atmospheric carbon burden.

It should be pointed out that energy wood harvesting is already occurring in conjunction with conventional timber harvests on the Apalachicola National Forest. Intensive management of a little more than a square mile of land would have minimal impact on a portion of the national forest that is already disturbed by a busy airport and existing sewage irrigation of agricultural crops on adjacent lands.

The energy wood plantations would replace slash pine plantations which are not appropriate for the sand hill topography of this area. The appropriate plant community for this area would have been a longleaf pine-wiregrass association; however site preparation for the slash pine destroyed the wiregrass and it would be difficult to restore the natural plant community. Thus, energy wood plantations are an ideal opportunity to restore these national forest lands to a productive use while meeting the needs of society for waste treatment, energy production, global environmental protection, wildlife habitat, and open space.

I strongly support this proposal and hope that it can be implemented soon.

Sincerely,

Harold M. Draper

Harold M. Draper, D.Sc.
Biomass Energy Coordinator
(601) 961-4733

copy: Grey F. Reynolds

FLORIDA FORESTRY ASSOCIATION

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H. Wyndell Sapp, President

Wm. Carroll Lamb, Executive Vice President

October 3, 1989

Dr. Cory W. Berish
Environmental Policy Section
U. S. EPA Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Dear Dr. Berish:

This letter is to endorse the "effluent to energy" strategy which W. V. McConnell has proposed for the disposal field of the expanded Tallahassee sewage system. The Florida Forestry Association represents the forest industries and forest landowners in our state. Private commercial forestland comprises 36% of the total land area in Florida and 83% of the total commercial forest acreage.

The Association endorses this proposal for a number of reasons. The principal one is the realization that the replacement of fossil fuels with renewables will be of vital importance to any national policy of climate stabilization. We foresee the information generated by the proposed research and demonstration area will have very significant long-term benefits for the nation, and indeed, for the world.

Also, we suggest the concept be expanded to include non-effluent-based energy-wood production. A southeastern regional energy-wood research and development center, under the sponsorship of the U. S. Forest Service using National Forest land, could provide the setting for vital on-going research. The research, combined with operational testing, could bring energy-wood production onto commercial forest lands of the South as well.

We understand the U. S. Forest Service is now in the process of formulating an energy policy for National Forest lands. Forest industry has a keen interest in this policy and we would be pleased to offer comments on it as it is developed. By copy of this letter, we're asking the Forest Service to keep us posted on their progress in this regard.

Certainly, the proposed "effluent to energy" research farm would be a logical early step in the U. S. Forest Service's move towards providing leadership in energy wood research and, ultimately, providing its share of the nation's renewable fuels.

Sincerely,

Wm. Carroll Lamb

Wm. Carroll Lamb, CAE
Executive Vice President

WCL:mlj

cc: Grey F. Reynolds, USFS
Dave Rinebolt, NWEA

bc: Bob Jacobs, USFS, Tallahassee
W. V. "Mac" McConnell

NWEA NATIONAL WOOD ENERGY ASSOCIATION

Suite 610 • 1730 North Lynn Street • Arlington, VA 22209-2009 • (703) 524-61

August 21, 1989

Dr. Cory W. Berish
Project Monitor
Environmental Policy Section
U.S. EPA, Region IV
345 Courtland St., NE
Atlanta, GA 30365

Dear Dr. Berish:

I am writing on behalf of the National Wood Energy Association to endorse the proposal of Mr. W.V. McConnell to establish a Tallahassee Energy Farm which would demonstrate the use of sewage effluent to irrigate and fertilize intensively cultivated hardwood trees for energy purposes.

The National Wood Energy Association is the national trade association for the commercial/industrial wood energy industry. Our members include developers, equipment manufacturers, foresters, engineers, woodlot owners and other involved in the production of energy from biomass resources.

NWEA believes that the proposal advanced by Mr. McConnell is worth developing and funding for a variety of reasons. The first pressing need is to demonstrate and conduct additional research on the disposal of effluent by using it as fertilizer and irrigation agent for intensively cultivated hardwood trees. Effluent disposal has been and will continue to be a major issue issue. Previous research has indicated the positive benefits of using effluent in conjunction with the production of short rotation trees. NWEA believes that a project such as this would demonstrate the environmental benefits of this disposal option.

A second justification involves the ongoing research on short rotation forestry. This type of forestry involves the intensive management of highly productive, monocultural timber stands. This type of forestry is being developed by both the U.S. Department of Energy and the USDA Forest Service. While the end product can be used for wood pulp or other traditional end uses, the focus of current research is on the production of wood biomass for energy purposes. The primary advantages of using wood fuel are the elimination of SO2 emissions, the limitation of NOX emissions and the mitigation of CO2 emissions through producing energy feedstocks on a sustainable yield basis.

One of the issues involved in short rotation forestry is providing sufficient nutrient levels for intensive growth. Sewage effluent shows tremendous promise as a nutrient source.

Thus, Mr. McConnell's proposal offers a 'twofer' - a demonstration of a technique to dispose of effluent and a demonstration of the impact of sewage effluent as a fertilizer for short rotation stands. Since both U.S.EPA and U.S. DOE are looking at short rotation woody biomass as a replacement for environmentally damaging fossil fuels, this proposal is consistent with research efforts at both agencies. The emergence of concerns over global warming should serve to underline the appropriateness of this project.

NWEA offers its unqualified support for the Tallahassee Energy Farm proposal. If we can provide any additional information please feel free to contact our office. NWEA would be happy to do anything possible to facilitate this research/demonstration project.

Sincerely,

David C. Rinebolt

David C. Rinebolt
Director of Research

encl

cc: Grey Reynolds/USFS
Earle Gavett/USDA
John Ferrell/USDOE
Rep. Bill Grant
Sen. Bob Graham
Sen. Connie Mack

OAK RIDGE NATIONAL LABORATORY
OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC

POST OFFICE BOX 2008
OAK RIDGE, TENNESSEE 37831-6352

September 7, 1989

Cory W. Berish, Ph.D.
Project Monitor
Environmental Policy Section
U.S. EPA, Region IV
345 Courtland St., N.E.
Atlanta, Georgia 30365

Dear Dr. Berish:

I am writing this letter in regard to the proposal recently submitted to you by W. V. McConnell of Tallahassee, Florida. His proposal that the U.S. Forest Service and the city of Tallahassee install and manage an operational energy-wood farm irrigated and fertilized with sewage effluent addresses a significant topic that needs more attention. I wish to comment on the concepts of the proposal only. Soil scientists and foresters in the Tallahassee regions should be consulted on specific aspects of the proposal such as whether the site proposed is suitable.

The technology of short-rotation intensive culture of hardwood trees has advanced sufficiently to assure that wood energy plantations can be successful with appropriate application of the technology. But under conditions of low fossil fuel costs, short rotation woody crop plantations are not likely to be established by the private sector unless multiple market opportunities or incentives are present to reduce risks. The environmental and economic advantages potentially offered by disposing of wastewater effluents on land that is also producing wood for energy appears to have the necessary elements to attract private sector investment. This is demonstrated by the fact that several municipalities along the eastern coast of the United States have expressed interest in establishing short-rotation trees in sewage effluent fields. However, in most cases the municipalities are looking for government funding to support the projects. The establishment of one or two large demonstration sites of the type proposed by McConnell could go a long way towards demonstrating that wastewater application to short-rotation plantations is economically and environmentally viable.

Previous research funded or co-funded by the Short Rotation Woody Crops Program and other research agencies has indicated the positive benefits to tree growth of applying wastewater to short-rotation plantation. Results after one year of application of wastewater on a sycamore and sweetgum plantation in Edenton, North Carolina, appear to be quite positive. But, to my knowledge, guidelines have not been developed for optimizing wastewater applications to maximize tree growth while ensuring that surface runoff or nitrate leaching to groundwaters does not occur. Thus a research component to the project would be necessary. The proposal recognizes this by its recommendation of the diverse team of specialists that would be required for implementation of the project and by including the USDA Forest Service as the coordinator of the research effort.

To meet the goal of the project as a "research/demonstration/education center focusing on the environmentally sound production of effluent-based woody energy biomass," it must be managed such that protection of the environmental integrity of the area is given highest priority. The proposer appears to recognize this.

The size of the project is much larger than is needed for research or demonstration purposes alone. It is not clear whether the size is dictated by the land area needed by the city of Tallahassee for wastewater treatment or by the size of a planned market for the wood. The project would certainly have greater value if an energy market for the wood were available. If the site is established as a short-rotation plantation, the trees must be harvested at appropriate intervals to maintain the vitality and high nutrient uptake capability of the stand. Failure to use this wood for production of energy would reduce the positive "global" benefits of this project.

The projected annual tonnage of energy wood projected to be produced (18,000) is extremely optimistic if that is to be produced on the 800 to 1000 acres under intensive culture. An exciting aspect of this type of project, however, is that such wood production yields might be obtainable since wastewater effluent application can provide an optimum growth environment. However, best available plant materials and intensive culture techniques would need to be used to attain such high yields even with the fertilization benefits offered by the wastewater.

The Department of Energy's Short Rotation Woody Crops Program (SRWCP) recognizes the need for gaining a greater understanding of how to optimally manage short-rotation plantations that are irrigated and fertilized with sewage effluents. It is not the mission of the SRWCP to support demonstration trials, thus any interest the program might have in this specific project would be limited strictly to research components of the project. Requests for proposals in this general area might be issued in 1991 or 1992 if programmatic funding levels are increased by more than double over present funding levels. Other higher program priorities, such as genetic improvement of hardwood trees for higher yields and pest resistance prohibit our initiation of work in this area at current funding levels.

In summary, I believe that the concept of establishing a large short-rotation woody crop plantation using sewage effluent for irrigation and fertilization for demonstration purposes has considerable merit. Such a project requires great sensitivity to environmental issues which the proposal appears to reflect. The project would require a research component to ensure that best procedures are followed for protecting the environment as well as to determine optimum management for growing the wood. Such a research component might address a research need recognized by DOE's Short Rotation Woody Crops Program which the program is currently unable to support. I recommend that the Environmental Protection Agency seriously consider this proposal provided that local experts and the USDA Forest Service agree that the site proposed is suitable.

Sincerely,

Lynn Wright

Lynn L. Wright, Field Manager
Short Rotation Woody Crops Program
615/574-7378 (FTS 624-7378)

LLW:plh

cc: J. E. Ferrell, USDOE-SRWCP Manager
W. V. McConnell, Land Management Planner
Grey F. Reynolds, USDA Forest Service

NFDC

Tennessee Valley Authority
National Fertilizer Development Center

Muscle Shoals, Alabama 35660
(205) 386-2601
Telex No. 797658

August 28, 1989

Dr. Cory W. Berish
Project Monitor
Environmental Policy Section
U.S. EPA, Region IV
345 Courtland St., NE.
Atlanta, Georgia 30365

Dear Dr. Berish:

The purpose of this letter is to voice my personal support for the "Development of an Energy Farm Using Effluent from the Tallahassee Wastewater Treatment System" as proposed by W. V. McConnell of Tallahassee, Florida, at the EPA Tallahassee public hearing on August 15, 1989. My current position is manager of the DOE Southeastern Regional Biomass Energy Program (SERBEP). SERBEP covers 13 States in the Southeast, including Florida.

The proposed project touches on several important issues facing our Nation and local communities including protection of water quality and waste disposal. The proposed technology would not only demonstrate a technology with numerous environmental benefits, but also through the associated research, refine and add to the body of available technical knowledge on these systems. Demonstration and more experience would expedite the application and use of this beneficial technology. The net result would thus not only benefit the citizens of Tallahassee, but improve the quality of life of citizens throughout our Nation.

Part of the new Forest Service energy plan is to promote the use of National Forests for wood fuel purposes. There are presently several markets for wood fuel in the region. The city of Tallahassee is currently negotiating with DOE for a "Clean Coal Technology" grant to replace its 250 MW electric oil and gas fired power plant with a coal-fired boiler. Wood fuel could be used to supplement the coal and reduce acid emissions. The use of wood fuels, by virtue of carbon recycling, would also reduce atmospheric buildup of CO_2 and hence reduce the greenhouse effect. Other wood fuel users such as Proctor & Gamble at Perry; St. Joe Paper Co. at Port St. Joe; and the Panama City Resource Management Center; are in the vicinity. Because of its numerous environmental and economic advantages, the use of wood fuels will continue to grow in the future.

In summary, the project is well planned and provides an excellent opportunity to EPA and the USFS to serve the citizens and taxpayers of this country. There are times when government must take the lead in technology development. I believe the project is one such example and believe any publicity would be positive and beneficial to EPA and the USFS.

Because of this belief, we will support this project in any way possible and encourage you to do likewise.

Please let us know if we can provide you additional information or assist you in any way with this project.

Sincerely,

Phillip C. Badger, Manager
Southeastern Regional Biomass
Energy Program

cc: Dr. Gray F. Reynolds
Forest Service - USDA
WSA, Room 1210 RDE
P.O. Box 96090
Washington, D.C. 20090-6090

bc: Mr. W. V. McConnell
Land Management Planner/Forester
1023 San Luis Road
Tallahassee, Florida 32304

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August 21, 1989

Dr. Cory W. Berish
Project Monitor
Environmental Policy Section
US EPA, Region IV
345 Courtland St., NE
Atlanta, GA 30365

Dear Dr. Berish:

I have reviewed the proposal "The Effluent to Energy Alternative" for Tallahassee, Florida prepared by W.V. McConnell. This is to indicate that I believe this to be a sound concept whose time for application has arrived. There are so many benefits to the proposed project that it has to be considered seriously.

Because I did the early work on effluent irrigation in Tallahassee that showed the responsiveness of hardwoods to effluent; have performed research since then on energy wood plantations; and managed a comprehensive bioenergy program, I recognize the technical feasibility of the project. As an environmentally concerned citizen, I also recognize that the project is an environmentally benign way of dealing with serious pollutants.

My only criticism of the proposal is that it did not go far enough. It would be more comprehensive if landspreading of composted waste in forest sites were also included. Many believe composting yard trash, if not all the biologically degradable fraction of MSW, is the method of choice for solid organic waste reduction and landspreading on forest sites as the most acceptable terminal recycling step. There is evidence for this in the enclosed paper recently accepted for publication in the Journal of Environmental Quality. While this dimension was not included I see no reason why the concept could not be expanded to include this option also.

As Director of the Biomass Center and Coordinator of this institute's solid waste program, I would be pleased to cooperate with the US Forest Service, EPA, and others dedicated to supporting this project and making it successful.

Sincerely,

Wayne H. Smith

Wayne H. Smith
Director and Professor

WHS:LS8\Berish

Enclosure: Growth and Elemental Content of Slash Pine 16 Years After Treatment With Garbage Composted With Sewage Sludge.

A.F. Clewell, Inc.
Botany, Ecology, Wetland Science, Vegetational Restoration

1447 Tallevast Road
Sarasota, Florida 34243
(813) 355-5065

September 24, 1989

Dr. Cory W. Berish
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, GA 30365

RE: W.V. McConnell Proposal: Energy Farm Using Effluent From The Tallahassee Wastewater Treatment System

Dear Dr. Berish:

I have reviewed a copy of this proposal. I understand that it was formally presented at a public hearing in Tallahassee on August 15 and that you are the Project Monitor.

I would like to point out two features in favor of this proposal. First, it is my understanding that hardwoods are far more efficient than grasses and rowcrops for removing nutrients from wastewater in land spreading facilities. Herbaceous cover has two other drawbacks, relative to tree cover: Municipalities sometimes have difficulty harvesting and disposing of herbaceous material, and frequent harvesting compacts the soil to the point that infiltration is poor. My source of information was the Hardwood Research Cooperative at N.C. State University, Raleigh. You could call Dr. Russ Lea for more details at 919-737-3674.

Second, effluent from Tallahassee's waste treatment facilities is presently polluting Lake Munson with excessive nutrients. There is reasonably good evidence that groundwater discharge from the lake is causing eutrophication in aquifers and springs, which are part of the Wakulla Springs system. If McConnell's proposal alleviates that problem, it would be well worth implementation.

I am not ecstatic about the prospect of dumping effluent in national forests. Nonetheless, McConnell's proposal carefully specifies the use of lands that have already been ruined ecologically by tree farming. Further, he proposes the restoration of certain lands to their original cover of longleaf pine--a definite plus.

I urge you to consider carefully the points I have raised with regard to nutrient uptake efficiency and the potential benefit to the Lake Munson system. If indeed my contentions are upheld, EPA and other interested agencies should seriously consider issuing permits for this project.

Sincerely,

Andre F. Clewell

Andre F. Clewell, Ph.D.

COPY: G. F. Reynolds
U.S. Forest Service

P.S.: I authored the 1971 report, THE VEGETATION OF THE APALACHICOLA NATIONAL FOREST, AN ECOLOGICAL PERSPECTIVE.

Natural Areas Journal

Volume 9, Number 4

Rare Vascular Plant Taxa Associated with Wiregrass

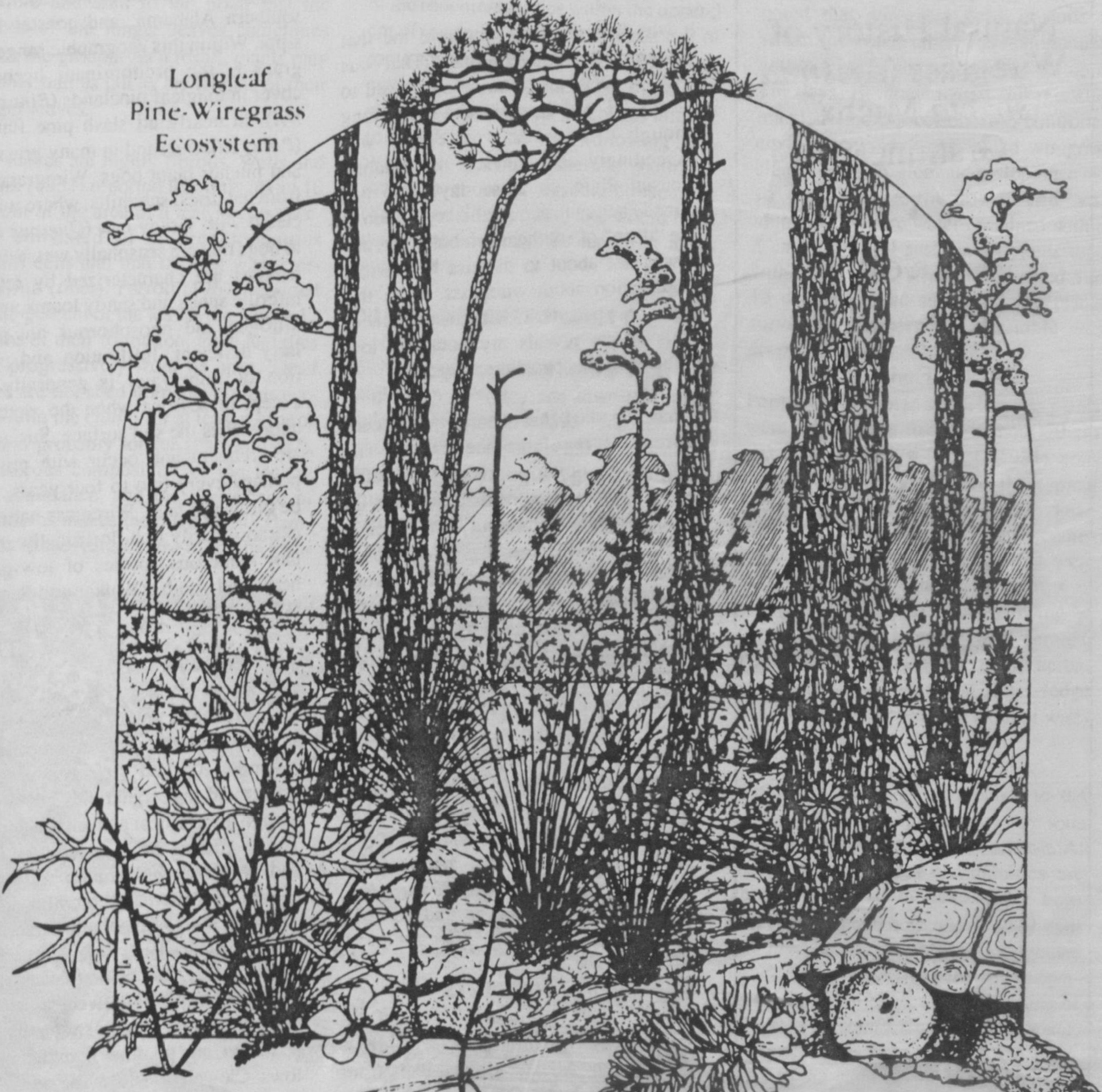
Natural History of Wiregrass

Is It Wiregrass?

Longleaf Pine Communities of the West Gulf Coastal Plain

October 1989

Longleaf
Pine-Wiregrass
Ecosystem



A QUARTERLY PUBLICATION OF T NATURAL AREAS ASSOCIATION

Natural History of Wiregrass (*Aristida stricta* Michx., Gramineae)

Andre F. Clewell

A. F. Clewell, Inc.
1447 Tallevast Road
Sarasota, Florida 34243

ABSTRACT: Wiregrass (*Aristida stricta*) is the principal fuel for the frequent fires that are necessary to maintain longleaf pinelands, slash pine flatwoods, and associated bogs in much of the Atlantic Coastal Plain. Wiregrass regulates the structure and floristic composition of these ecosystems, largely through its propensity to carry fires. Wiregrass has an exceptionally low reproductive capacity, and common land management practices that destroy wiregrass are threatening the integrity of wiregrass ecosystems. The life history wiregrass is presented, along with characterizations of its vegetative condition, population structure, and habitats.

INTRODUCTION

It was Bob Godfrey who told me that wiregrass did not reproduce. That was back in 1962, just after I had moved to Florida. I had been in the field long enough to know that wiregrass was exceedingly abundant on the Atlantic Coastal Plain. In those days Bob had already begun to acquire his reputation as the "dean" of southeastern botanists, and I was not about to dismiss his curious observation about wiregrass. From that point on, I became a "wiregrass watcher." This article reveals my botanical love affair with this paradoxical species.

I have learned that wherever it occurs, wiregrass regulates the natural fire regime. In doing so, wiregrass determines species composition and thus the type of plant community in which it grows. In this article I will attempt to describe why wiregrass is such a pivotal species and will discuss the extent and consequences of its decline in response to recent land use activities. In spite of its importance, wiregrass has been largely ignored as a focus of ecological study. Much of the pertinent literature comes from older papers, and most of our autecological knowledge of the species resides in an admirable but unpublished master's thesis by Roger Parrott (1967). To a large extent, this article pulls together the scattered story of wiregrass, based on extant literature and personal observations.

RANGE AND HABITATS

Wiregrass, *Aristida stricta* Michx., occurs on the Atlantic Coastal Plain from southeastern North Carolina to the edge of the Florida Everglades and westward through the Florida panhandle, Georgia, southern Alabama, and coastal Mississippi. Within this geographic range, wiregrass is the predominant herbaceous cover in longleaf pinelands (*Pinus palustris*), in nearly all slash pine flatwoods (*Pinus elliottii*), and in many grass-sedge and pitcher plant bogs. Wiregrass grows from the driest sandhills, where it is associated with turkey oak (*Quercus laevis*), to bogs that are seasonally wet. Wiregrass habitats are characterized by relatively infertile sands and sandy loams, in which nitrogen and phosphorous are particularly deficient. Infiltration and percolation of rain water is generally rapid, except in seasons when the water table approaches the soil surface. Surface fires are frequent and occur with regularity, perhaps every two to four years, as will be discussed later. Wiregrass habitats are extraordinarily rich floristically and contain numerous species of low-growing herbs and shrubs (Walker and Peet 1983, Clewell 1986).

NOMENCLATURE

The vernacular name, wiregrass, is occasionally applied to two other grasses that resemble *Aristida stricta* in vegetative aspect and that sometimes grow with it, though generally at a much lower density. These grasses are *Sporobolus junceus* and *Muhlenbergia capillaris* (= *M. expansa*). An alternate common name for *Aristida stricta*, pineland three-awn, is used, particularly in U.S. Forest Service publications, and distinguishes *Aristida stricta* from the other two grasses. In this paper the name wiregrass applies only to *A. stricta*, and all other nomenclature follows Clewell (1985). The most recent taxonomic treatment of *Aristida* was prepared by Allred (1986).

HABIT

Wiregrass is a cespitose perennial bunch grass that arises from a clump that is up to about 15 cm across at the base (Figure 1). The flat, narrow blades are strongly involuted, so that they appear to be round in cross section, resembling fine wire. Hundreds of leaves may arise from a single plant (clump). The leaves often attain a length of 0.5 m. The leaves are stiff but flexible and arch to the point that the apices of the longer leaves sometimes touch the ground. As a result, plants may be only half as tall as the lengths of their longer leaves.

The leaves are highly fibrous. Wells and Shunk (1931) reported that only about 10 percent of the area of a leaf in cross section consisted of chlorenchymatous (green) cells and that the rest was sclerenchyma (fiber). Parrott (1967) reported that 85 percent of the leaves die within 12 months of their formation. Each leaf dies back progressively from its apex. Dead leaves are not shed immediately but persist within the clump for at least a year or two and probably longer (Parrott 1967). The fibrous composition of the leaves, their abundance, and the persistence of dead leaves makes the plant highly flammable. These features also make the plant unpalatable to grazing animals, except during the first six weeks or so of new growth following a fire, while all the leaves are still tender, nutritious, and alive. Wiregrass was found to be less digestible than some other forage grasses growing with it (Kalmbacher 1983).

The roots are wiry and often very dense. Parrott (1967) said that roots may reach a depth of 45 cm and that 55 to 60 percent of the root biomass lies within the upper 5 cm of the soil. The shallow, dense mat of roots appears to be effective in absorbing nutrients, including the flush of soluble nutrients from ash that percolates into the soil with the first rain following fire. Wiregrass roots are generally shallower than the roots of associated species (Wells and Shunk 1931) and would have the initial advantage in capturing these nutrients.

NUTRIENT SEASONALITY

Carbohydrate reserves in the roots are highest in February and lowest in mid-July (Woods et al. 1959). Nitrogen and phosphorous reserves in the roots decline sharply in September and gradually accumulate thereafter (Woods et al. 1959, Saterson and Vitousek 1984). The distribution of nutrients and other cellular constituents varies substantially among roots, leaves, and other plant parts according to the season (Kalmbacher 1983), suggesting a well regulated temporal translocation of materials within a single plant.

SOIL MOISTURE TOLERANCE

Wiregrass tolerates wet soils. During two years of observations, Parrott (1967) noted that wiregrass grew in soils in which the water table was continuously within 5 cm of the soil surface for up to 114 days. He documented soil moisture tolerance more precisely in a controlled environment. He transplanted wiregrass clumps into an elongated, sloping tank, so that soil in the lower end was immersed. Where water remained within 5 cm of the soil surface, all plants died within 200 days. Where it remained 5 to 13 cm below the surface, some plants survived. Where the water table was deeper, all plants survived.

Parrott (1967) noted that wiregrass plants were elevated on tussocks about 10 cm tall in wet sites. Clewell (1971) confirmed that tussocks were the typical growth form in grass-sedge bogs and that each tussock originated from an accumulation of earthworm castings that were deposited in the centers of clumps of wiregrass. Wiregrass roots growing in tussocks are presumably well aerated. Plants of nearly all of the many herbaceous species growing in grass-sedge bogs were rooted along the sides of wiregrass tussocks.

Wiregrass retains its dominance to the point on elevational gradients where soils are too wet for wiregrass to survive. At that point, wiregrass communities are abruptly replaced by grass-sedge bogs (e.g., pitcher plant bogs and, in south central Florida, by "cutthroats" dominated by *Panicum abscissum*) or more commonly by shrub bogs, often consisting of species of *Cliftonia*, *Cyrilla*, *Ilex*, *Lyonia*, or *Nyssa*. Fires burn through the wiregrass to the edge of shrub bogs but are unable to carry into them for lack of adequate fuel, except under unusually dry,

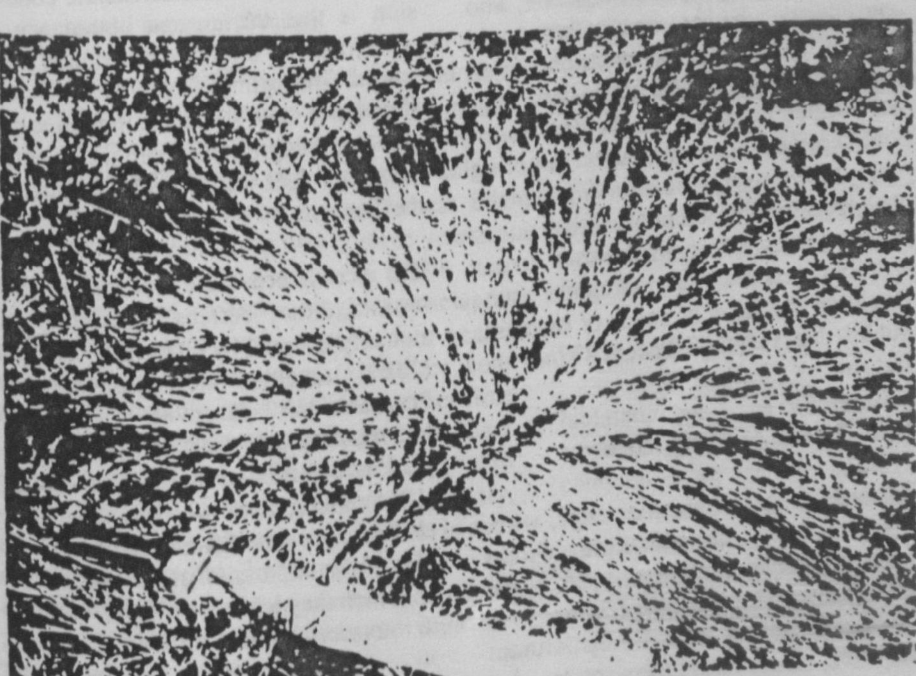


FIGURE 1. Large clump of wiregrass that has not been burned for at least two years.

windy conditions. The frequent fires in wiregrass communities prevent these shrubs from colonizing wiregrass habitats.

POPULATION DENSITY

A remarkable feature of wiregrass is that it is uniformly dense wherever it grows without disturbance. Wiregrass density was determined in 30 1-m^2 quadrats. Ten quadrats were in sandhill sites, 10 in flatwoods sites, and 10 in boggy sites (Clewell 1986). All sites were recently burned and lacked evidence of soil disturbance. The mean density per square meter of wiregrass was 5.3 clumps in sandhills, 4.6 clumps in flatwoods, and 4.8 clumps in bogs. The standard errors for these means were low, respectively 0.5, 0.7, and 1.2. There was no apparent relationship between wiregrass density and tree cover at these study sites.

Reconnaissance in numerous stands confirmed a density of about five plants/m^2 throughout the entire geographic range of wiregrass. These observations were limited to those stands that appeared to have sustained little if any soil disturbance, that appeared to have a long history of frequent surface fires, and that contained few or no dicotyledonous trees, including those growing as coppice sprouts. Exceptions were small oaks that ordinarily occupy sandhills (e.g., turkey oak, bluejack oak [*Quercus incana*], and sand-post oak [*Q. margaretta*]).

A departure from the natural fire regime allows brushy vegetation to mask the abundant wiregrass. Infrequently burned or lightly winter-burned pine flatwoods become overgrown by shrubs, especially saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), or fetterbush (*Lyonia lucida*). Production of wiregrass leaves diminishes, and after a decade or two of fire suppression, many clumps of wiregrass become dormant. After winter fire, the torpid wiregrass clumps rejuvenate and assume dominance at the expense of the top-killed shrubs. The shrubs gradually coppice-sprout from their roots. After summer fire, wiregrass not only recovers, but also many shrubs are entirely killed, as is being documented by personnel at Myakka River State Park, Florida (J. Huffman pers. comm.).

A density of about five clumps of wiregrass per square meter is maintained to the very edge of its geographic limit of distribution. For example, it reaches that limit in the longleaf pinelands of northwestern Escambia County, Florida (near Pensacola), where other grasses, especially slender bluestem (*Schizachyrium tenerum*), abruptly and entirely replace densely spaced clumps of wiregrass beneath these pines (Clewell 1986).

"Wiregrass watching" requires an exceptionally careful vigil for traces of past disturbance. Otherwise investigators may be lulled into thinking that sites with low densities or irregular distributions of wiregrass are "natural." Such sites consistently reveal subtle signs of past disturbance or prolonged fire suppression, such as unusual combinations of associated species, hardwood coppice-sprouts, or slight topographic irregularities caused by disturbance, such as scars caused by bushhogging.

Perhaps the biggest variable in determining wiregrass density is the observer, who must decide whether a small plant should be tallied independently or as part of an old clump that is in the process of fragmentation, as described below. Point-interception or point-quarter sampling relieve the observer from having to make that decision. These sampling techniques also obviate the considerable errors inherent in determining wiregrass abundance on the basis of cover or biomass, values that vary with recency since the last fire.

ORIGINAL ABUNDANCE

Throughout its geographic range, wiregrass is essentially ubiquitous within longleaf pinelands, slash pine flat ...ds, and associated grass-sedge bogs. It is often difficult to take a step without brushing against wiregrass, at least in relatively undisturbed and frequently burned "barrens," as these communities were called by early naturalists. We are fortunate to have large tracts of "pine barrens" that are preserved in national forests and other public lands. Virtually all of the old-growth pines were harvested and have been replaced by second-growth trees, but the original groundcover remains, and it is consistently dominated by wiregrass. From these tracts, the extent of original wiregrass lands is surmised.

We cannot be absolutely certain that wiregrass has always been as dominant as it is in the remaining "barrens." For example, differential grazing by cattle on the open range may have favored wiregrass at the expense of more palatable species. Nonetheless, large herbivores were abundant at the time of European colonization and would have asserted similar grazing pressures prior to the introduction of cattle. We do know that wiregrass has an exceedingly low reproductive potential and that successful reproduction is initiated by summer burning, as will be discussed below. It would be difficult to explain how wiregrass could have increased its density in historic times, when winter-burning has dominated. The most defensible conclusion is that the current abundance of wiregrass in undisturbed stands with natural fire regimes is similar to what its abundance once was in the indefinite past and that wiregrass has been the principal source of fuel for fires that maintained the "barrens."

Old records provide a feel for the vastness of these "barrens" that were presumably covered by wiregrass. Williams (1827) traversed the region between Pensacola and Jacksonville by horseback and reported that the pine barrens occupied two-thirds of the terrain. Smith (1884) wrote, "One who has never traveled through pine barrens can have little idea of the impression of utter desolation on which they leave the mind. Nothing is to be seen in any direction but tall, str... ...olumns of the pine, with here a... ...a pond or lakelet." Harper (1... ...lished that these pine barrens were frequently burned and that without fire the barrens are soon colonized by competitive hardwoods.

FIRE

The uniformly dense population structure of wiregrass assures that the arching leaves of each clump overlap the leaves of neighboring plants. In a clump that has not experienced fire for at least two years, the fibrous leaves are numerous, mostly dead, and persistent. It would be difficult to conceive of a better tinder. Wiregrass virtually "begs" to be ignited by a bolt of lightning or by embers falling from a smouldering, punky pine that was lightning-struck during a thunderstorm, which passed by hours earlier. Once ignited, the fire passes from one overlapping clump to another. High humidity, dew, or even light rain may retard the advance of fire without extinguishing it, particularly if augmented by a "needle drape" of resinous pine needles.

A fire spawned from a summer thunderstorm could continue burning indefinitely because of the constant source of fuel provided by wiregrass. Hundreds or thousands of hectares could have been burned from one lightning strike. Harper (1911) asserted that the average fire spread for several miles.

Chapman (1932) suggested a natural frequency of lightning-set fires of once every three or four years in longleaf pinelands prior to human occupancy. Wahlenberg (1946) proposed a pre-human fire frequency of every two or three years in longleaf pineland. Heyward (1939) said that until recently, longleaf pinelands burned once every three or four years. During the last century, most fires were intentionally ignited. Cattlemen set fires at various seasons to provide fresh young wiregrass and other herbaceous growth for cattle. During the present century, winter burning became prevalent. In contrast, natural, lightning-set fires were generally summer burns that corresponded with the thunderstorm season.

By removing leaf litter, fire prepares seed beds for longleaf pine, whose seeds require mineral soil for successful germination. Longleaf pine is extraordinarily fire-tolerant and is virtually the only tree within its geographic range that survives fire as a seedling. Wiregrass provides fuel for the frequent fires that prevent colonization by trees of other species, particularly overstory hardwoods. Longleaf pine is exceptionally competition-intolerant and cannot compete with these hardwoods (Wahlenberg 1946). Today, where wiregrass abundance has declined from land use activities, fires are less frequent or they burn less evenly. Trees of other species eventually overtake these sites at the expense of longleaf pines and wiregrass.

Within the geographic range of wiregrass, longleaf pine is dependent on wiregrass to carry the frequent fires needed to prepare seed beds and preclude competitive trees. Conversely, wiregrass persists indefinitely in treeless bogs and in pinelands from which longleaf pines were harvested decades earlier and have not returned. These observations demonstrate that longleaf pine is dependent on wiregrass, but wiregrass thrives without longleaf pine. Wiregrass is therefore more important ecologically than longleaf pine, wherever the two grow sympatrically. The longleaf pinelands are not really forest ecosystems, but are better considered as grasslands in which pines are incidently interspersed. This analysis extends to the south Florida slash pine (*Pinus elliottii* var. *densa*), which is the ecological equivalent of longleaf pine in southern peninsular Florida, where it replaces longleaf pine on all but the driest sites (Ketcham and Bethune 1963).

FIRE SUPPRESSION

Isolated clumps of wiregrass nestled among shrubs and young hardwoods are common in former pine barrens. These clumps appear stressed from shade and competition with their woody neighbors. They represent the merest remnants of a once continuous population of wiregrass. Indications of fire suppression are universal at such locations. The question is how long wiregrass can survive fire suppression. The answer is approximately two or four decades, depending on soil fertility and flammability of the site, as will be seen in the following three examples.

One remnant wiregrass colony was described by Clewell (1986). Sapling hardwoods containing 17 to 20 annual rings were growing beneath older longleaf pines. These hardwoods lacked charred bark and must have seeded into the site subsequent to the last fire. The hardwood undergrowth was fairly dense on the relatively fertile sandy loam soil. Wiregrass clumps displayed various degrees of torpor, and those growing in the deepest shade contained only a few living leaf blades. Brush and leaf litter had accumulated to a point that a fire would kill wiregrass by raising the temperature to a lethal degree within the superficial soil layer in which wiregrass is rooted.

At the Olustee Experimental Forest, Florida, fire was excluded from a longleaf pine flatwoods for 25 years. Saw-palmetto and gallberry overtook the undergrowth before hardwoods could become established. Foreman John Perry (pers. comm.) said that wiregrass was not evident beneath the rough of saw palmetto and gallberry. A few weeks after fire, though, wiregrass, sprouting from previously dormant tussocks, covered the site. In this instance, wiregrass was able to survive suppression and revive after fire. The infertility of the sandy soil may have prevented hardwood colonization and the accompanying fuel accumulation, thereby allowing wiregrass to survive the fire.

Beckwith (1967) reported no wiregrass in a longleaf pine woods from which fire had been excluded for 34 years. The relatively clayey soil promoted the rapid growth of understory hardwoods that presumably eliminated wiregrass.

COMPETITION

In frequently burned terrain, wiregrass gives every indication of being a highly competitive and successful, long-lived perennial species. The uniformly dense populations of wiregrass assure that the roots of each clump intermingle with roots of neighboring clumps. Wells and Shunk (1931) suggested that wiregrass roots exerted strong competition with other species. They wrote, "Anywhere in sandhills where weed vegetation has invaded old fields bordering wiregrass with bare areas between tussocks, no weeds appear, even during rainy seasons during which thousands of weeds sprout a few feet away on the old field." They suggested that there was competition for nutrients in that instance, but they also speculated that the competition might be for water in xeric sites. Woods (1957) provided confirmation by determining that lower soil horizons were drier than the upper soil horizons, in which wiregrass was rooted. Soil moisture from rainfall was mainly absorbed by the superficially rooted wiregrass, leaving relatively little moisture that could infiltrate deeper.

Woods (1958) also showed that wiregrass, rather than turkey oak, was responsible for the removal of water by transpiration from droughty sandhill soils. He noted that it took 15 rainless days for the soil moisture to drop from 8 percent (slightly above field capacity) to the wilting point (1.5 to 1.9 percent) in natural stands of longleaf pine-turkey oak-wiregrass. In a plot where the turkey oaks were deadened by herbicides, the same reduction in soil moisture also took 15 days, demonstrating that turkey oaks were inconsequential in removing water by transpiration. But on plots where at least half of the wiregrass had been removed by plowing furrows, it took 23 days for the soil moisture to reach the wilting point. This result showed that wiregrass effectively removed water from the soil by transpiration. Woods (1958) estimated that it would take 30 days for the soil to reach the wilting point if wiregrass were eliminated entirely. He continued, "On denuded areas, soil moisture in the first foot remained well above the wilting range even during the most extended droughts. This was true despite the fact that the moisture-retention capacity of the undisturbed plots was greater than that of the denuded plots, apparently because of the higher organic matter content."

One wonders how wiregrass survives on dry sandhills during prolonged drought. One possibility that lacks verification is that the copious leaf blades are constructed for the efficient collection of dew. Dew may accumulate within the hollow formed by the in-rolled leaf margins, and other dew droplets may roll down the arching leaves to the base of the clump where superficial, spongy roots absorb the moisture (Clewell 1986).

VEGETATIVE PROPAGATION

A small clump of wiregrass consists of a solid mass of many tillers, each consisting of a short stem bearing several leaves. As the clump expands in diameter, the central portion dies, making the clump doughnut-shaped (Figure 2). The soil of the central portion is peaty from the dead remains of roots and tillers. With continued expansion to a diameter of about 15 cm, the "doughnut" begins to fragment. Each fragment is now a small clump that has the potential to expand and form its own "doughnut."

Such growth represents the only mode of vegetative propagation in wiregrass. The rate of propagation was measured at St. Marks National Wildlife Refuge, Florida, in plots established in December 1977 by refuge personnel. Measurements of wiregrass growth were made in these plots in December 1979, and the data are on file at the refuge. Fourteen mature clumps of wiregrass ranged from 1.2 to 7.0 cm in diameter in 1977. In 1979, 13 surviving clumps had increased in diameter on an average of 39 percent.

From these measurements, we can make a rough estimate of the rate of vegetative growth. Assume that a fragment from a "doughnut" is 1.2 cm in diameter, that this fragment increases in diameter by 39 percent every two years, and that it grows to become a "doughnut" 15 cm in diameter—the size at which fragmentation begins anew. That process will be completed in 15 years. Although these assumptions need verification, it is obvious that the rate of vegetative propagation for wiregrass is nominal and nearly negligible.

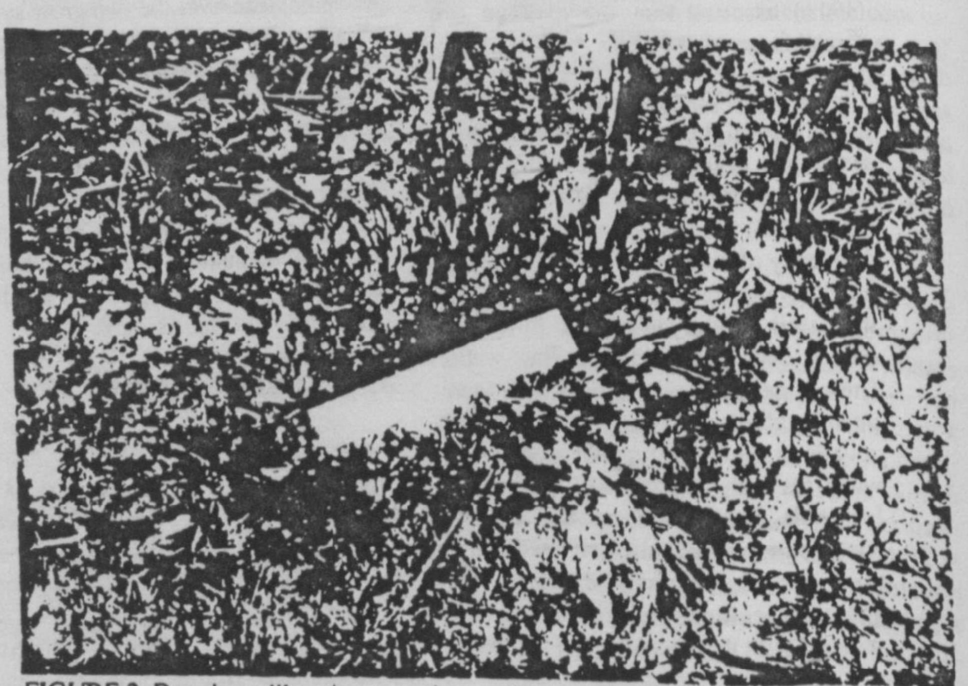


FIGURE 2. Doughnut-like wiregrass clump with leaves removed to show tillers arising in near its periphery. Ruler is 15 cm long.

FLORAL INDUCTION

Wiregrass commonly produces inflorescences following fire, especially fire in summer (Abrahamson 1984). Parrott (1967) noted that inflorescences were also produced following defoliation and minor soil disturbance. Defoliation under natural conditions could be caused by grazing, but the probability is low that a grazing animal would defoliate a fibrous plant of wiregrass with its many dead leaves. Grazing is common only after fire, which would have already stimulated floral induction. There is no natural mechanism for soil disturbance in wiregrass lands, as will be discussed below. Fire remains as the only natural agent that could cause frequent and widespread floral induction.

Anthesis occurs no longer than nine months following fire, defoliation, or disturbance, usually much sooner. The flowers are rarely perfect and almost never produce seeds. Parrott (1967) performed a number of experiments involving floral induction with conflicting results. His data suggested that temperature and photoperiod must be satisfactory if perfect flowers and seeds are produced. The details are complicated by the unequal responses of plants from different geographic areas, suggesting genetic differences. He never observed perfect flowers at his study sites on the Caloosa range in southern Florida, except once following a fire in July and again following defoliation in September. No seeds were produced, though.

SEED PRODUCTION

Floristic manuals lack descriptions of wiregrass seeds, which suggests that seeds are rarely produced (Small 1933, Radford et al. 1968). I examined the many specimens of wiregrass in the herbaria of Florida State University and the Missouri Botanical Garden. None contained seeds.

To my knowledge, the only recorded occurrences of seeds are as follows. In 1955 Q. Kyle (Clewell 1971) observed wiregrass in the Apalachicola National Forest with the inflorescences bent over, presumably from the weight of seeds. Doves were numerous and may have been feeding on these seeds. The inflorescences were produced following an early summer fire. Parrott (1967) found seeds in several populations in North Carolina. Floral induction was stimulated by fires in several months, both summer and winter. In 1975 Bruce Means (pers. comm.) discovered seeds in Bay County, Florida, on a site that had been summer-burned. I germinated some of these seeds on moist filter paper. In 1977 seeds were collected by personnel at the St. Marks National Wildlife Refuge, Florida, following a summer fire. I collected seeds in 1977 at Torreya State Park, Florida, from a site that was summer-burned. All of those seeds, though, had been destroyed by a fungus whose black spores filled the cavity inside the seed coat. Steven P. Christman (pers. comm.) wrote, "I have found the seeds on a dozen or so occasions from Ochlockonee State Park [Florida] and St. Marks National Wildlife Refuge to Riverside Island in the Ocala NF. . . always in the autumn, and always following a summer fire." Christman sent me specimens with seeds that he collected in Putnam County, Florida, in 1984. All were filled with fungus similar to that from my collection at Torreya State Park.

SEED DESCRIPTION

The wiregrass seeds supplied to me by Bruce Means were translucent-brown in color and flinty in texture. They were 4.5 mm long and nearly cylindrical in shape. They were 0.4 mm wide at a point 1.5 mm from the base and tapered slightly towards either end. The seeds remain tightly enclosed by a three-awned lemma after disarticulation from the inflorescence. S. P. Christman (pers. comm.) observed that the degree of tortion of the awns varied with their moisture content and that alternate twisting and untwisting of these awns while in contact with the soil could serve to bury the seed. This mechanism seems likely and needs verification.

GERMINATION

Parrott (1967) ran several germination experiments. He found that germination occurred both in light and dark. At least 75 percent of the seeds placed in dry sand and exposed to a temperature of 120°C for 800 minutes germinated. Seeds placed in wet sand likewise germinated after exposure to a temperature of 100°C for 10 minutes, but the percentage of germination dropped sharply if either temperature or time of exposure were increased. It took 127 days for three-month-old seeds to germinate on moist filter paper, and the germination percentage ranged from 2 to 33 percent, depending on the population from which the seeds were obtained. One-year-old seeds germinated in 15 days, with the germination percentage ranging from 60 to 97 percent, depending on the population.

SEEDLINGS

I have been looking without success for wiregrass seedlings in natural populations since 1962. Woods (1959) said that wiregrass normally propagates vegetatively but will increase in abundance after seeds are produced following fire. He gave no documentation of this claim. I have asked many individuals if they had ever seen wiregrass reproducing in the field. None gave affirmative replies, and these individuals included botanists, ecologists, range specialists, wildlife specialists, foresters, Soil Conservation Service personnel, surveyors, anthropologists, and foremen at game plantations.

Finally, seedlings were observed following the aforementioned burn at St. Marks National Wildlife Refuge. At this site, all merchantable trees were clearcut and the remaining woody refuse was pushed into brush piles and ignited in July 1977. The fire escaped into a natural wiregrass population. Wiregrass flowered prodigiously in response to that fire and produced seeds in abundance (Figure 3). Most seeds were shed by December. Refuge biologists established six 1-m^2 plots. Three plots were undisturbed and contained mature clumps of wiregrass (the

FIGURE 3. Frank Zontek (left) and Joe White of St. Marks National Wildlife Refuge inspect wiregrass and associated species blooming prodigiously in November 1977, following fire in July.

same ones described previously), and three plots were disturbed and lacked wiregrass. Wiregrass seeds were harvested in December 1977 and scattered on each plot. In December 1979 the undisturbed plots contained 12 wiregrass plants that arose from seeds, and the disturbed plots contained 53 wiregrass plants. To my knowledge this is the only documentation of seedling production in the field. The data are unpublished and are on file at the refuge headquarters.

CRITERIA FOR SEXUAL REPRODUCTION

From the preceding discussion, it seems probable that sexual reproduction in wiregrass is dependent upon sequential criteria, all of which must be met.

(1) Summer fire (at least in Florida) that stimulates the production of inflorescences with perfect flowers.
(2) An unknown event that allows perfect flowers to produce viable seeds. This event could be a weather-dependent pollination system, or it might be related to the levels of nutrients or other cellular constituents and their distribution within the plant at the time of fire. The latter possibility, if correct, may be complicated by the fact that nutrient levels vary according to the length of time since the last fire (Christensen 1977).
(3) After-ripening of the seeds for most or all of a year. It is possible that after-ripening may be accelerated by heat from a subsequent fire, as suggested by Parrott's findings on the heat tolerance of the seeds.
(4) Midsummer temperatures at the time of germination.

This sequence of events would be expected only to occur in its entirety at irregular intervals. Even then, the seeds may be consumed by herbivores or destroyed by fungi.

POPULATION STABILITY

Wiregrass populations are remarkably stable and seem immune to disturbance. Soil disturbances, other than those of human instigation, are all but lacking in wiregrass habitats. Soils are exceptionally stable, held together in large part by the exceedingly dense, shallow mat of wiregrass roots. The wiregrass turf is seldom interrupted by tip-up mounds from wind-thrown trees. Relative to hardwood trees, overstory pines are not typically uprooted. Instead, their trunks break at or above the soil surface. Burrowing animals large enough to kill wiregrass are nearly absent, with the possible exception of gopher tortoises on drier sites. Gopher tortoises do not necessarily exhume or bury wiregrass clumps while burrowing. Their burrows are widely spaced and are occupied for extended periods, so that burrowing activities are quite limited relative to total land area. In short, there are no natural agencies known that could disrupt or replace a wiregrass population under a natural fire regime. Once established, a population of wiregrass persists indefinitely, assuming a natural fire regime and barring human interference.

Once a wiregrass population is established, there is apparently no further need for sexual reproduction. The slow rate of vegetative propagation seems more than adequate for replacing an occasional clump of wiregrass lost at a gopher tortoise burrow or from beneath a wind-thrown tree.

The mechanisms that commonly prevent production of perfect flowers and seeds may have adaptive significance. By circumventing sexual reproduction, energy and nutrient resources may be allocated entirely into important vegetative functions. For example, more leaves may be produced, which would facilitate the spread of fires. These fires, in turn, prevent colonization by competitive but fire-intolerant shrubs and trees.

PALEOECOLOGY

Once established, wiregrass seemingly persists indefinitely. The question arises, how long ago did the seed germinate that gave rise to a particular clump of wiregrass? Older plants presumably undergo fragmentation and "doughnut" formation in approximately 15-year cycles. Roots of wiregrass, like those of most grasses, are short lived and are continually undergoing replacement (Saterson and Vitousek 1984). Therefore, the cells of an extant clump of wiregrass are no more than a few years old. Nonetheless, the seed that ultimately produced that clump may have germinated well into the indefinite past.

The palynological literature provides a glimpse into that past. Organic deposits have been identified and carbon-dated from lake sediments in Florida and adjacent Georgia and Alabama. Pollen in these deposits confirmed that present-day pineland vegetation has existed continuously within the current geographic range of wiregrass for at least the last 5000 years (Watts 1969, 1971, Delcourt 1980, Watts and Stuiver 1980, Delcourt et al. 1983). Although there has undoubtedly been much subsequent reproduction by seed, at least some and perhaps many existing wiregrass plants could have germinated from seeds 5000 years ago.

POPULATION REDUCTION

Wiregrass is easily uprooted. Using a knife, a person can sever the shallow roots from around a clump of wiregrass in a few seconds and easily pull the clump and its roots from the sandy soil. Clewell (1980) proposed that Apalachee Indians cleared extensive agricultural fields in this manner, using shell implements for knives. If uprooted, a plant may become reestablished as long as the roots are placed in contact with moist soil. Nonetheless, nearly any kind of soil disturbance will destroy at least some wiregrass plants. Wiregrass densities are reduced by seemingly innocuous practices, such as skidding felled logs with light equipment. Wiregrass is entirely eliminated by clearing land for row crops and improved pastures.

Once destroyed, wiregrass does not become reestablished, owing to its negligible reproductive potential. Its inability to become reestablished was noted long ago. Loughridge (1884) observed in southern Georgia that wiregrass, "once destroyed, either by cultivation or otherwise, does not return." Bennett and Mann (1909) noted the absence of wiregrass in cultivated fields in Thomas County, Georgia. Wells and Shunk (1931) wrote the following about wiregrass in the sandhills of North Carolina: "One of the most peculiar facts to be noted in the response of vegetation to habitat changes is that related to the flora coming in following the abandonment of cultivated areas. Outstanding is the observation that the wiregrass does not return. Areas abandoned as many as 15 years ago show no wiregrass; the transition from the weed flora to the adjacent native wiregrass cover is as sharp as the plow furrow which broke the original wiregrass sod. Consistent search for an abandoned field or orchard in the extensive sandhill area in which there was evidence of the return of *Aristida* failed to disclose any."

Wells (1967) elaborated, "Once it is plowed up, as it has been over thousands of acres, it will not return when the field is abandoned. Cotton patches and peach orchards abandoned over ten to twenty years ago show no trace of its coming back; yet it will be thick in the adjoining woodland right up to the old field edge. Here is a botanical 'believe it or not' which needs investigation." Hebb (1957) echoed Wells' comments when he wrote, "A field remains clear of oaks and wiregrass for years after it is abandoned."

In another example, some fields in Florida were cleared of wiregrass, row cropped, and later abandoned in the early 1940's (Clewell 1986). Slash pines were planted on these fields without disturbing the soil about 1956. Natural populations of wiregrass existed on adjacent land and in the uncultivated fence rows between fields. In spite of the proximity of these natural populations, there has been no colonization of wiregrass on this land for more than 30 years.

EVIDENCES OF REPRODUCTION

A few instances have surfaced that may represent reproduction of wiregrass in recent times. The late wildlife biologist, H. L. Stoddard, was interested in wiregrass and transplanted some clumps to a plot in a woods he owned in Grady County, Georgia. He mentioned that he had established this plot in the late 1930's to his colleagues, Ed and Roy Komarek. In 1974 the Komareks and I rediscovered this plot. The site had once been a longleaf pine woods from which fire had been excluded long enough for its replacement by a pine-oak-hickory forest. The plot was 1 x 2 m in size and consisted of two rows of densely planted wiregrass. The rows were as straight as the day on which Stoddard planted them 40 years earlier. Two additional wiregrass plants grew within 2 m of the plot, but they obviously were not part of it. Although other explanations are possible, these two plants may very well have arisen as offspring from Stoddard's transplants. If so, they emphasized the negligible rate of reproduction.

Other isolated clumps of wiregrass are seen occasionally in old borrow pits and in former fields of sharecroppers. These plants may also represent modest examples of recent reproduction; however, other explanations are possible. In borrow pits, pre-existing wiregrass plants grow along the edges. When undercut by erosion, they fall into the pits, where they may take root. Wiregrass in sharecroppers' fields may have persisted from prior times, owing to the inefficiencies of nonmechanized agriculture.

FOREST MANAGEMENT AND WIREGRASS

Modern practices of commercial forestry nearly always include chopping, disking, or other modes of soil disturbance during site preparation. Such practices are designed to eliminate wiregrass and other native vegetation that compete with planted pine seedlings. Woods (1959), Grelen (1962), and Hebb (1971) reported that double chopping in sandhills eliminated nearly all wiregrass. Grelen (1962) said, "A few clumps of *Aristida stricta* were missed by the chopper; they increased in size but no seedlings were recorded." Hebb (1971) said that wiregrass declined from a natural density of 14.8 plants/m² to less than 0.1 after chopping.

Wiregrass is also adversely impacted by site preparation in pine flatwoods. Shultz and Wilhite (1974) reported that wiregrass was reduced by disking in Baker County, Florida. Harris et al. (1974) said that wiregrass declined with increasing intensities of site preparation. White et al. (1975) compared plant biomass in flatwoods that were site prepared with and without soil disturbance. They discovered that the biomass of wiregrass in the sites that suffered soil disturbance was reduced 73 to 89 percent below the biomass produced on undisturbed soil.

Thirty pairs of natural and neighboring site-prepared stands of wiregrass were compared (Clewell 1986). The sites were equally divided (10 pairs each) between dry sandhills, mesic flatwoods, and boggy sites. Site preparation always involved some form of soil disturbance. Wiregrass density was reduced by 75 percent on the average in boggy sites, 85 percent in flatwoods, and 91 percent in sandhills. The differences in actual density values between natural and disturbed stands were highly significant (Wilcoxon sign-rank test). The results indicated that wiregrass had a better chance of recovering in wet soils than in dry soils.

WIREGRASS DEMISE

Wiregrass is being destroyed on thousands of hectares each year by intensive site preparation for commercial forestry. Additional wiregrass is destroyed as lands are cleared for agriculture, urban development, and other purposes. At the present rate of destruction, wiregrass, which was probably the most abundant plant in the extensive pine barrens region of the Southeast, could become rare in a few decades. It is not even safe on national forests and other public lands, although public pressure has mounted in favor of "natural" management practices of remnant pine barrens on federal lands.

A resumption of summer burning is being attempted on some public lands as a method of natural management. Several state parks in Florida are providing leadership in this effort, and the U.S. Forest Service is beginning to experiment with prescribed summer fire. In comparison to the usual winter fires of this century, summer fires provide better control of saw palmetto, gallberry, and other shrubs. Summer burning appears to be the only alternative for producing wiregrass seeds, which could potentially repopulate former wiregrass habitats. As urbanization encroaches on public lands, though, there will be increasing public pressure to eliminate summer fires, which are perceived as being less easily controlled than winter fires. Public education regarding the value of summer fires is essential.

ASSOCIATED SPECIES

The relatively large spaces between wiregrass clumps are occupied by numerous species of herbs and low-growing shrubs. Clewell (1986) made floristic inventories of eight wiregrass sites in Georgia and Florida and listed from 66 to 133 species of vascular plants at each of them. Xeric ridges contained the fewest species and bogs the most species. The number of herbaceous species in these eight sites ranged from 49 to 103. Most were composites, legumes, and grasses—nearly all were perennials. Numerous wiregrass associates were also recorded by Walker and Peet (1983) and Rome (1988) in North Carolina.

Studies by Clewell (1986) at Tall Timbers Research Station, Florida, showed that some, but not all, of the species regularly growing with wiregrass appear in pinelands on abandoned agricultural lands that have been intentionally burned nearly annually ever since second-growth pines were large enough to survive surface fires. Dominated by tall loblolly and shortleaf pines (*Pinus taeda*, *P. echinata*), these stands resembled longleaf pinelands in aspect, although wiregrass was absent. It was replaced by broomsedge (*Ardropogon virginicus*) and other ruderal species that persisted after their colonization on recently abandoned fields. Many common wiregrass associates also were absent. One small area, though, was exceptional and contained wiregrass associates that were usually lacking on such lands. An elderly resident later explained that the site was a former cemetery for slaves and was never cultivated.

Some of the many wiregrass associates that are rare or absent in pinelands that developed on fallow agricultural fields are bracken (*Pteridium aquilinum*), shiny blueberry (*Vaccinium myrsinites*), dwarf huckleberry (*Gaylussacia dumosa*), running oak (*Quercus pumila*), dwarf-live oak (*Quercus minima*), dwarf waxmyrtle (*Myrica cerifera* var. *pusilla*), turkey oak, bluejack oak, and saw palmetto.

Herbaceous species that grow with wiregrass bloom prodigiously following fire. During the next two or three years they decline in profusion and become rare thereafter until after the next fire. Wiregrass and eventually shrubs like saw palmetto and gallberry dominate the vegetative cover between fires, and most of the perennial herbs go dormant. The wiregrass associates generally appear in greater profusion and bloom more prolifically after a summer fire than following the usual winter burns (Abrahamson 1984).

NEED FOR PROTECTION

Until a few decades ago, wiregrass was probably the most abundant species in longleaf pinelands and associated herb bogs and prairies within its broad range of geographic distribution. Its shallow root system makes it especially susceptible to modest soil disturbances. Its negligible reproductive capacity makes regeneration particularly difficult. At its present rate of destruction, wiregrass could become a candidate for federal protection under the Endangered Species Act within a few decades. With it may be doomed an undetermined but rather large number of associated species that rarely occur except with wiregrass. Wiregrass is the keystone species for determining the natural fire regime. Wiregrass asserts competition indirectly through fire and directly through its roots, as was described earlier. Therefore, wiregrass is instrumental in shaping the physiognomy of the community and directing both arboreal and nonarboreal species composition and abundance. The continuing demise of wiregrass threatens the ecological integrity of all longleaf pine-wiregrass lands and other wiregrass communities.

Since most large populations of wiregrass currently exist in national forests and other public lands, I urge the adoption of the following policy on all public lands: management and use of lands in which the groundcover is characterized by *Aristida stricta* should be limited to those techniques and activities that continually foster the perpetuation of *Aristida stricta* as a dominant species. This policy would protect associated species. It would also assure the preservation of longleaf pinelands and other wiregrass communities that once covered the majority of the terrain within the geographic range of wiregrass. This policy would require frequent prescription burning but would not necessarily preclude carefully supervised timber harvests. Natural regeneration of pines would replace those practices of site preparation that entail soil disturbance. Educational efforts are needed to encourage private landowners to adopt this policy.

Efforts should be made to restore damaged wiregrass lands. Summer burning should be attempted to encourage seed production and to reduce competition from shrubs. Since reproductive potentials are limited, meristemming techniques should be attempted as a means to provide planting stock.

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LETTER #7: W.V. McCONNELL, LAND MANAGEMENT PLANNER / FORESTER; TALLAHASSEE, FLORIDA; JULY 17, 1990

Thank you for your comments. The various items addressed in your letter are discussed in the following numbered sections. Also refer to Letter #11 from the Florida Forestry Association (Lamb) and Letter #12, a follow-up letter to this letter.

1. Global Climate Change - In response to the issue of using biomass as a global climate change mitigation procedure, a description of the "greenhouse effect" and global climate change has been provided.

The global temperature is regulated through energy received from the sun and through energy released from the earth. The energy received from the sun is of a higher frequency than energy emitted from the earth, and passes relatively readily through the earth's atmosphere. The lower frequency energy emitted from the earth is absorbed by certain gases present in the atmosphere, slowing its dissipation into outer space. These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and chlorofluorocarbons (CFC's). These gases are termed "greenhouse gases" (GG's) because of their role in regulating this energy balance. As these gases accumulate in greater concentrations and trap more lower frequency energy, the earth's atmosphere is expected to become warmer. The potential warming of the earth as a result of increased concentrations of GG's is called global warming or global climate change. As a result of warming of the earth's atmosphere, significant changes in the earth's climate (e.g., temperature, precipitation, and cloud cover) are also expected to occur; hence the term global climate change (GCC). While CO_2 has attracted a great deal of attention because it is the most abundant of the GG's, its capacity to absorb radiation is the lowest. Other gases -- such as CH_4, CFC's and N_2O -- exist in lower quantities yet they may play a significant role in GCC because their capacity to absorb radiation is greater. A description of the GG follows:

- Carbon Dioxide - The significant role of increasing concentrations of CO_2 in GCC has been well documented. CO_2 concentrations in the atmosphere have increased from 270 ppm to 339 ppm since pre-industrial times and have been increasing by approximately 1 to 1.5 ppm per year. The primary anthropogenic (manmade) sources contributing to the increased accumulation of CO_2 include fossil fuel combustion and deforestation. In 1986, an estimated 5.4 billion metric tons (mT) of carbon were emitted from the combustion of fossil fuels and another 1.8 billion mT were emitted from the total effects of deforestation (Cushman, 1989).

- Methane - CH_4 is of considerable interest because of the relatively rapid increase in its concentration, 21 percent per year in the last decade (Matthews and Fung, 1987). There are a variety of natural processes that release CH_4 into the atmosphere; however, the relative contribution of each process to the total atmospheric CH_4 concentration is uncertain. Natural global emission sources of CH_4 include enteric fermentation, wetlands, lakes, and oceans. Human activities contributing to CH_4 emissions include rice cultivation, biomass burning (e.g., burning forests for agriculture or as fuelwood), coal mining, animal husbandry, and solid waste disposal. The annual emissions of CH_4 ranges from 200 to 600 million mT (Cushman, 1989).

- Chlorofluorocarbons - CFC's, a class of halogenated hydrocarbons, are synthetic chemicals used primarily in propellants, foams and refrigerants (Wuebbles and Edmonds, 1989). While these chemicals are well known for their ozone destroying properties in the earth's stratosphere, they are also very potent GG's. The concentrations of certain CFC's were observed to increase by approximately 5 percent per year between 1978 and 1981 (Dickinson and Cicerone, 1986). Since CFC's have a long residence time in the atmosphere -- 60 to 100 years -- an immediate decrease in CFC's emissions would not result in an immediate decrease in their atmospheric concentration.

- Nitrous Oxide - Like the other important GG's, atmospheric nitrous oxide (N_2O) concentrations are increasing (USDOE, 1988). However, records are not extensive enough to confidently pinpoint reasons for the increase. Annual global increases are estimated at approximately 0.6 ppb per year between 1976 and 1980, and 0.8 ppb per year between 1979 and 1982 (Dickinson and Cicerone, 1986). N_2O emissions are the result of both natural processes and human activities. The estimated N_2O emissions from natural sources -- including oceans, estuaries and natural soils -- range from 5.0 to 12.0 million mT per year. Agricultural activities, biomass burning and fossil fuel combustion contribute another 3 to 5 million mT per year of nitrogen to the atmosphere.

2. Forest Spray Irrigation - Appendix C (Section C-2) of the FEISS documents the components of a typical forest spray irrigation system. In general, the USEPA concurs with the concepts presented in your letter and attachments in regard to biomass, global climate change, and "effluent-to-energy". However, USEPA believes that a potential longleaf pine-wiregrass ecosystem within a Forest Service site, such as the Apalachicola National Forest, is not an appropriate site (Refer to item 2 below). The City is also aware of the possible advantages of a forest spray irrigation system over an agricultural system. It is the understanding of the USEPA that the City of Tallahassee is to try forest spray irrigation for an undetermined number of acres in the Eastern Expansion Area (of the City's SE Sprayfield) on a small demonstration project basis as part of the implementation of Alternative 1 (Refer to item 4 below). Below is a list of possible advantages and disadvantages of forest versus agricultural spray irrigation systems anticipated from a general application:

Forest Spray Irrigation

- Advantages
  - Higher nutrient-consumption potential.
  - Higher water-using potential.
  - Requires less vegetation management on an annual basis.
  - Less land clearing (e.g., stump removal) needed which would reduce potential for soil erosion.
  - Reduces global climate change impacts associated with land clearing of natural vegetation.

- Disadvantages
  - Relatively new approach for treated wastewater disposal but is used in southeast and Florida.
  - Requires reduced irrigation levels for four to five years on newly planted plots.
  - Harvesting constraints due to irrigation system lowers the return on the timber product.
  - Requires understory vegetation maintenance.
  - May require operational changes such as "drip" versus "spray" irrigation techniques which may reduce the per-acre effluent disposal capacity of the operation and therefore require more sprayfield land area.

Agricultural Spray Irrigation

- Advantages
  - Long history of successful operations for disposal of treated wastewater.

- Disadvantages
  - Use of harvested crops restricted to animal feed or processed food for humans to the extent consistent with Chapter 17-610 F.A.C.
  - Requires clearing and grubbing of land in preparation of farming, which increases potential for soil erosion.

3. Site Specificity - The examined Forest Service sites can generally be expected to contain one or more of the protected animal and plant species common

to longleaf pine-wiregrass ecosystems. The USEPA believes the longleaf pine-wiregrass Forest Service sites are not ideal for spray irrigation. The USEPA concurs that the cost of complete wiregrass restoration is very expensive; however, wiregrass communities would be expected to slowly regenerate over time in association with longleaf pines. Also, during the restoration of the longleaf pine-wiregrass ecosystem, many endangered and other animal species can already colonize and multiply in such recovering systems. The USEPA has therefore concluded that the Forest Service sites were not the best sites to use for anything that would increase development, such as agricultural spray irrigation which would involve land clearing. We concur with the Florida Game and Fresh Water Fish Commission that any reasonably undisturbed longleaf pine-wiregrass communities should be preserved. Additionally, disturbed communities could be replaced or enhanced, if feasible, or simply allowed to naturally recover as indicated above.

4. "Effluent-to-Energy" Concept - Notwithstanding, however, the USEPA believes this concept is a good idea that could be applied in other appropriate areas where sensitive communities, such as the longleaf pine-wiregrass ecosystem, do not exist. In general, many acres of land exist that are suitable for spray irrigation of trees and other vegetation, and do not support wiregrass or other sensitive communities. (Note: While wiregrass patches exist in the proposed Eastern Expansion area of Alternative 1, they are as a rule considered, when compared to the Forest Service sites, remnant patches in a generally disturbed silvicultural area of planted pines.)

5. Demonstration Project - In addition to the above concept of forest spray irrigation at the Forest Service sites, Alternative 2, a non-Forest-Service site, proposes forest spray irrigation. Alternative 2 is essentially the same as Alternative 1 except Alternative 2 proposes forest spray irrigation and Alternative 1 proposes agricultural spray irrigation for the same expansion area of the City's existing SE Sprayfield. Although Alternative 1 and 2 were tied as having the most favorable overall ranking in terms of the four evaluative criteria considered in the EIS Supplement (Refer to Executive Summary and Chapter 4), Alternative 1 is considered the preferred alternative of the EIS Supplement since the City of Tallahassee has had successful experience in agricultural spray irrigation. However, as indicated above (See item #2), forest irrigation is to be tried as a small demonstration project by the City of Tallahassee for Alternative 1 for an undetermined number of acres. The tree species in this demonstration project would utilize the typical existing St. Joseph Land and Development Company's pine plantation (young slash and sand pine), so that land conversion in this area would not be needed for the forest spray irrigation. The City plans to operate the demonstration project area initially and is investigating existing forest spray irrigation operations in Clayton County, Georgia for guidance, which is one of 66 forest application sites in the southeast including 31 in the State of Florida. It is anticipated that in the future, the City would involve a private entity for harvesting trees. Specifics on crop management practices have not yet been finalized. The small forest irrigation demonstration project that the City is to try as part of Alternative 1 (if implemented), should provide an excellent opportunity for local decision-makers to compare the merits of agricultural irrigation versus forest irrigation. Operational, environmental and nutrient uptake (crop nitrogen demand) aspects of each technique would need to be considered by local decision-makers.

#3

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333

August 10, 1990

EPA REGION IV
ATLANTA, GA

AUG 14 11 30 PM '90

ENVIRONMENTAL
ASSESSMENT BRANCH

Heinz J. Mueller, Chief
Environmental Policy Section
Federal Activities Branch
U.S. EPA, Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Mueller:

We have completed our review of the Draft Environmental Impact Statement Supplement (DEISS) for "Tallahassee - Leon County Wastewater Management, Tallahassee, Leon County, Florida". We are responding on behalf of the U.S. Public Health Service.

Potential public health impacts, which are described in the DEISS, are related to potential aerosols containing pathogens traveling away from the spray field area and potential groundwater and surface water contamination. Of particular concern is the Floridan Aquifer, a source of drinking water for the area.

Because these potential impacts are inherent to a project of this type, adequate design and location, and careful operation of proposed systems must be assured. We believe the DEISS has addressed these issues, and that proper treatment of the wastewater, routine monitoring of effluent quality, selective operation times on approved sprayfield areas, and proper implementation of the other described mitigative measures should minimize potential impacts of concern. Also, when compared to the failing on-site septic systems within the jurisdiction, a situation which will only worsen, we believe the proposed alternative is preferable.

The Final document should emphasize that well-trained and certified wastewater treatment plant operators will be capable of operating the planned facility according to State and Federal standards and regulations. We also emphasize that provisions of the Occupational Safety and Health Act be closely followed to ensure worker safety and health.

Thank you for the opportunity to review and comment on this document. Please insure that we are included on your mailing list to receive a copy of the Final EIS, and future EIS's which may indicate potential public health impact and are developed under the National Environmental Policy Act (NEPA).

Sincerely yours,

Kenneth W. Holt

Kenneth W. Holt, M.S.E.H.
Environmental Health Scientist
Center for Environmental Health
and Injury Control

LETTER #8: DEPARTMENT OF HEALTH & HUMAN SERVICES; PUBLIC HEALTH SERVICE; CENTERS FOR DISEASE CONTROL; ATLANTA, GEORGIA; AUGUST 10, 1990; KENNETH W.HOLT, M.S.E.H., ENVIRONMENTAL HEALTH SCIENTIST; CENTER FOR ENVIRONMENTAL HEALTH AND INJURY CONTROL

Thank you for your comments.

Regarding your concern about plant personnel and compliance with the Occupational Safety and Health Act (OSHA), the Florida Department of Environmental Regulation (FDER) requires that the wastewater treatment plant be under the supervision of an on-site, certified wastewater treatment plant operator at all times. Florida law further requires that the on-site Chief Operator be a Class "A" Operator. The City of Tallahassee requires that all wastewater treatment plant operators be certified by the State of Florida. To insure worker safety and health, the City is regulated by the Florida Department of Labor and Employment Security, Bureau of Industrial Safety and Health. Although the City is technically exempt from OSHA regulation, the City is regulated by the Florida Hazardous Communication Standard which adopts OSHA Standards by Florida statute.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Affairs
Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303

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ER-90/583

Mr. Greer C. Tidwell
Regional Administrator
Environmental Protection Agency
345 Courtland Street, NE.
Atlanta, Georgia 30365

Dear Mr. Tidwell:

We have reviewed the Draft Environmental Impact Statement Supplement for Wastewater Management Tallahassee, Leon County, Florida, and have the following comments.

We concur with the preferred alternative No. 1. We also agree that the mitigative measures described on page ES-8 should be incorporated into project plans.

The document does not mention mineral resources. Sand and clay deposits occur near the study area, and occurrences of phosphates, limestone, fullers earth, and peat also are reported in the vicinity. These and any other mineral commodities occurring in the study area should be evaluated and described in subsequent reports or versions of the environmental impact statement along with impacts and necessary mitigation measures. Oil and gas pipelines pass near or through the area; however, our information is not sufficiently detailed to pinpoint their exact location. Plans for relocating or protecting pipelines, if they pass through the project area, should be discussed. If no adverse impacts to pipelines in the study area are identified, a statement to that effect also should be included.

Our primary concern is the conservation of habitat that may be critical for the Gopher Frog (Rana areolata aesopus) and the Gopher Tortoise (Gopherus polyphemus). Both the Gopher Frog and the Gopher Tortoise are listed as species of special concern by the State of Florida (Florida Game and Fresh Water Fish Commission; Official List; January 1, 1990). Both are under review (UR2) by the Fish and Wildlife Service, but are not officially on the Federal List in Florida (50 CFR 17.11 and 17.12: April 15, 1990).

In review of the migratory habit of the Gopher Frog (page 3-19) the ninth item of mitigation (page ES-8) is particularly important. Every effort should be made to conserve habitat of both species, and to locate field areas so that the remaining forested areas of the site are not isolated but rather form a contiguous wildlife corridor throughout the site. In addition, we recommend that the EPA solicit, review and incorporate in plans and construction, the recommendations of the Florida Game and Fresh Water Fish Commission relative to the protection and conservation of the Gopher Frog and the Gopher Tortoise.

The Fish and Wildlife Service contaminants biologist has inspected the agricultural spray field site operated by the City of Tallahassee and has found it to be an exemplary operation. We realize that expansion of treatment facilities is necessary for the growth being experienced in the Tallahassee area, and we believe that alternative one provides the best option for meeting growth needs while also conserving valuable fish and wildlife resources.

If you have questions regarding the endangered species, please contact James Barkuloo, U.S. Fish and Wildlife Service, 1612 June Avenue, Panama City, Florida 32405-3721. The Panama City Field Office telephone number is 904/769-0552.

Thank you for the opportunity to comment on this document.

Sincerely yours,

James H. Lee

James H. Lee
Regional Environmental Officer

LETTER #9: UNITED STATES DEPARTMENT OF THE INTERIOR; OFFICE OF THE SECRETARY; OFFICE OF ENVIRONMENTAL AFFAIRS; ATLANTA, GEORGIA; AUGUST 14, 1990; JAMES H. LEE, REGIONAL ENVIRONMENTAL OFFICER

Thank you for your comments.

In regard to your concern about possible mineral resources in the proposed project area, refer to Section 2.5.2 of this FEISS which incorporates this information.

The USEPA agrees with your concern for the conservation of Gopher Frog and Gopher Tortoise habitat within the proposed project area. Accordingly, contiguous wildlife corridors are to be left in the Eastern Expansion of the SE Sprayfield proposed by the City of Tallahassee for near-future construction (Refer to Figure ES-5 or 4-2). The locations of these corridors were based on the locations of sensitive ecological areas, sinkholes, poorly drained soil types, the City of Tallahassee's proposed project site layout, and coordination with various State of Florida agencies.

At your recommendation in your August 14, 1990 letter, the USEPA has coordinated with the Florida Game and Fresh Water Fish Commission (FG&FWFC) since the date of the publication of the Draft Environmental Impact Statement Supplement (DEISS) and the Public Hearing to help finalize the locations of the wildlife corridors. Coordination also occurred with the City of Tallahassee and the FDEP. Coordination with these parties involved participation in a field survey of the proposed Eastern Expansion site of the existing SE Sprayfield on January 23, 1991 to help identify sensitive ecological areas and delineate the wildlife corridors (See attached letters at the end of this response; USEPA January 11, 1991 letter verifying the planned field survey and FG&FWFC February 6, 1991 letter summarizing that agency's position on the wildlife issues resulting from the survey).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

January 11, 1991

Mr. John Dean
Superintendent
City of Tallahassee
1815 Lake Bradford Road
Tallahassee, FL 32304

RE: Field Survey for Sensitive Ecological Areas of Proposed Eastern Expansion Site of Existing City of Tallahassee SE Sprayfield

Dear Mr. Dean:

This is to verify the planned field survey of the Eastern Expansion site of your existing Southeast Sprayfield located on Old Tram Road. As we discussed, the survey is planned for January 23, 1991; we will meet at the Sprayfield office at 9 AM and continue the survey for most of the day. The main purpose of the survey is to generally locate sensitive ecological areas to help delineate wildlife corridors for such species as the Gopher Frog and Gopher Tortoise. Delineated wildlife corridors are to be incorporated in the Tallahassee-Leon County Wastewater Management Final EIS Supplement. Other areas of interest could also be discussed during the survey as appropriate.

In addition to EPA (Chris Hoberg), the EPA contractor (Cy Whitson), and possibly your consultant attending, we have invited several State agencies to attend. Coordination with the Florida Game and Fresh Water Fish Commission was recommended by the U.S. Department of the Interior in their comments on the Draft EIS Supplement; as such, the Commission will be an important participant. The following State agencies were invited:

- Florida Game and Fresh Water Fish Commission (Tallahassee) - Larry Perrin and/or Douglas Bailey;
- Florida DNR, Division of State Lands (Tallahassee) - Grant Gelhardt and/or designee;
- Florida DER, Facilities Planning Section (Tallahassee) - Van Hoofnagle and/or Carla Perry;
- Florida DER, Water Facilities Section (Pensacola) - Ed Chivers and/or designee.

We understand that Florida DER wetland representative(s) may or may not also attend, although this survey is certainly not intended as a formal wetland determination. However, obvious wetland areas will be considered as sensitive areas.

We look forward to meeting with you and appreciate your assistance.

Sincerely,

For Gerald J. Miller

Heinz J. Mueller, Chief
Environmental Policy Section
Federal Facilities Branch

cc: Larry Perrin
Grant Gelhardt
Van Hoofnagle
Ed Chivers
Cy Whitson

FEB 2 2 27 PM '91

ASSt

FARRIS BRYANT BUILDING
620 South Meridian Street
Tallahassee, Florida 32399-1600
(904) 488-1960

February 6, 1991

Mr. Chris Hoberg
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Hoberg:

With respect to the 23 January 1991 site inspection of the proposed Tallahassee sprayfield expansion, this letter is to summarize the views I discussed concerning wildlife issues relative to this project. The upland area of this site contains vestige longleaf pine/sandhill plant community characteristics. The majority of this area has been planted into sand pine and slash pine (approximately 4 to 6 years old). These young pine plantations contain sufficient ground cover to provide habitat suitable for several listed species including the gopher tortoise, gopher frog, Eastern indigo snake, and Florida pine snake. While gopher tortoise burrows were present, our casual survey through this area suggests a relatively low population.

To ensure the continued on-site existence of the wildlife species listed above following conversion of this area to a sprayfield and agricultural farm, the protection of 15 percent of the upland area is recommended. This upland protection area should be situated adjacent to the wetlands and identified wildlife corridor areas. This measure should provide suitable habitat for the species listed above as well as provide additional buffer to on-site wetland areas which also support important wildlife resources.

From a cursory review of the sprayfield configuration presented by the City of Tallahassee, 15 percent of upland protection area may be available under their proposal, however, an accurate determination must be made. In addition, a 300-foot-wide upland corridor should be maintained between the two 122-acre pivot fields to provide a better wildlife connection between proposed protection areas.

Further, I expressed concern for direct surface water connection from on-site wetlands with wetlands tributary to the St. Marks River. This river is classified as an Outstanding Florida Water and every effort should be made to ensure its protection. Therefore, since deterioration of on-site wetlands is expected due to proposed sprayfield and agricultural operations, I recommend that on-site wetlands be disconnected from off-site wetlands through installation of levees or berms. Also, ground water impacts relative to the St. Marks River system should be evaluated. Several sinkholes exist on this site with apparent direct connection with the aquifer. Since the St. Marks River receives considerable water from springs located within a couple of miles of this site, potential impacts to this river system need to be addressed. Such an evaluation is beyond the scope of our agency; however, we would like to be assured that appropriate precautions are taken to prevent these potential off-site impacts.

Please contact me (904/488-6661) if you have any questions concerning these comments.

Sincerely,

Larry Parrin
Office of Environmental Services

ENV 1-3-2
cc: Mr. John Dean, City of Tallahassee

*10

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor | Dale Twachtmann, Secretary | John Shearer, Assistant Secretary

August 22, 1990

Dr. Cory Berish
EIS Preparation Section
Region IV, U.S. Environmental Protection Agency
345 Courtland Street, Northeast
Atlanta, Georgia 30365

Re: Tallahassee-Leon County Draft Environmental Impact Statement Supplement

Dear Dr. Berish:

The Facilities Planning Section has reviewed the draft EIS supplement for Tallahassee-Leon County wastewater management, and offers the following comments:

1. Please be aware that recently enacted legislation in Florida imposes new requirements on domestic wastewater treatment facilities that generate sludge or residuals which are to be applied to land. The new rule effects not only new treatment plants, but also facilities undergoing substantial expansion or modification (reference attached copy of Chapter 17-640, Florida Administrative Code). The Lake Bradford Road treatment plant expansion, and expansion of the T.P. Smith facility will likely be effected by the new ruling.

2. The EIS supplement should include a map identifying environmentally sensitive areas such as wetlands, floodplains, historic and archeological sites, etc. within the planning area.

3. Section 2.4 indicates that conveyance, treatment, and disposal components detailed in Tables 2-7 through 2-9 were combined to develop the system alternatives shown in Tables 2-11 through 2-19. For the sake of clarity, the component breakdown should be reiterated in Chapter 4, for just the preferred alternative. The breakdown should include estimated length of force main, gravity sewer, number of pump stations, etc., with corresponding component cost figures. A map showing the preferred alternative's facilities should also be included.

4. Section 2.3.5.1 includes soil and septic tank drain field suitability information derived from a soils map presented in the Soil Survey of Leon County, Florida, February 1981, prepared by the SCS and the University of Florida. Soils and septic tank suitability maps should be incorporated into an appendix of the EIS supplement, to substantiate Section 2.3.5.1.

5. Chapter 4, the Preferred Alternative Section should be revised to clearly and more fully describe the selected plan. The major components of the total system should be listed, along with associated costs. Ample maps should also be provided to show facilities' locations. Much of the confusion from the public regarding the preferred alternative could be allayed by reformatting Chapter 4.

We appreciate the opportunity to comment on this document. If you have any questions, please call me at (904)488-8163.

Sincerely,

Van R. Hoofnagle

Van R. Hoofnagle, P.E., Administrator
Facilities Planning Section
Bureau of Local Government Wastewater Financial Assistance

VRH/cpm

Attachment

CHAPTER 17-640

DOMESTIC WASTEWATER RESIDUALS

17-640.100 Scope/Intent/Purpose.

(1) All domestic wastewater treatment facilities which use biological treatment processes generate domestic wastewater residuals as a by-product of the treatment process. The Department finds that unregulated disposal or land application of domestic wastewater residuals poses a threat to the environment and public health. It is the intent of the Department to regulate the management and disposal of domestic wastewater residuals in a manner to ensure protection of the environment and public health.

(2) The Department also intends in this chapter to encourage the proper recycling, including agricultural use, of domestic wastewater residuals generated in, or imported into the state.

(3) This chapter establishes minimum requirements for domestic wastewater residuals which are to be applied to land for agricultural purposes, distributed and marketed, or used for land reclamation. Included are domestic wastewater residuals which are composted with yard waste and ultimately applied to land or distributed and marketed.

(4) Disposal of domestic wastewater residuals in a solid waste landfill, co-composting of domestic wastewater residuals with solid waste, and incineration of domestic wastewater residuals are not regulated by this rule. Also excluded from this rule are disposal requirements for industrial sludges, air treatment sludges, and water supply treatment sludges.

(5) The purpose of Chapter 17-640, F.A.C., is to provide minimum standards for the treatment of domestic wastewater residuals to be applied to land, establish land application criteria, and define requirements for agricultural operations which have received or will receive domestic wastewater residuals.

Specific Authority: 403.061, 403.087, 403.[illegible], 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.[illegible], 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New

17-640.110 Applicability.

(1) Requirements in this chapter shall apply to domestic wastewater treatment facilities that generate domestic wastewater residuals which are to be applied to land or distributed and marketed, to applicators or distributors of domestic wastewater residuals or domestic wastewater residual products, and to owners or operators of sites which receive land applied domestic wastewater residuals.

(2) Unless specifically provided otherwise, requirements in this chapter shall apply to all facilities which generate domestic wastewater residuals, or apply domestic wastewater residuals to land, or distribute and market domestic wastewater residuals or operate an agricultural operation which has had domestic wastewater residuals applied to the land after June 1, 1990.

(3) Facilities which have submitted complete permit applications before June 1, 1990, are considered to be existing facilities and shall meet the requirements of this chapter in accordance with (4) below.

(4) Existing wastewater treatment facilities in Florida which dispose of domestic wastewater residuals by application to the land shall comply with these requirements at the time of renewal of the operation permit or at the time of substantial expansion or modification of the facilities, whichever occurs first.

(5) Until such time as the operation permit is renewed or substantial modification of the wastewater treatment facilities occur, the existing residuals disposal requirements of Chapter 17-7, Part IV, F.A.C., shall remain in effect.

(6) Domestic wastewater residuals or residual products which are produced outside of Florida but imported to Florida are subject to the provisions of this rule beginning June 1, 1990.

(7) Land application of septage and food service sludge shall be conducted in accordance with requirements of Chapter 17-7, Part IV, F.A.C.

(8) Disposal of domestic wastewater residuals in a solid waste landfill shall be in accordance with Chapter 17-7, F.A.C., and Chapter 17-701, F.A.C.

(9) Incineration of domestic wastewater residuals shall be in accordance with Chapter 17-2, F.A.C., and the Resource Conservation and Recovery Act.

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New______________.

17-640.200 Definitions.

Terms used in this rule shall have the meaning specified below unless the content clearly indicates otherwise.

~~(1) "Aerosol" means suspension of ultramicroscopic solid or liquid particles in air.~~

(2) "Agricultural lands" means all lands being used for agricultural purposes.

(3) "Agricultural Use Plan" means a formal document submitted to the Department which describes the controlled use of domestic wastewater residuals as part of a planned agricultural operation.

(4) "Agricultural site" means a domestic wastewater residuals application site which has an application rate appropriate for the agronomic needs of the site vegetation.

(5) "Conservation Plan" means a formal document, prepared or approved by a local Soil and Water Conservation District Board organized pursuant to Chapter 582, Florida Statutes, which outlines a system of management practices for a specific parcel of property to control soil erosion, reduce sediment loss, protect the water quality and manage nutrient use.

(6) "Dedicated site" means a domestic wastewater residuals application site which has a residuals application rate greater than the agronomic needs of site vegetation.

(7) "Department" means the Florida Department of Environmental Regulation.

(8) "Distribution and Marketing" is the giveaway or sale of domestic wastewater residuals meeting the criteria of Rule 17-640.850, F.A.C., or a product derived from such domestic wastewater residuals, either packaged or in bulk form, by owners or operators of treatment works or by a person who receives residuals or residual products from treatment works.

(9) "Domestic septage" means the liquid and solid material pumped from a septic tank, holding tank, or similar domestic sewage treatment or holding system when the system is cleaned and maintained.

(10) "Domestic wastewater residuals" means the solid, semisolid, or liquid residue removed during the treatment of municipal wastewater. Not included is the treated effluent or reclaimed water from a domestic wastewater treatment plant.

(11) "Dried residuals" means domestic wastewater residuals that contain 85% solids or greater, by weight.

(12) "Dry weight" means the weight measured after oven

drying at 103-105 degrees C to a constant weight.

(13) "Food service sludge" means oils, greases, and grease trap pumpings generated by a restaurant, retail food service operation or institutional source.

(14) "Human food chain crops" means all crops which may be harvested for human consumption or which may be fed to animals which may be consumed by humans.

(15) "Incorporation into the soil" means the injection of domestic wastewater residuals beneath the surface of the soil, or disking into the soil of surface applied domestic wastewater residuals within 24 hours of application.

(16) "Industrial sludges" means all sludges that are primarily composed of materials generated through a manufacturing or other industrial process.

(17) "Land reclamation" means the restoration of lands made barren through processes such as erosion, mining, or land clearing.

(18) "Lime stabilization" means the addition of sufficient quantities of lime to raise and maintain domestic wastewater residuals to a pH of 12.0 for two hours.

(19) "Liquid residuals" means any domestic wastewater residuals that are less than 12% solids by weight.

(20) "Pathogens" means disease causing organisms.

(21) "pH of residuals-soil mixture" means the value obtained by sampling the soil to the depth of domestic wastewater residuals placement.

(22) "Reclaimed water land application site" means a site to which reclaimed water is applied to the land in accordance with Chapter 17-610, F.A.C.

(23) "Residuals use or disposal facility" means all land and structures, other appurtenances, and improvements on the land used for domestic wastewater residuals disposal or use.

(24) "Residuals generator" means any facility, that as a normal function of its operation produces domestic wastewater residuals.

(25) "Residuals ponds" are ponds that contain only domestic wastewater residuals.

(26) "Restricted access" means that access to the site by the general public is controlled and that access to the site by the public is infrequent. Such sites will be accessible to authorized operators and farm personnel.

(27) "Shallow water supply well" means any potable water well which pumps from an unconfined aquifer containing ground waters of class G-II quality or better, as defined by Chapter 17-3, F.A.C.

(28) "Stabilization" means the use of a treatment process to render domestic wastewater residuals less odorous or putrescible, and to reduce the pathogen content.

(29) "Toxic substances" means either of the following:

(a) Hazardous wastes as defined in Chapter 17-730, F.A.C.

(b) A substance which is present in sufficient concentration to pose a serious danger to the public health, safety, or welfare.

(30) "Treatment" means the process of altering the character or physical or chemical condition of waste to prevent pollution of water, air, or soil, to safeguard the public health, or enable the waste to be recycled.

(31) "Type I facility" means a wastewater treatment facility with a design average daily flow of 500,000 gallons per day or greater.

(32) "Type II facility" means a wastewater treatment facility with a design average daily flow of from 100,000 up to, but not including 500,000 gallons per day.

(33) "Type III facility" means a wastewater treatment

facility with a design average daily flow of over 2,000 up to, but not including, 100,000 gallons per day.

(36) "Wastewater" means the combination of the liquid and waterborne pollutants from residences, commercial buildings, industrial plants and institutions together with any entrained ground water, surface runoff or leachate which may be present.

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New______________.

17-640.210 General Technical Guidance.

(1) The technical standards and criteria contained in the standards manuals and technical publications listed in Rule 17-640.210(2), F.A.C., are hereby incorporated by reference to supplement the requirements of this rule.

(2) Standards Manuals and Technical Publications.

(a) U.S. Environmental Protection Agency. 1983. <u>Process Design Manual for Land Application of Municipal Sludge</u>. EPA Center for Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268.

(b) Title 40, Code of Federal Regulations, Protection of Environment, 1979, Part 257 - "Criteria for Classification of Solid Waste Disposal Facilities and Practices."

(c) U.S. Environmental Protection Agency. 1989. <u>POTW Sludge Sampling and Analysis Guidance Document</u>. EPA Center for Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268.

(d) U.S. Environmental Protection Agency. <u>Process Design Manual for Sludge Treatment And Disposal</u>. 1979. Center for Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268.

(e) <u>Recommended Standards for Sewage Works</u>. 1978. Great Lakes Upper Mississippi River Board of State Sanitary Engineers (Ten State Standards).

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New______________

17-640.300 Permit Requirements.

(1) No domestic wastewater residuals <u>shall be applied to any</u> ~~disposal or land application site shall be constructed, operated, modified, maintained, or expanded~~ unless a plan for the intended use of <u>such</u> the sites is approved in a currently valid construction or operation permit for the wastewater treatment facility which generates the domestic wastewater residuals to be applied to the land, unless otherwise exempted.

(2) The wastewater treatment facility permittee shall notify the Department by letter of any modifications or expansions of the approved disposal or land application residual sites. The notice shall be submitted prior to such expansion or modification. Expansions include additional site locations for the permittee's residuals. The letter shall include a site location map and shall state how the modified or expanded residuals land application site will be operated in accordance with all requirements of Chapter 17-640, F.A.C. No permit modification or permit fee is necessary for these changes. A new or revised Agricultural Use Plan shall be submitted to the Department with the annual update required by Rule 17-640.500(1)(f), <u>F.A.C.</u>

(3) The wastewater treatment facility permittee shall be responsible for proper disposal of its domestic wastewater residuals. If <u>disposal</u> violations occur, the wastewater

treatment facility permittee will not be held responsible if the permittee can demonstrate that it has delivered a residual that meets the chemical criteria and appropriate stabilization requirement of this rule and ~~be responsible unless the permittee can show that its actions are not causing any violations that occur, or~~ the disposer (e.g. hauler, contractor, or disposal/land application site owner) has legally agreed in writing to accept responsibility for proper disposal. Such an agreement shall state that the disposer agrees, upon delivery of residuals that have been treated as required by Chapter 17-640, F.A.C., that he will accept responsibility for proper disposal of the residuals as required by Chapter 17-640, and that the disposer agrees that he is aware of and will comply with requirements for proper disposal as described in the wastewater treatment facility's permit.

If it is shown that receipt of additional residuals at an existing disposal site will result in violation of Department rules the Department shall require the permittee to use an alternative residuals disposal site.

(4) Domestic wastewater treatment facilities whose residuals ~~residuals which~~ qualify as AA quality residuals in accordance with Rule 17-640.850, F.A.C., are exempt from the permitting requirements of this rule~~section~~ and such residuals may be distributed and marketed under the provisions of Rule 17-640.850, F.A.C.

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New______________.

17-640.400 Prohibitions.

(1) Ocean disposal of domestic wastewater residuals, or disposal of domestic wastewater residuals in any natural or artificial body of water, including direct discharge to ground water, is prohibited.

(2) Only domestic wastewater residuals that meet the Class A stabilization requirements may be used on playgrounds, parks, golf courses, lawns, hospital grounds, or other unrestricted access areas where frequent human contact with the soil is likely to occur or may be sold or given away in a distribution and marketing program.

(3) Domestic wastewater residuals which are hazardous waste pursuant to Chapter 17-730, F.A.C., shall not be applied to land.

(4) No domestic wastewater residuals may be disposed of into a collection or transmission system without prior consent of the owner of that system.

(5) No domestic wastewater residuals shall be disposed of or applied to the land except in accordance with the provisions of this rule.

(6) No person shall cause or allow the discharge of air pollutants which cause or contribute to a nuisance odor pursuant to Rule 17-2.620(2), F.A.C.

(7) The spraying of liquid domestic wastewater residuals shall be conducted so that the formation of aerosols is minimized.

(8) Domestic wastewater residuals shall not be used for the cultivation of tobacco or leafy vegetables, except for AA residuals.

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New______________.

17-640.500 Agricultural Use Plan/Dedicated Site Plan.

(1) Agricultural Use Plan

(a) An Agricultural Use Plan shall be included in the application for a treatment plant construction or operation permit for any treatment plant which uses domestic wastewater residuals by application to agricultural lands. Residuals which qualify as AA quality in accordance with Rule 17-640.850, F.A.C., are exempt from this requirement and may be used under the provisions of Rule 17-640.850, F.A.C.

(b) The Agricultural Use Plan shall describe how the use of domestic wastewater residuals is part of a planned agricultural operation, <u>in accordance with Rule 17-640.700(3), F.A.C.,</u> considering the nutrient content of domestic wastewater residuals and the agricultural needs of crops.

(c) The Agricultural Use Plan shall be described on an applicable Department form and submitted as a part of the application for a construction or operation permit for the wastewater treatment facility generating the domestic wastewater residuals.

(d) Only domestic wastewater residuals suitable for land application as defined by Rule 17-640.700(2), F.A.C., may be used on an agricultural site.

(e) If residuals are intended to be applied at rates exceeding the agricultural needs of crops, the site shall not be considered an agricultural land application site and a Dedicated Site Plan is required.

(f) The Agricultural Use Plan shall be updated annually or as specified in the operation permit to reflect any changes in domestic wastewater residuals characteristics or agricultural practices and to provide a summary of the domestic wastewater residuals application of the previous year.

(g) If domestic wastewater residuals are applied to a reclaimed water land application site, the Agricultural Use Plan shall consider the combined effect of nitrogen loading from domestic wastewater residuals and reclaimed water on the site.

(2) Dedicated Site Plan.

(a) A Dedicated Site Plan shall be included in the application for a treatment plant construction or operation permit for any domestic wastewater residuals land application site where the application rates will exceed the agricultural requirements of the vegetation on the site.

(b) The Dedicated Site Plan shall demonstrate that the site will be operated in a manner which will not cause violations of surface or ground water quality standards.

(c) The Dedicated Site Plan shall be described on an applicable Department form and submitted as part of the application for a construction or operation permit for the wastewater treatment facility generating the domestic wastewater residuals.

(d) Only domestic wastewater residuals suitable for land application as defined by Rule 17-640.700(2), F.A.C., shall be used on a dedicated disposal site.

(e) The Dedicated Site Plan shall be updated annually or as specified in the operation permit to reflect any changes in domestic wastewater residuals characteristics or site operation and to provide a summary of the domestic wastewater residuals application for the previous year.

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New________________.

17-640.600 Stabilization Requirements and Site

Management Practices.

All domestic wastewater residuals applied to the land shall be treated to one of the classes of stabilization provided in this section. All land application sites shall conform to the minimum site management requirements for the stabilization class of the domestic wastewater residuals which are being used.

(1) Class A Stabilization Standards

(a) Process Methodology

Class A stabilization standards will be met if one of the Process to Further Reduce Pathogens methods under the specified operational conditions as described in Title 40, Code of Federal Regulations, Part 257 is used (EPA, 1979, *Criteria for Classification of Solid Waste Disposal Facilities and Practices*). These standards are adopted by reference. Other methods or operating conditions may be acceptable if pathogens are reduced to an extent equivalent to the approved methods. The alternate process shall be submitted to the Department~~Environmental Protection Agency's Pathogen Equivalency Committee~~ for approval as a Process to Further Reduce Pathogens.

(b) Pathogen Sampling Methodology (Reserved)

(2) Class B Stabilization Standards

(a) Process Methodology

Class B stabilization standards will be achieved if one of the Process to Significantly Reduce Pathogens methods under the specific operational conditions as described in Title 40, Code of Federal Regulations, Part 257 is used. These standards are adopted by reference. Other methods or operating conditions may be acceptable if pathogens are reduced to an extent equivalent to the approved methods. The alternate process shall be submitted to the Department~~Environmental Protection Agency's Pathogen Equivalency Committee~~ for approval as a Process to Significantly Reduce Pathogens

(b) Pathogen Sampling Methodology (Reserved)

(3) Class C Stabilization Standards

(a) Process Methodology

Class C stabilization standards will be achieved if one of the domestic wastewater residuals stabilization processes identified as a Process to Significantly Reduce Pathogens is utilized but the design or operational characteristics do not meet the minimum standards of Title 40, Code of Federal Regulations, Part 257. However the design or operational characteristics must as a minimum comply with conventional design standards.

(b) Pathogen Sampling Methodology (Reserved)

(4) Vector Control Provisions (Reserved)

(5) Class A Site Restrictions

(a) The requirements of Rule 17-640.700, F.A.C., and this section shall apply to Class A domestic wastewater residuals which are used for agricultural land application. However, if residuals qualify as AA quality, in accordance with the provisions of Rule 17-640.850, F.A.C., they are exempt from the requirements of Rule 17-640.700(3) and (4), F.A.C., and may be distributed and marketed or applied to agricultural land under the provisions of Rule 17-640.850, F.A.C.

~~(b) Use of Class A residuals on playgrounds, parks, golf courses, lawns, hospital grounds, or other unrestricted access areas is permissible.~~

(6) Class B Site Restrictions

In addition to the requirements of Rule 17-640.700, F.A.C., the following requirements apply:

(a) Application is limited to sod farms, pasture lands, forests, highway shoulders and medians, and plant nursery use. Use on highway shoulders and medians is restricted to limited access highways, or other roadways to which public access is similarly restricted. Class B domestic wastewater residuals may be used for the cultivation of human food chain crops only as described in (c) through (f) below.

(b) Use of Class B residuals on playgrounds, parks, golf courses, lawns, hospital grounds, and other unrestricted access areas is prohibited.

(c) Root crops, and fruits and vegetables which touch the soil and which are to be consumed raw shall not be grown on residuals application sites for 18 months after the last application of Class B domestic wastewater residuals.

(d) Fruits and vegetables which do not touch the soil and which are to be consumed raw shall not be harvested for 30 days following the last application of Class B domestic wastewater residuals. Orchard tree crops, which do not come in contact with the domestic wastewater residuals due to the application method, are exempted. This exemption does not apply to orchard tree crops which have fallen to the ground before harvesting.

(e) Pasture vegetation on which Class B domestic wastewater residuals have been applied shall not be cut or used for grazing by livestock for 30 days following the last application of domestic wastewater residuals.

(f) The public shall be restricted from the area for 12 months after the last application of domestic wastewater residuals.

(g) Class B domestic wastewater residuals shall not be applied within 300 feet of a building occupied by the general public. This distance may be reduced to 100 feet if domestic wastewater residuals are injected into the soil.

(7) Class C Site Restrictions

In addition to the requirements of Rule 17-640.700, F.A.C., the following requirements apply:

(a) Application is limited to sod farms, pasture lands, forests, highway shoulders and medians, and use in plant nurseries. Use on highway shoulders and medians is restricted to limited access highways and other roadways to which public access is similarly restricted. Class C domestic wastewater residuals may be used for the cultivation of human food chain crops only as described in (c) through (f) below.

(b) Use of Class C residuals on playgrounds, parks, golf courses, lawns, hospital grounds, and other unrestricted access areas where frequent human contact is likely to occur is prohibited.

(c) Root crops and fruits and vegetables which touch the soil and which are to be consumed raw shall not be grown for 18 months after the last application of Class C residuals.

(d) Fruits and vegetables which do not touch the soil and which are to be consumed raw shall not be harvested for 60 days following the last application of Class C domestic wastewater residuals. Orchard tree crops which do not come in contact with the domestic wastewater residuals due to the application method are exempted. This exemption does not apply to orchard tree crops which have fallen to the ground before harvesting.

(e) Pasture vegetation on which Class C domestic wastewater residuals have been applied shall not be cut or used for grazing by livestock for 3060 days following the last application of domestic wastewater residuals.

(f) The public shall be restricted from the area for 12 months after the last application of domestic wastewater residuals.

(g) Class C domestic wastewater residuals shall not be applied within 500 feet of a building occupied by the general public. This distance may be reduced to 100 feet if domestic wastewater residuals are injected into the soil.

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New______________

17-640.700 General Criteria for Land Application of Domestic Wastewater Residuals.

(1) The sampling and analysis requirements of this section shall be used to determine the suitability of domestic wastewater residuals for land application.

(a) The interval between domestic wastewater residuals analyses shall be no greater than three months for a Type I domestic wastewater treatment facility, no greater than six months for a Type II domestic wastewater treatment facility, and no greater than 12 months for a Type III domestic wastewater treatment facility.

(b) Parameters to be analyzed:

Total Nitrogen	% dry weight
Total Phosphorus	% dry weight
Total Potassium	% dry weight
Cadmium	mg/kg dry weight
Copper	mg/kg dry weight
Lead	mg/kg dry weight
Nickel	mg/kg dry weight
Zinc	mg/kg dry weight
pH	standard units
Total Solids	

(c) Analysis of additional parameters may be required by the Department, based on changes in the quality of the wastewater or domestic wastewater residuals as a result of new discharges to the treatment plant, changes in wastewater treatment processes or process efficiency, changes in the use or disposal of the domestic wastewater residuals, the potential presence of toxic substances in the domestic wastewater residuals, or other considerations as determined by the Department.

(d) Where monitoring data show no significant changes over time in domestic wastewater residuals quality, analysis frequency of certain parameters shall be reduced as is appropriate to eliminate unnecessary testing, but adequate monitoring to assure compliance shall continue to be required.

(e) Sampling points, number of samples and sampling intervals shall be specified in the wastewater facility construction or operation permit. All domestic wastewater residuals classification samples shall be representative and shall be taken after final treatment of the domestic wastewater residuals but before use or disposal.

(f) Samples and domestic wastewater residuals analysis shall be in accordance with the U.S. Environmental Protection Agency publication - <u>POTW Sludge Sampling and Analysis Guidance Document</u>, 1989.

(2) Domestic wastewater residuals are suitable for land application if concentrations of all of the parameters listed below are less than the chemical criteria and are stabilized for the class compatible with the intended site use and restrictions as defined by Rule 17-640.600, F.A.C. ~~Domestic wastewater residuals are unsuitable for land application if any one of the parameters listed below is greater than the criterion established for domestic wastewater residuals suitable for land application or the domestic wastewater residuals are not stabilized in accordance with Rule 17-640.600, F.A.C.~~

Chemical Criteria (in mg/kg dry weight)

Parameter	Suitable for land application
Cadmium	≤ 100
Copper	≤ 3000
Lead	≤ 1500
Nickel	≤ 500
Zinc	≤ 10000

(3) Site Conditions and Application Rates for Agricultural Sites.

(a) Domestic wastewater residuals which meet the criteria suitable for land application may be applied to the land if the requirements in this subsection are met.

(b) Site management practices including setback distances, crop harvesting, grazing, and public access shall conform to the requirements of Rule 17-640.600, F.A.C., for the class of stabilization provided.

(c) Florida water quality criteria and standards shall not be violated as a result of land application of domestic wastewater residuals. Testing of surface and ground waters contiguous to domestic wastewater residuals application areas may be required if the Department determines that application of domestic wastewater residuals does not conform to this section, and that water quality violations may be occurring. If violations are indicated, they should be reported to the Department immediately and the site owner shall suspend any further land application of domestic wastewater residuals.

(d) Annual domestic wastewater residuals application rates are limited to agronomic rates based on the nitrogen requirements of the site vegetation as specified in the Agricultural Use Plan. Application rates for domestic wastewater residuals shall be considered agronomic if the following conditions are met:

1. The nitrogen demand of crops shall be determined in accordance with the following Table. Alternative nitrogen loading rates for these crops and loading rates for crops not listed may be justified by site specific agricultural considerations or by recommendations of the Soil Conservation Service or the University of Florida Institute of Food and Agricultural Sciences.

Pounds of Nitrogen Needed (lb/Ac/Yr)

Crop

Field Crops		Forage Crops	
Citrus	100	Alfalfa Hay	
Corn	200	Bahiagrass Hay or Grazed	160
Cotton	120	Bermudagrass Hay or Grazed	250
Grain Sorghum	100		
Oats	60		
Peanuts	---	Clover-grass-Hay	100
Soybeans	---	Clover Grazed	---
Sugarcane	200	Guineagrass	300
Wheat	125	Johnsongrass	300
		Limpograss	400
		Napiergrass	400
		Pangolagrass	350
		Paragrass	350
		Ryegrass - grazed	200
		Sorghum x Sudan hybrid	400

2. One of the following methods shall be used to determine the maximum domestic wastewater residuals application rate

based on the availability of nitrogen in the residuals:

a. For surface applied residuals the available nitrogen shall be assumed to be no less than 50% of total nitrogen. For residuals incorporated into the soil the available nitrogen shall be assumed to be no less than 75% of total nitrogen.

b. The analysis procedure in Chapter 6, U.S. Environmental Protection Agency, *Process Design Manual for Land Application of Municipal Sludge* ~~analysis procedure~~ may be used to justify higher application rates.

c. An analysis procedure equivalent to that in subparagraph b. may be used if approved by the Department.

(e) Total cumulative application amounts of domestic wastewater residuals shall be restricted by limits set on cumulative heavy metals application. Maximum allowable cumulative heavy metals application is (in pounds per acre):

Cadmium - 4.4

Copper - 125

Lead - 500

Nickel - 125

Zinc - 250

The annual application rate for cadmium shall not exceed 0.5 lbs/acre/year. An annual summary of the cumulative metals applied shall be provided with the annual update to the Agricultural Use Plan.

(f) ~~The domestic wastewater residuals land application area shall not be located closer than 1000 feet to any~~ Class I water body, ~~Outstanding Florida Water or Outstanding National Resource Water, or 200 feet from any other surface water except canals or bodies of water used for irrigation that are located completely within the site and will not discharge~~ from the site ~~at any~~ time. The setback area shall be naturally vegetated. The 200 foot setback distance requirement may be reduced to 100 feet if domestic wastewater residuals are injected into the soil, or a conservation plan is provided which demonstrates that stormwater runoff generated by storms up to a 10-year, 1 hour storm event will be prevented from entering or leaving the land application area. Berms shall be placed for this purpose if necessary. Recovery time of the system should be specified in the plan with a maximum retention time of 72 hours as required by Rule 17-25.025(4), F.A.C. Back slope protection as well as other safety features should be included.

(g) The domestic wastewater residuals land application area shall not be located closer than 300 feet from any shallow private water supply well or 500 feet from any shallow public water supply well.

(h) Soil Requirements - The pH of the domestic wastewater residuals soil mixture shall be 6.5 or greater at the time of domestic wastewater residuals are applied. At a minimum testing shall be done annually.

(i) Ground Water Depth Requirements - A minimum unsaturated depth of two feet above the water table level is required when the domestic wastewater residuals are applied to the soil. The seasonal high ground water level for the site may be indicated in the Agricultural Use Plan by use of soil survey maps. If the seasonal high ground water level is within two feet of the surface or is not determined by soil survey maps, the water table level shall be determined before each application of domestic wastewater residuals by observing the standing water level in a three-foot-deep hole dug in the area to be used, or by measuring the water level in a monitoring well.

(j) No domestic wastewater residuals shall be applied during rains that cause runoff from the site or when surface soils are saturated.

(k) Topographic grades of the land application area must be eight percent or less. If site slopes exceed two percent a conservation plan must be provided with the Agricultural Use Plan which demonstrates that suitable soil infiltration rates and stormwater control measures to retain runoff generated by storms up to a 10-year 1-hour event exist at the site. Berms shall be placed for this purpose if necessary.

(l) The land application area and an area 200 feet wide adjacent to the area shall contain no visible evidence of subsurface fractures, solution cavities, sink holes, excavation once holes, abandoned wells, or any other natural or man-made conduits that could allow direct contamination of ground water.

(m) ~~Depth of [illegible] [illegible] feet~~ of permeable ~~[illegible] the surface of the land~~ application area, ~~except when [illegible] domestic wastewater residuals~~ as ~~defined in Rule 17-640.100, F.A.C.~~, are applied.

(n) Domestic wastewater residuals shall be applied with appropriate techniques and equipment to assure uniform application over the site.

(o) Residuals storage facilities at land application sites may be used only for temporary storage of residuals for no more than a month during periods of inclement weather or to accommodate agricultural operations. Storage facilities shall be subject to all applicable requirements for residuals application sites listed in this section. Residuals shall be stored in such a manner so as to prevent site runoff.

(p) Records of application areas and of application rates must be maintained by the wastewater treatment facility permittee and must be available for inspection upon request by the Department, or the appropriate Local Environmental Program. Records shall be kept on an appropriate Department form or by an approved method which provides equivalent detail. These records shall include:

1. Date of application of the domestic wastewater residuals.

2. Location of the residuals application site.

3. Amount of domestic wastewater residuals applied or delivered.

4. Identification of specific areas of the site where domestic wastewater residuals were applied and acreage of that area.

5. Method of incorporation of residuals (if any).

6. Water table level at time of application, and

7. Concentration of nitrogen and heavy metals in the domestic wastewater residuals, % solids, and date of last analysis.

A summary of the total domestic wastewater residuals, nitrogen, and heavy metals applied on an annual basis shall be provided with the annual update to the Agricultural Use Plan.

(q) Distribution and marketing of Class AA residuals is exempt from the site management and recordkeeping requirements of Rule 17-640.700(3) and (4), F.A.C. Distribution and marketing must be carried out in accordance with Rule 17-640.850, F.A.C.

(4) Site Conditions and Application Rates for Dedicated Sites.

(a) Domestic wastewater residuals which meet the criteria specified in Rule 17-640.700(2) for residuals suitable for land application may be applied to the land if the requirements of this subsection are met.

(b) Site management practices, including setback distances, crop harvesting, grazing, and public access, shall conform to the requirements of Rule 17-640.600, F.A.C., for the class of stabilization provided.

(c) A ground water monitoring plan shall identify monitoring wells to be installed at appropriate locations around the dedicated site in accordance with Rule 17-28.700 (6)(g), F.A.C., requirements for discharges to ground water. As a minimum these shall include a well to determine the background water quality, a compliance well at the downgradient edge of the zone of discharge, and an intermediate well downgradient of the site and within the zone of discharge. Ground water standards shall not be exceeded as a result of the residuals land application activities.

(d) ~~Table shall be checked for a minimum~~ unsaturated soil ~~depth of at least one foot before each application~~ of domestic wastewater residuals.

(e) ~~The residuals land application area shall not be located closer than [illegible] feet from any shallow private water supply well or [illegible] feet from~~ any shallow public water supply well.

(f) Maximum allowable cumulative total heavy metals application loading is (in pounds per acre):

Cadmium - 4.4

Copper - 125

Lead - 500

Nickel - 125

Zinc - 250

The annual application rate for cadmium shall not exceed 0.5 lbs/acre/year. An annual summary of metals applied per acre shall be provided with the annual update to the Dedicated Site Plan.

(g) ~~The land application area shall not be located closer than [illegible] feet from any Class I water body, Outstanding Florida Water, or Outstanding National Resource Water, or [illegible] feet from any other surface water except canals or bodies of water used for irrigation purposes, located completely within and not~~

discharging from the site. The setback area shall be naturally vegetated.

(h) Soil Requirements - The pH of the residuals soil mixture shall be 5.5 or greater at the time of residuals application.

(i) Depth of permeable soil - More than two feet of permeable soil shall cover the surface of the land application area except when dried Class A domestic wastewater residuals as defined in Rule 17-[illegible], F.A.C., are applied.

(j) Topographic grades of the domestic wastewater residuals land application area must be eight percent or less.

(k) The land application area and an area 200 feet wide adjacent to and beyond the residuals land application area boundary shall contain no visible evidence of subsurface fractures, solution cavities, sink holes, excavation core holes, abandoned wells, or any other natural or man-made conduits which could allow direct contamination of ground water.

(l) Florida water quality criteria and standards shall not be violated as a result of land application of domestic wastewater residuals. Testing of surface waters contiguous to domestic wastewater residuals application areas shall be required if the Department determines that application of domestic wastewater residuals is not conforming to this section and that water quality violations may be occurring as a result. If water quality violations are indicated, they shall be reported to the Department immediately and the site owner shall suspend any further domestic wastewater residuals land application.

(m) A conservation plan must be provided with the Dedicated Site Plan which demonstrates that suitable soil infiltration rates and stormwater control measures to retain runoff generated by storms up to a 10-year 1 hour event exist at the site. Berms shall be placed for this purpose if necessary.

(n) The maximum allowable application rate is limited to 25 dry tons per acre per year.

(o) Residuals storage facilities at land application sites shall be used only for the temporary one-month storage of residuals during periods of inclement weather or to accommodate agricultural operations. Storage facilities shall be subject to all applicable requirements for residuals application sites listed in this section, and shall be stored in such a manner so as to prevent site runoff.

(p) Records of application areas and of application rates must be maintained by the wastewater treatment facility permittee and must be available for inspection upon request by the Department, the Department of Health and Rehabilitative Services, or the appropriate Local Environmental Program. Records shall be kept on an appropriate Department form or an approved method with equivalent detail. These records shall include:

1. Date of application of the domestic wastewater residuals.
2. Location of residuals application site.
3. Amount of domestic wastewater residuals applied or delivered.
4. Identification of specific area of the site where domestic wastewater residuals were applied and acreage of that area.
5. Method of incorporation of residuals (if any).
6. Water table level at time of application, and
7. Concentration of nitrogen and heavy metals in the domestic wastewater residuals, % solids, and date of last analysis.

A summary of the total cumulative domestic wastewater residuals, nitrogen, and heavy metals applied on an annual basis and the ground water quality analysis shall be provided with the annual update to the dedicated site plan.

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New

17-640.[illegible] Criteria for Land Reclamation with Domestic Wastewater Residuals.

(1) All domestic wastewater residuals which meet the chemical criteria of Rule 17-640.700(2), F.A.C., for domestic wastewater residuals suitable for land application and which have been stabilized as a minimum to the Class C stabilization standards of Rule 17-640.600(3), F.A.C., may be used in land reclamation projects if the following conditions are met:

(a) Application of heavy metals shall not exceed the criteria listed in Rule 17-640.700(3)(e), F.A.C.

(b) Maximum total allowable application quantity shall be 50 dry tons/acre with such application to be accomplished within a one-year period on any acre of a land reclamation area. When composted residuals or residuals blended with other soil amendment materials are used, only the domestic wastewater residuals portion of the blended product shall count toward the 50 dry tons/acre limitation.

(c) Except for Class A residuals the applied material shall be incorporated into the soil within the same day as application.

(d) Seed or turf forming grass shall be planted as soon as possible but in no case later than three months after the last application of domestic wastewater residuals.

(e) Florida water quality criteria and standards shall not be violated as a result of land application of domestic wastewater residuals. Testing of surface and ground waters contiguous to domestic wastewater residuals application areas shall be required if the Department determines that application of domestic wastewater residuals is not conforming to this section and that water quality violations may be occurring as a result. If water quality violations are indicated, they shall be reported to the Department immediately and the site owner shall suspend any further domestic wastewater residuals application.

(f) There shall be no building occupied by the general public located within 300 feet of the land application area for Class B domestic wastewater residuals or within 500 feet for Class C domestic wastewater residuals.

(g) The domestic wastewater residuals land reclamation area shall not be located closer than 300 feet from any shallow private water supply well or 500 feet from any shallow public water supply well.

(h) There shall be no production of human food chain crops on the domestic wastewater residuals land application area for 60 days after the last application of domestic wastewater residuals. No root crops or fruits and vegetables to be consumed raw which touch the soil may be grown for a period of 18 months after the last application.

(i) The domestic wastewater residuals land application area shall not be located closer than 1000 feet from any Class I water body, Outstanding Florida Water, or Outstanding National Resource Water or 200 feet from any other surface water.

(j) Public access shall be restricted for one year after the last application of domestic wastewater residuals.

(k) Topographical grades must be eight percent or less before and after application.

(l) Topographical grading shall be completed before application begins.

(m) Stormwater runoff generated by storms up to the 10-year, 1 hour storm event shall be prevented from entering or leaving the domestic wastewater residuals land application area. Berms shall be placed for this purpose if necessary.

(n) Ground Water Depth Requirements - A minimum unsaturated depth of two feet above the water table level is required when the domestic wastewater residuals are applied to the soil. Water table level shall be determined by observing the standing water level in a three-foot deep hole dug on the area to be used, or by measuring the water level in a monitoring well. No land application of domestic wastewater residuals shall be conducted during rains that cause runoff on the site or when surface soils are saturated.

(o) In addition to the above requirements, land reclamation projects at mining reclamation sites shall be in compliance with any other applicable Department rules concerning mining reclamation.

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New ________________.

17-640.850 Distribution and Marketing of Residuals. Domestic wastewater residuals or residual products which meet both the stabilization standards of subsection (1) and the chemical criteria of subsection (2) may be designated Class AA and may be distributed and marketed or applied to agricultural land under the provisions of subsections (3) and (4) below.

(1) Domestic wastewater residuals or residual products shall be stabilized to the Class A stabilization standards of

Rule 17-640.600(1), F.A.C.

(2) Domestic wastewater residuals or residual products shall be analysed in accordance with Rule 17-640.700(1), F.A.C., and the residuals or final blended residuals product shall have parameter concentrations less than <u>or equal to</u> all of the following criteria:

<u>Parameter</u>	<u>Maximum Concentration</u>	
Cadmium	$\leq$ 30	mg/kg dry weight
Copper	$\leq$ 900	mg/kg dry weight
Lead	$\leq$ 1000	mg/kg dry weight
Nickel	$\leq$ 100	mg/kg dry weight
Zinc	$\leq$ 1000	mg/kg dry weight

(3) Generators of Class AA domestic wastewater residuals who produce such residuals in Florida or who deliver such residuals to Florida shall file quarterly residuals analysis reports and quarterly residuals shipping and sales reports with the Domestic Waste Section of the Department, Twin Towers Office Building, 2600 Blair Stone Road, Tallahassee, Florida, 32399-2400.

(a) The quarterly residuals analysis report shall include the concentrations of the parameters listed in Rule 17-640.850(2), F.A.C. If domestic wastewater residuals are blended with other soil conditioning materials, the parameter concentrations may be estimated based on the blending ratio of the final product to be land applied.

(b) The quarterly domestic wastewater residuals shipping and sales report shall include the total amount of residuals (dry tons) delivered and the counties to which the residuals were delivered or in which the residuals were applied.

(4) The following residuals analysis information must be made available to the users by the manufacturer by product labels or other means:

Total Nitrogen

Total Phosphorous

Total Potassium

Recommended Application Rate

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New

17-640.870 Approval of Alternative Procedures and Requirements.

(1) The owner or operator of a domestic wastewater residuals land application site or the treatment facility permittee subject to the provisions of this rule, may request in writing a determination by the Department that a requirement shall not apply to such facility or the residuals land application site, and may request approval of alternative procedures and requirements.

(2) The request shall set forth at a minimum the following information:

(a) The specific facility or residuals application site for which the exemption is sought;

(b) The specific provisions of this rule from which exemption is sought;

(c) The basis for the exemption;

(d) The alternate procedure or requirement for which approval is sought and a demonstration that the alternate procedure or requirement provides an equal degree of protection for the public and the environment; and

(e) A demonstration of the effectiveness of the proposed alternate procedure.

(3) The Department shall specify by order each alternative

procedure or requirement approved for an individual facility or residuals application site in accordance with this section or shall issue an order denying the request for such approval. The Department's order shall be reviewable in accordance with Section 120.57, F.S.

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Laws Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: New.

17-640.900 Forms.

The forms used by the Department in the Domestic Wastewater Residuals Management Program are adopted and incorporated by reference in this section. The form is listed by rule number, which is also the form number, and includes the subject, title, and effective date. Copies of forms may be obtained by writing to the Domestic Waste Section of the Department, Twin Towers Office Building, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

(1) Agricultural Use Plan (Reserved)

(2) Dedicated Site Plan (Reserved)

(3) Standard domestic wastewater residuals record keeping form (Reserved)

Specific Authority: 403.061, 403.062, 403.087, 403.088, 403.704, 403.707, F.S.

Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.0881, 403.702, 403.704, 403.707, 403.708, F.S.

History: Ne

LETTER #10: FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION; FACILITIES PLANNING SECTION; TALLAHASSEE, FLORIDA; AUGUST 22, 1990; VAN R. HOOFNAGLE, P.E., ADMINISTRATOR OF FACILITIES PLANNING SECTION, BUREAU OF LOCAL GOVERNMENT WASTEWATER FINANCIAL ASSISTANCE

Thank you for your comments.

The USEPA appreciates receiving the recently enacted Florida legislation (Chapter 17-640, Florida Administrative Code: F.A.C.) concerning new requirements on domestic wastewater treatment plants. We are hereby providing the City of Tallahassee with a copy relative to the proposed expansion of the T.P. Smith Facility and the Lake Bradford Road plant. This chapter of the F.A.C. is also published and available and is referenced several times in this FEISS.

In regard to your concern for inclusion of a map identifying environmentally sensitive areas, this FEISS includes figures showing soil types (Figures ES-4 and 4-1), sinkholes (Figures ES-4, ES-5 and 4-2), and wildlife corridors (Figures ES-5 and 4-2) within the Eastern Expansion of the SE Sprayfield which the City proposes for near-future construction. Known listed archeological sites in the SE Sprayfield and expansion areas and the T.P. Smith plant area, as well as alternative SW Sprayfield areas, are presented in Figure 2-9, as well as Figures ES-5 and 4-2. An archeological survey to determine any additional sites in the areas of near-future proposed construction has been conducted by the City (see Penton, 1991). Survey results are shown in Figures ES-5, 4-2 as well as 2-9. (Also see USEPA response to the DEISS Comment Letter #3 (received from the Florida SHPO) and Sections 3.2.1.5, 3.3.5, 4.6.1 and 4.7 in this FEISS). Regional Karstic geology is presented in Figure 2-8.

The USEPA appreciates you and your staff's participation in the field survey on January 23, 1991 of the proposed Eastern Expansion site of the existing SE Sprayfield to help delineate sensitive ecological areas and wildlife corridors.

#11

FLORIDA FORESTRY ASSOCIATION

402 EAST JEFFERSON STREET • P.O. BOX 1696 • TALLAHASSEE, FLORIDA 32302-1696
(904) 222-5646 • FAX (904) 222-6179

William K. Cook, President

Wm. Carroll Lamb, Executive Vice President

Fax transmission 10:12 Hrs.
August 24, 1990

Heinz J. Mueller, Chief
Environmental Policy Section
EPA, Region IV
345 Courtland St. N.E.
Atlanta, GA 30365

Dear Mr. Mueller:

By letter dated October 3, 1989, we advised you of the Florida Forestry Association's support for the "effluent to energy" alternative for the City of Tallahassee's enlarged wastewater disposal system. We were concerned to discover that, despite our interest and the endorsement of a number of highly qualified scientists and leaders in the wood-energy field, the EPA did not discuss this strategy in presenting its Draft Environmental Impact Statement Supplement (DEISS) of January, 1990. We understand that budgeting problems made this necessary and that you will fully explore this option in the Final EISS.

In addition to the points raised in our earlier letter we now raise 2 issues to which we ask that you respond. Some of those opposing the renewable energy proposal hold that the area should be restored to the longleaf-wiregrass ecosystem, rather than being used for research into renewable fuel production, The EPA supports this position in Section 2.3.3 of the DEISS. The economic and administrative practicality of such restoration is, of course, central to judging its viability as an option. A number of considerations will influence this: cost per acre, total acres needing treatment, competing needs and the availability of fund and manpower.

Wiregrass can be re-established. Dr. Andre Clewell, specialist in ecosystem restoration and leading authority on wiregrass estimates that the cost, based on state of the art techniques, would range from $10,000 to $11,000 per acre. Cost of restoring wiregrass on the area proposed for treatment under this project would be 10 million dollars. The Wakulla Ranger District includes 73,300 acres suited to the longleaf-wiregrass ecosystem. While an exact figure is not available, a search of stand/condition class inventory records, together with discussion with district and supervisor's office personnel, suggests that perhaps 20,000 acres of the this total area could be a candidate for wiregrass re-establishment. Restoration of this area would cost an estimated $200 million, the entire operating budget for the district for the next 125 years!

Dr. Clewell points out that the quoted costs are "state of the art" and that an aggressive research effort, if successful, could reduce them substantially. Even the most optimistic scenario, reduction by a factor of 10, would require an expenditure equal to the district's total budget for a period of 12.5 years to restore the areas needing treatment on the district.

In light of existing and expected budget constraints, other national needs, and competing management priorities for our National Forests is there any possibility that even a small fraction of this area will ever be restored? We ask that, in responding to this letter, you assess the administrative probability and the economic feasibility of re-establishing wiregrass on the area proposed for treatment and specifically factor these into your decision making.

The second issue has been raised by unfolding events in the Mideast which have drastically changed the decision-making framework for this project. From concern about a comfortably distant future happening - global warming (a probable but not-quite-certain event), we have suddenly shifted to an immediate need for the replacement of an endangered oil source with domestic and renewable fuels. The "effluent to energy" proposal, focusing as it does on research and demonstration for renewable energy production, directly responds to this suddenly pressing need. In responding to this letter we ask that you recognize this national need and the unique ability of this project to meet it. The matter of national energy self-sufficiency is not one of casual concern, Your selection of preferred alternatives must reflect its significance.

These two factors, plus the many other benefits to be derived from the "effluent to energy" option, will make it difficult indeed to justify a refusal to include it as a preferred alternative in the final EISS.

Sincerely,

Wm. Carroll Lamb

Wm. Carroll Lamb, CAE
Executive Vice President

WCL:wm

cc: City of Tallahassee Water and Sewer Dept.
Supervisor, N Fs in Fl
Dr. Andre Clewell

FLORIDA FORESTRY ASSOCIATION

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DATE 8-24-90

TO Heinz J. Mueller
Environmental Policy Section

FROM Wm. Carroll Lamb

COMMENTS:

FLORIDA FORESTRY ASSOCIATION

402 EAST JEFFERSON STREET • P.O. BOX 1696 • TALLAHASSEE, FLORIDA 32302-1696
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William K. Cook, President

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Fax transmission 10:12 Hrs.
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345 Courtland St. N.E.
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Wiregrass can be re-established. Dr. Andre Clewell, specialist in ecosystem restoration and leading authority on wiregrass estimates that the cost, based on state of the art techniques, would range from $10,000 to $11,000 per acre. Cost of restoring wiregrass on the area proposed for treatment under this project would be 10 million dollars. The Wakulla Ranger District includes 73,300 acres suited to the longleaf-wiregrass ecosystem. While an exact figure is not available, a search of stand/condition class inventory records, together with discussion with district and supervisor's office personnel, suggests that perhaps 20,000 acres of the this total area could be a candidate for wiregrass re-establishment. Restoration of this area would cost an estimated $200 million, the entire operating budget for the district for the next 125 years!

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In light of existing and expected budget constraints, other national needs, and competing management priorities for our National Forests is there any possibility that even a small fraction of this area will ever be restored? We ask that, in responding to this letter, you assess the administrative probability and the economic feasibility of re-establishing wiregrass on the area proposed for treatment and specifically factor these into your decision making.

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These two factors, plus the many other benefits to be derived from the "effluent to energy" option, will make it difficult indeed to justify a refusal to include it as a preferred alternative in the final EISS.

Sincerely,

Wm. Carroll Lamb

Wm. Carroll Lamb, CAE
Executive Vice President

WCL:wm

cc: City of Tallahassee Water and Sewer Dept.
Supervisor, N Fs in Fl
Dr. Andre Clewell

LETTER #11: FLORIDA FORESTRY ASSOCIATION; TALLAHASSEE, FLORIDA; AUGUST 24, 1990; WILLIAM CARROLL LAMB, CAE, EXECUTIVE VICE PRESIDENT (FACSIMILE TRANSMISSION ALSO SENT AT 10:13 AM ON AUGUST 24, 1990)

Thank you for your comments.

The USEPA agrees that complete restoration of longleaf pine-wiregrass ecosystems would be very expensive due to the cost of wiregrass establishment. However, wiregrass communities will recover naturally over time in association with longleaf pines and will eventually disseminate as succession occurs. It should be noted that even during the recovery time of the longleaf pine-wiregrass ecosystem, many endangered and other animal species can already colonize and multiply in such recovering systems.

Please also refer to the USEPA response to the related DEISS Comment Letter #7 (received from Mr. W.V. McConnell) relative to the "Effluent-to-Energy" concept and related matters.

#12

W. V. McCONNELL LAND MANAGEMENT PLANNER / FORESTER

1023 SAN LUIS ROAD, TALLAHASSEE, FLORIDA 32304
(904) 576-7774

August 24, 1990

Heinz. J. Mueller, Chief
Environmental Policy Section
EPA, Region IV
345 Courtland St. N.E.
Atlanta, GA 30365

Dear Dr. Mueller:

This is a supplement to my letter to you dated July 18, dealing with the EISS for the Tallahassee wastewater disposal system.

On August 2 Iraq invaded Kuwait. This act and subsequent events produced worldwide economic turmoil and has triggered the currently developing Energy Crisis II. This crisis, regardless of its intensity and duration, has again demonstrated the vulnerability of our nation's energy system and the absolute necessity for prompt development of domestic and renewable energy sources.

The "effluent to energy" alternative as described in the attachments to my previous letter has the primary aim of promoting this end. This newly evident and massive beneficial impact fully justifies the inclusion of this option as a preferred alternative in the final EISS.

Very truly yours,

W.V. McConnell

ENERGY-WOOD MANAGEMENT

FLORIDA FORESTRY ASSOCIATION

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DATE 08/24/90

TO USEPA – HEINZ J. MUELLER

FROM W.V. McCONNELL

COMMENTS:

W. V. McCONNELL LAND MANAGEMENT PLANNER / FORESTER

1023 SAN LUIS ROAD, TALLAHASSEE, FLORIDA 32304
(904) 576-7774

August 24, 1990

Heinz. J. Mueller, Chief
Environmental Policy Section
EPA, Region IV
345 Courtland St. N.E.
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W. V. McConnell

ENERGY-WOOD MANAGEMENT

LETTER #12: W.V. McCONNELL, LAND MANAGEMENT PLANNER / FORESTER; TALLAHASSEE, FLORIDA; AUGUST 24, 1990 (FACSIMILE TRANSMISSION ALSO SENT AT 10:16 AM ON AUGUST 24, 1990)

Thank you for your comments.

The USEPA appreciates your additional comments emphasizing your interest in the "Effluent-to-Energy" concept. Please refer to the USEPA response to your previous, related DEISS Comment Letter #7, where your comments have been addressed. Also refer to the USEPA response to the related DEISS Comment Letter #11 (received from the Florida Forestry Association).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION IV
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EPA

ENVIRONMENTAL NEWS

EPA TO HOLD PUBLIC HEARING FOR TALLAHASSEE/LEON COUNTY WASTEWATER MANAGEMENT PLAN

The U.S. Environmental Protection Agency (EPA) will hold a public hearing Thursday, August 9, 1990 in Tallahassee, FL to receive comments on the Draft Environmental Impact Statement Supplement (DEISS) for the Tallahassee/Leon County Wastewater Management Plan. The public hearing will begin at 7:00 p.m. at the City Commission Chambers, 2nd floor, City Hall, 300 S. Adam St.

The DEISS concludes that the preferred alternative is a centralized approach. Wastewater will be treated at the improved Lake Bradford Road and T. P. Smith Facilities. Effluent disposal will be handled by spray irrigation at the Southeast Agricultural Sprayfield and local golf courses. The preferred alternative is cost effective, readily implementable and has few environmental impacts.

In order to solicit further public participation on the proposed project, both oral and written comments will be accepted and a transcript will be made. For accuracy of the record, written comments are encouraged. Persons may also respond in writing before the close of the public comment period on August 24, 1990 to Heinz J. Mueller, Chief, Environmental Policy Section, Federal Activities Branch, U.S. EPA, 345 Courtland Street, NE, Atlanta, GA 30365. Facsimile transmittals may be sent to EPA at (404) 347-5056.

Copies of the DEISS are available for review at the following locations in Tallahassee: Leon County Public Library, 1940 Monroe Street, ATTN: Ms. Linda Barber; Coleman Memorial Library, Florida A & M University, Rm 304 C, ATTN: Mrs. M. B. Crump; and Robert Manning Strozier Library, Florida State University, ATTN: Ms. Sharon Schwerzel.

A Final Environmental Impact Statement Supplement (FEISS) will be published after the close of the public comment period. The FEISS will include: a revised DEISS (or a summary of the DEISS), EPA's decision on the preferred alternative, responses to comments received on the DEISS, the transcript of the public hearing and any other relevant information or evaluations developed after publication of the DEISS.

-0- August 3, 1990

CONTACT: Carl Terry, Press Office, 404/347-3004

USEPA TRANSCRIPT OF USEPA PUBLIC HEARING

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Tallahassee-Leon County Wastewater Management
August 9, 1990
City Hall, City Commission Chambers
Tallahassee, Florida

(EPA Representative: Heinz Mueller)

My name is Heinz Mueller from the Environmental Policy Section at EPA/Region IV and I will be tonight's Hearing Officer. I want to welcome all of you to the Hearing tonight. The main purpose of this Hearing is to make information available to the public and to other agencies on the Tallahassee-Leon County wastewater management alternatives. Our primary purpose here tonight is to receive public and agency comments on the Draft Environmental Impact Statement Supplement, this document here, which hopefully all of you have had an opportunity to look at and read. The document was released June 29, 1990 and we're hoping that everyone here tonight will be...feel free to participate. If you have not filled out a registration card at the table when you came in, we would appreciate it if you would do so now or do so at one of the breaks. Hopefully, you have indicated interest in making a statement. Even if you do not wish to make a statement, we would still appreciate you filling out a card with your name and address because your presence becomes part of the official Hearing record and also provides us with means of notifying you the final results. With me tonight on my left is Dr. Cory Berish, who has followed this project I think for a number of years now. He was responsible on the EPA side for coming up with this Draft Supplement. Chris Hoberg, who is the current Project Monitor, is sitting up at the table there at the door. At this time, I would like to get any elected officials who would like to be acknowledged, to stand up [No one stood up]. OK. I know we probably have a number of City officials here tonight. Also, the authority for tonight's Hearing on the National Environmental Policy Act, which we refer to as NEPA, requires an examination of a major federal action that might potentially have significant impact on the human environment. Title II of the Clean Water Act provides for construction grant money to upgrade and construct publicly-owned wastewater treatment plants and the associated collection facilities. The recent reauthorization of the Act, which was about two years ago, is replacing the grant program with a revolving loan program. An EIS on the wastewater management alternatives for Tallahassee-Leon County, Florida, was finalized back in '83. The present EIS Supplement was prepared in response to the many changes which have taken place in Tallahassee and Leon County over the last seven years. Under EPA rules and regulations, all findings of the EIS Supplement are to be made public and the public may provide comments on the Draft within 45 days of its issuance. All comments made at the Hearing tonight are being recorded and will be addressed and responded to as part of the preparation of the Final Supplement document. To facilitate this Hearing, I would like to lay out some general ground rules and, as I said we can probably be a little less formal than we have to be at times, but the primary ground rules are that we are not here, really, to debate any of the conclusions or recommendations of the document; We're here to hear your comments and concerns. I may ask questions of any of the speakers for clarification. When you come up to speak, you may use either one of these two microphones and your statement at that time will be recorded on tape. Submission to any written comments will be helpful to us either tonight or you have until the end of the comment period to get those in to us. The comment period will end at the close of business August 24, 1990. If you are an individual, we would appreciate if you would limit your comments to approximately five minutes. I'm not going to set off a alarm clock or anything, so if we run over a minute or two, that's fine. If you represent a group, we would be glad to give you up to 10 minutes. In terms of any clarifications or questions that you might want to ask to the technical staff, you may do so either during the recess, if we decide to have one, or after the meeting. And also, we're available at the address and at the phone number provided and you can call us really anytime. The Draft EIS Supplement was made available and noticed in the Federal Register June 29, 1990, and as I said previously, we will accept written comments until August the 24th. The Draft EIS Supplement will then be revised and we will prepare a Final Supplemental EIS. The Final Supplemental EIS will include, at a minimum, a summary of the findings, the preferred alternative, public comments from tonight's meeting, any written comments that have been submitted or will be submitted to us during the public comment period. This document will be available to the general public, so I hope as you signed in tonight, you've expressed a desire to get a copy of the Final Supplement. EPA's Regional Administrator, Greer Tidwell, will examine the Final EIS Supplement, make his final decision, and that decision then will be published in the Federal Register. Again, if you have registered at the Hearing tonight, we will be notifying you of the final results. Now I would like to turn the meeting over to Dr. Berish, who will make a brief presentation outlining the preferred alternatives and a little bit of background. Cory...

(EPA Representative: Dr. Cory Berish)

I want to use a couple of overheads. These overheads are also present in the Executive Summary that Chris [Hoberg] gave out, so you can follow along in the Executive Summary if you'd prefer, rather than looking at this overhead [DEISS Fig. 2-4]. As you all know, this study really began in about 1977 when the City prepared a 201 Facilities Plan and they started looking at growth, how growth occurred in this area, and what should be done about it. In 1983 is when the U.S. Government became involved and they did their Draft Impact Statement. At that time, they came up with their findings of their first preferred alternative in 1983, which was the No-Action Alternative. Essentially what the Draft found at that time was that the City should go ahead and build their facilities up to what was recommended in the 201, but any growth beyond that should be addressed via on-lot septic tank kinds of systems of small package plants through development. Heinz [Mueller] indicated there's been some new data that's been developed. Since that time, the kinds of things that have occurred since that original EIS...[Interruption]. The kinds of things that have occurred since then: we have some septic tanks that have failed in the northern part of town, we have some new data on soils which indicate some of these soils in the northern part of town, again, are not really appropriate for septic tanks, and then there is the issue of growth - how much growth can be accommodated by on-lot systems? It's an interesting question because on-lot systems are a direct contributor to non-point pollution problems and non-point pollution problems are a very important question in Tallahassee. There are a lot of issues involved with Lake Munson and the pollution associated with that area. So that takes us to where we are now. We want to look at what the major issues are. So the issues that we're really looking at are: is a centralized system better than a decentralized system -- and a centralized system would be a City-run system versus a decentralized sort of on-lot system -- and then what are the kinds of options we can look at? In fact, the EIS looked at two centralized options, 17 effluent use and disposal options, and two sludge disposal sites; so there really were a lot of various options that were addressed in the EIS. And, actually, reading through these various combinations, it was rather confusing because there were so many combinations of options. There are three general basic options that were followed. The three basic options are identified on this figure [DEISS Fig. 2-4]. One option would be modification of the plants in the south, then with some sort of disposal in the south. A second option would be a modification of plants in the south with a building of a plant in the south, I mean the north, and either disposal in the north and the south. A third major option would be a continue on with the decentralized kind of system. So what are the major issues that we need to think about when we look at this? One would...what would the environmental impacts be? And so in this EIS, we had the contractor and ourselves look at what are the major kinds of environmental impacts, and they'd be similar if we're to cut down an area of forest, or cut down whatever vegetation would be there. That's going to occur if we do that in the north or south. There would be some damage associated with that. It's interesting if you look from the north to the south and compare land areas that would be necessary to use for spray irrigation. It would take much more land in the north than in the south, the reason being the soils are generally much more clayey in the north, and because of that, the permeability is much less - it would take much more land. There is a negative aspect of that: the negative aspect of that - it could cause more environmental damage. In addition to that, one of the options could also be if we wanted them to use rapid infiltration basins, that either in the north or in the south, rapid infiltration basins and/or artificial wetlands generally take a much smaller land area to maintain than does spray irrigation. But there is an inherent problem in looking at artificial wetlands in the sense that you need to have a pollutant discharge permit system to use one of these kinds of artificial wetlands. There's not a stream course that would be available to discharge to at this present time in this area. That pretty much eliminates from consideration the many areas for one of these kinds of systems. About this time is when we came down just about a year ago now, I guess, for a scoping meeting that was really well turned out. I think we had about 130 people in the audience, if I remember, giving comments and much of those comments dealt with the possibility of siting a sprayfield in the National Forest. And there's a lot of good points and bad points about siting a sprayfield, using effluent in a sprayfield. Mack McConnell gave some testimony at that time about the importance of biomass generation, especially with respect to climate change. It turned out, however, that in our preliminary examination, that both the sites that were selected as possible sites for spray effluent in the past had maintained longleaf-wiregrass communities that are often associated with a variety of endangered species. These kinds of habitats were suggested by the Florida Freshwater Game and Fish that these should be protected and the Forest Service thinks the same thing in one sense, if in fact the habitat is not degraded. It doesn't matter if it's slash pine, because slash pine can be replaced. It's if the lands haven't been physically degraded that these sites are probably better put back into longleaf pine for future generations. So taking all these kinds of considerations into a variety of matricies, we had our contractor do an assessment for us and it turns out then, the alternative that we selected as the best in terms of looking at the most...that can be most easily implemented, and would cause the least environmental damage and is relatively cost effective, is siting a new sprayfield next to the existing sprayfield. The City knows how to run these kinds of operations, they're doing it successfully right now, improving the plants that are in the south and shipping most of that effluent to those plants. Part of the effluent, we suggest should also be put to golf courses, and we feel this is an important consideration. By putting some of the effluent on golf courses, you're going to reduce the need to fertilize some of these golf courses. You...theoretically, you should reduce non-point runoff to your waterways, improving overall water quality. It would be interesting if in the future, when more and additional capacity is needed, if there would be a turnout that would really be pushing for conservation. I think some of the recent developments in looking at the problems you're facing in the City with respect to water, it really argues for water conservation, the wise use of water, and the reuse. The spray effluent is really a resource that needs to be used. It's not something that you think of as disposal; we need to think about using it. And spray irrigation of our crops is a wise management technique; so is the spray irrigation of golf courses. So that's, in a nutshell, our examination of preferred alternative.

(Heinz Mueller)

Thank you, Cory. All right, I have, I believe, six cards. Are there anyone else who would like to sign a card?

(Question from Audience : Margaret Fogg)

I have a question...

(Heinz Mueller)

Yes ma'am.

(Question Continued)

...that I would like to ask, is: Do you consider now that we have a decentralized system in Tallahassee, or...?

(Heinz Mueller)

Can you tackle that [Cory]?

(Dr. Cory Berish)

I'll tackle that. I think it depends on where you draw the boundaries of where you're looking at. With respect to the City limits, it would be a centralized system. As you get further outside of the area where the sewers are in place, it would be a more decentralized system. So you have a mix. In terms of the future, as the City grows in terms of environmental quality, I think in many areas that you'd be preserving environmental quality by going to a centralized system versus a decentralized system, again by reducing the amount of pollution that would be sent to your various surface waters in this area. [Pause] Did she [recorder] get that question?

(Heinz Mueller)

Yeah, she [recorder] may not have gotten all of your question. Would you mind very much restating your question up here at the microphone? And I guess in the future, I'll have to ask all of you to come up to a microphone, if you would please.

(Speaker #1: Margaret Fogg from Audience)

[Unclear, probably: I thought we'd be informal, and I thought we...]

(Heinz Mueller)

Yeah, that's what I had hoped, but I guess what we need is a...

(Margaret Fogg)

My name is Margaret Fogg and I live at 1312 Carson Drive and on Lake Munson, and I represent the Munson Preservation Group. And my question is: Do you consider that we have a decentralized system or a centralized sewage system at this time?

(Heinz Mueller)

OK. Think the question...[has been addressed]. Are you satisfied with the response? Does that clarify it? OK. I would like to now go through the cards pretty much I guess in the order that they were filled out. The first individual I have is John Gray. Mr. Gray, would you mind coming up and using one of the microphones please, and stating your name and address for the recorder please? [Interruption due to wiring] Caution everyone that...careful not tripping on the wires, here.

(Speaker #2: John Gray)

Is the recorder on? First, I would like to take exception to the comment that seems to be always made at these meetings about the soils. Now I'm not necessarily a soil expert, but I think if you'll check your files, you'll have a letter that I sent to the Agency, the EPA agency, along with some references to soils. And, while there may be some soils in the north and the east that has a certain amount of pipe clay involved in it that would not be suitable for disposal of effluents, but by and large, most of that area has also a lot of sands. And this particular report that I referred to in my letter that was sent to you some time back, speaks contrarily to these statements; that that is never a site to dispose of effluent. And, I guess I'll accept your statement that it would simply take more land to dispose of the property, but I think it leaves the impression with a lot of the people that that's not practical to dispose of effluent in the north and eastern section of the City...of the County, and I would just like to say that I don't think that's quite right. I think you can dispose of a lot of it over there. Secondly, let me start on my little spiel, here. Referring to your report, to page ES-5, and I'll quote the statement. This has to do with alternatives evaluation. It speaks to the method and the mentality that you use to arrive at some of your alternatives. It says "[I]t should be noted that the items addressed during the rating process for each of the categories do not incorporate a weighting factor. Weighting of the items would have been difficult to justify because, though certain items could be considered more "important" than the others, the determination of a specific weighting value is highly subjective and dependent on the individual's or organization's needs and wants." After I poured over this report, I found that that's probably the most appropriate statement in the whole report, that most of these determinations in here are highly subjective and it depends on one's viewpoint whether you live in the northern or eastern section of the County or in the south/southwest section of the County. The values that you've always discussed here seems to always refer to some varied, smoky type of values, and you say that the impact that you would have in the south is less than impacts on people in the north. And, that once again depends on where you live, not how you crunch numbers in a report. But to me, this Draft Supplement we are discussing here tonight is an exercise really in misrepresentation. It's very blatant. This study does nothing more than sound off and agree with most of the issues that the Tallahassee 201 Sewer Plan has always espoused, with all the harmful effects that it will have on all the lives of those citizens that happen to live in the southern half of our County. Now this may be a Plan that the City has, that's the only route that they can go because of certain political pressures, but it is very harmful to half the citizens in half the area of the County. And we protested that Plan - the 201 Plan - then when we first read it and heard of it, and we protest this study now. It seems the wealthy and influential people of the County, which always seems to reside on the north and east sides of almost all counties in the country, seem to have sway over both City and now the EPA because this simply is a reflection, mirror reflection, of what the City has always wanted to do. The Impact Statement tries to overpower the average reader with massive data and numbers crunching that could have only come from someone's imagination, because the numbers are based on one's opinion as to what harm...how much harm can be done to a regional area of the County. So it simply goes back to one's opinion as to how harmful something it can be. Somehow, I've attended all these meetings and read most of these reports as best I could. You'd almost have to be up to Pharisee level to even read it, to about understand it. I doubt if he [Dr. Berish] understands it. But everywhere you seem to have a mind lock on a couple of words and this has been true since the very first day that we have met up here at these public hearings. Everywhere the word "treatment" appears in all these reports, always the word "south" follows. It's just...its like pounding a psychological point home to everyone who reads this book, that "treatment south," "treatment south", it always occurs. You never seem to grasp the fact that utilities demanded by a section of our County should also be located as near to the demand as possible. It's cheaper for the public, it's cheaper on the taxpayers, and it's fair. Everyone shares in the goodies. You only seem to think of a southern part of Leon County as a dumping place for the waste and pollution for the entire County. Somehow, the environment of those living in the southern half of the County is not very important. The environment and the clean good life style is only important for those that are wealthy enough to live in the eastern section of Leon County. Your attitude throughout this whole procedure has been: to hell with the land values and the neighbors and the health and their environment of the citizens living in the southern half of the County. Only those who lives in the other part of the County seems to have sway on demanding and receiving considerations to have a clean environment. And after being involved with this study and other EPA actions in the area, and projects in the area, I personally have come to the conclusion, this Agency seems to be just another government agency to protect the lifestyles of the influential and the better off people of the world. Only their welfare and their environment rates your protection according to most of the reports I've read. And I'm sure you can go to every County in the State of Florida and probably every County in this country, and you would find a similar condition being imposed upon the less fortunate people. So, see, when you tell me you're a national Environmental Protection Agency, it kind of becomes a joke when you live in the area where you consider your land values are no good, and we've received all the unsightly utilities that any agency or any municipal government seeks to put on us. I'm saddened by the behavior of the Agency and I personally don't intend to support too many of your mistaken goals in the future. I look for someone else to protect me and my family's environment, perhaps maybe the courts. Your report indicates that you selected Alternate 1 out of a total of nine. You twiddled it down to three, then you went down to Alternate 1. And even in the Alternate 1, you didn't even do the courtesy of including the proposed plan that the City officials intends to build in the northeast section. There's no mention of that. It doesn't even address the idea that a plant should be built in the northeast section of the County. It's completely left out. Was that a mistake or is that intentionally? And if it's intentional, I would like to know why, since the City themselves are proposing, at least they've been proposing for the last about 5-10 years, to build one up there. They intend to build a small one. It's about a 5-million gallon plant which, in my opinion, compared to the one we have in our section of the County, it's a little overgrown septic tank, when really the northern section should have a system three times the size we have in our area. And I'd just like to say that I protest the total summation of this report as it stands today, as to how it affects many lives in the southern half of this County. I thank you.

(Heinz Mueller)

OK. Thank you Mr. Gray. OK, the next person I would like to call is Jessie Brown.

(Speaker #3: Jessie Brown)

I'm Jessie Brown. I live at 1717 Old Briar Trail and am representing Munson Area Preservation, Incorporated. My neighborhood, as you well know by now, is opposed to the expansion of the southwest effluent sprayfield which would have destroyed a large section of the National Forest that attracted us to this area of the County. And I do understand from reading your report, that that's no longer under consideration and we're very greatful for that. If there's any representatives from Game and Freshwater Fish or the National Forest Service here tonight, I'd like to say "thank you". However, we are very displeased that the construction of a new sewage treatment plant in the northeast is not being recommended by the Supplemental EIS. The 201 Plan, which was approved by the City and County Commissions in April 1977, proposed the construction of a northeast plant. The City of Tallahassee's Master Sewer Plan acknowledges that the most significant demand on future wastewater management facilities will come from the northwest and northeast areas of Tallahassee, and proposes construction of a northeast plant. The Citizens Committee that drafted the Tallahassee-Leon County Comprehensive Plan included a statement that future City of Tallahassee sewage treatment plants shall be located in the northeastern quadrant of the City, and even your own Draft EIS, on page 2-20, discusses the fact that it has been determined that good engineering practices requires treatment of wastewaters as close to the source as possible, and we all know this would be in the northern part of the County. I think the dismissal of this proposed alternative shows poor planning for our future. Our City government has seen fit to establish a policy which prohibits putting parks in the unincorporated area of the County, but has no problem shipping their sewage and garbage to the unincorporated area. As a citizen living in the unincorporated southwest section of the County, I have a lot of problems with such a policy, especially when that same City government proposes infringing on the National Forest as a site for its wastewater facilities, one of the few recreational areas available to the citizens of this section of the County. I just want to go on record as saying I think that policy stinks.

(Heinz Mueller)

OK. Thank you for your statement. [Calling] Elmer, is it Leek?

(Speaker #4: Elmer Leek)

My name is Elmer Leek, and I live in the National Forest, right...it adjoins my property. I got 13 lots in Forest Lake Subdivision. And in 1973, I seen my water well flowing 3 foot above the ground. I seen the water running out the sides of the hills, from flood water. I've seen that happen six times since I've been out there in 18 years. And how anybody can consider putting the sewage treatment water in an area like that, I just can't believe it. I've waited, I haven't said anything, I kept quiet all these years, but all this has been going on. But it don't make sense. I'm a master plumber, and you don't put water on ground where the water level table is only 2 or 3 feet below the ground. It don't make sense. Now, the area...I made these notes...the area next to the proposed sprayfield adjoins a floodplain and a closed basin, that's a closed basin, there has no way out -- once that water...and on top of that, the City is dumping water in the sinkholes, and the sinkholes from Lake Bradford comes up in the sinkholes in the back of my house. And when there's...you get a lot of rain uptown, the water will rise for weeks out in the National Forest because it's coming up from the sinkholes and out of the ground. And then you want to spray the wastewater out there too? It don't make any sense. There's lakes out there. There was fish; I don't eat the fish out of the lakes anymore. But there is a chain of lakes right through the National Forest behind my house, and there is no way once the water gets in that basin, there's no way out. It has to seep into the ground, and yet they want to keep putting it out there. I can't understand it. But if they would consult the flood map...you [Dr. Berish] had a map out there a while ago; would you mind putting it back up there, is it possible?

(Heinz Mueller)

Yeah, we'd be glad to do it [DEISS Fig. 2-4 overhead replaced].

(Elmer Leek: Continued)

Show you where I live...[Discussion of overhead inaudible without a microphone]...if they would get some engineers out to check, they'll find what I'm saying is absolutely true. But nobody's ever sent an engineer out to check. Because the sand they say is fine. I'm like Mr. Gray, any clay...there's a lot of clay that will absorb more water than that will. And, so what they're doing, it doesn't make sense. But they...[Inaudible question from audience concerning Mr. Leek's house; probably: Is the house outside the floodplain?]. But I live there.

(Heinz Mueller)

OK. Thank you for your statement Mr. Leek, and we will look into your concerns as part of our final document.

(Mr. Leek)

It's a funny thing that they can go put an oil well down and everybody hollers don't put an oil well in the Gulf of Mexico, you know, we don't need the oil. But we can send 100,000 men over to try and protect someone else's oil. It's the same thing here. You got a National Forest and the Federal Government doesn't want to protect it.

(Heinz Mueller)

OK. Thank you for your comment. The next card I have is Barbara Rambo.

(Speaker #5: Barbara Rambo)

I don't really have anything prepared tonight, I...but I have to protest this wastewater coming to the south end of town. I feel like that the issue is not whether the preferred alternative is cost effective, readily implementable or whether it has few environmental impacts, but rather I feel that everybody in this town that does not live on the south end of town would like to send all the garbage to the south end of town that they don't want. And I would like to ask something. I'd like to know where you two gentlemen [Mr. Mueller and Dr. Berish] are from? Are you from Atlanta or do you live in Tallahassee?

(Heinz Mueller)

We're both from the Atlanta office.

(Barbara Rambo)

From Atlanta? OK. I just want to protest, and there's a lot I'd like to say. I may come back up here. Thank you.

(Heinz Mueller)

OK. Thank you for your comment. [Calling] Judy Hancock.

(Speaker #6: Judy Hancock)

Wondered if Dr. Berish might have expected to see me back up here again, to be sure we weren't going to site this on the National Forest. I'm Judy Hancock with the Florida Chapter of the Sierra Club, and I'm going to address my comments only to your not siting it on the National Forest, since I'm not familiar with the other sites. We're very pleased that the National Forest is no longer being considered. We think the long-term maintenance of the longleaf-wiregrass plant community is very high in the public interest and precludes any use as a sprayfield. Longleaf is a declining community and can only be assured consideration on public lands, particularly national forests, as they are very large land areas which are managed for bio-diversity and maintenance of native species. Many other public lands are not managed with those goals, and so we have opportunity on national forests we don't have on other lands. We don't think that the national forests are the place for biomass production. If this is done, it should be a private sector investment. We very much appreciate your determination that is responsive to our concerns, and which recognizes the high values of the longleaf community. We would like to ask, and I think I read it in your summary and noted in the Draft EIS, that we have some concerns about Gopher Frog migration, and I was wondering how you were addressing that with your preferred alternative. Do you have some plan for...?

(Heinz Mueller)

We're not prepared to really respond to that tonight, but we will be responding to that in the Final EIS.

(Judy Hancock)

OK. Thank you.

(Heinz Mueller)

Thank you for your statement. OK, I have one final card unless some more have been filled out. [Calling] Dan Hendrickson. Is that [pronounciation] close?

(Speaker #7: Dan Hendrickson)

My name is Dan Hendrickson. I'm also glad to be returning up here, since I spoke once before. I'll keep this brief. Tonight I'm here as a representative from the Big Ben Group Sierra Club and as a member of the Springhill Road Group. Want to initially say we appreciate very much you all taking seriously the comments from so many people and the input from the agencies that resulted in your deferring and actually staying away from the National Forest alternative for the sprayfields. Seems to have been a very sound decision and we appreciate what you and the other agencies did in taking those concerns so seriously. We'd also compliment in your list of what you call "mitigative measures," the recognition there that the same concern that you used in the, as you referred to it, the determination that wildlife concerns may be more important than habitat area in our wiregrass community in that area of the forest, that the wildlife corridor would be an important mitigative measure, as you call it. We would prefer to try to not...get away some from the word "mitigation" because it's been over-used and actually used in ways that's been more destructive of the environment in the past few years, especially in Florida. But that section that you call "Mitigative Measures" could be seen as "Environmental Protection Measures" and we would, of course, encourage you in any ways that you can and we would be willing to offer some help in formulating some ways of strengthening those environmental protection measures. But in there you'd made comment that the importance of keeping contiguous wildlife corridors, and we agree that it would be important not to fragment important wildlife habitat areas that are left in the County, since those are rapidly enough disappearing.

We had a couple of concerns on the negative side, just more or less questions that we would like for you to consider as you are getting ready to draft the final version. One of them, as you probably know, that we're not involved in -- and your lucky -- this County and the City both have gone through an arduous process the last year and a half in putting together a local comprehensive plan, and in Florida those local "comp" plans have the power of law, nothing can be done here that's not consistent with what those plans prescribe. The plan that was submitted recently is the proposed plan. It's not yet the definite and final plan. We're expecting changes from the State at any time, or in the next few months. But at any rate, as part of that planning process that the local governments went through, that involved hundreds, literally hundreds, of citizens over a year and a half or longer. There were a number of additional statistical and other data collection of information that was used in formulating some of the policies that the County and City governments ended up trying to formulate. And since you expressed a concern -- you mentioned new data as part of the reasons for this Draft -- that we would strongly encourage you to look into and to incorporate the new data that has also been recently generated in the formulation of that local comp plan, so when the final version comes, it might be as up to date in terms of where some of those...the underlying statistics, especially looking towards the growth measures and where the projections for growth are in the County and City. Some of that's sort of changed the way people have seen it in the last year or two. We also...I would also reiterate Mr. Gray's concern, that data that you all use not just come from the City's own planners, and that there may...would suggest that there may be other sources of information that we could still call more information in terms of where the projected growth needs are as well as those environmental measures that you talked about were not totally satisfied that even the local comp plan and its supporting documents truly reflect all the concerns that should be addressed. So if there are...is time for you to incorporate some of those additional studies, we would appreciate it. Second, to do with the comp plan, again picking up on what Mr. Gray suggested, the comp plan did formalize the reflection that somewhere off in the future, the City and County is not going to just continue to capitalize its sewage treatment facilities in the south. So we would suggest that in order to be consistent and to incorporate those future...what if it ended up becoming political decisions, we think of them as being practical and realistic, not just equitable but that they make sense. That those plans that say the northeast is going to have to start supporting its own sewage should be addressed a little more seriously in this Draft...Final EIS, if possible, especially in order to be somewhat consistent with the local comp plan. And then third, in the list of environmental protection, you didn't perhaps specifically enough, address the issue of possible ground-water contamination, which you did mention in your list of preliminary environmental concerns of the impacts of some of these facilities. But particularly one that I'm concerned about, in addition to those Judy [Hancock] mentioned and others, would probably impact what Mr. Leek is talking about in terms of those lakes we have in that area of the National Forest, that you probably could do some mitigative measures or some environmental protection measures more carefully, having to do with the sludge and sludge deposit area, particularly the airport site. A number of us seriously question when is there going to be enough, I mean at what point are we putting too much sludge there, and it's going to be too late and the results of contamination indefinite, over-nutrification of some of those lakes. We don't know what some of those results are going to be until it's probably too late. So we would request that you look a little more carefully into what the City's plans are for expanding the sludge fields. Otherwise, we're looking forward to seeing the Final Draft and would hope that in that Draft you could make available, as much as possible, more of the underlying statistics and data and some of the analysis that you've been able to use in pulling together your valuable wisdom. We appreciate it.

(Heinz Mueller)

OK. Thank you for your comment. OK, I have one more card here. [Calling] Mildred Hall.

(Speaker #8: Mildred Hall)

I have a question mainly of concern. As a biologist, I notice in your report, and I haven't read all of the reports...have you done a study to see where the water goes by using a dye? That is one way to show how filtration is done to prove that it's better to put it on the south side as opposed to putting it on the north end of town. I live on the south end of town also and I have a problem with Lake Bradford because the smell is unbelievable if you live near there, and a lot of people just, you know, turn tail and run as opposed to staying in the area, so they'd have to put up with it. I support Mr. Hendrickson's remarks, what he said already. Some of these same things have been said, and in the past people use this as a sounding board and, of course, nothing really happens. So, I would like to see some studies done on some of these things and put in lay terms where all people, that you don't have to be a biologist or an engineer...a person to read some of this material. Almost anybody, almost half of the elected officials, can't read a lot of this information unless they've had some technical training. Thank you.

(Heinz Mueller)

Thank you for your comment.

(Question from the Audience: Mr. Leek)

Could I add something to Ms. Hall?

(Heinz Mueller)

Would you like to...OK, is there anyone else who has signed a card Chris [Hoberg]? [Answer: No] OK, Mr., OK, I think we've got a few moments, Mr. Leek, would you like to come back forward? I was going to call a short recess and give everyone another opportunity here to...but go ahead if your comments are...

(Speaker #9 [Repeat Speaker #4]: Mr. Leek)

OK. What I wanted to mention was that the airport, the whole complete airport, is draining all the runoff stormwater into the sinkholes and those same sinkholes come up the back of my house. I can't get anybody to test them. I've tried the State; nobody wants to test to see if there's any pollution or anything going into them. And the sludge that they're dumping out there, all the sludge from the sewer plant on Capp Circle is going around the edge of the airport and the edge of the National Forest, and the same area, the closed basin I'm talking about, when you get the rain from up on...the land where they're dumping is higher than the basin and all that runoff is coming down into that basin, and nobody tests it to see if there is any pollution or anything. And all the...your phosphates and enzymes and the detergents from the City from the sewer plant and all of that, if they want to spray it into the National Forest, it's going to wind up in the lakes. There's no place else for it to go. That's all I wanted to add.

(Heinz Mueller)

OK. Appreciate hearing from you on those concerns. I will now call a short recess. If there's anyone else in the audience that would like to sign a card to speak, we will readjourn in approximately five minutes or so.

[After the recess, no additional speakers came forward. Heinz Mueller then officially called the Public Hearing adjourned. (Not recorded)]

To: United States Environmental Protection Agency

Aug. 9, 1990

The area next to the proposed spray fields adjoins a flood plain and a closed basin. Also a chain of lakes are nearby.If anyone would take a close look ,they would seethis area is not suitable for this purpose and the last thing we need is more water.Some one needs to look at a flood map of this area before this project continues.

Elmer Leek
RT. 16 Box 9055
TALLAHASSEE,FLA. 32310
Phone 904-575-8051

Statement by Jessie Brown at EPA Public Hearing
Representing Munson Area Preservation, Inc.
August 9, 1990

My neighborhood, as you well know by now, is opposed to the expansion of the southwest effluent sprayfield which would have destroyed a large section of the beautiful National Forest that attracted us to this area of the County. I understand this option is no longer under consideration and for that we are grateful.

However, we are very displeased that the construction of a new sewage treatment plant in the northeast is not being recommended by the Supplemental EIS. The 201 Plan, which was approved by the City and County Commissions in April 1977, proposed the construction of a northeast plant; the City of Tallahassee's Master Sewer Plan acknowledges that the most significant demand on future wastewater management facilities will come from the northwest and northeast areas of Tallahassee and proposes construction of a new northeast plant; the citizens' committee that drafted the Tallahassee-Leon County Comprehensive Plan included a statement that future City of Tallahassee sewage treatment plants **shall** be located in the northeast quadrant of the City and even your own draft EIS on Page 2-20 discusses the fact that it has been determined that good engineering practice requires treatment of wastewaters as close to the source as possible and we all know that this would be in the northern part of the County. I think the dismissal of this proposed alternative shows poor planning for our future.

Our City government has seen fit to establish a policy which prohibits putting parks in the unincorporated area of the County but has no problem shipping their sewage and garbage to the unincorporated area. As a citizen living in the unincorporated southwest section of the County, I have a lot of problems with such a policy especially when that same City government proposes infringing on the National Forest as a site for its wastewater facilities, one of the few recreational areas available to the citizens in this section of the county. I think we will all have to agree that this policy "stinks."

cc: City Commissioners
County Commissioners
District 1 County Commission Candidates

USEPA RESPONSES TO VERBAL AND WRITTEN PUBLIC HEARING COMMENTS

(Speaker #1: Margaret Fogg)

Thank you for attending and participating in the Public Hearing.

Your question whether USEPA considers Tallahassee to presently have a decentralized or centralized sewage system, was addressed by USEPA representative Dr. Cory Berish at the Public Hearing and is part of the Public Hearing transcript. Dr. Berish stated that: "I think it depends on where you draw the boundaries of where you're looking at. With respect to the City limits, it would be a centralized system. As you get further outside of the area where the sewers are in place, it would be a more decentralized system. So you have a mix. In terms of the future, as the City grows in terms of environmental quality, I think in many areas that you'd be preserving environmental quality by going to a centralized system versus a decentralized system, again by reducing the amount of pollution that would be sent to your various surface waters in this area." Also refer to the expanded description provided in Section 1.1.2 of this FEISS.

(Speaker #2: John Gray)

Thank you for attending and participating in the Public Hearing.

The USEPA has no record of your letter to this Agency that you referenced regarding soil permeability in north versus south Leon County. Therefore, by letter dated November 15, 1990 (copy enclosed at end of these nine (9) responses to the Public Hearing speaker comments), the USEPA requested a resubmittal of your letter. Since to our knowledge, this Agency has not received a resubmitted copy of the letter, USEPA is providing a generic response regarding soil permeability in the northern versus southern portions of Leon County:

References in this FEISS to soil characteristics and distribution patterns include the Executive Summary (Figure ES-4), the Project Updates Summary, and Sections 2.1.4, 2.2.2, 2.3.5.1, 2.5.2, 3.2.1.2, 4.5 (Figure 4-1), C-1, the USEPA responses to received comment letters on the DEISS (Letter #5: Bradley Hartman, State of Florida FG&FWFC), as well as the cited Leon County Soil Survey (USDA [SCS] and USFS, 1981).

From a soils suitability perspective, it appears from the 1981 Soil Survey of Leon County, Florida (USDA [SCS] and USFS, 1981) that the northern part of Leon County is generally less suitable for septic tank and spray irrigation wastewater disposal than the southern part. This is not to say, however, that favorable soils for septic tanks and spray irrigation do not exist in both northern and southern areas of Leon County or that unfavorable soils do not exist in southern Leon County. However, the USEPA understands that the Leon County Public Works Department apparently conducted a spray irrigation site assessment in 1989 and determined that more acreage would be needed to dispose the same quantity of effluent in the selected northern alternative sites than in the selected southern alternative sites due to soil types. This suggests a slower percolation rate at the northern sites.

The USEPA understands from the City of Tallahassee that the City would concur with the County with such a trend for northern versus southern Leon County in general, since the northern portion of the County appears to be generally underlain by layers of clay and since sandy upper horizons are rather shallow. The City has conducted geohydrologic analyses by contractor for nine sites in northeastern Leon County in 1991. Core soil samples generally exhibited clay layers of varying degree in the samples collected. Such clay layers would affect the drainage capabilities of the area and thus its suitability for septic tank and spray irrigation disposal.

This trend also generally agrees with Table 2-9 of this FEISS. When the acreage predicted to be required for agricultural spray irrigation in the SE (component D1) is compared to agricultural spray irrigation in the NE (component D2), the average acreage needed per effluent flow (mgd) is much greater in the NE (430 acres/mgd) than in the SE (188 acres/mgd). The same trend also exists for the NE forest irrigation site (component D4: 524 acres/mgd) compared to the SE forest irrigation site (component D3: 197 acres/mgd). (Note: This trend, however, is not true in every instance since the artificial wetlands with RIBs disposal in the SE (components D11 and D16) are predicted to require the same amount of acreage as in the NE (components D12 and D17), i.e., 111 acres/mgd). For Table 2-9, the maximum application rate was used to estimate acreages and was based on the soils in the 1981 Leon County Soil Survey at the given sites. However, the USEPA recommends that soil percolation testing be conducted at any site proposed for irrigation be implementation to determine actual soil percolation rates.

It may also be noted that the City indicated in an October 27, 1992 letter to the USEPA (Refer to the end of the "Project Updates Summary" Chapter following the "Executive Summary" of this FEISS) that the USEPA has "...been involved with readdressing the Environmental Impact Statement of 1983 because of septic tank failures. A joint City and County Commission letter was sent to the EPA requesting that you [USEPA] revisit the 1983 decision. This request was prompted by septic tank failures in the County, beyond the city limits. It's difficult to imagine that the [Leon] County continues to promote the septic approach given the problems that are encountered with these in clay soil areas." The USEPA recalls participating in a site visit of the greater Tallahassee area in 1987. Several failing septic tanks were observed, with more failures being noticed in northern Leon County than in the southern portions of the County. Although percolation tests were not conducted during the site visit, the effects of differences in soil filtration were observed among as well as within some of the residential subdivisions visited. This observed trend for northern vs. southern Leon County are generally supported by the 1981 Soils Survey for Leon County.

Based on the "General Soil Map" for Leon County in the 1981 Soil Survey, Leon County is dominated by three soil associations: the Orangeburg-Lucy-Norfolk association in the northern part of Leon County and the Kershaw-Ortega-Alpin and the Dorovan-Talquin-Chipley associations in the southern part of Leon County. The Orangeburg-Lucy-Norfolk soils and the Kershaw-Ortega-Alpin soils are generally well-drained while the Dorovan-Talquin-Chipley soils are generally not well-drained. Specifically, the 1981 Soil Survey classifies the Orangeburg-Lucy-Norfolk soils as "well drained soils" and the Kershaw-Ortega-Alpin soils as "excessively drained and moderately well drained soils," while the Dorovan-Talquin-Chipley soils are considered "somewhat poorly drained to very poorly drained soils." Of the two well-drained soil associations, the depths of these sandy associations differ significantly: the Orangeburg-Lucy-Norfolk soils are sandy to only 20-inch depths with loam below, compared to sandy 20-40 inches deep with loam below or are loamy throughout (Note: "loam" is a soil type that is defined in the 1981 Soil Survey as a mix of clay (7-27%), silt (28-50%), and sand (<52%) particles.) By contrast, the Kershaw-Ortega-Alpin soils are sandy to 80 inches or more, with some having loamy layers (lamellae) below 45-inch depths.

Regarding the suitabilities of these soil associations for septic tank absorption fields, Table 11 of the 1981 Soil Survey presents the "restrictive soil features" of existing soil types. All listed Orangeburg, Lucy and Norfolk soil types are classified as "moderate: percs slowly" and/or "moderate: wetness," with "moderate" being defined as having unfavorable soil properties for the given activity. The Kershaw soils are classified as "slight" which is defined as soil properties generally favorable for the activity. Oretega and Alpin soils are classified as "severe: poor filter," with "severe" being defined as soil properties very unfavorable for the activity. The Dorovan, Talquin and Chipley soils are classified as "severe: wetness" or "severe: floods, wetness." These classifications indicate that only the Kershaw soils have properties favorable for septic tank absorption field infiltration while the others do not adequately drain or drain too well and therefore do not provide proper filtration (i.e., adsorption of inorganics (metals), microbes, etc.). Leon County therefore appears to be a mix of soil types with "slight," "moderate" or "severe" classifications regarding the suitability for septic tank activity. The preliminary 1988 Leon County MW&SSP also addresses the issue of soil suitability for septic tanks within Leon County.

Specific to the proposed Eastern Expansion of the existing SE Sprayfield in southeastern Leon County, Figures ES-4 and 4-1 taken from the Leon County Soil Survey (USDA [SCS] and USFS, 1981), present a composite of the soil types in the Eastern Expansion area proposed by the City for near-future construction as part of preferred Alternative 1. Based on the 1981 Soil Survey, the soils of the Eastern Expansion Area sprayfield site proposed by the City are dominated by Ortega Sand, Kershaw Sand with a 0-5% slope, Talquin Fine Sand, Chipley Fine Sand and Kershaw Sand with a 5-8% slope, respectively. Of these, only the Kershaw sands are classified as favorable for septic tank absorption fields (classified as "slight," i.e., having favorable soil properties for the activity).

Of the portions of the proposed Eastern Expansion Area sprayfield proposed for irrigation (i.e., center pivot irrigation Areas A-E and adjacent fixed head irrigation areas: Refer to Fig. ES-5 or 4-2 of this FEISS), irrigation areas associated with and adjacent to Areas A, B, and D primarily contain Kershaw Sands while irrigation areas associated with and adjacent to Areas C and E primarily contain Ortega Sand. As indicated, Kershaw Sands are considered suitable soil types for septic tank absorption fields while Ortega Sand would not be favorable due to poor filtration capabilities (too well-drained sands). However, it should be noted that the City's proposed project is not septic tank disposal of raw sewage, but rather spray irrigation of monitored, secondarily-treated sewage effluent. As such, spray irrigation would disperse effluent over a greater area than septic tank disposal and also would dispose wastewater of a considerably higher water quality than untreated raw sewage wastewater of septic tanks. (Specifically, all of the vertical soil horizons are utilized for filtration during spray irrigation whereas several inches of soil filtration are not utilized in septic tank drainage fields, since drainage lines are buried several inches below the surface; spray irrigation utilizes the entire horizontal soil surface area whereas septic tank fields only utilize soil areas associated with the drainage lines; and secondarily-treated spray effluent requires considerably less soil filtration for purification than untreated septic tank raw sewage wastewater.)

Because of the filtration limitations of the Ortega Sand in the proposed irrigation areas associated with and adjacent to Areas C and E as well as some unfavorable soils interspersed in irrigation areas associated with and adjacent to Areas A, B and D, the USEPA recommends reduced irrigation application (inches/week) in these areas. If monitoring exhibits compliance with State of Florida groundwater quality standards and monitoring is conducted to the satisfaction of the State of Florida, additional application can be tried if commensurate with groundwater quality compliance. Groundwater monitoring is also essential since the entire Eastern Expansion Area lies in the Woodville Karst Plain, i.e., Karstic geology that is subject to water dissolution and collapse (sinkholes). In any areas of collapse, irrigation should be stopped immediately in those areas and the State of Florida notified. The USEPA recommends that no effluent be sprayed in a reasonable surrounding area of the existing sinkhole depressional area located within the proposed fixed head irrigation area adjacent to Area D, as well as any other potentially discovered sinkhole areas (Refer to Fig. ES-5 or 4-1 of this FEISS). The USEPA further recommends that the State of Florida consider the existing soil characteristics and Karstic conditions of the proposed Eastern Expansion Area in their permitting decision for the City's proposed sprayfield expansion.

As indicated in Section 2.1.4, septic tank drainfield failures have been investigated and documented for the Killearn Lakes Subdivision area located in the northeast portion of Leon County. Failures were generally due to a combination of slowly permeable soils, high water table elevations in confining layers, storm water runoff and drainage, and high density development. As a consequence, the Leon Public Health Unit recommended a central sewage system and adequate storm water collection system for the area. The Public Health Unit also advised restrictions for issuing on-lot sewage disposal system permits. However, this is not to say that such failures were documented throughout Leon County, since soil permeability and other conditions vary in the County, with some soils being suitable for septic tanks. The County is currently compiling a computer-based inventory of septic tank drainfield failures. However, this inventory only includes "new" failures and therefore cannot provide a historical record to quantify the problem caused by failures or to identify all specific problem areas.

It should also be noted that the Leon County Public Health Unit has indicated that the successful operation of septic tank drainfields in the study area is a function of available soil storage above a confining layer and not necessarily the capacity of the soil to move water. Accordingly, tests and the measuring of water table elevations before development may be misleading for determining the suitability of areas to accommodate drainfields.

Your comments also included a quotation on page ES-5 of the DEISS indicating that no weighting factor was used in the EIS rating process for alternatives since the relative importance of each item addressed would be subjective. This was interpreted in your comments to mean that most DEISS determinations were subjective and dependent upon one's viewpoint and whether one lived in the northern or southern part of the County. USEPA understands that weighting factors, matrices and other forms of rating systems are somewhat subjective forms of assessment, particularly depending on who conducts the analysis. However, the selection of Alternative 1 as the preferred alternative of the FEISS was based on the evaluative ranking results of the four criteria considered (cost-effectiveness, reliability, implementability, and environmental impacts) presented in Table ES-1 and Table 4-1. This matrix evaluation was developed at the DEISS preparation stage (1989). The overall favorable ranking was attributed to: (1) projected relatively low capital costs, (2) the City's successful experience in operating agricultural spray irrigation facilities for effluent disposal, and (3) negative environmental impacts could be expected to be reasonably minimized. Alternative 1 is also a practical alternative since it would not only utilize the City's successful experience in agricultural spray irrigation, it also proposes to expand the City's existing SE Sprayfield as opposed to developing a new, separate sprayfield facility (or a new disposal approach). Of the final four alternative considered, Alternative 1 was rated the most cost-effective of the three centralized alternatives considered; was rated the most reliable given that the proposed project would expand the City's existing SE Sprayfield as opposed to developing a new, separate sprayfield facility; and negative environmental impacts could be expected to be reasonably minimized despite the fact that the proposed project ranked as one of the two least environmentally preferable. Based on these criteria, Alternative 1 resulted in the most favorable overall ranking, tied with Alternative 2. However, Alternative 1 is considered the preferred alternative over Alternative 2 in the EIS Supplement since the City has had successful experience in agricultural spray irrigation proposed in Alternative 1 as opposed to forest spray irrigation proposed in Alternative 2. In general, Alternative 1 is a practical alternative that represents a continuation of the City's agricultural spray irrigation approach to the disposal of treated effluent through an expansion of the City's SE Sprayfield, as well as the irrigation of existing local golf courses.

Regarding the relative harm to residents in the north versus south parts of Leon County, USEPA understands from the City that citizen concerns regarding aerosol spray drift, odor, and decreased property value were voiced by some 20 speakers in a public hearing held by Leon County in Tallahassee on July 23, 1991. One residence exists immediately adjacent (east) of the proposed Eastern Expansion (near Pivot Area C), and several other residences exist further east of the site and north of Tram Road. In general, the public health issue relative to spray irrigation of wastewater effluent is of concern to residents living adjacent to or downgradient/downstream/downwind of the SE Sprayfield and the adjacent proposed eastern Expansion area as well as golf courses should they be utilized for spray irrigation. Potential public health risks are related to aerosols containing non-pathogenic bacteria and pathogens (e.g., pathogenic bacteria, viruses, protozoans and other infectious microbes) migrating off-site from the sprayfield area and the potential groundwater contamination of the Floridan Aquifer, a drinking water source. Post-irrigation use of the golf courses may also be of concern if effluent pathogens are not completely disinfected. (Also refer to Section 4.6).

It is generally documented (Crook, 1990; Asano et al., 1992) that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater. However, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious. However, several precautions can be taken to reduce the human health risk at spray irrigation sites. These include effluent treatment, effluent monitoring, on-site containment of aerosols, and groundwater monitoring.

The USEPA understands from the City that City effluent is disinfected in accordance with State of Florida standards and permit requirements. The City's wastewater treatment processes are the activated sludge process, chlorination, and natural ultraviolet light (sunlight) treatment in the holding ponds. Prior to effluent spray irrigation, the City also monitors its effluent for 40 parameters including 17 metals on a monthly basis; monitors for 11 parameters (biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen, residual chlorides, pH, fecal coliforms, and other parameters) on a twice a week basis; and monitors for the six (6) above parameters on a daily basis.

Studies have shown that the health risk associated with aerosols from sewage effluent spray irrigation sites is extremely low, particularly for irrigation with wastewater that has been disinfected. Effluent sprayer nozzle design can also help minimize aerosol drift effects. The dispersal of aerosols is also directly related to wind velocities. Local prevailing winds average 7.7 miles per hour and are from a southerly direction in the spring and summer and shift toward a more northerly direction near the end of the year. Other factors which prolong pathogen viability and increase the distance of aerosol travel are increased relative humidity, lower temperature, and darkness. Studies also indicate that pathogens tend to survive longer in an aerosol than do the traditional indicator organisms.

The USEPA also understands from the City of Tallahassee that fecal coliform levels are monitored by the City before effluent is spray irrigated on sprayfields and after irrigation via groundwater monitoring. The USEPA also understands from the City that the water quality limits for fecal coliform levels used by the City for effluent prior to sprayfield irrigation is the State of Florida standards defining "secondary treatment" of wastewater, i.e., <200 organisms per 100 ml of effluent. Although there are no USEPA or federal standards for fecal coliforms for spray irrigated effluent, this criterion is consistent with USEPA guidance from the Requirements Memorandum #79-3 dated November 15, 1978 of the former Construction Grants Program (USEPA, 1978). The concepts of this memorandum were incorporated in a USEPA Technology Transfer manual entitled "Land Treatment of Municipal Wastewater" (EPA No. 625-1-81-013) (USEPA, 1981). The 200 counts/100 ml of effluent criterion is USEPA's fecal coliform criterion for bathing (swimming) waters. It is presumed that water considered safe enough for swimming (which could include incidental drinking) would be adequate for irrigation of sprayfields, particularly with vegetated buffers. In the absence of federal standards regarding acceptable remaining levels of fecal coliforms in sprayed effluent, the USEPA recommends that the State of Florida the use, at a minimum, the above federal guidance (USEPA, 1981) to help protect public health and the environment during their permitting decision for effluent sprayfields in addition to any appropriate State of Florida regulations (Chapter 17-640 F.A.C.) for public access areas.

The proposed Eastern Expansion sprayfield of the preferred Alternative 1 is to include evergreen vegetative buffer zones around the site perimeter and considerable wildlife corridors between irrigation areas (See Figures ES-5 and 4-2). The use of forested buffer and corridor areas should greatly reduce the spread of aerosols off site by acting as a barrier and by reducing wind velocities. Buffer strips located at the sprayfield external boundaries (100 to 400 feet wide are to be retained/created and consist of dense evergreen natural/silvicultural tree vegetation, while wildlife corridors are to be retained and consist of various natural/silvicultural trees and natural understory vegetation (a portion of these proposed corridor areas will continue to be timbered by the St. Joseph Land and Development Company although the Florida Game and Freshwater Fish Commission has recommended that logging be limited to alternate rows of planted pines with exposed areas between remaining trees being maintained to benefit the habitat of the protected Gopher Tortoise). Such corridor and evergreen buffer vegetation should reasonably protect adjacent and nearby residents from contacting aerosol dispersion from the proposed Eastern Expansion sprayfield. In addition to the vegetative buffer areas, the USEPA also recommends that the City implement other environmental protection measures (Refer to Section 4.7) such as monitoring weather conditions to avoid spraying effluent during inclement conditions (e.g., rainy, wet, windy, freezing conditions) if spraying during those conditions would be expected to cause detrimental environmental or human health effects, or be considered ineffective from an effluent disposal perspective. Similar prudent spraying operations should also be undertaken during periods of increased relative humidity, lower temperature, and darkness since the above-noted studies have shown that these conditions prolong pathogen viability and increase the distance of aerosol travel. It is also recommended that the City consider any reasonable public complaints made before or during operation of the proposed sprayfield expansion regarding effluent aerosol dispersion or other operational impacts.

In general, reasonable protection of residents neighboring a sprayfield should be possible through the proper design and implementation of appropriate effluent treatment methods, frequent effluent monitoring of treated wastewater prior to irrigation, natural ultraviolet light (sunlight) disinfection, prudent spraying operations, use of evergreen forested buffer areas along external borders of sprayfields, use of forested corridors within the general sprayfield area, and groundwater monitoring. The spray application of wastewater directly to forested areas, as opposed to open agricultural fields, would further reduce the risk associated with aerosols (forest irrigation is proposed by the City as a small demonstration project within Alternative 1).

The spray application of wastewater to golf courses and other public access areas, which would provide greater public exposure than agricultural or forest sprayfields, requires additional treatment for suspended solids removal and high-level disinfection under State of Florida regulations. Compliance with these regulations should greatly reduce the health risks associated with aerosols at golf courses. Irrigation of golf courses using wastewater effluent is also not an uncommon practice since 84 golf courses in Florida were being irrigated with wastewater in 1991. In addition, golf course spray irrigation would require, per FDEP stipulation (FDER, 1991), that an alternate disposal method be made available as a back-up. It is the USEPA's understanding from the City that such a contingency does not presently exist.

Potential public health effects from animal vectors at spray irrigation sites would be minimized through effluent disinfection. Such effects could be further minimized through prudent spraying operations that allow acceptable effluent soil infiltration rates that avoid ponding.

Relative to groundwater human health concerns, the City is conducting an on-site groundwater monitoring program for its existing effluent sprayfields. Historically, over 60 monitoring wells have been drilled and tested at the SE Sprayfield site during interagency cooperative studies. Although the City has been monitoring wells for some time, the State of Florida required monitoring via a Groundwater Monitoring Program by permit condition since November 1, 1984. The City now quarterly monitors seven (7) compliance wells at the SE Sprayfield for six (6) parameters: NO_2 (nitrite) and NO_3 (nitrate) as nitrogen; nitrites; total Kjeldahl nitrogen; chlorides; dissolved organic carbon (DOC); and fecal coliforms. Pesticides and herbicides are also monitored annually.

Based on this monitoring program, the USEPA understands from the City that the City discovered five (5) nitrate-nitrogen groundwater quality violations in one of the seven compliance wells at the City's SE Sprayfield. The USEPA further understands from the City that these violations occurred at Compliance Well No. SE-22 during 1989, 1990 and 1991 and that causes included a faulty well construction and application techniques for additional (non-effluent) fertilizer. The nitrate concentrations in Compliance Well No. SE-22 during those sampling periods were 10.7 mg/l and 10.1 mg/l (1989), 10.3 mg/l and 10.8 mg/l (1990) and 10.2 mg/l (1991), compared to the 10.0 mg/l State of Florida limit for groundwater nitrate-nitrogen. Overall, four (4) other compliance well violations were monitored (also for nitrate-nitrogen) at the City's SW Sprayfield during 1986, 1987 and 1988. The USEPA understands from the City that causes included the fact that a stockpile of dewatered sludge was placed near Compliance Well No. LS-25. The nitrate concentrations in Compliance Well LS-25 were 11.8 mg/l (1986), 10.3 mg/l and 11.0 mg/l (1987) and 11.2 mg/l (1988). The USEPA further understands from the City that the exceedances in these two wells were noted by the FDER by letter to the City but were not formally filed as violations. The discussed exceedances involving the faulty well, additional fertilizer and dewatered sludge were resolved by constructing a new nearby well and adjusting farming techniques at the SE Sprayfield, and by removing the sludge at the SW Sprayfield. The USEPA understands from the City that these exceedances have been resolved by the City through corrective actions and monitoring has shown no additional groundwater quality violations for monitored parameters. As a rule, nutrient groundwater quality problems can be minimized or prevented.

With regard to your concern about the complexity of the DEISS, the document is and must remain a technical document. As such, it will be too complicated and technical for some readers (and perhaps not detailed enough for others). However, through the NEPA process, a public hearing was held, a 45-day public comment period for the DEISS was provided, and a 30-day public comment for the this FEISS is being provided, so that adequate time for clarification should exist. The USEPA believes the Executive Summary, for example, is a readable synopsis that can be generally understood by the layman.

The USEPA does not disagree that it is good engineering practice to locate treatment plants near the sewage source since the amount of conveyance pipe would be decreased. However, this was only one consideration during the alternative analysis. Also as indicated below, the USEPA understands from the City that the northeast is the next likely area for potential treatment plant construction.

With regard to your comment concerning the City's construction of a new sewage treatment plant in the NE portion of the Leon County, the concept of a NE Wastewater Treatment Plant is not a new one. It was promoted in the 1977 201 Plan, but was not the preferred alternative in the USEPA 1983 FEIS. The City's 1988 Master Sewer Plan, however, calls for a NE Wastewater Treatment Plant to be constructed after the year 2010. The USEPA understands from the City of Tallahassee that a Citizens Advisory Committee (for a NE treatment plant) had been established to consider the establishment of a NE treatment plant and to determine where such a plant could be located and how best to dispose the effluent generated. The Committee, however, did not provide a final recommendation and has not reconvened on the issue. The USEPA further understands from the City that the City had made a commitment that a wastewater treatment plant in NE Leon County would be constructed in early 1997. Subsequently, however, the USEPA understands from the City and Leon County that the County unilaterally defranchised (cancelled) the City's water and sewer service zones outside City limits, so that the City consequently felt that a NE Plant would not be needed in the NE area (where the City's "urban services area" outside the City limits was located).

However, the City of Tallahassee and Leon County have more recently signed a new "Water and Sewer Agreement" (1993) on February 11, 1993, which establishes a new urban services area outside of the City in northern Leon County. The USEPA also understands from the City that the northeast is the next likely area for potential treatment plant construction. The City already owns an 80-acre site in the northern part of the City that was part of the Welaunee annexation package that could potentially be used for such a NE plant. The site is located south of Interstate Highway 10 and north of Miccosukee Road, in the SW quarter of Section 12, Township 1.N., Range 1.E. (Also refer to Figure ES-3, where this site is depicted as the alternative "Northeast WWTP"). Given the public interest in such a plant (as opposed to conveyance of northern wastewater for treatment and disposal in southern Tallahassee) as demonstrated at the USEPA Public Hearing on August 9, 1990, local decision-makers may wish to further consider such a potential treatment plant with appropriate effluent disposal in their future

Tallahassee wastewater management plans.

(Speaker #3: Jessie Brown)

Thank you for attending and participating in the Public Hearing and providing associated written comments.

You are correct in noting that the alternative that would expand the existing Southwest Sprayfield (Alternative 1A) has not been selected by USEPA as the preferred alternative; Alternative 1 has been selected. As such, sprayfields (Alternate Site No.1 and No.2) in the National Forest are not proposed in this FEISS (or DEISS). However, the Alternative 1A aspect of expanding the Thomas P. Smith Wastewater Treatment Plant facility is still proposed in Alternative 1, although sprayfields are proposed as an Eastern Expansion and a Western Expansion Area of the City's existing Southeast Sprayfield. It is the USEPA's understanding from the City of Tallahassee that the City currently only proposes near-future construction in the Eastern Expansion Area and at the T.P. Smith facility since acquisition of and construction at the Western Expansion Area appears unlikely at this time.

With regard to your interest in the construction of a new sewage treatment plant in the NE portion of the Leon County, please refer above to the related response to Speaker #2 (Gray).

In response to your reference to page 2-20 of the DEISS, the USEPA does not disagree that it is good engineering practice to site treatment plants near the sewage source. Good engineering practice generally refers to the procedures involved in planning, designing, constructing, and operating the most cost-effective systems that meet the needs of the people served while considering impacts on the environment and energy sources. Since a major component of designing and operating wastewater management facilities is the treatability of the wastewater, the problems associated with transformations that occur as wastewater is transported becomes a consideration. However, this was only one consideration during the alternative analysis for evaluation of alternative cost-effectiveness and environmental impacts. Overall, results from the matrix developed for the project indicated that Alternative 1 and Alternative 2 were the most preferable, with Alternative 1 being selected due to the City's successful experience in agricultural spray irrigation. The additional costs that would occur when conveying untreated wastewaters over a relatively large distance (including costs for preventing pipe corrosion and odors and for treating more septic sewage) should be compared against the costs for expanding an existing treatment plant (i.e., the TPS plant) versus the costs for siting, constructing, and operating a separate, new plant (i.e., a NE plant).

(Speaker #4: Elmer Leek)

Thank you for attending and participating in the Public Hearing and providing associated written comments.

Your comments concerning the potential location of sprayfields in the National Forest near your residence are well taken. Alternative 1A was not selected and is not proposed in this FEISS (or DEISS); Alternative 1 has been selected. However, the Alternative 1A aspect of expanding the Thomas P. Smith Wastewater Treatment Plant facility is still proposed in Alternative 1, although sprayfields are proposed as an Eastern Expansion and a Western Expansion Area of the existing SE Sprayfield. It is USEPA's understanding from the City of Tallahassee that the City currently only proposes near-future construction in the Eastern Expansion Area and at the T.P. Smith facility since acquisition of and construction at the Western Expansion area appears unlikely at this time.

(Speaker #5: Barbara Rambo)

Thank you for attending and participating in the Public Hearing.

USEPA believes that all the issues that you indicated, i.e., whether or not the preferred alternative has few environmental impacts, is cost effective and is readily implementable, are all important in the preferred alternative decision-making process. Please also refer to the matrix and ranking summary in the Executive Summary (Table ES-1 and 4-1) and the text for additional factors. Your public input through the National Environmental Policy Act (NEPA) public review process is also important.

(Speaker #6: Judy Hancock)

Thank you for attending and participating in the Public Hearing.

You are correct in noting that the alternative that would expand the Southwest Sprayfield (Alternative 1A) has not been selected by USEPA as the preferred alternative; Alternative 1 has been selected. As such, sprayfields (Alternate Sites No.1 and No.2) in the National Forest are not proposed in this FEISS (or DEISS). However, the Alternative 1A aspect of expanding the Thomas P. Smith Wastewater Treatment Plant facility is still proposed in Alternative 1, although sprayfields are proposed as an Eastern Expansion and a Western Expansion area of the existing SE Sprayfield. It is USEPA's understanding from the City of Tallahassee that the City currently only proposes near-future construction in the Eastern Expansion area and at the T.P. Smith facility since acquisition of and construction at the Western Expansion area appears unlikely at this time.
With regard to your concerns about the proposed project and potential disruption of Gopher Frog migrations, contiguous wildlife corridors are to be left in the Eastern Expansion area sprayfield. The location of these corridors was based on the locations of sensitive ecological areas, sinkholes, poorly-drained soil types, the City of Tallahassee's proposed project site layout, and coordination with State of Florida agencies (See Figures ES-4, ES-5, 4-1 and 4-2 in this FEISS). The USEPA and the City preliminarily finalized the locations of these corridors since the dates of publication of the DEISS and the Public Hearing through coordination with the City of Tallahassee and the Florida Game and Fresh Water Fish Commission, including conducting a field survey with these parties on January 23, 1991. (Refer to DEISS Comment Letter #9 (received from the U.S. Department of the Interior), USEPA's response, and follow-up letter responses, particularly the Florida Game and Fresh Water Fish Commission letter dated February 6, 1991 regarding their field survey conclusions.) Preliminary corridor locations were subsequently confirmed by the City based on the City of Tallahassee's wetland delineation in consultation with the Florida Department of Environmental Regulation (FDEP) and the U.S. Army Corps of Engineers (COE). However, the USEPA understands from the City that these corridors could be changed (since the configuration of proposed spray areas could be changed from those depicted in Fig. ES-5 and 4-2) by local decision-makers during their local alternatives selection process. The USEPA recommends, however, that if Alternative 1 is implemented, appropriate and effective wildlife corridors should be included in the final configuration.

(Speaker #7: Dan Hendrickson)

Thank you for attending and participating in the Public Hearing.

You are correct in noting that the alternative that would expand the Southwest Sprayfield (Alternative 1A) has not been selected by USEPA as the preferred alternative; Alternative 1 has been selected. As such, sprayfields (Alternate Site No.1 and No.2) in the National Forest are not proposed in this FEISS (or DEISS). However, the Alternative 1A aspect of expanding the Thomas P. Smith Wastewater Treatment Plant facility is still proposed in Alternative 1, although sprayfields are proposed as an Eastern Expansion and a Western Expansion area of the existing SE Sprayfield. It is USEPA's understanding from the City that the City of Tallahassee currently only proposes near-future construction in the Eastern Expansion Area and at the T.P. Smith facility since acquisition of and construction at the Western Expansion Area appears unlikely at this time.

In regard to your concern about the terms "mitigative measures" versus "environmental protection measures," the USEPA appreciates your concern and understands the difference between the two terms. Our first approach in reviewing proposed projects is environmental protection, i.e., impact avoidance, reduction, and minimization. If impacts are unavoidable and the project is justified, mitigation (i.e., compensation) for those impacts is appropriate. In the DEISS, the measures listed at the end of the Executive Summary and in Chapter 4 should be, we agree, more correctly termed "environmental protection measures." Therefore, appropriate language changes have been made in this FEISS.

Regarding your interest in maintaining contiguous wildlife corridors, such corridors are to be left in the Eastern Expansion of the existing Southeast Sprayfield, which the City of Tallahassee proposes for near-future construction. The location of these corridors was based on the locations of sensitive ecological areas, sinkholes, poorly-drained soil types, the City of Tallahassee's proposed project site layout, and coordination with various State of Florida agencies (See Figures ES-4, ES-5, 4-1, and 4-2 in this FEISS). Since the dates of publication of the DEISS and the Public Hearing, the USEPA has coordinated with the Florida Game and Fresh Water Fish Commission, the City of Tallahassee, the Florida Department of Environmental Regulation (FDER) and the Florida Department of Natural Resources (FDNR) (Note: FDER and FDNR have since become the Florida Department of Environmental Protection (FDEP), effective July 1, 1993) to help finalize the locations of the wildlife corridors. Coordination with these parties involved participation in a field survey of the proposed Eastern Expansion site of the existing Southeast Sprayfield on January 23, 1991 to help identify sensitive ecological areas and delineate the wildlife corridors. Preliminary corridor locations were subsequently confirmed by the City based on the City of Tallahassee's wetland delineation in consultation with the Florida Department of Environmental Regulation (FDEP) and the U.S. Army Corps of Engineers (COE). However, the USEPA understands from the City that these corridors could be changed (since the configuration of proposed spray areas could be changed from those depicted in Fig. ES-5 and 4-2) by local decision-makers during their local alternatives selection process. The USEPA recommends, however, that if Alternative 1 is implemented, appropriate and effective wildlife corridors should be included in the final configuration.

Your referenced first concern involved incorporating information from the local comprehensive plan (comp plan) into the EIS Supplement process to make the recommendations compatible with the plan. The local comprehensive plan is titled "Tallahassee-Leon County 2010 Comprehensive Plan." The plan was adopted by the City Commission and the County Board of Commissioners on July 16, 1990. A review by the Florida Department of Community Affairs found the plan not in compliance. Subsequently, each commission negotiated compliance agreements with the Department of Community Affairs. These compliance agreements include remedial actions which bring the Comprehensive plan into compliance. Each commission is required to formally amend the plan in accordance with the Compliance Agreement.

USEPA's preferred Alternative 1 consists of:

1. Expand T.P. Smith Plant by 7.5 mgd.

2. Expand Southeast Sprayfield by 7.5 mgd.

3. Provide 3.0 mgd of golf course irrigation from Lake Bradford Road Treatment Plant.

The draft Comprehensive Plan Sewer Element includes the following:

1. Expand T.P. Smith Plant by 7.5 mgd by 1995.

2. Expand Southeast Sprayfield by 7.5 mgd by 1995.

The Comprehensive Plan does not include the 3.0 mgd of golf course irrigation. However, it does include a policy to "complete a study examining the feasibility of alternative waste disposal methods." This study is expected to include alternative effluent disposal techniques. It is USEPA's understanding that the City does not anticipate near-future spray irrigation of golf courses. Since the draft Comprehensive Plan is basically consistent with the FEISS, the Comprehensive Plan was not incorporated into the FEISS.

Your referenced second concern dealt with the concept that the northern part of the County should support its own sewage treatment. Please refer above to the related responses to Speakers #2 (Gray) and #3 (Brown). The USEPA understands from the City that the northeast is the next likely area for potential treatment plant construction.

Finally, in regard to your referenced third concern involving potential groundwater contamination from sludge deposit fields near the airport, please refer below to the related concern and response for Speaker #9 (Leek).

(Speaker #8: Mildred Hall)

Thank you for attending and participating in the Public Hearing.

In response to your question if a dye study had been conducted to demonstrate filtration rates in the northern and southern parts of Leon County, a dye study using Rhodamine B was performed at the Southwest Sprayfield by USGS around 1975. The work was unpublished as none of the dye was detected in the groundwater. This result was more a function of dye absorption onto soil particles with subsequent biological breakdown than a function of filtration capacity. Dye tracer studies are often unsuccessful in getting approved tracer dyes to move through soils.

A tracer study is not the appropriate vehicle to ascertain the filtration capacity of soils. The term "filtration rate" implies volume per unit time, as opposed to contaminant removal capacity. A standard soil hydraulic infiltration test would better measure filtration rate. Please refer above to related responses to Speaker #3 (Gray) regarding soil permeability concerns.

In response to your concern about odors, considerable effort is made to operate all City of Tallahassee treatment facilities in a manner that will prevent the formation of odorous compounds. The City of Tallahassee has not received any odor complaints from area residents regarding the Lake Bradford Road treatment plant. The secondarily-treated effluent produced by the City of Tallahassee is comparable in odor to the water in area lakes. However, should you or your neighbors consider odor from treatment plants or irrigation sites to be a problem, the City of Tallahassee may be contacted regarding any substantiated complaints.

In regard to your concern about the complexity of the DEISS, the document is and must remain a technical document. As such, it will be too complicated and technical for some readers (and perhaps not detailed enough for others). However, through the NEPA process, a public hearing was held, a 45-day public comment period for the DEISS was provided, and a 30-day public comment for the this FEISS is being provided, so that adequate time for clarification should exist. We believe the Executive Summary, for example, is a readable synopsis that can be generally understood by the layman.

(Speaker #9 [Repeat Speaker #4]: Elmer Leek)

Thank you again for attending and participating in the Public Hearing and providing associated written comments.

In regard to your concern for sewage sludge fields near the Tallahassee airport affecting the lake water quality in the National Forest near your residence and your interest in water quality testing of the lakes near your residence, we believe your concerns are shared by the USEPA, the State of Florida, and Leon County. In addition to the USEPA (Mr. Roosevelt Childress, Chief of Storm Water and Municipal Unit: 404/347-2391; x3012), you may wish to discuss your concerns with the State of Florida, Department of Environmental Protection (FDEP) or the Leon County Health Department. Specifically within the FDEP, further information may be available from the Ground Water Quality Monitoring Section (Mr. Rick Copeland: 904/488-3601), the Bureau of Surface Water Management (Ms. Vivian Garfein: 904/488-6221), and/or the Health and Rehabilitative Services, Office of Environment and Health (904/488-4070).

Currently, at the issuance of this FEISS, the City of Tallahassee maintains a Grade 1 quality sludge, as defined in Chapter 17-7, Part IV, Florida Administrative Code. (The City's current State of Florida operation permit will remain applicable until such time as the state reissues a new permit pursuant to Chapter 17-640.) At this quality, there is no cumulative limit on the amount of sludge which can be applied to a site. However, heavy metals concentrations, and annual applications of nitrogen and solids are limited by the statute to avoid groundwater contamination.

It is the USEPA's understanding from the FDEP that the City sludge field near the municipal airport is in compliance with the State's nitrogen application criterion (500 pounds of nitrogen per acre per year: 500 lbs/N/ac/yr). However, the sludge field is apparently at capacity based on FDEP nitrogen level determinations. Continued use of the sludge field, particularly if greater nitrogen application is planned due to the proposed expansion of the SE Sprayfield, should be evaluated in light of the fact that the field is at capacity. The sludge field must remain in compliance with the State of Florida requirements.

The City has a groundwater monitoring program in effect for the airport sludge field. The wells are tested quarterly, with results reported to the FDEP. Data from groundwater monitoring wells have shown some nitrogen exceedances, which have been addressed and corrected for areas outside the sludge field property line. Apparently the FDEP believes that the sludge field is in compliance outside the property line based on the nitrogen parameter. According to the City, the compliance wells located down-gradient in the Floridan Aquifer from the airport sludge field have shown no violations of drinking water standards. The quality of the groundwater in the compliance wells therefore appears to demonstrate that the airport sludge field is not causing nitrification of area lakes via groundwater contamination. In addition there is no known surface runoff from the sludge field to any lakes. Also, runoff from the airport sludge field does not appear to enter sinkholes directly because there is no surface runoff. A review of the soils survey for the airport property indicates Kershaw sand as the only soil type present. Kershaw sand has a permeability of greater than 20 inches per hour. The City and USGS have monitored area sinkholes that contain standing water. There is no evidence that effluent irrigation or sludge land spreading has influenced any of the monitored sinkholes. Further information on this matter may be obtainable from the Northwest District of FDEP in Pensacola, Florida (Mr. Alan Johnson, Program Administrator of Water Facilities: 904/444-8380).

Relative to the proposed sprayfield expansion project, the City must make application for a "Sludge Only" NPDES permit for the current and proposed disposal/reuse activity associated with the SE Sprayfield, as well as any other City sludge disposal/reuse practice.

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Note: In addition to the coordination discussed in this Chapter 5, two additional "informal" (outside NEPA DEISS comment period) comment letters are included and addressed in this FEISS. These letters were received from the Leon County Board of County Commissioners dated July 15, 1992, and from the City of Tallahassee dated October 27, 1992, and are appended to the "Project Updates Summary" chapter, which follows the "Executive Summary" of this FEISS.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

NOV 15 1990

Mr. John Gray
Route 16, Box 8055
Tallahassee, FL 32310

RE: Soils Letter Referenced in Tallahassee Public Hearing Comments

Dear Mr. Gray:

As you recall, you provided verbal comments at the public hearing for the Tallahassee-Leon County Wastewater Management Draft Environmental Impact Statement Supplement (DEISS) on August 9, 1990 in Tallahassee, Florida. In your comments, you referenced a soils letter that you sent to EPA. Unfortunately, we have no record of your letter in our files. Therefore, we request that you resubmit your letter to us within ten days of the date of this letter. Your letter will be useful in the preparation of our response to your public hearing comments.

Thank you for attending and participating in the public hearing. We look forward to receiving your resubmittal.

Sincerely,

Heinz Mueller

Heinz J. Mueller, Chief
Environmental Policy Section
Federal Activities Branch

CHAPTER 6

LIST OF PREPARERS

CHAPTER 6 LIST OF PREPARERS

U.S. Environmental Protection Agency, Region IV

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Eshelman	Institutional Analyst
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APPENDIX A

ALTERNATIVE WASTEWATER CONVEYANCE CONFIGURATIONS

APPENDIX A ALTERNATIVE WASTEWATER CONVEYANCE CONFIGURATION

Section A-1 Treatment South

This conveyance component assumes that treatment would take place at the existing LBR Plant and T. P. Smith Facility. The elements of this component are presented below:

1. Construct a pump station west of Ox Bottom Lake to service the area between Meridian Road (FL 155) and Thomasville Road (U.S. 319). Run a force main along Ox Bottom Road and connect it to the existing interceptor south of Lake Killearn.

2. Expand the Northeast Pump Station to service the Lake Killearn development area.

3. Construct a force main along Centerville Road (U.S. 151) from the Northeast pump station to Capital Circle, N.E. (U.S. 319). Continue the force main along Capital Circle, N.E./S.E./S.W. to the T. P. Smith Facility.

4. Construct a pump station southeast of Buck Lake to service Buck Lake development area. Run a force main along Buck Lake Road to Capital Circle, N.E. to join with a proposed force main leading to T. P. Smith Facility.

5. Construct two pump stations, force mains, and interceptors to service the proposed Southeast Lake Jackson area development. Run a force main to the existing interceptor leading to Pump Station No. 22.

6. Construct a gravity relief sewer from the Capital Circle, N.E./ Lonnbladh Road intersection to existing Pump Station No. 22 to alleviate surcharge conditions.

7. Construct a pump station north of the Federal Correctional Institute with a force main leading to a proposed force main along Capital Circle, N.E.

8. Construct a relief force main from the expanded Pump Station No. 22 to a proposed pump station north of the Federal Correctional Institute.

9. Construct a pump station along Perry Highway (U.S. 27) in the Lafayette area to serve the area east of Capital Circle, N.E./ S.E., between the railroad and St. Augustine Road. Construct a force main along Perry Highway to Capital Circle, N.E./S.E. to join with a proposed force main leading to T. P. Smith Facility.

10. Construct a gravity relief sewer parallel to the existing gravity sewer serving the central inner city area near Florida A&M University to alleviate surcharge conditions entering the LBR Plant.

11. Construct a gravity relief sewer along the existing gravity sewer tributary to the Springhill Road pump station to handle projected flows from Springhill Road Service Area.

12. Construct a pump station off Monroe Street (U.S. 27), south of the I-10 Interchange. Construct a force main to the existing interceptor leading to Pump Station No. 36.

13. Construct two pump stations to serve the development along the Megginnis Arm of Lake Jackson. Construct a force main to the existing Pump Station No. 43, directly south of the Monroe Street/I-10 Interchange.

14. Construct two gravity interceptors running north to south: one west of Old Brainbridge Road (FL 157) and the other along Capital Circle, N.W. (FL 263) to serve the proposed development in the western portion of Tallahassee, north of New Quincy Highway (U.S. 90).

15. Construct a pump station adjacent to Capital Circle, N.W. near Gum Road to transport sewage collected by the two interceptors noted in Item No. 14. Construct a force main along Capital Circle, S.W. to the T. P. Smith Facility.

16. Construct two pump stations in series along Capital Circle, S.W. near the Tallahassee Municipal Airport. Construct a force main and interceptor to the existing Pumping Station No. 12 off LBR Plant near Black Swamp.

17. Expand Pump Station No. 12 and construct a new force main to parallel the existing force main along LBR Plant and leading to the Springhill Road Pump Station.

18. Expand Springhill Road Pump Station.

(Note: Also see descriptions of Alternative 1 in this FEISS, including the "Project Updates Summary" chapter.)

Section A-2 Treatment North and South

This conveyance component assumes that treatment would be located at the existing LBR Plant and the T. P. Smith Facility and that a new NE plant would be constructed in the northeast area of Tallahassee. The elements of this component include elements 1, 2, 5, 6, and 10 through 18 of the Treatment South conveyance component described in the previous section. In addition, this component contains elements to convey flows to the new NE plant which include:

1. Construct the force main from the expanded Northeast Pump Station, south to the proposed NE Plant north of I-10.

2. Construct a pump station along Perry Highway (U.S. 27) in the Lafayette area to serve the area east of Capital Circle, N.E./S.E. between the railroad and St. Augustine Road. Construct a force main along Perry Highway to Capital Circle, N.E./S.E. Continue the force main north on Capital Circle, N.E. to the proposed pump station north of the Federal Correctional Institute.

3. Construct a pump station north of the Federal Correctional Institute to serve the proposed development south of Mahan Drive (U.S. 90) and east of Capital Circle, N.E. Construct a force main along Capital Circle, N.E. to Mahan Drive, east on Mahan Drive, north on Edenfield to Miccosukee Road (FL 146), and north on Miccosukee Road to the proposed NE Plant.

4. Construct a pump station southeast of Buck Lake to serve the Buck Lake development area. Construct a force main north to Mahan Drive to join with the proposed force main leading to the proposed NE Plant.

APPENDIX B

ALTERNATIVE WASTEWATER TREATMENT CONFIGURATIONS

APPENDIX B ALTERNATIVE WASTEWATER TREATMENT FACILITIES

Section B-1 Lake Bradford Road Wastewater Treatment Plant

The LBR Plant improvements of component T1 were proposed in the City MSP. The improvements are to increase the facility's influent flow to match its design capacity of 4.5 mgd and to install equipment which will reduce the volume of sludge produced. The items included in the improvement are as follows:

- Modify influent diversion structure to allow higher flows at night.
- Add equipment to make bar screen and grit chamber operation automatic.
- Add flow equalization tank to store excess flow to be pumped through plant at night.
- Upgrade influent pump station for peak flow of 6.75 mgd with two pumps operating and third pump for standby.
- Add sludge thickener.
- Upgrade effluent pump station to match effluent pumps.
- Expand sewer division headquarters.

Section B-2 T.P. Smith Wastewater Treatment Facility

The TPS Plant expansion of component T2 was also proposed in the City MSP. This expansion increases the design flow from 20 mgd to 27.5 mgd and includes improvements recommended by the operation and maintenance staff. The items included in the expansion are as follows:

- Add new 27.5 mgd headwords with grit and screening removal and odor control.
- 7.5 mgd activated sludge expansion with Biological Nutrient Removal.
- Add new anaerobic digester.
- Expand sludge thickening unit with blending tank and odor control.
- Add new building for operations center and shop.

The expansion, along with the upgrading of the LBR Plant, is to accommodate all sewage flows generated, including flows from the Northeast service area. Conveying untreated flows from the Northeast could present special problems as discussed previously in Section 2.3.2. Since expanding an existing plant, in this case the TPS Plant, is much lower in costs and environmental impacts than the construction of a new plant, the additional costs incurred for conveying untreated sewage over a long distance are balanced by the cost savings of not building a new treatment facility. This would not have been the case with a proposed Southeast Treatment Plant which would have included both the additional conveyance costs and the costs of a new facility.

(Note: The City of Tallahassee has completed an expansion of the T.P. Smith Plant from a design capacity of 20.0 mgd to 27.5 mgd in January 1993).

Section B-3 Northeast Wastewater Treatment Facility

The NE Plant construction of component T3 includes facilities to treat 5.2 mgd using conventional activated sludge units with chlorination, anaerobic digestion and mechanical dewatering. The level of treatment to be reached is secondary. The phosphorus removal option includes the replacement of the conventional activated sludge aeration system with a biological phosphorus removal activated sludge system.

APPENDIX C

ALTERNATIVE WASTEWATER DISPOSAL FACILITIES

APPENDIX C ALTERNATIVE WASTEWATER DISPOSAL FACILITIES

This appendix summarizes various alternative wastewater disposal facilities. The permitting guidance outlined for the alternatives presented is very general and is not intended to be used to make final decisions on the applicability of the NPDES or sludge regulations. Site specific conditions are always important factors in making these determinations.

Section C-1 SE Agricultural Spray Irrigation

The expansion of the City's existing SE Sprayfield is proposed as part of the preferred alternative (Alternative 1: See Chapter 4). Both an Eastern Expansion area and a Western Expansion area are proposed in Alternative 1; however, the USEPA understands from the City that the City only proposes near-future construction for the Eastern Expansion area.

East of the existing SE Sprayfield is an area of land owned by the St. Joseph Land and Development Company that is approximately 1,830 total acres in size. The topography and soils on this proposed site, which is the disposal component D1, are significantly different from the existing SE Sprayfield. The proposed site is traversed by two drainage features and another low-lying drainage area is located on the common border between the proposed and existing sprayfields. Due to a high water table and slow drainage characteristics, the soil within the drainageways are not suitable for spray irrigation of wastewater.

The Florida criteria for land application of domestic wastewater residual (treated effluent) establishes application rates based on the nitrogen requirements of the site vegetation. The analysis procedure in Chapter 6, USEPA "Process Design Manual for Land Application of Municipal Sludge," may be used to justify higher application rates. Application rates established for the alternative wastewater disposal facilities are based on existing agricultural spray irrigation operations, nitrogen requirements of vegetation, water-tolerance of crops, soil permeability, and water table depth. In general, irrigation rates should not exceed State of Florida permit conditions. The City's existing SE Sprayfield is permitted for 3.16 inches of wastewater effluent per week.

Based on the 1981 Soil Survey (USDS [SCS], USFS) the soils of the Eastern Expansion Area sprayfield site proposed by the City are dominated by Ortega Sand, Kershaw Sand with a 0-5% slope, Talquin Fine Sand, Chipley Fine Sand and Kershaw Sand with a 5-8% slope, respectively (Fig. 4-1). Of these, only the Kershaw sands are classified in the Soils Survey as favorable for septic tank absorption fields (classified as "slight," i.e., having favorable soil properties for the activity).

Of the portions of the proposed Eastern Expansion Area sprayfield proposed for irrigation, irrigation areas associated with and adjacent to Areas A, B, and D (see Figure 4-2 in Chapter 4.0 of this FEISS) primarily contain Kershaw Sands while irrigation areas associated with and adjacent to Areas C and E primarily contain Ortega Sand. As indicated, Kershaw Sands are considered suitable soil types for septic tank absorption fields while Ortega Sand would not be favorable due to poor filtration capabilities (too well-drained sands).

Because of the filtration limitations of the Ortega Sand in the proposed irrigation areas associated with and adjacent to Areas C and E as well as some unfavorable soils interspersed in irrigation areas associated with and adjacent to Areas A, B and D, the USEPA recommends reduced irrigation application (inches/week) in these areas. If monitoring exhibits compliance with State of Florida groundwater quality standards and monitoring is conducted to the satisfaction of the State of Florida, additional application can be tried if commensurate with groundwater quality compliance. Groundwater monitoring is also essential since the entire Eastern Expansion Area lies in the Woodville Karst

Plain, i.e., Karstic geology that is subject to water dissolution and collapse (sinkholes). In any areas of collapse, irrigation should be stopped immediately in those areas and the State of Florida notified. The USEPA recommends that no effluent be sprayed in a reasonable surrounding area of the existing sinkhole depressional area located within the proposed fixed head irrigation area adjacent to Area D, as well as any other potentially discovered sinkhole areas (See Fig. 4-1). The USEPA further recommends that the State of Florida consider the existing soil characteristics and Karstic conditions of the proposed Eastern Expansion Area in their permitting decision for the City's proposed sprayfield expansion.

Although the Western Expansion area of preferred Alternative 1 is not, as indicated above, proposed by the City for near-future construction, it may be noted that this area is characterized by Kershaw Sands based on the Leon County Soil Survey (USDA [SCS] and USFS, 1981). As indicated above, the Kershaw Sands have excellent drainage and filtration characteristics.

An analysis by the City's consultant revealed that approximately 909 acres would be available for irrigation at the proposed Eastern Expansion area of the existing SE Sprayfield. It is expected that 414 acres would be in center pivots and 495 acres would be irrigated by fixed-head sprinklers. Application at a uniform rate of 2 inches per week would dispose of 7.0 mgd. Application of 2.5 and 3 inches per week would result in the disposal of 8.8 and 10.5 mgd, respectively. This effluent flow assumes total utilization of the available land area. The type of application system can affect the utilization of the available land and, therefore, the amount of water treated, and would need to be considered during final design.

The proposed vegetation management activity on the Eastern Expansion Area is an agricultural crop rotation similar to the existing SE Sprayfield. Vegetation management on the agricultural based system currently operated by the City has been carried out by the Pascuna Florida Corporation for several years. This farm management system has operated satisfactorily and no changes are recommended by evaluations performed for the EIS Supplement. Interviews with the manager of the SE Sprayfield operations indicated that a particular land area would be managed under one of two crop rotation schedules. The first is a three-crop per year rotation of corn, soy beans, and annual rye grass, while the second rotation schedule would include soy beans, canola, and annual rye grass.

The crops may only be used as animal feed and/or as processed human food to the extent consistent with Chapter 17-610 F.A.C. Utilization of the crops is not intended for direct human consumption. Each land management area of the existing sprayfield has the crop rotation schedule switched each year. The facilities and equipment required to utilize the proposed SE Sprayfield expansion are minimized due to its close proximity to the existing SE Sprayfield. In general, the following would be required:

- Effluent holding pond and pump station at the proposed SE Sprayfield expansion site,
- Effluent irrigation equipment,
- Farm equipment and facilities, and
- Groundwater monitoring wells.

Aspects of effluent disposal through agricultural spray irrigation at the proposed expansion of the City's existing SE Sprayfield would be subject to NPDES permitting if point source storm water discharges to waters of the United States exist during the construction of the Alternative 1 sites and from the treatment plants actually treating the spray irrigation effluent.

Pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124) and to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), an NPDES permit is required for point source storm water discharges to waters of the United States from the facility actually treating domestic wastewater. This provision applies to domestic wastewater treatment facilities that have design flows of at least 1.0 mgd. The NPDES storm water regulations of November 16, 1990, also require that point source storm water discharges to waters of the United States from all construction activities (including the initial clearing, until revegetated, of spray irrigation sites) disturbing a total of five or more acres must be permitted under the NPDES program. The permit application deadline for these discharges is 90 days prior to commencement of construction. Construction activities needing NPDES permit coverage can be made through a general permit recently issued by EPA/Region IV.

Relevant to NPDES permitting for Alternative 1, application for an NPDES permit would need to be made by the City for point source storm water discharges to waters of the United States from regulated treatment facilities actually treating domestic wastewater under the above-noted criteria. Application by the City for a separate NPDES permit would also be needed by the above-noted deadline for point source storm water discharges to waters of the United States for all construction sites associated with and actually involving the effluent land application site (including the initial clearing, until revegetated, of the proposed Eastern Expansion area of the SE Sprayfield and the proposed Western Expansion area (if implemented) of Alternative 1) disturbing a total of five or more acres of land. These permit requirements would be relevant for Alternative 1 as well as any existing unpermitted City sites.

Storm water point source discharges to waters of the United States from the operation (spray irrigation) of non-agricultural/non-silvicultural land application sites (such as golf courses, rights-of-way, and landscape areas) receiving domestic wastewater treated to the quality required by Chapter 17-610 F.A.C. for the land application of reclaimed water are not required to be covered by NPDES permits, unless the USEPA specifically requires a facility to submit an application on a case-by-case basis. Therefore, no NPDES permit is needed for the operation of such land application sites for the City's proposed project (if storm water point source discharges exist to waters of the United States for such sites) unless specifically requested by the USEPA. However, dedicated discharges of reclaimed water, without land application, are required to be covered by NPDES permits. It may also be noted that storm water discharges from the land application of wastewater effluent on agricultural and silvicultural sites are exempt from the NPDES permitting program if the sites are consistent with 40 CFR Part 122.3(e), so that the operation of such sites for Alternative 1 would not require an NPDES permit if consistent with 40 CFR 122.3(e). Therefore, no NPDES permit would be needed by the City for the operation of the four golf courses (if implemented) proposed in Alternative 1, as well as any similar existing City application sites (if such storm water point source discharges to waters of the United States exist at these sites). Additionally, since the land application of wastewater effluent on agricultural sites is exempt from the NPDES permitting program, the operation of the Eastern Expansion of the SE Sprayfield and the Western Expansion thereof (if implemented) proposed in Alternative 1, as well as any existing City application sites such as the SE Sprayfield (if such storm water point source discharges to waters of the United States exist at these sites), would not require an NPDES permit if these sites are consistent with 40 CFR 122.3(e).

Included in the proposed spray irrigation of wastewater effluent in the preferred Alternative 1 is the generation of and land application of wastewater sludge. Section 405(d) of the Clean Water Act requires that the disposal or reuse of sewage sludge be regulated. This regulatory activity is to be accomplished through the utilization of permits based upon technical federal regulatory standards. The USEPA established federal sludge disposal/reuse standards which were promulgated in the Federal Register at 40 CFR 503 on February 19, 1993. In general, these standards must be complied with by all treatment works treating domestic sewage by February 19, 1994. Violation of these standards would be a violation of the Clean Water Act. It is anticipated that current and proposed sludge disposal/reuse activities would be regulated through an NPDES permit, where applicable, or through issuance of a "Sludge-Only" permit. This federal permitting activity would be issued by the USEPA/Region IV until program authorization is given to the State of Florida. Therefore, the newly promulgated federal regulations are in addition to the State of Florida sludge disposal/reuse regulations. Relative to Alternative 1, the City must also make application for a Sludge Only permit for the current and proposed sludge disposal/reuse activity associated with the SE Sprayfield and the Alternative 1 proposal, as well as any other City sludge disposal/reuse practice. These federal regulations are in addition to the State of Florida sludge disposal/reuse regulations.

Section C-2 NE Agricultural Spray Irrigation

To evaluate land treatment northeast of the City for component D2, land areas generally outside of the development areas were chosen.

It appears from the 1981 Soil Survey of Leon County, Florida (USDA [SCS] and USFS, 1981) that the northern part of Leon County is generally less suitable for septic tank and spray irrigation wastewater disposal than the southern part. This is not to say, however, that favorable soils for septic tanks and spray irrigation do not exist in both northern and southern areas of Leon County or that unfavorable soils do not exist in southern Leon County. However, the USEPA understands that the Leon County Public Works Department apparently conducted a spray irrigation site assessment in 1989 and determined that more acreage would be needed to dispose the same quantity of effluent in the selected northern alternative sites than in the selected southern alternative sites due to soil types. This suggests a slower percolation rate at the northern sites.

This trend also generally agrees with Table 2-9 of this FEISS. When the acreage predicted to be required for agricultural spray irrigation in the SE (component D1) is compared to agricultural spray irrigation in the NE (component D2), the average acreage needed per effluent flow (mgd) is much greater in the NE (430 acres/mgd) than in the SE (188 acres/mgd). The same trend also exists for the NE forest irrigation site (component D4: 524 acres/mgd) compared to the SE forest irrigation site (component D3: 197 acres/mgd). (This trend, however, is not true in every instance since the artificial wetlands with RIBs disposal in the SE (components D11 and D16) are predicted to require the same amount of acreage as in the NE (components D12 and D17), i.e., 111 acres/mgd). For Table 2-9, the maximum application rate was used to estimate acreages and was based on the soils in the 1981 Leon County Soil Survey at the given sites. However, the USEPA recommends that soil percolation testing be conducted at any site proposed for irrigation be implementation to determine actual soil percolation rates.

Based on the "General Soil Map" for Leon County in the 1981 Soil Survey, Leon County is dominated by three soil associations: the Orangeburg-Lucy-Norfolk association in the northern part of Leon County and the Kershaw-Ortega-Alpin and the Dorovan-Talquin-Chipley associations in the southern part of Leon County. The Orangeburg-Lucy-Norfolk soils and the Kershaw-Ortega-Alpin soils are generally well-drained while the Dorovan-Talquin-Chipley soils are generally not well-drained. Specifically, the 1981 Soil Survey classifies the Orangeburg-Lucy-Norfolk soils as "well drained soils" and the Kershaw-Ortega-Alpin soils as "excessively drained and moderately well drained soils," while the Dorovan-Talquin-Chipley soils are considered "somewhat poorly drained to very poorly drained soils." Of the two well-drained soil associations, the depths of these sandy associations differ significantly: the Orangeburg-Lucy-Norfolk soils are sandy to only 20-inch depths with loam below, compared to sandy 20-40 inches deep with loam below or are loamy throughout (Note: "loam" is a soil type that is defined in the 1981 Soil Survey as a mix of clay (7-27%), silt (28-50%), and sand (<52%) particles.) By contrast, the Kershaw-Ortega-Alpin soils are sandy to 80 inches or more, with some having loamy layers (lamellae) below 45-inch depths.

Regarding the suitabilities of these soil associations for septic tank absorption fields, Table 11 of the 1981 Soil Survey presents the "restrictive soil features" of existing soil types. All listed Orangeburg, Lucy and Norfolk soil types are classified as "moderate: percs slowly" and/or "moderate: wetness," with "moderate" being defined as having unfavorable soil properties for the given activity. The Kershaw soils are classified as "slight" which is defined as soil properties generally favorable for the activity. Oretega and Alpin soils are classified as "severe: poor filter," with "severe" being defined as soil properties very unfavorable for the activity. The Dorovan, Talquin and Chipley soils are classified as "severe: wetness" or "severe: floods, wetness." These classifications indicate that only the Kershaw soils have properties favorable for septic tank absorption field infiltration while the others do not adequately drain or drain too well and therefore do not provide proper filtration (i.e., adsorption of inorganics (metals), microbes, etc.).

Considering the restrictive characteristics of the limiting soils and the intermingled pattern of soil type occurrence, an initial application rate of approximately 0.75 inches per week may be reasonable. However, actual soil percolation testing should be provided at specific sites before any alternative site is implemented.

The managed vegetation of the alternative NE Sprayfield would be an agricultural crop rotation similar to that proposed for the Eastern Expansion of the SE Sprayfield (Refer to Section C-1 above). Equipment and facilities required for an agricultural crop is also similar to that described for the proposed Eastern Expansion Area. However, it may be necessary to add some farm management items since the existing farm management facilities at the SE Sprayfield are not nearby to allow sharing.

The need for NPDES permitting for effluent disposal for this alternative would be as described in Section C-1. The need for sludge permitting would also be as described in Section C-1. Other federal, state and local permitting may also be involved for this disposal method.

Section C-3 SE and NE Forest Spray Irrigation

An alternative to the management of an agricultural crop system at the proposed SE and the alternative NE Sprayfields would be the establishment of a forested system as presented in components D3 and D4. In general, forested spray irrigation has excellent revenue-producing potential, high water-using potential, and good nitrogen-consumption potential. The City proposes to try forest spray irrigation on a demonstration project basis for the preferred alternative (Alternative 1: Refer to Chapter 4) for an undetermined number of acres of the proposed Eastern Expansion area adjacent to the City's SE Sprayfield. Forest irrigation is being successfully used at 66 sites in the southeast, including 31 in Florida.

Vegetation management is important on a forested land treatment site, but the intensity of management is much lower than required on a crop system. The forested vegetation type most suited to a spray irrigation system is one that grows well in the Leon County area and is tolerant of high moisture levels. A fast growing southern yellow pine species such as slash pine would be well suited for planting in the sprayfields. Other species to be considered include loblolly pine, sand pine, and pond (swamp) pine. Initial planting practices determine the long-term viability of the trees in a spray irrigation system. To increase the survival and viability of a newly planted stand, seedling bedding should be considered as a part of planting.

Forested spray irrigation systems require less vegetation management than annual crops. Normally, when a system is installed in an area with an existing tree stand, the existing stand can be used for treatment until harvesting. After harvesting is complete and planting is finished, irrigation levels will need to be reduced until crown closure occurs, approximately four to five years, so that the root systems can become established. Once crown closure occurs, normally no further timber stand maintenance is required until harvesting which may be 20 to 30 years depending on the product to be harvested, either pulp chips or saw timber.

Harvesting: The periodic tree harvest and planting are important to the operational efficiency of the spray irrigation system. To maximize nutrient removal from the site, some type of whole tree harvesting is required. Whole tree harvesting removes the entire standing tree (stem, branches, and leaves) so that 100% of the nitrogen accumulated in the above-ground biomass is removed. In addition, some whole tree harvests have utilized coarse root material. For trees not of construction quality, it is recommended that they be skidded to a central point at the site, then chipped and blown into a trailer. Most pulp mills accept whole tree chips and chips can be used as a fuel/energy source.

Harvesting can be carried out by one of two methods: contract harvesting with local harvesting companies, or providing the necessary equipment and training for a City-employed crew. Communication with the USDA FS personnel in Tallahassee concerning harvesting practices revealed several factors to be considered in a harvesting plan. A timber cruise prior to harvest to determine bid volumes costs the USDA FS approximately $10 per 1,000 board feet for sizable blocks of land (in 1989 dollars). A timber cruise on smaller parcels of land could cost 50 percent more.

Local harvesting companies are prepared for whole tree harvesting operations; however, harvesting constraints would reduce the bid price from these companies. Harvesting constraints would be necessary due to the land treatment goals of the system. Typical constraints on a harvesting contract would be limiting inclement weather access to reduce site damage, and a contractual agreement detailing responsibility for damage to sprinklers and associated piping. Experienced USDA FS personnel indicated that moderate restrictions on a harvesting activity can reduce the stumpage price by more than 50 percent. Recent bid prices (in 1989 dollars) were $150 per 1,000 board feet for saw timer and $30 per 100 cubic feet for pulpwood. A 50 percent or greater reduction in these prices would significantly reduce the return on the timber product.

The other harvesting alternative would be to equip a City crew so that harvesting could be managed under conditions which might minimize the possibility of site disturbance and damage to the irrigation system. A capital investment for harvesting equipment and an ongoing operation and maintenance (O&M) cost would be necessary to provide harvesting capabilities for a City-staffed crew. A harvesting operation can involve several pieces of equipment such as: a feller-buncher, skidder, chipper, chip hauling vans, and a tractor rig for moving the chip vans from the site to the wood processing plant.

Irrigation System: The general design parameters recommended for this alternative include the following:

- Buried, solid-set sprinklers with sprinkler and pipe spacing to be 60 feet and 80 feet, respectively. This represents 9.138 sprinklers per acre.
- Nozzle pressure to be between 55 and 70 psi.
- Nozzle openings to be between 1/4 and 3/8 inch, depending on spacing, pressure, radius of throw, and gallons per minute

application rate. Note, no stream straightener mechanism should be used.

- Last filtering/screening treatment unit should ensure that the largest particle in the wastewater is less than 1/3 of the diameter of the sprinkler nozzle.

- Storage shall be provided for a maximum of 7 days of flow.

The application rates for this system depend on the age of the tree stands. Generally, the system is hydraulically limited, not nitrogen limited. For an existing, mature forest, the application rate can be as high as 3 inches per week (the same as that for a crop system) without damaging the trees. For new forest areas, the application rate should be about 50 percent of the peak rate, or 1½ inches per week. Currently, the FDER is concerned about the rate of 3 inches per week being too high and subsequently contaminating groundwaters. Therefore, for this alternative, the land area requirements were derived based on an application rate of 2 inches per week for mature plots of trees and 1½ inches per week for newly planted plots of trees. It is recommended though that all irrigation equipment be specified and designed to handle the higher rate of 3 inches per week to allow for possible irrigation at that rate if it is considered no potential threat to the groundwater quality.

It should be noted that the lower rate of 1½ inches per week is generally recommended until crown closure occurs which can take four to five years. Assuming that the rate to be used on the mature stands is only 2 inches per week and that a growth of herbaceous vegetation will be allowed, it is considered safe to use the 1½ inches per week for only two years on a "new" plot.

Other items to be considered in the design of this irrigation system include:

- Buried main lines and laterals should have drain valves to drain lines after applications are complete.

- Screening of the stored water is required to avoid nozzle clogging from debris that may fall into the storage pond (screening to catch particles that are greater than 1/3 the diameter of the nozzle).

Operations: A buried, solid-set sprinkler distribution system was recommended because it would not interfere with forest management activities including thinning, harvesting, and replanting. The sprinkler risers should be high enough to raise the sprinklers above most of the understory vegetation, but not greater that 5 feet above ground level. It is also recommended that low trajectory sprinklers be used so that water is not thrown into the tree canopies. The site preparation tasks consists of clearing a 10-foot wide path for each buried lateral. Construction must be carefully done to avoid excessive damage to trees and soils. After construction, the disturbed area must be mulched or seeded. During operation, a 5-foot radius area around each sprinkler should be kept clear to provide for better distribution and more convenient observation of sprinkler operation.

Forest crop management practices consist of maintaining existing forest stands, harvesting, and reforestation. The specific tasks depend on the tree species, age and structure of stands, method of reproduction, the terrain, and the type of equipment and techniques used by local harvesters. The application rate of wastewater is generally not limited by a forest's nitrogen uptake and storage abilities. Therefore, the management practices should be designed to optimize the nitrogen uptake. Generally, the nitrogen uptake is slow during the initial growth stage and should be supplemented by establishing a growth of understory vegetation and restricting the wastewater loading rate. Following the initial growth stage, the nutrient uptake increases and remains constant until maturity. At maturity, the rate decreases, and therefore the trees should be harvested. Generally, maturity of southern pines is reached at 20 to 25 years, but harvesting can be done on a more frequent cycle.

If the selected irrigation area consists of an existing, uneven-aged forest, the desired forest composition, structure, and vigor should be achieved through thinning and selective harvesting. This practice optimizes the nutrient storage and promotes reproduction growth of an understory. Recommended tree density, in light of the irrigation process is approximately 450 to 500 stems per acre. Thinning is usually done initially to enable construction of the distribution system, but then should only be done once every 10 years or so to minimize soil and site damage. Therefore, for this operation, it is recommended that thinning be done for uneven-aged forests at the time of harvesting the mature, marketable trees (every 10 years for a given plot). If the selected irrigation area consists of an even-aged forest, the practice is to clear-cut the forest at harvest age and regenerate a stand by planting seedlings. Of course, the total irrigation area may consist of both uneven- and even-aged forests. These forests should be divided into plots and managed accordingly.

During reforestation, maintenance could include controlling but not eliminating the herbaceous vegetation. As stated previously, this vegetation acts as a supplemental nitrogen sink for young forests, but if left unattended, it could shade out the desirable forest species. If the herbaceous vegetation is eliminated, then the wastewater application rate must be reduced during the establishment period. Generally, the establishment period is considered the period required for crown closure to occur which is approximately four to five years. After crown closure has occurred for a given plot, it is recommended that the herbaceous vegetation of the understory be harvested and removed from the site. This is necessary to prevent the decaying vegetation from adding to the nitrogen supply of the system.

<u>Land Area Requirements</u>: Land area requirements consist of acreage for the field area, buffer zones, wastewater storage area, and area for pre-application treatment facilities (includes screening and filtering if not done at the treatment plant), buildings, roads, and future expansion.

The field area of the irrigation system is that portion of the land application site to which wastewater is actually applied, including necessary dikes, ditches, and berms.

It is recommended that the entire land application site include a buffer zone around its perimeter. This zone is primarily for control of public access, aesthetics, and public health protection. The buffer area is recommended to be from 100 to 400 feet wide (depending on adjacent land uses). In general, it should be managed as a multi-storied forest canopy by maintaining mature, tall trees on the inside edge of the buffer next to the irrigated field area. Trees of moderate height and with full, dense canopies should then be used beneath the tall, inside canopy and out to the outside edge of the buffer. Evergreen species are preferred for year-round operations.

The storage of wastewater during wet-weather conditions is essential to avoid surface runoff due to rainfall. It is recommended that the storage pond be designed for 7 days of storage.

The need for NPDES permitting for this alternative would be as described in Section C-1. The need for sludge permitting would also be as described in Section C-1. Other federal, state and local permitting may also be involved for this disposal method.

Section C-4 Power Plant Cooling Water

Under alternative component D5, an average of 3.0 mgd of effluent from the TPS Plant would be used for power plant cooling make-up water to the existing A.B. Hopkins Generating Station cooling towers. To implement this alternative component, the level of treatment at the TPS Plant would have to be upgraded beyond the current secondary treatment levels to include filtration and high-level disinfection. Phosphorus removal would also be required to meet the power plant's discharge requirement of 1.65 mg/l as total P.

The treated effluent would be conveyed via a new force main that would have to be constructed from the treatment plant due west to a power line right-of-way, then northwest to the power plant, following various power line rights-of-way. There would have to be a storage facility constructed at the power plant to store approximately three million gallons (approximately one day's required flow).

It is estimated that the cooling tower blowdown would be less than 1.0 mgd. Therefore, a modification of the existing NPDES permit for the Hopkins Plant would be required if the blowdown were to continue to be discharged to a tributary of Lake Talquin. Alternatively, other methods of disposal could be investigated.

The need for NPDES and sludge permitting for this alternative, in addition to the above NPDES permit modification, relate to the storm water and sludge permitting requirements as described in Section C-1 (although there would be no spray irrigation). Other federal, state and local permitting may also be involved for this disposal method.

Section C-5 Golf Course Irrigation

Under alternative component D6, 3.0 mgd of treated wastewater from either the TPS Plant or the LBR Plant would be used to irrigate four (4) existing local golf courses in the Tallahassee area. The selected golf courses would be:

- Florida State University Golf Course,
- Jake Gaither Golf Course,
- Capital City Country Club, and
- Hilaman Municipal Golf Course.

The preferred alternative (Alternative 1: See Chapter 4 and Section C-1) includes golf course irrigation at these four golf courses.

It is estimated that each golf course would use an average of 0.75 mgd of effluent and storage of several days' flow could be accommodated in existing ponds at the golf courses. The existing irrigation systems at the courses would be used to distribute the reclaimed water. (Update: The USEPA understands from the City that results from a recent (11/93), essentially final City feasibility study regarding irrigation of the proposed golf courses and other public access areas indicates an application rate of 0.6-0.7 inches per week (i.e., 1 mgd)).

To implement this alternative component, the level of treatment at the discharging treatment facility would have to be upgraded beyond the current secondary treatment levels to include filtration and high-level disinfection. It should be noted that, without plant modification, it may be more difficult to provide the required additional treatment at the LBR Plant than the TPS Plant due to the age of the facility and space limitations.

A force main would have to be constructed to convey the treated effluent to the various golf courses. If using LBR Plant effluent, there would be a slight reduction in pipeline lengths and it would not be necessary to pump effluent to the TPS Plant and the SE Sprayfield on a regular basis. The existing pipeline between the LBR Plant and TPS Plant would provide an alternative effluent disposal route in the event that treatment levels would fall below the requirements for use on the golf courses or rainfall was so great that additional irrigation could not be handled at the golf courses. In any case, the force main could be tapped at other locations in the future, such as cemeteries, parks, and school grounds. In addition, the nutrient value of the treated effluent may allow a reduction in the application of commercial fertilizers at the irrigated sites.

Golf course spray irrigation has the potential for causing a localized increase in airborne pathogens carried via aerosols. Proper treatment of wastewaters prior to spray irrigation and selective operation times should minimize this impact (However, although it is generally documented (Crook, 1990; Asano et al., 1992) that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious.)

The USEPA understands from the City of Tallahassee that fecal coliform levels are monitored by the City before effluent is spray irrigated on sprayfields and after irrigation via groundwater monitoring. The USEPA also understands from the City that the water quality limits for fecal coliform levels used by the City for effluent prior to sprayfield irrigation is the State of Florida standards defining "secondary treatment" of wastewater, i.e., <200 organisms per 100 ml of effluent. Although there are no USEPA or federal standards for fecal coliforms for spray irrigated effluent, this criterion is consistent with USEPA guidance from the Requirements Memorandum #79-3 dated November 15, 1978 of the former Construction Grants Program (USEPA, 1978). The concepts of this memorandum were incorporated in a USEPA Technology Transfer manual entitled "Land Treatment of Municipal Wastewater" (USEPA No. 625-1-81-013) (USEPA, 1981). The 200 counts/100 ml of effluent criterion is USEPA's fecal coliform criterion for bathing (swimming) waters. It is presumed that water considered safe enough for swimming (which could include incidental drinking) would be adequate for irrigation of sprayfields, particularly with vegetated buffers. In the absence of federal standards regarding acceptable remaining levels of fecal coliforms in sprayed effluent, the USEPA recommends that the State of Florida the use, at a minimum, the above federal guidance (USEPA, 1981) to help protect public health and the environment during their permitting decision for effluent sprayfields in addition to any appropriate State of Florida regulations (Chapter 17-640 F.A.C.) for public access areas.

The application of wastewater to golf courses and other public access areas (unrestricted access urban irrigation areas), which would provide greater public exposure than application on agricultural or forest sprayfields, would require additional treatment for suspended solids removal and high-level disinfection under State of Florida regulations. Compliance with these regulations should greatly reduce the health risks associated with aerosols at golf courses. Irrigation of golf courses using wastewater effluent is also not an uncommon practice since, 84 golf courses in Florida were being irrigated with wastewater in 1991. In addition, golf course spray irrigation would require, per FDER stipulation, that an alternate disposal method (e.g., Rapid Infiltration Basin (RIB) system; alternate sprayfield) be made available as a back-up. It is the USEPA's understanding from the City that such a contingency does not presently exist for the preferred Alternative 1, which proposes golf course irrigation as part of the effluent disposal.

Storm water point source discharges to waters of the United States from the operation (spray irrigation) of non-agricultural/non-silvicultural land application sites (such as golf courses, rights-of-way, and landscape areas) receiving domestic wastewater treated to the quality required by Chapter 17-610 F.A.C. for the land application of reclaimed water are not required to be covered by NPDES permits, unless the USEPA specifically requires a facility to submit an application on a case-by-case basis. Therefore, no NPDES permit is needed for the operation of such land application sites (if storm water point source discharges exist to waters of the United States for such sites) unless specifically requested by the USEPA. However, dedicated discharges of reclaimed water, without land application, are required to be covered by NPDES permits.

Related to wastewater effluent disposal through golf course spray irrigation is the generation of and land application of wastewater sludge. The need for sludge permitting would be as described in Section C-1. Other federal, state and local permitting may also be involved for this disposal method.

Section C-6 Golf Course and State Ornamental Garden Irrigation

Under alternative components D7 and D8, 0.5 mgd of treated wastewater from the alternate NE Plant would be used to irrigate the Killearn Golf Course and Country Club in northeast Leon County.

Existing ponds at the golf course could be used to provide approximately one day's worth of storage (0.5 mgd). The existing golf course irrigation system would be used to distribute the treated effluent.

Component D8 provides for disposal of an additional 0.5 mgd of treated wastewater from the NE Plant to irrigate the Alfred B. Maclay State Gardens in north central Leon County. Reclaimed water is known to have adverse effects on some vegetation (azaleas and some tree species); therefore, an evaluation of the plant species at the State Gardens would have to be made to determine acceptable irrigation areas. A storage facility would have to be constructed at the State Gardens, but the existing irrigation systems would be used to distribute the treated effluent.

It is generally documented (Crook, 1990; Asano et al., 1992) that wastewater treatment methods can remove significant numbers of pathogens and non-pathogenic bacteria typically associated with sewage wastewater. However, not all may be killed by disinfection. In the case of pathogens such as viruses, the surviving numbers could potentially be hazardous from a human health perspective since even a small number of viruses can be infectious. As indicated above in Section C-5, a secondary level of treatment with filtration and high-level disinfection would have to be provided to meet FDER requirements for this type of reuse in public access areas, i.e., unrestricted access urban irrigation areas. As a back-up, an alternate disposal method to golf course irrigation would also need to be made available. These criteria would apply for the irrigation of golf courses and would likely also apply for the irrigation of state gardens (subject to the FDER), as they would presumably also be considered unrestricted access urban irrigation areas by the State of Florida.

The need for NPDES permitting for this alternative would be as described in Section C-5, since golf course and state ornamental garden spray irrigation sites are considered non-agricultural/non-silvicultural land application sites. The need for sludge permitting would be as described in Section C-1. Other federal, state and local permitting may also be involved for this disposal method.

Section C-7 Power Line Right-of-Way Irrigation

Under alternative component D9, an average of 2.0 mgd of treated effluent from the TPS Plant would be used to irrigate power line right-of-way areas south of the treatment facility. To implement this alternative, the level of treatment at the TPS Plant would have to be upgraded beyond the current secondary treatment levels to include filtration and high-level disinfection.

It is assumed that an average application rate of 2.0 inches per week could be maintained and that the power line right-of-way areas have an average width of 100 feet. Therefore, approximately 26.67 miles of right-of-way would be required to provide enough area to dispose 2.0 mgd of treated effluent. Solid set (buried) sprinklers would be used and no storage would be required. It is expected that the maintenance costs associated with the right-of-way areas would increase due to the need to mow the irrigated areas more frequently.

Power line rights-of-way would presumably be considered public access reuse areas (unrestricted access urban irrigation) by the State of Florida. As such, special precautions in terms of effluent quality and possibly disposal method back-up would be necessary (subject to the FDER) for irrigation of these areas as described above in Section C-5 and C-6.

The need for NPDES permitting for this alternative would be as described in Section C-5, since power line rights-of-way are considered non-agricultural/ non-silvicultural land application sites. The need for sludge permitting would be as described in Section C-1. Other federal, state and local permitting may also be involved for this disposal method.

Section C-8 Existing Sludge Disposal Field Irrigation

Under alternative component D10, an average of 3.9 mgd treated effluent from the TPS Plant would be sprayed on the existing sludge disposal fields around the Tallahassee airport. No additional treatment would have to be provided beyond the current secondary treatment level and basic disinfection.

It is the USEPA's understanding from the FDER that the City sludge field near the municipal airport is in compliance with the State's nitrogen application criterion (500 pounds of nitrogen per acre per year: 500 lbs/N/ac/yr). However, the sludge field is apparently at capacity based on FDER nitrogen level determinations. Continued use of the sludge field, particularly given the proposed additional effluent application on the sludge field, should be evaluated in light of the fact that the field is at capacity. The sludge field must remain in compliance with the State of Florida requirements.

A force main would convey the treated effluent due west from the TPS Plant to the southwest area of the airport land for distribution to the sludge fields. The application rate is assumed to be 2.0 inches per week. Center pivot sprinklers would be used and storage facilities would not be required.

The effluent quality from the TPS Plant would meet FDER requirements for this type of land application. Minimal site preparation would be required; however, an evaluation would have to be made of the possible adverse effects that spray irrigation may have on airport activities and adequate buffer zones would have to be established. Also, if the irrigation was to be used to produce crops, then coordination of the sludge disposal activities and imposition of agricultural restrictions and crop use (to the extent consistent with Chapter 17-640 F.A.C.) would have to be considered. While this method of effluent disposal is practiced in other areas, regulatory acceptance of the Tallahassee area is not completely known, although water quality aspects of the airport sludge field were discussed by Speaker #4/9 during the USEPA Public Hearing on August 9, 1990 (Refer to Chapter 5).

Groundwater monitoring may be required to track the potential leachate contamination due to the combination of sludge and effluent disposal on the same lands.

This effluent disposal method would be subject to NPDES permitting if sludge fields are not utilized for beneficial use (such as for agriculture to the extent consistent with Chapter 17-640 F.A.C.) and if point source storm water discharges to waters of the United States exist at the irrigation site(s) of this alternative. In such instances, the need for such permitting would be as described in Section C-1. Other federal, state and local permitting may also be involved for this disposal method.

This effluent disposal method would not be subject to the storm water requirements of NPDES permitting if the sludge fields are utilized for beneficial use such as agriculture. The NPDES regulations exempt from storm water permitting, lands utilizing sludge in a beneficial manner that are not within the confines of the facility and are in compliance with Section 405(d) of the Clean Water Act.

In either case of beneficial or non-beneficial use, however, the need for sludge permitting for sludge disposal/reuse at existing and proposed sludge fields would be as described in Section C-1.

Section C-9 Rapid Infiltration Basins (RIBs)

Under alternative components D11 and D12, treated effluent would be conveyed via force main to RIBs in an area south of Tram Road and east of the existing SE Sprayfield or to the NE disposal sites. It is expected that the secondary treatment level and basic disinfection would be reasonably adequate from a public health viewpoint. However, additional nitrogen removal would most likely be required to prevent groundwater contamination. These components could be combined with components D16 and D17, the artificial wetlands. Effluent from the wetlands disposal components, which has a higher quality than effluent directly discharged from secondary treatment facilities, could be directed to RIBs for final disposal.

It is assumed that an average application rate of 10.0 inches per week could be maintained and no storage would be required. Also, the RIBs would be constructed as small, one-acre cells which will roughly double the total land requirement when the buffer areas and access roadways are incorporated. Extensive groundwater monitoring would be required along with careful consideration of sinkhole activity in the area to prevent "short circuiting" of the infiltration system.

Effluent disposal through the RIB method would, by itself, not be subject to NPDES permitting if the RIBs do not drain as a point source discharge into waters of the United States. However, pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124) and to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), an NPDES permit is required for any associated point source storm water discharges to waters of the United States, as described in Section C-1. However, if the RIBs do drain as a point source discharge into waters of the United States, an NPDES permit would be required for such discharges pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124) in addition to requirements for any point source discharges of storm water from the site to waters of the United States. Other federal, state and local permitting may also be involved for this disposal method.

Related to wastewater effluent disposal through the use of RIBs is the generation of and land application of wastewater sludge. The need for sludge permitting would be as described in Section C-1.

Section C-10 Landscape Irrigation and Disposal in Percolation Ponds (Redistribution)

Under alternative component D13, 1.5 mgd of treated wastewater from the TPS Plant would be used for landscape irrigation of residential or other land in the eastern area of the City and could also be discharged into small percolation ponds for disposal. A 15-mile force main from the TPS Plant would parallel Capital Circle to Centerville Road, then parallel Centerville Road in a northeast direction to Interstate 10. To implement this alternative, effluent at the TPS

Plant would have to be upgraded beyond the current secondary level to include filtration and high level disinfection.

Specific irrigation and percolation areas have not been identified, and it has been assumed that approximately 100,000 gpd of wastewater would be used per mile of pipeline. The force main would be tapped at various locations along its route. A 1.5-mgd covered storage tank would be provided.

The upgraded effluent would need to meet FDER requirements for unrestricted access urban irrigation and should not present any significant health risks. The use of treated effluent for irrigation would replace existing and future withdrawal of groundwater, thus conserving groundwater resources.

The need for NPDES permitting for effluent disposal through landscape spray irrigation would be as described in Section C-5, since landscape irrigation sites are considered non-agricultural/non-silvicultural land application sites. Other federal, state and local permitting may also be involved for this disposal method.

In regard to disposal in percolation ponds, if the ponds drain as a point source discharge to waters of the United States, an NPDES permit would be needed for such discharges pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124) as described below in Section C-11.

Related to wastewater effluent disposal through the use of the landscape irrigation and percolation pond method is the generation of and land application of wastewater sludge. The need for sludge permitting would be as described in Section C-1.

Section C-11 Point Source Discharge to Surface Waters

The disposal of treated wastewater by discharge to surface waters is the most common method currently used in the United States. It involves piping treated wastewater (effluent) from the wastewater treatment facility to a suitable body of water. This may include a creek, canal, stream, river, pond or lake. It may also include various locations in the ocean such as bays, inlets, channels or offshore waters. Regardless of the surface water feature chosen, the receiving water must be of a quality and volume to render the effluent/receiving water mixture acceptable to established water quality standards and criteria. In addition, the effluent must meet the standards and criteria that describe the use classification for the receiving water.

The FDER and the USEPA actively regulate the discharge of effluent to surface waters in the Tallahassee-Leon County area. Although USEPA administers the National Pollution Discharge Elimination System (NPDES) permitting in Florida, FDER must certify that the NPDES permit will not violate state water quality standards. Chapter 403 of the Florida Statutes sets forth surface water classifications and water quality standards by which surface water discharges are evaluated. In the Tallahassee-Leon County area many of the surface waterbodies are hydraulically connected to the groundwater (e.g., sinkholes), which is further regulated by FDER through Chapter 376 of the Florida Statutes. Disposal of effluent into the Florida jurisdictional waters of the Gulf of Mexico would add the local regulations of a second county and Chapter 161 of the Florida Statutes, the Beach and Shore Preservation Act, also administered by the Florida Department of Natural Resources (FDNR). (Note: Effective July 1, 1993, the FDNR and the FDER were reorganized to become the Florida Department for Environmental Regulation: FDEP).

Until the completion of the SE Sprayfield, the City disposed its effluent in the Munson Slough-Lake Munson surface water system. Currently, there are no major permitted effluent discharges to surface waters in the Tallahassee-Leon County area and none are probably likely, particularly lake disposal. Effluent disposal in the Florida jurisdictional waters of the Gulf of Mexico has never previously been considered as an alternative for Tallahassee-Leon County.

The alternative component D14 provides options for effluent disposal by discharge to surface waters as listed below.

- Construct a gravity/pressure pipeline from the treatment plant(s) to one or more of the selected surface waters.
- Dispose effluent in one of several local stream/lake systems.
- Dispose effluent in one of two major rivers: the St. Marks River and Ochlockonne River.
- Dispose effluent in the Florida jurisdictional waters of the Gulf of Mexico.

The location of the outfall lines would follow existing rights-of-way such as roads or power lines whenever possible. The point of discharge should be selected to maximize effluent dispersal and dilution.

Effluent point source discharges to waters of the United States would be subject to NPDES permitting. Pursuant to the existing NPDES permitting program (40 CFR Parts 122 and 124), an NPDES permit is required for point source discharges to waters of the United States. In addition, pursuant to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), requirements for any storm water point source discharges from the site to waters of the United States would also need to be met in the permit, as described in Section C-1. Other federal, state and local permitting may also be involved for this disposal method.

Related to wastewater effluent disposal through point source discharges to waters of the United States is the generation of and land application of wastewater sludge. The need for sludge permitting would be as described in Section C-1.

Section C-12 Deep Well Injection

Disposal of treated wastewater effluent by deep well injection, as presented in component D15, involves the drilling of a well(s) and pumping the effluent into a suitable geological formation. Depending upon the effluent flow rate and the permeability/transmissivity of the receiving geologic formation, several wells may be required at different locations. The receiving formation must also be of a use classification that is compatible with the effluent quality.

The USEPA/Region IV has delegated (1983) the Deep Well Injection Program to the State of Florida (FDER) for Florida projects. The FDER, through Chapters 403 and 376 of the Florida Statutes, has the primary and broadest control over groundwater quality. The Northwest Water Management District (WMD) has authority over consumptive use of groundwater as provided in Chapter 373 of the Florida Statutes. There is also a provision in Chapter 373 that allows local governments to establish regulations equal to or more stringent than the FDER's regulations.

The FDER chairs a Technical Advisory Committee (TAC) that reviews and provides recommendations for applications for Class I facility deep well injections in Florida. In addition to the FDER, the TAC consists of representatives of the USEPA/Region IV, WMD and the United States Geological Survey (USGS), and also includes a local public health representative. The FDER has the option to accept or refuse the recommendation(s) of the TAC members.

The USEPA (1978) reported that no acceptable geologic formations were located at practical depths in the Tallahassee-Leon County area. Concern still exists as to whether the confining layers of the Floridan Aquifer are continuous enough to protect this potable water aquifer. Other potentially suitable geological formations located below the Floridan Aquifer would be at depths ranging from 3,500 to 5,000 feet. Apparently, there have been no attempts to investigate the suitability of the geologic formations at this depth range, although such depths could be feasible even though more expensive. A test well drilled in 1977 in Gainesville, Florida showed little potential for water disposal and the project was terminated. Also, the USGA (1979), in cooperation with the FDER, has started that Area II, which includes Leon County, "...is the least suitable in Florida for waste injection."

The alternative component elements for effluent disposal by deep well injection are as follows:

- Install a test well to a depth necessary to identify a geologic formation suitable for the injection of effluent volumes and quality proposed by Tallahassee-Leon County.

- Construct a gravity/pressure pipeline from the treatment plant(s) to one or more well locations.

- Construct the necessary number of wells to the specifications determined by the test well, and construct the necessary surface facilities.

The location of deep well injection facilities is mostly determined by the effluent volumes and the permeability/transmissivity of the receiving geologic formations. Any deep well injection receiving formation must also be vertically isolated from freshwater zones, i.e., potential drinking water sources (<10,000 mg/l of total dissolved solids: TDS), by an appropriate confining formation. Wells should also logically be located near the treatment facilities to reduce piping (costs) to the extent feasible.

Effluent disposal through this alternative would, by itself, not be subject to NPDES permitting. However, pursuant to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), an NPDES permit is required for any associated point source storm water discharges to waters of the United States from the site as described in Section C-1. Other federal, state and local permitting may also be involved for this disposal method.

If a deep well facility has to have a discharge to surface waters during Mechanical Integrity Tests (MIT) or in the event that the deep well injection procedure fails, it would also be advisable to apply for an NPDES permit for emergency discharges into waters of the United States (the need for such a permit would be as described above in Section C-11). An NPDES permit would not be needed if the MIT and contingency plan discharges would not be point source discharges to waters of the United States, unless a storm water permit would be needed (see Section C-1).

Related to wastewater effluent disposal through deep well injection is the generation of and land application of wastewater sludge. The need for sludge permitting would be as described in Section C-1.

Section C-13 Artificial (Constructed) Wetlands

The criteria used to develop this component were taken from the USEPA Design Manual entitled "Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment."

This alternative component considers the wastewater treatment capabilities of artificial (constructed) wetlands. Wetlands can remove significant amounts of Biochemical Oxygen Demand (BOD), suspended solids, nutrients, metals and bacteria from wastewater. Their treatment efficiency is dependent upon several variables, including:

- Wetland type
- Vegetation
- Filtration media (soil)
- Influent characteristics
- Wastewater flow
- Temperature
- Detention time

Artificial wetlands have the same pollutant removal capabilities as natural wetlands, without many of the potentially negative impacts. Negative aspects of using natural wetlands can include disruption to wildlife, increased mosquito breeding, odor generation and nutrient and sediment flushing. These aspects can be controlled more easily in a constructed system.

There are two major types of artificial wetlands: free-water surface and subsurface flow. The key difference is that free-water surface systems are flooded and utilize submerged or floating vegetation while subsurface flow systems are filled with a gravelly media and the water is kept below the surface of the media to support emergent vegetation. The artificial wetland system considered for this component is subsurface flow.

Subsurface flow systems are basically horizontal trickling filters with an extensive root system in the media. These systems were developed in West Germany and have been successfully used in Europe. Use in the United States has been more limited. Therefore, in regions where constructed wetlands have not been successfully tried, a pilot program should be considered prior to any full-scale construction to more accurately predict the actual pollutant removal efficiency of the full-scale system for the specific region.

Although still a relatively new wastewater disposal method in the United States, constructed wetlands have shown increasing reliability in the United States. Other examples of functioning constructed wetlands are found in Orlando (Florida), Mississippi, California, Kentucky and Alabama (the Tennessee Valley Authority (TVA) operates facilities in Kentucky and Alabama, and possibly other areas). The facility in Orlando has been functional for several years and consists of marsh (bulrush and cattail) wetlands. Forested (bottomland hardwood) wetlands were tried but were unsuccessful.

The sizing and design of a wetland treatment system is dependent upon the type of treatment desired. A wetland can be designed to remove primarily BOD, suspended solids and metals, or it can be changed to provide more nutrient removal. Nutrient removal is achieved primarily through vegetative uptake and sequestering in plant tissues. Nutrient removal efficiency is a function of the contact time between the wastewater and the plant root systems and the period of time between plant harvests. The USEPA Design Manual suggests that a detention time of 5-7 days is needed to produce an effluent with nitrogen (as TKN) less than 10 mg/l. BOD and suspended solids removal can be achieved with shorter detention times. This may change for any final design, based upon the actual method of discharge and the regulatory discharge limits.

Influent is distributed to the system through a slotted pipe which is placed on top of a coarse stone discharge area. From there, the wastewater flows through a 30-inch deep gravelly sand mixture (maximum 10% of particles with 8 mm diameter) that is planted with bulrushes, an herbaceous wetland species (Juncus) that grows in clumps. The media is lined with an artificial or compacted clay liner with a permeability of $1x10^{-6}$ meters/second. The entire system has a slope of 1.5 percent from the influent end to the discharge point. Discharge is through another coarse stone filter and slotted collection pipe.

The wetland facility can be divided into multiple cells to provide better O&M characteristics. Higher temperatures and biological activity in the summer should allow for the use of only selected cells, permitting harvesting and maintenance of other cells. The areas set aside for wetland facilities must include an area to allow for harvesting and maintenance functions between the individual wetlands. As stated above, this component is designed to be planted with bulrushes. An alternative to the use of bulrushes is the design of a more complex wetland that includes the use of more diverse vegetation. This vegetation can include cattails, reeds, and woody, long-lived plants including wetland trees and shrubs. The more diverse the vegetation, the less dependent the wetland's removal efficiency is on one particular plant species.

Discharge from the wetlands can be through one of four methods. The first method involves elimination of the effluent collection pipe discussed previously and allowing sheet flow into a natural wetland or stream. The second method involves collecting the effluent in a pipe and discharging it as a point source into a stream. The third alternative is pipe collection and discharge into rapid infiltration basins. This provides groundwater recharge and removes the surface discharge. The fourth alternative is pipe collection and spray irrigation. Under this alternative the wetlands provide additional treatment capacity and the stream discharge is eliminated. The drawback to this alternative is the large total land requirement.

Treatment efficiency of artificial wetlands varies. However, the USEPA Manual lists the BOD and suspended solids percent reductions for two subsurface flow wetland systems in Maryland and Australia. The average BOD removal efficiency of these two systems is 78 percent. Suspended solids removal averages 82 percent. Nitrogen removal is said to range from 25 to 85 percent for constructed wetlands. Given the 7-day detention time used here, an estimate of 50 percent nitrogen removal could be expected. Phosphorus removal is typically less than nitrogen removal. The National Space Technology Lab studies conducted in the late 1970's have reported phosphorus removal in the range of 28 to 57 percent.

Effluent disposal through the artificial (constructed) wetlands method need not, by itself, be subject to NPDES permitting if the wetlands do not drain as a point source discharge into waters of the United States. However, pursuant to the "NPDES Permit Application Regulations for Storm Water Discharges" (55 FR 47990 dated November 16, 1990), an NPDES permit is required for any associated point source storm water discharges to waters of the United States as described in Section C-1. If the constructed wetlands do drain as a point source discharge into waters of the United States, an NPDES permit would be required for such discharges plus requirements for any discharges to waters of the United States of storm water from the site, as described in Section C-11. Other federal, state and local permitting may also be involved for this disposal method.

Related to wastewater effluent disposal through the use of artificial (constructed) wetlands is the generation of and land application of wastewater sludge. The need for sludge permitting would be as described in Section C-1.

APPENDIX D

ALTERNATIVE SLUDGE TREATMENT AND DISPOSAL FACILITIES

APPENDIX D ALTERNATIVE SLUDGE TREATMENT AND DISPOSAL FACILITIES

Section D-1 Land Spreading

Solids generated during wastewater treatment are stabilized by aerobic and anaerobic digestion, thickened to reduce the volume of sludge, and disposed by land application. The City currently disposes the majority of its sludge by landspreading it in liquid form on land the City owns around the municipal airport. This sludge field is apparently currently at capacity, based on FDER nitrogen determinations. The remainder of the sludge is dewatered on belt filter presses and applied to land around the T. P. Smith Facility or on the sprayfield adjacent to the T. P. Smith Facility. Total land available for sludge application is currently 806 acres.

Based on operating experience at the T. P. Smith Facility and LBR Plant, the City generates approximately 0.36 dry tons of sludge per mgd of wastewater treated. The stabilized sludge total nitrogen content has averaged approximately 6.1 percent. Future sludge production is estimated to be 4,070 dry tons per year with a resulting total land requirement of 1,210 acres for the planning year 2010. The City would have to obtain additional acreage for landspreading (currently has a total of 806 acres) to handle the projected sludge production levels. For the purposes of developing this alternative component, it was assumed that the City would continue to use the land around the T. P. Smith Facility and SW Sprayfield for dewatered sludge disposal and an expanded airport site for liquid sludge disposal. Sludge generated at any proposed wastewater treatment plant (e.g., NE Plant) would be disposed in liquid form on land adjacent to the effluent disposal site.

Section D-2 Pelletization

An alternative sludge handling and disposal option considered for the County area is the use of the heat drying/pelletization process. The process of heat drying dewatered sludge involves exposing the sludge to hot gases, thereby producing a dried sludge containing 10 percent or less moisture content. The final product resulting from heat drying is a small sludge pellet or bead that has been sold in portions of the United States as a soil conditioner and supplemental soil nutrient source.

The fertilizer value of the sludge pellet would be approximately the same as the dewatered sludge, but conveyance, transportation and application of the pellets would be easier. The overall mass and volume reduction achieved through pelletizing would reduce the number of truck trips from the treatment plant to the land application sites. The area required for on- or off-site final product storage would also be less than the dewatered sludge. However, the land area required for final disposal of the pellets is the same as that required for dewatered or liquid sludge.

The heat drying sludge process considered for the Leon County area is the direct rotary dryer unit system. Mechanically dewatered sludge at 20 percent total solids content is added to a mixer and blended with previously-dried sludge. The blended sludge is then fed to a rotary dryer. The number of dryers needed depends on the volume of sludge produced. Each dryer would be a 3-in-1 drum design, 12.5 feet in diameter and 42 feet long. Within the dryer, the sludge moves forward through a center cylinder, then back through an intermediate cylinder and forward through another cylinder toward a fan on the discharge end. Heated air would be provided by a furnace which would burn natural gas, fuel oil, or other fuels such as digester gas, wood, or coal. Typical dryer inlet temperatures would be 800° F and sludge outlet temperatures would be about 180° F. Although the sludge temperature is too low to destroy organic matter, the process does reduce the level of pathogens present in the sludge, thus allowing the pellets to be sold without restriction as to pathogens.

After passing through the rotary dryer, the sludge is introduced to a product sizing cyclone separator where entrained solids are removed from the offgas. The spent gases then go through an air pollution control system for deodorization and particulate removal. Facilities required for the pelletization process include the feed sludge/recycled dried sludge mixing system, furnaces, rotary dryers, product sizing devices, product storage silo, odor and fugitive dust controls, and a separate building to house the process.

APPENDIX E

GLOSSARY

APPENDIX E GLOSSARY

Aerosols - A suspension of colloidal solid or liquid particles in air and gas, having small diameters ranging from 0.01 to 50 microns.

Area Systems - Wastewater Management facilities with design average daily flows less than 500,000 gpd. FDER refers to these facilities as Type II (flows between 100,000 and 500,000 gpd) and Type III (flows between 2,000 and 100,000 gpd).

Bedrock - The more or less solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface. It may be soft, medium or hard and have a smooth or irregular surface.

Biochemical Oxygen Demand - Measure of the concentration of organic impurities in wastewater. The amount of oxygen required by bacteria while stabilizing organic matter under aerobic conditions, expressed in mg/l, is determined entirely by the availability of material in the wastewater to be used as biological food, and by the amount of oxygen utilized by the microorganisms during oxidation. Usually referred to as BOD.

BOD - See Biochemical Oxygen Demand.

Bonifay Soil Series - USDA SCS soil series with soils that are fine sand, nearly level to gently sloping, and well drained.

Borings - Cylindrical samples of a soil profile used to determine infiltration capacity.

Bulrushes - Members of the genus *Scirpus* and are perennial, grass-like herbs that grow in clumps. They are capable of growing well in water that is 2 inches to 10 feet deep. Desirable temperatures are 61 to 81 °F and desirable pH range is 4 to 9.

Centralized (wastewater collection and treatment) System - Refers to a system with large regional facilities. The collection system would be a network of pipes (generally servicing most customers of a given governmental jurisdiction) that conveys flows from the sewage source to one or two major "centrally" located facilities. Facility planning, construction, operation, and maintenance tasks are normally the responsibility of a single government agency or authority.

Channel - A natural or artificial watercourse with a definite bed and banks which confine and conduct continuously or intermittently flowing water. See "Watercourse".

Chemical Oxygen Demand - A measure of the oxygen equivalent of that portion of organic matter that is susceptible to oxidation by a strong chemical oxidizing agent. Usually referred to as COD.

COD - See Chemical Oxygen Demand.

Cody Scarp Sandhills - A physiographic region characterized by dry, mostly low sandhills over limestone, allowing moderately rapid recharge of surface water to the Floridan Aquifer. It has small, circular lakes, but only two intermittent channels. Native vegetation was longleaf pine - turkey oak forests, but is now pine plantation.

Confining Layer - A geological layer including low permeable soil, bedrock, and water table, that prohibits the flow of liquid.

Decentralized (wastewater collection and treatment) System - Refers to a system with a multitude of facilities. The facilities generally include various combinations of single-customer on-lot systems and small collection and treatment systems (e.g., package plants) servicing a cluster of customers (e.g., a residential subdivision, shopping center, industrial park, or office complex). Facilities planning, construction, operations, and maintenance tasks are normally the responsibility of the individual customers or a private entity.

Dothan Soil Series - USDA SCS soil series with soils that are loamy fine sand, nearly level to sloping, and well drained.

Ecotone - The transition area between distinct habitat/community areas such as wetlands, grasslands and forests.

Emergent Plants - Aquatic plants that are rooted in the sediment but whose leaves are at or above the water surface. These wetland plants often have high habitat value for wildlife and waterfowl, and can aid in pollutant uptake.

Erosion - The removal of soil particles or rock fragments of the land surface by the action of running water, wind, ice, or other geological agents.

Eutrophication - The process of over-enrichment of waterbodies by nutrients often typified by the presence of algal blooms.

Evapotranspiration - The combined loss of water from a given area and during a specific period of time, by evaporation from the soil surface and by transpiration from plants.

Faceville Soil Series - USDA SCS soil series with soils that are sandy loam, strongly sloping on upland, and well drained.

Field Area - The "wetted area" where treatment/disposal occurs in a land application system.

Floodplain - The nearby level land area situated on either side of a channel which would be inundated temporarily by overflow waters caused by storm water runoff.

Florida Department of Environmental Protection (FDEP) - The FDEP is the State of Florida agency that regulates spray irrigation permitting for proposed projects in Florida. Effective July 1, 1993, the Florida Department of Environmental Regulation (FDER) and the Florida Department of Natural Resources (FDNR) were reorganized to form the FDEP.

Fuquay Soil Series - USDA SCS soil series with soils that are fine sand, nearly level to sloping, and well drained.

Groundwater Recharge - Replenishment of existing natural underground water supplies.

Heavy Metals - Metals, including nickel, manganese, lead, chromium, cadmium, zinc, copper, iron and mercury, that exist in trace quantities in wastewater. Some of these metals are necessary in trace amounts for the growth of biological life. The presence of any of these metals in excessive quantities will interfere with many beneficial uses of the water because of their toxicity.

Horizon, Soil - A layer of soil or soil material approximately parallel to the land surface and differing from adjacent genetically-related layers in physical, chemical, and biological properties or characteristics (e.g., color, structure, and texture).

Hydrogen Sulfide - A chemical compound formed from the decomposition of organic matter containing sulfur or from the reduction of mineral sulfites and sulfates. It is a colorless, inflammable, highly toxic gas having the characteristic odor of rotten eggs.

Impervious Area - A surface which prevents the infiltration and percolation of water into the ground.

Infiltration - The flow of a liquid into a substance through pores or other openings, connoting flow into a soil in contradistinction to the word, percolation, which connotes flow through a porous substance. The infiltration capacity is expressed in terms of inches per hour.

Karst - The geologic condition in which limestone is dissolved by groundwater, forming underground voids, and resulting in surface depressions, or sinkholes. Karstic depressions with standing water have been referred to as "live" Karstic depressions.

Kershaw Soil Series - USDA SCS soil series with soils that are sand, nearly level to sloping, and excessively drained.

Leaching - The removal of soluble material from soil by percolating water.

Leefield Soil Series - USDA SCS soil series that loamy sand, nearly level, and poorly drained.

Lucy Soil Series - USDA SCS soil series with soils that are fine sand, nearly level to sloping, and well drained.

Marsh - Wetlands that are characterized by soft-stemmed herbaceous emergent plants, such as cattails and pickerel weed. Shallow marshes are those with up to six inches of water; deep marshes have as much as two to three feet of water. Seasonal fluctuations in the water level may occur. The Everglades is an example of a vast expanse of marshland.

Mottling, soil - Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage.

Mounding - (1) Filling the area for the on-lot absorptions field with suitable soil material (usually sand) to the level above the water table necessary to meet local and state requirements. (2) The process in which an artificial water table is created on top of a confining layer in the ground. Over a period of time if the water can not drain properly, the top of the water table will approach the ground surface and create ponding problems.

Mound System - See Mounding, first definition.

Nitrogen - Chemical element usually available as ammonium, nitrite, and nitrate ions, and certain simple amines for the growth of plants and protista. A small fraction of organic or total nitrogen in the soil is available at any time. Excessive amounts of nitrogen in water (usually measured as nitrate nitrogen) can be detrimental to the health of infants.

Nonpoint Source Pollution - Pollution that enters a water body from diffuse origins in the watershed and does not result from discernible, confined, or discrete conveyances.

Norfolk Soil Services - USDA SCS soil series with soils that are loamy fine sand, gently sloping to moderately sloping, and well drained.

National Pollutant Discharge Elimination System (NPDES) Permit - A permit issued, as appropriate, by the USEPA or by a delegated state regulating the release of pollutants from point sources into waters of the United States.

Nutrients - Substances necessary for growth of protista and plants in water. Most important nutrients include nitrates and phosphates. Trace quantities of other elements such as iron are also needed for biological growth. Excessive amounts of nutrients results in the uncontrolled growth of plant matter such as noxious algal blooms in surface waters.

Orangeburg Soil Series - USDA SCS soil series with soils that are fine sandy loam, nearly level to strongly sloping, and well drained.

Organic Matter - Plant and animal residue in the soil in various stages of decomposition.

Ortega Soil Series - USDA SCS soil series with soils that are sand, nearly level to gently sloping, and moderately well drained.

Pathogens - Infectious microbes such as viruses, pathogenic bacteria, and protozoans. Most numerous pathogens in wastewater are bacterial pathogenic organisms. Those excreted by man can cause diseases of the gastrointestinal tract, such as typhoid and paratyphoid fever, dysentery, diarrhea, and cholera. Usually the coliform group of organisms is used as an indication of the presence in wastewater of feces and hence pathogenic organisms.

Perched Water Table - A type of unconfined aquifer in which the waterbody is separated from the main groundwater by a relatively impermeable stratum.

Percolation - The downward movement of water through the soil.

Permeability - The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil.

Phosphorus - Inorganic element that is readily available in the form of orthophosphate for the growth of plants and protista.

Ponding - Standing water on soils in closed depressions. Unless soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Rapid Infiltration (Basin) System (RIB) - A disposal technique that uses land application of wastewater treatment plant effluent. It generally consists of a constructed land area onto which water is applied (sprinkled or spread) to relatively porous soil at rates far in excess of normal crop irrigation (loading rates >4 inch/week).

Renovate - In the context of wastewaters this refers to the biological treatment of the wastewater in a constructed facility or in a natural setting (such as wetlands or soils) to restore them to a quality standard that allows reuse of the water.

Runoff - The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soils is called surface runoff. Water that enters the soil before reaching surface streams is called groundwater runoff or seepage flow.

Secondary Treatment Level - Wastewater treatment to a level that will achieve the effluent limitations specified in Chapter 17-6, Part 1, Section 17-6.060 (1)(a) of FDER Rules and Regulations.

Sedimentation - The process by which solid material, both mineral and organic, is accumulated, having been transported by wind or moving water and deposited by gravity. Once this matter is deposited (or remains suspended in water), it is usually referred to as "sediment".

Senescence - The annual die-back of aquatic plants at the end of the growing season.

Series, soil - A group of soils that have profiles that are almost alike except for differences in texture of the surface layer or the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheetflow - Runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel.

Silvicultural Operations - The management of forested land in order to maximize the growth, health, and marketability of timber.

Sinkhole - A depression in the landscape where limestone has been dissolved. See Karst. Sinkholes containing water may be known as "live" sinkholes.

Soil Strata - The various horizontal layers of sedimentary rock (soil).

St. Marks Lowlands - A physiographic province which includes the present floodplain valley of the St. Marks River. It is marked by bottomland swamps of the St. Marks River and its major tributaries. A portion of the St. Marks River, below Cody Scarp, is made up primarily of groundwater flow.

Storm water - Runoff and drainage from land surfaces resulting from precipitation including snow or ice melt.

Storm water Management - A program of controls and measures designed to regulate the quantity and quality of storm water from a development and/or land disturbance while promoting the protection and conservation of groundwater and groundwater recharge.

Swamp - Wetlands that unlike marshes, are dominated by woody plants such as trees, and shrubs. Swamp soils are saturated during the growing season, and standing water (from a few inches to a foot) is not uncommon at certain times of the year.

Tallahassee Red Hills - A physiographic region located in the northeastern portion of Leon County. It is a clayhills region composed of a moderately thick layer of sandy clay over limestones. It has substantial formation of sinkholes, Karstic depressions and valleys formed partly from solution of underlying limestone, and contains many lakes and seasonal streams and wetlands. Most of the limestones represent the Floridan Aquifer.

Total Suspended Solids (TSS) - Solids either floating or suspended in water, sewage, or other liquid wastes that are removable by filtering.

Watercourse - A stream of water, river, brook or creek; or a channel or ditch for water, whether natural or manmade. See "Channel".

Watershed - The entire region or area drained by a river or other body of water, whether natural or man-made.

Water Table - The upper surface of the free groundwater in a zone of saturation (indicates the uppermost extent of groundwater); locus of points in soil water at which hydraulic pressure is equal to atmospheric pressure.

Wetlands - The regulatory definition of wetlands according to the U.S. Army Corps of Engineers (33 CFR Section 328.3) and the USEPA (40 CFR Section 230.3) is "...areas that are inundated or saturated with surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Wetlands Dredge-and-Fill Permit - Section 404 (Clean Water Act) permits are issued, as appropriate, by the U.S. Army Corps of Engineers (COE) for the filling of jurisdictional wetlands. Mitigation for such wetland fill may be a COE permit condition. The USEPA independently reviews individual permit applications (and some nationwide permit applications) and provides comments to the COE.

Whole Tree Harvesting - Forest management harvesting operations that involves the removal of the entire standing tree (stem, branches, leaves, and sometimes roots).

Woodville Karst Plain - A physiographic region located in the southeastern portion of the County near Woodville. It is a low plain consisting of sand a few feet thick over limestone. The entire area is a high recharge area for the Floridan Aquifer. It is currently composed of cypress swamps and pine plantations.

APPENDIX F

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APPENDIX F

BIBLIOGRAPHY

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PUBLIC NOTICE

March 9, 1994

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, NE
ATLANTA, GEORGIA 30365

The availability of the Final Environmental Impact Statement Supplement (FEISS) entitled "Tallahassee-Leon County, Wastewater Management, Tallahassee, Leon County, Florida" is being noticed in the Federal Register on March 18, 1994, by the United States Environmental Protection Agency (USEPA), Region IV. The Draft Environmental Impact Statement Supplement (DEISS) was noticed at 55 FR 26751 on June 29, 1990. After issuance of the DEISS, the USEPA held a Public Hearing on August 9, 1990, at the City Commission Chambers in Tallahassee, Florida.

The City of Tallahassee presently has not requested any federal funds to implement the 1988 City Master Sewer Plan (MSP), nor does the implementation of the MSP as proposed otherwise constitute a "major Federal action" under Section 102(2)(C) of NEPA, and NEPA does not mandate that an EIS Supplement be prepared. However, this discretionary USEPA EIS Supplement provides technical guidance to the City of Tallahassee Sewer Division as well as other local decision-makers for facility expansion planning. Since no major federal action is currently planned, the USEPA presently does not intend to prepare a Record of Decision (ROD) for this EIS Supplement. If, however, local decision-makers should ultimately include federal involvement in the City MSP at the level of a "major Federal action," the EIS Supplement (the DEISS and this FEISS) will serve to meet the requirements of NEPA (and an ROD would be prepared), unless a significant amount of time has passed before project implementation and significant changes have occurred in the project as proposed, in the impacts of the project, and/or in the project area. After appropriate examination of such considerations, the need for a supplemental EIS to update the present EIS Supplement could be determined.

Given the nine alternatives considered and the four alternatives (1, 2, 7 and 9) selected for further study in the EIS Supplement, the USEPA finds Alternative 1 to be an acceptable alternative. Alternative 1 is a practical alternative that represents a continuation of the City's successful agricultural spray irrigation approach to the disposal of treated effluent through an expansion of the City's SE Sprayfield, as well as the irrigation of existing golf courses. As such, Alternative 1 was considered the preferred alternative for the EIS Supplement. However, the USEPA is not requiring the implementation of Alternative 1 since the EIS Supplement is discretionary and there are no federal funds and no major federal action proposed for Alternative 1 (or for Alternatives 2, 7 or 9) at this time. Unless the proposed project becomes a major federal action, the selection of an appropriate alternative for the City of Tallahassee wastewater management would be a local decision.

Written comments on this FEISS will be accepted by the USEPA if postmarked by the close of the 30-day public comment period on:

APRIL 18, 1994

Comments should be addressed to Heinz J. Mueller (FAB-4); Chief, Environmental Policy Section; U.S. Environmental Protection Agency; Region IV; 345 Courtland Street, NE; Atlanta, Georgia 30365. Facsimile transmittals may be sent to the USEPA at (404) 347-5206. Although all comment letters will be retained as part of the project file, the USEPA may choose to not formally respond to comments received since there is no major federal action and USEPA preparation of an ROD is not planned at this time.

(MORE ON BACK)

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Tallahassee, FL 32307
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Distribution of the FEISS and/or this Public Notice by the USEPA/Region IV included numerous federal and state agencies, environmental groups, congressional representatives, and individuals. This distribution included ten (10) copies to the State of Florida clearinghouse (Ms. Janice Hatter) and twelve (12) copies to the U.S. Department of the Interior (DOI) clearinghouse (Ms. Lillian Stone) for their internal distribution in addition to the USEPA's selected State of Florida and DOI distributions.

The USEPA/Region IV has distributed essentially all printed copies of the FEISS, so that none are currently available from the USEPA. However, inquires regarding the potential availability of any extra copies of the FEISS may be made to Chris Hoberg at (404) 347-3776, FAX (404) 347-5609, or the above USEPA/Region IV address. Conversely, any distributed copies that are unwanted may be returned to the USEPA during or after the public comment period at the above address. However, there is absolutely no obligation to return distributed copies.