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FINAL ENVIRONMENTAL IMPACT STATEMENT

Durham - Eno River Wastewater Treatment Plant and Service Area
City of Durham, Durham County, North Carolina

FINAL ENVIRONMENTAL IMPACT STATEMENT
DURHAM-ENO RIVER WASTEWATER TREATMENT PLANT AND SERVICE AREA

Prepared By

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In Cooperation With

State of North Carolina
Department of Environment, Health,
and Natural Resources
Division of Environmental Management

This Final EIS addresses wastewater facilities and management options for the City of Durham, North Carolina. Numerous wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface water and the impacts of projected population growth on the natural and human resources of Durham and the surrounding area.

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EXECUTIVE SUMMARY FOR ENVIRONMENTAL IMPACT STATEMENT

DURHAM-ENO RIVER WASTEWATER TREATMENT PLANT AND SERVICE AREA

DURHAM, NORTH CAROLINA

Draft [ ] Final [X]

ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
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EXECUTIVE SUMMARY

A. Purpose and Background

The purpose of this Environmental Impact Statement is to evaluate wastewater treatment alternatives for the Durham-Eno River wastewater treatment plant service area and the impacts of those alternatives. Current wastewater practices use residential on-lot treatment and a 2.5 mgd Eno River wastewater treatment plant. The City of Durham had determined that existing wastewater treatment needs, failing on-lot septic tank systems, and future needs associated with rapid population growth within the Urban Growth Boundary will necessitate an expansion of the Eno River wastewater treatment plant to 12 mgd or more. It was felt by all levels of government involved as well as by the general public that an Environmental Impact Statement was necessary to thoroughly evaluate alternatives for wastewater treatment and disposal.

B. Key Environmental Considerations

A primary consideration of the preferred alternative was water quality impacts to Falls Lake, which is both a recreation area and the City of Raleigh drinking water supply. Falls Lake was formed, starting in 1983, by the impoundment of the Neuse River. The reservoir bottom topography is wide and shallow in the upper northern portion, whereas the southern lower portion is narrow and deep. Tributaries to the upper portion of Falls Lake include the Eno River, the Little River, the Flat River, and Ellerbe Creek. The upper portions of Falls Lake are highly eutrophic. Lakes are said to be eutrophic when they are overenriched with nutrients, which leads to excessive algae growth, nuisance weeds, low transparency, and generally poor aesthetics. Eutrophication also impairs the quality of water drawn for water supply because it leads to problems relating to taste, odor, and trihalomethane formation.

Phosphorus is the nutrient limiting algal growth in Falls Lake. The current phosphorus load to Falls Lake is approximately 204 tons/year. Non-point sources account for about 115 tons/year (56%) and the point source discharges from the three plants, prior to consolidation by the N-EC alternative, would contribute about 39 tons/year (19%) to Falls Lake. With the effluent limits described above, the expected TP loads for Alternative N-EC Phase A and B are 34 and 32 tons/year, respectively. Both of these loads are reductions from the existing 39 tons/year point source load.

Another major issue of this EIS was non-point source pollution. Increased non-point source pollution is a basin-wide secondary impact associated with population growth and land development created by expanded wastewater treatment plant capacity. It was estimated that the year 2010 non-point source load of TP for the EIS study area would be approximately 18 tons/year. It was recommended that the Durham County and City Watershed Ordinances and Sedimentation and Erosion Control Ordinance be strengthened to improve best management practices (BMP's) for better control of non-point sources of pollution. Some of the BMP's that should be applied include impervious cover ceilings, land use controls, detention basins, infiltration facilities, silt fence curtains, and buffer strips. Additional mitigation of non-point source

loads should involve the formation of a Multi-County Consideration Committee to handle watershed and non-point source pollution issues. Consideration should also be given toward upgrading the existing WS-III designation on Lake Michie and Little River Watersheds to a WS-II or WS-I designation (NCDEM fresh surface water classification, 15A NCAC 2B.0211).

C. Alternatives Evaluation

Sixteen potential wastewater treatment alternatives were considered at the start of the EIS process. The alternatives included four different treatment plant locations and six wastewater disposal options. The 16 alternatives were derived by combining various treatment plant locations and disposal options. The alternatives were screened on the basis of technical feasibility and implementability. With input from a 24-member review committee comprising local citizens, county and city agencies, and the business community, seven alternatives were selected for further analysis by EPA and NCDEM.

One alternative for wastewater treatment in the EIS study area was No-Federal Action. This alternative assumes that Federal funds through State Revolving Fund loan programs would not be available to the City of Durham, and that future wastewater management facilities are developed by local funding. Other alternatives, shown in Figure ES-1, are described as follows:

a. EN-ER — A 12 mgd advanced tertiary treatment plant at the Eno River location discharging to the Eno River.

b. EN-LA — A 12 mgd secondary treatment plant at the Eno River location with wastewater disposal via land application.

c. N-EC — A 29 mgd advanced tertiary treatment plant at the Northside location discharging to the Ellerbe Creek. A 12 mgd pump station at the Eno River location conveys study area wastewater to Northside.

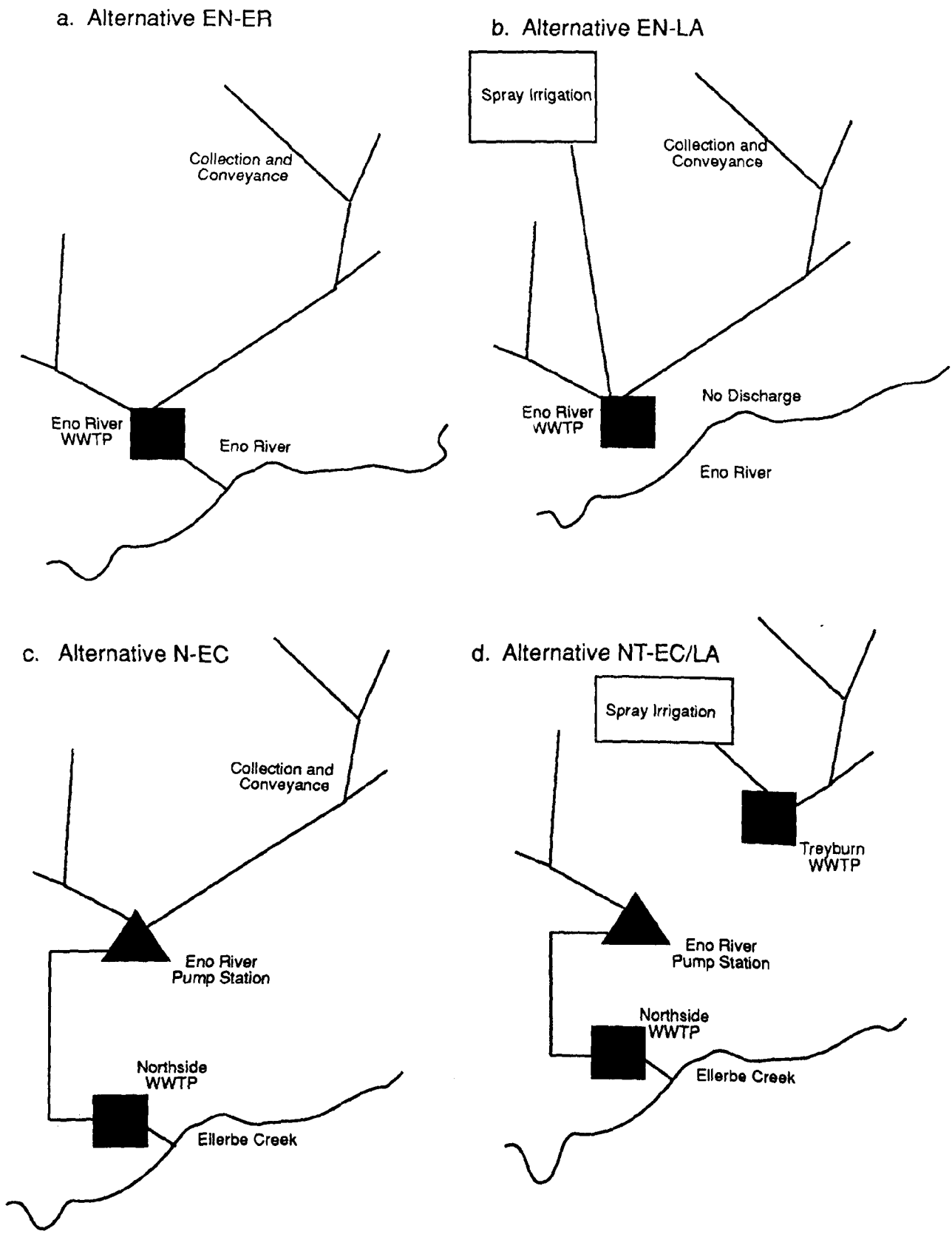
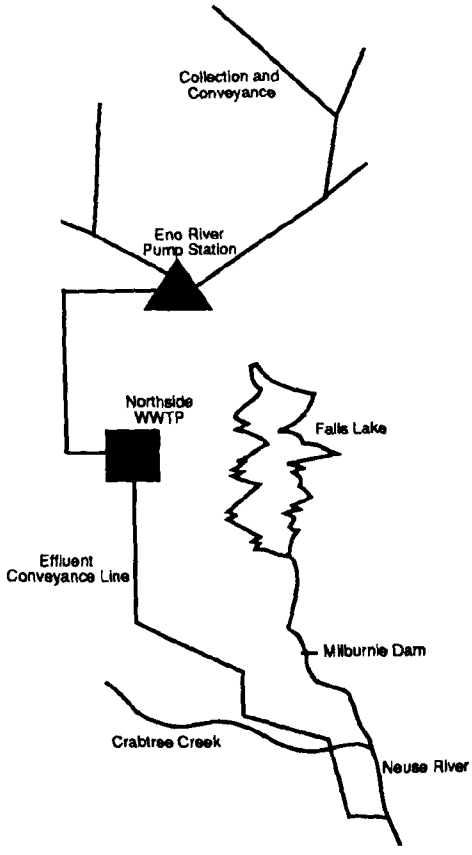
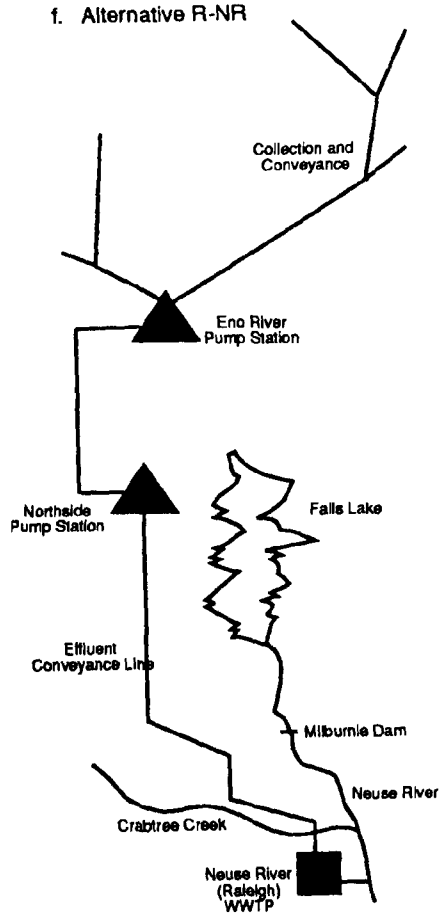


Figure ES-1
Wastewater Management Alternatives

e. Alternative N-NR



f. Alternative R-NR



g. No Federal Action Alternative

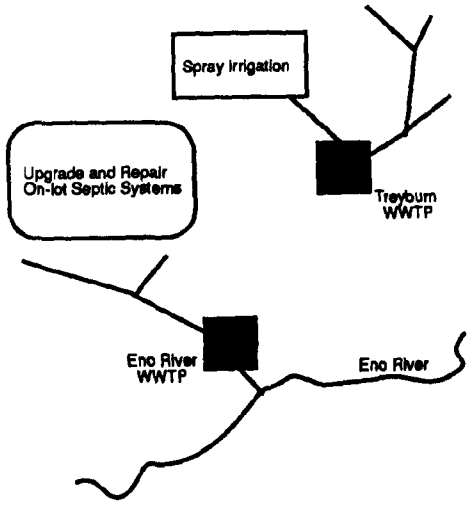


Figure ES-1 (Continued)
Wastewater Management Alternatives

d. NT-EC/LA Modification of N-EC using a 3 mgd secondary treatment plant at the Treyburn location with land application disposal. Northside facility is 26 mgd. Eno pump station is 9 mgd.

e. N-NR Modification of N-EC using the Neuse River as a new disposal location.

f. R-NR A 29 mgd pump station at the Northside location. Raw wastewater conveyed to Neuse River wastewater treatment plant (Raleigh). Advanced tertiary treatment facility with discharge to the Neuse River.

g. NFA A 2.5 mgd advanced tertiary treatment facility at Eno River location to treat wastewater from failing on-lot systems. A 2 mgd secondary treatment facility at Treyburn location with land application disposal. On-lot systems and package treatment plants serve remaining needs for wastewater treatment.

The alternatives with Neuse River discharges (N-NR and R-NR) involved a 40-mile pipeline to convey wastewater or effluent to the Neuse River. Implementation concerns and high cost related to this pipeline removed Alternatives N-NR and R-NR from consideration. The land application alternative, EN-LA, would have required five disposal sites in northern Durham County with an estimated total land area of 7,695 acres. The prohibitively high cost of such a land acquisition eliminated this alternative from consideration. Alternative NFA was not considered feasible because it would require future development to be served by package plants and on-lot systems. Use of these facilities is not acceptable because of environmental and public health impacts associated with inadequately treated wastewater discharges caused by upset conditions and poor maintenance. Water quality monitoring and modeling conducted by NCDEM indicated that the Eno River was not a suitable receiving water for the proposed 12 mgd of wastewater discharge. For this reason, Alternative EN-ER was removed from consideration.

D. Preferred Alternative

Expansion of the Northside wastewater treatment plant under the preferred alternative would occur in two phases. Phase A would expand the plant from 9.5 to 20 mgd. Three effluent limits for this phase would be 5 mg/L BOD_5, 1 mg/L NH_3-N, and a seasonal total phosphorus (TP) limit of 0.5 mg/L April-October and 2 mg/L November-March. Water quality monitoring and modeling are needed to confirm the adequacy of these limits prior to the construction of Phase B. Phase B, which would be initiated in 1995 and on-line in 1998, would expand the Northside facility from 20 mgd to 29 mgd. Effluent limits would be the same as those for Phase A, except TP would be lowered to 1.0 mg/L November-March. The 2.0 mg/L TP limit proposed for Phase A is based upon North Carolina's year-round 2.0 mg/L limit requirement for Nutrient Sensitive Waters. However, given the eutrophic conditions in the Ellerbe Creek headwaters of Falls Lake, a stricter 1.0 mg/L limit may be required. The necessity of this limit should be evaluated during Phase A monitoring and modeling.

E. Agency Decision - Technical Bases and Rationale

Following comment and input by the Review Committee, EPA and NCDEM selected Alternative N-EC to be the EIS preferred alternative. Alternative N-EC had the lowest cost and highest potential for implementability of the seven alternatives. Alternative N-EC would consolidate three existing wastewater treatment plants (the Eno River, Northside, and Little Lick Creek facilities) into one state-of-the-art advanced tertiary treatment facility. Water quality in the Eno River and Little Lick Creek would improve because discharges from the old existing plants would be removed. Ellerbe Creek would benefit from both increased flow and the improved quality of wastewater discharged from the upgraded Northside plant. Additional considerations that prompted the selection of N-EC were that the Northside plant was already slated for an upgrade, and the site was sufficiently accessible and large enough to expand to 29 mgd.

F. Recommendations

Phased construction (A and B) of the preferred alternative will allow impacts to be assessed and mitigated prior to the ultimate expansion of the Northside facility to 29 mgd. During Phase A, mitigation efforts should include water quality monitoring/modeling, non-point source pollution BMP's, conveyance line construction impact mitigation, and sludge disposal evaluation. The entire collection and conveyance system for the preferred alternative would be constructed during Phase A. Necessary mitigation activities include noise reduction, traffic routing, sediment/erosion controls, rights-of-way conversions to greenways, and conveyance line placements to avoid archaeological and historical areas. At a Phase A design capacity of 20 mgd, the Northside facility will generate 5,400 dry tons/year of sludge. Approximately 1,080 acres of land will be required to dispose of this sludge at agronomic rates. In terms of toxic metal content, the Northside sludge is expected to be suitable for land application. Also, there appears to be sufficient acreage in Durham and surrounding counties for land application during Phase A. The viability of this sludge disposal method should be further evaluated prior to Phase B of the preferred alternative.

During the operation of the Northside Plant at the 20 mgd level, Ellerbe Creek would be monitored by NCDEM to assess the impacts upon the stream. This would need to be done as a condition for receiving permission to expand to 29 mgd. Additionally, the City of Durham is required by its NPDES permit to conduct whole effluent toxicity testing on the Northside discharge.

G. Mitigative Measures

Mitigation efforts for Phase A of the preferred alternative should include water quality monitoring, non-point source BMP's, and continued evaluation of the sludge disposal operation. Water quality monitoring should be included as a requirement for the NPDES permit to ensure water quality standards are met, and to confirm water quality projections made during Phase A. This process will determine if expansion to 29 mgd can be granted. Non-point source BMP's will become increasingly important as land use development

continues in the Eno, Northside, and Little Lick Basins during Phase B. Structural BMP's should be implemented and maintained. Enforcement of non-structural BMP's involving impervious cover ceilings and land use controls should continue.

It may be necessary to evaluate the sludge land application disposal operation. It was estimated that 8,400 dry tons per year of sludge would be generated by a Phase B capacity flow of 29 mgd, and that 1,680 acres of land would be required to dispose of this sludge at agronomic rates of application. Innovative and alternative means for sludge disposal, such as use in the cement industry, may become preferable to the land application disposal method.

Preferred Alternative

4.0 PREFERRED ALTERNATIVE

4.1 INTRODUCTION

The preferred alternative would expand the existing Northside wastewater treatment plant from 9.5 to 20 mgd during Phase A, and from 20 mgd to 29 mgd during Phase B. The existing Eno River and Little Lick Creek wastewater treatment plants would be eliminated and sewage from their drainage areas would be pumped to the Northside facility. The expanded Northside facility would be designed and constructed to achieve state-of-the-art BOD and phosphorus removal. Non-chlorine disinfection would be used to reduce the toxic effects of discharge. Also, ultraviolet disinfection may be used to eliminate the formation of chlorination by-products. Water quality improvements to the Eno River and Little Lick Creek will occur when the existing wastewater discharges are eliminated. Ellerbe Creek water quality improvement is expected during low flow conditions because of flow augmentation by the highly treated wastewater effluent. These water quality improvements should also have a positive impact on the Eno River, Ellerbe Creek, and Little Lick Creek headwaters of Falls Lake. Water quality monitoring and modeling for Ellerbe Creek and Falls Lake should be conducted during Phase A of the preferred alternative to confirm expected water quality improvements and to determine effluent limits for Phase B.

The preferred alternative is referred to with the acronym "N-EC." Alternative N-EC had the lowest cost and best potential for implementability of all the seven alternatives that were evaluated. It would result in a centralized, highly advanced tertiary treatment facility at a plant that is already planned for an upgrade, the Northside WWTP. The land application alternatives were not feasible because of the cost and unavailability of land suitable for spray irrigation.

Editor's Note: To facilitate cross-references with the Draft Environmental Impact Statement (EIS) published in September 1989, the chapter headings in this Final EIS have remained the same as in the Draft.

4.2 DESCRIPTION OF THE PREFERRED ALTERNATIVE

4.2.1 Project Phasing

The existing Northside WWTP has a design capacity of 9.5 mgd average daily flow. The proposed facility would provide 29 mgd of treatment capacity to the existing Northside Service Area, the Little Lick Service Area, and the Eno River Service Area. Projected flows from these three service areas are listed in Table 4-1 and graphed in Figure 4-1. By the year 2010, wastewater flow from the Eno River Service Area is projected to equal 12 mgd, or 40 percent of the total capacity need for the area tributary to the Northside WWTP. The incremental flow increase in year 1993 is a result of a 1.6 mgd discharge from Mitsubishi.

A Finding of No Significant Impact was issued by NCDEM on April 28, 1989 for an expansion of the Northside WWTP to 20 mgd. NCDEM did not consider an application for an expansion to 29 mgd so as to not preclude or bias the findings of this EIS. The preferred alternative would be implemented with a two phase schedule. The first phase would involve expansion of the Northside plant from 9.5 mgd to 20 mgd. During the first phase, water quality monitoring and modeling of Ellerbe Creek and Falls Lake would continue. A priori projections of water quality improvements and impairments would be refined and updated during this time. Effluent limit requirements for the second phase, i.e., the expansion from 20 to 29 mgd, would be further evaluated during this monitoring and modeling. As seen from Figure 4-1, wastewater flows from the three service areas are projected to exceed 20 mgd in 1998. Therefore, the second phase of the two-phase project schedule would have to be completed and on-line by 1998.

The existing capacity of the existing Northside WWTP is 9.5 mgd. As seen in Table 4-1, flow to the Northside basin will use this capacity prior to completion of the first phase expansion in 1993. For this reason the Eno and Little Lick plants should remain on line through at least the year 1993. It is the recommendation of this EIS that the failing on-lot system areas be given preference over new development when sewer extension permits are granted to the County of Durham. Assuming all the lots in the developments listed as

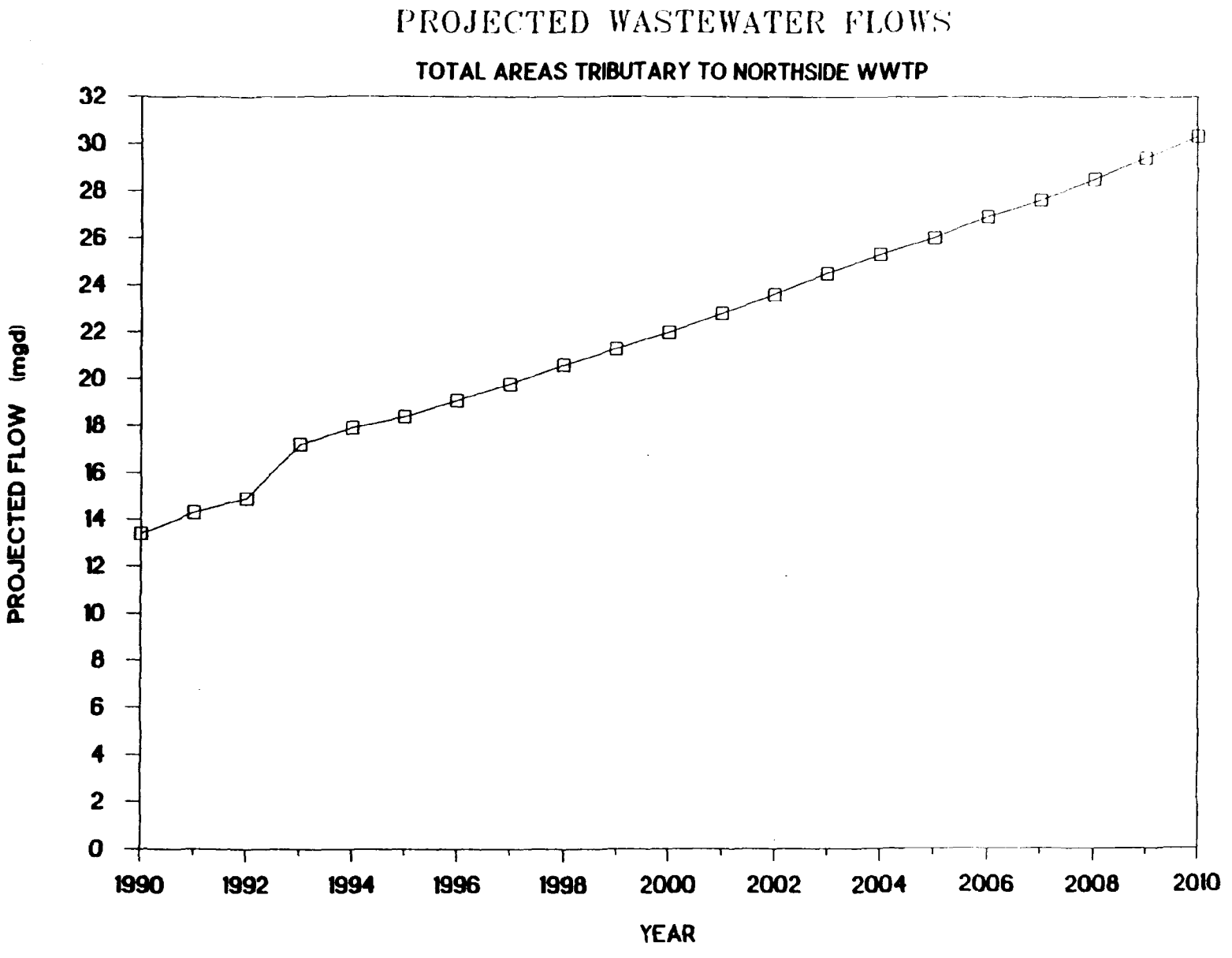

PROJECTED WASTEWATER FLOWS
TOTAL AREAS TRIBUTARY TO NORTHSIDE WWTP
PROJECTED FLOW (mgd)
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
YEAR

FIGURE 4-1

Table 4-1

Projected Wastewater Flows Per Service Area
(units in mgd)

Year	Eno River*	Little Lick	Northside	Total
1990	3.7	0.9	8.8	13.4
1991	4.0	1.1	9.2	14.3
1992	4.2	1.2	9.5	14.9
1993	6.0	1.3	9.9	17.2
1994	6.3	1.6	10.0	17.9
1995	6.5	1.8	10.1	18.4
1996	6.9	2.0	10.2	19.1
1997	7.2	2.2	10.4	19.8
1998	7.6	2.5	10.5	20.6
1999	8.0	2.7	10.6	21.3
2000	8.3	2.9	10.8	22.0
2001	8.7	3.2	10.9	22.8
2002	9.1	3.5	11.0	23.6
2003	9.5	3.8	11.2	24.5
2004	9.8	4.1	11.4	25.3
2005	10.2	4.3	11.5	26.0
2006	10.6	4.6	11.7	26.9
2007	10.9	4.9	11.8	27.6
2008	11.3	5.2	12.0	28.5
2009	11.7	5.5	12.2	29.4
2010	12.0	5.9	12.4	30.3

* Total wastewater generation capacity of service area. Includes flows from existing on-lot systems.

Source: Eno River Flows - See Section 2.2.3.

Little Lick and Northside Service Area flows obtained from Northside WWTP Expansion, Environmental Assessment, January 1989. City of Durham.

concentrated failure areas (see the County of Durham Department of Health June 25, 1987 letter in Appendix A) are allotted the NCDEM standard flow of 360 gpd/dwelling unit, the amount of capacity that must be reserved for failing on-lot systems is 0.8 mgd. The 360 gpd/dwelling unit flow is based upon NCDEM design criteria. Actual flows would probably be less than this amount and the amount of capacity needed for failing on-lot systems would be slightly less than 0.8 mgd.

Table 4-2 summarizes the key milestone dates of the project schedule for the treatment plant expansion work. The tentative dates listed in the table are given for planning purposes only and may not reflect actual project timing. Conveyance facility construction would run concurrent with the treatment plant construction beginning in 1990. However, due to the immediate need for sewers throughout the Eno River Service Area and the economic advantage of initially installing ultimate conveyance capacity as opposed to future paralleling, conveyance facility construction should occur during the first phase of the preferred alternative.

Respectively, about 5,400 and 8,400 dry tons per year of sewage sludge would be generated by the Phase A, 20 mgd and the Phase B, 29 mgd flows of the preferred alternative. About 1,080 and 1,680 acres, respectively, would be required to land apply this sludge at agronomic rates. The City of Durham currently has discontinued disposing of Northside sludge in the landfill cover material and is considering land application for sludge disposal. As part of this process, a contractor contacted farmers and estimated that 1,200 to 1,500 acres of agricultural land would be available for sludge application (Personal Communication with City of Durham Department of Water Resources, July 1989). The City of Durham is initiating a Comprehensive Sludge Management Study to further evaluate options for sludge disposal. One of the issues for Comprehensive Sludge Management Study is the draft regulations for sewage sludge disposal published by EPA in the February 6, 1989 Federal Register. These regulations, which currently are in the public comment phase, will affect land application of sewage sludge. At this time, it is assumed that sludge generated by the preferred alternative will be land applied at agronomic rates.

Table 4-2

TWO-PHASED PROJECT SCHEDULE

A.	Phase A	
	1. Design, Bidding, Project Financing	February 1990 - Spring 1991
	2. Construction (Expansion from 9.5 mgd to 20 mgd)	Summer 1991 - Fall 1993
	3. Facilities Startup	Fall 1993
	4. Water quality monitoring/ modeling of Ellerbe Creek and Falls Lake	Prior to Phase B
B.	Phase B	
	1. Design, Bidding, Project Financing	January 1995 - Spring 1996
	2. Construction (Expansion from 20 mgd to 29 mgd)	Summer 1996 - Fall 1998
	3. Facilities Startup	Fall 1998
	4. Water quality monitoring/ modeling of Ellerbe Creek and Falls Lake	Prior to Phase B

The ultimate cost to the users of the sewerage system would include capital costs for facility construction and annual costs for facility operation and maintenance. The capital costs would include collection and conveyance sewers, wastewater treatment facilities, and treated effluent and sludge disposal facilities. The expanded Northside WWTP and the collection and conveyance facilities would serve the Eno, Little Lick and Northside Service Areas. However, the EIS study area includes only the Eno Service Area and the costs presented in this report reflect costs only to the Eno Service Area. To obtain the Eno River Service Area share of total construction costs, total Northside costs were multiplied by the Eno Service Area's portion of the expanded WWTP capacity (29 mgd - 9.5 mgd = 19.5 mgd). The factor used was 61.5% (12 mgd/19.5 mgd). The collection and conveyance costs represent those facilities serving only the Eno area.

Table 4-3 lists the estimated costs in 1992 dollars for the construction and operation of new collection and conveyance facilities to serve the Eno and Treyburn basins of the Eno Service Area. Project costs include the costs for construction of gravity collector sewers and conveyance interceptors, conveyance system pumping stations, and a 12 mgd pumping station at the Eno River WWTP site with a 20,600 feet force main to convey sewage generated in the two basins to the Northside WWTP. Project costs for the facilities were estimated to total approximately $51,296,000, with $42,688,000 and $8,608,000 allocated to the Eno and Treyburn basins, respectively.

As noted in the previous section, two wastewater treatment plant construction schedules were considered for expansion of the Northside WWTP from 9.5 mgd to 29 mgd. Table 4-4 lists the estimated costs for construction of the treatment facilities associated with the two project schedules. The two-phase construction schedule includes Phases A and B. The Eno River Service Area share of the Phase A (expansion of the Northside WWTP from 9.5 mgd to 20 mgd) construction was estimated to cost approximately $16,188,000 in 1992 dollars. The share of the Northside plant expansion of 20 mgd to 29 mgd during Phase B was estimated to cost an additional $18,079,000 in 1997 dollars. the combined total present worth costs for the two phase construction schedule of $42,496,000.

Table 4-3

WASTEWATER CONVEYANCE COST EVALUATION
N-EC WASTEWATER MANAGEMENT ALTERNATIVE
DURHAM-ENO RIVER EIS

	Eno Basin	Treyburn Basin	Total Eno Service Area
Total EDUs (Year 2010)	25,900	4,719	30,619
Project Costs			
Collection Sewers(1)	$18,655,000	$ 2,233,000	$ 20,938,000
Conveyance Sewers	12,925,000	2,971,000	15,896,000
Pump Stations	5,333,000	1,260,000	6,593,000
Contingencies	5,170,000	1,888,000	7,058,000
Right-of-Ways	605,000	206,000	811,000
Total Project Cost(2)	$42,688,000	$8,608,000	$51,296,000
Annual O&M Costs	--	--	$ 427,000

(1) Includes 4-inch residential service connection and in-street 8-inch collector sewer. Assumes 80 feet collector sewer per EDU at $22/linear foot.

(2) 1992 dollars.

Source: Gannett Fleming Environmental Engineers, Inc.

Table 4-4

WASTEWATER TREATMENT COST EVALUATION(1)
NORTHSIDE WASTEWATER TREATMENT PLANT EXPANSION AND UPGRADE
DURHAM-ENO RIVER EIS

	Phase A(2)	Phase B(3)
Project Costs		
Unit Process Construction	$ 9,728,400	$10,865,100
Miscellaneous Structures	0	0
Non-Component Costs	2,724,000	3,042,000
Contingencies, Water Quality Monitoring	3,735,700	4,172,200
Total Project Cost	$16,188,100	$18,079,500
Annual O&M Costs	$ 2,865,000(4)	$ 3,287,000(5)
Total Present Worth		$42,296,000(6)

Notes: (1) Costs for Eno Service Area, 12 mgd treatment capacity.

(2) Expansion from 9.5 mgd to 20 mgd. Construction completed 1993. Project costs given in 1992 dollars.

(3) Expansion from 20 mgd to 29 mgd. Construction completed 1998. Project costs given in 1997 dollars.

(4) O&M costs for treating 17.2 mgd average annual design flow projected for facility in 1993 costs in 1993 dollars.

(5) O&M costs for treating 20.6 mgd average annual design flow projected for facility in 1998. Costs in 1998 dollars.

(6) Total present worth for two-phase schedule in 1989 dollars (combination of Phase A and B).

Source: Gannett Fleming Environmental Engineers, Inc.

4.2.2 Financing Alternatives

The Eno pump station, Northside WWTP expansion project would be funded by local funding sources. The collection system costs would be paid for by bonds issued by Durham County. In 1986, the county developed a 10 year master plan that detailed public improvements. This master plan will be financed by two bond issues - the first paying for the first 5 years and the second paying for the last 5 years. The first bond issue allotted for $34 million, $27 million of which was to be used for wastewater projects with the remaining $7 million set aside for water projects. The second bond issue will occur around 1991. The Eno collection system construction costs would be paid for out of these bond issues. (Personal communication with Durham County Manager's office and Durham County Engineer's Office).

The City of Durham would like to have a referendum passed in November 1990 to allow the issuance of a bond to cover the treatment plant construction and upgrade costs. The tentative amount of the bond authorization for improvements to both the Farrington Road Plant and Phase A of the Northside plant would be approximately $92.5 million, although the actual amount issued would most likely be less than this amount and would probably be phased over a period of several years. After the bond referendum is passed, the City of Durham would have seven years over which to issue the bond amount. (Personal communication with City of Durham Financing Office).

In addition to local funding, the City of Durham could also receive money from the State Revolving Loan Fund (SRLF), supported by federal money, and the Grant Fund, supported by state money. These funds are described in more detail below. It is expected that no EPA construction grants money would be available as construction grants funds have been replaced by the SRLF.

State Revolving Loan Fund. In 1989, the State of North Carolina received a capitalization grant from the EPA to start a revolving loan fund to finance wastewater projects. The money in this fund is disbursed in a manner similar to the construction grants program in that the state maintains a priority list of projects and only interceptors and treatment works are eligible for funding.

The maximum yearly disbursement for a project is $7.5 million. However, if the project is phased, money can be applied for every year the project remains on the priority list. The interest rate charged for monies loaned from this fund is the lessor of 4% or 1/2 of the national tax exempt bond rate. North Carolina bases the bond rate on 20 year treasury bonds.

The preferred alternative of expanding and upgrading the Northside Wastewater Treatment Plant and replacing the Eno River WWTP with a pump station is being evaluated for placement on the priority list in fiscal year 1990. (Personal communication with NCDEM, May 1989).

Grant Fund. In addition to the State Revolving Loan Fund started with the Federal EPA money, the State of North Carolina maintains a similar fund using money appropriated from the state budget. Currently, this fund does not have a large budget and the maximum yearly disbursement for a project is $3 million. A separate priority system from that used by the State Revolving Loan Fund is used to determine which projects are eligible for funding. All costs associated with the wastewater project, including collection system and land acquisition, are eligible for funding. The Eno pump station, Northside expansion project is not currently on the priority list for this money but will be evaluated for possible priority status in the future. (Personal communication with NCDEM, May 1989).

4.2.3 User Charges

Under the preferred alternative, all users of the expanded Northside WWTP would pay the same rate except that county residents would continue to pay twice the rate of city residents. User charges would be based on cost per 100 cubic feet of wastewater generated. The generation rate is assumed to be equivalent to the rate of water usage as measured by the user's water meter. However, in cases in which wastewater meters are installed, the sewer charge would be based on the sewage meter reading.

The purpose of this cost analysis is not to predict exact user charges that customers would expect to pay, but rather to estimate the charges under "worst case" conditions, to assess the affordability of the preferred

alternative. If the project falls within EPA affordability guidelines (presented below) under "worst case conditions" it would be considered affordable to the community and no further analysis would be needed. However, if the project falls outside affordability guidelines, further analysis would be required.

Standard affordability criteria (EPA, 1983) consider a project affordable to the community if it falls within the guidelines below.

1.0% of median income if income is less than $10,000.
1.5% of median income if income is between $10,000-$17,000.
1.75% of median income if income is above $17,000.

The 1987 median family income for Durham County, as measured by the Bureau of Census, was $33,253. In 1989, HUD determined the median family income of the Durham Metropolitan Statistical Area to be $40,300. Using either income figure places the Durham area falls within the affordability criteria of 1.75% of median income.

The assumptions used in generating the analysis are outlined below:

- Number of households based on Moderate Growth Scenario.
- All construction costs (conveyance and treatment) would be paid for by the local community.
- No state or federal low interest rate loans or grants would be obtained.
- The Treyburn Development would pay for its conveyance system. No other developer, business or industry contribution to conveyance system costs was assumed at this time.
- The 1987 median income value from the Bureau of Census will be used to calculate percentage of median income values.

- All bonds would be amortized over 20 years with an interest rate of 7.12%. This interest rate was chosen because the current bond floated by Durham County carries an interest rate of 7.12% (Personal Communication with Durham County Manager's Office).

- All project costs were translated into 1989 dollars using an interest rate of 8.78%.

The charges were calculated both as costs per 100 cubic feet of wastewater and as annual costs per household. All results are presented in Table 4-5.

The user charges for the preferred alternative would be added to the existing user charges which are $1.16/100 cf for city residents. The total annual user charge would be about $340, assuming 215 gpd/household. Divided by the 1987 Durham County median family income of $33,253, the percent of median income for an annual charge of $340 is 1.02%, which is well below the 1.75% EPA affordability criteria.

4.3 IMPACTS OF THE PREFERRED ALTERNATIVE

4.3.1 Surface Water Resources

Eno River. The water quality of the Eno River is expected to improve with the preferred alternative because the existing Eno River WWTP would be removed. The annual reduction in loads to the Eno River would be 12,700 lb/yr BOD_5, 62,000 lb/yr TN, and 4,300 lb/yr TP. Higher dissolved oxygen levels and fewer algal blooms (lower chlorophyll-a) would be expected.

The quantity of water flowing in the Eno River would decrease below the existing plant upon implementation of the preferred alternative. The natural low flow in this stretch of the Eno River is approximately 1.5 cfs (NCDEM, 1989). The current discharge by the Eno River WWTP adds another 1.8 cfs. Removal of the Eno River WWTP discharge would reduce downstream Eno River water flow by about 55 percent during low flow conditions. Low flows in the

Table 4-5

USER CHARGES FOR ENO SERVICE AREA[1]
N-EC WASTEWATER MANAGEMENT ALTERNATIVE

	Two Phase Construction Phase A[2] (1993)	Phase B[3] (1998)
Construction Costs (Conveyance & Treatment)	$45,629,000	$9,148,000
O&M Costs	$ 2,550,642	$2,877,608
Annual Debt Payment[4]	$ 4,348,000	$5,220,000
Total Cost (O&M + Debt)	$ 6,888,642	$8,097,608
Eno Service Area Flow Contribution	6.92 MGD	8.24 MGD
User Charge/100 cf	$2.05	$2.00
Number of Households in Eno Service Area[5]	32,200	38,300
User Charge for the Preferred Alternative	$214	$211
Existing User Charge	$116	$116
Total Annual User Charge	$330	$327

1 All costs in 1989 dollars.

2 Expansion of Northside WWTP to 20 MGD.

3 Expansion of Northside WWTP from 20 MGD to 29 MGD.

4 Bond interest assumed 7.12%, amortized over 20 years. (Capital Recovery Factor = 0.0953).

5 Based on 215 gpd per residential equivalent dwelling unit.

Source: Gannett Fleming Environmental Engineers, Inc.

Eno River are the result of increased withdrawals and consumptive use of water from the Eno River.

Ellerbe Creek. With the preferred alternative, Ellerbe Creek would receive significantly higher treated effluent compared to the existing Northside WWTP discharge. The 29 mgd expansion is estimated to reduce BOD loads from 259 tons/year to 228 tons/year and NH_3-N loads would be reduced from 173 tons/year to 46 tons/year (NCDEM, 1989). The preferred alternative should have a beneficial effect on water quality because of these pollutant load reductions and because the increased volume of discharge should cause greater reaeration in Ellerbe Creek. In spite of these expected improvements to Ellerbe Creek water quality, NCDEM modeling still indicates that DO standard violations are possible. The modeling predicts that violations are expected to be less severe and less extensive than existing violations. There is some chance the violations would not occur because of model uncertainty. The purposes of the Phase A water quality monitoring and modeling are to reduce this uncertainty and document the necessary effluent limits for Phase B.

Falls Lake. Falls Lake is a highly eutrophic body of water with mean chlorophyll-a concentrations that can exceed 60 ug/L during warm months in its headwaters (NCDEM, 1989; and USACOE, 1988). Falls Lake receives point source discharges from the Northside WWTP and other smaller treatment plants as well as nonpoint source pollution from urban and agricultural areas. Both point source and nonpoint source phosphorus loads contribute to the eutrophication of Falls Lake. The point source phosphorus tends to have a more dramatic seasonal eutrophication impact because nearly 100 percent of point source phosphorus is bioavailable and that it is fed to the receiving waters on a continual basis. Nonpoint source phosphorus, although substantially less bioavailable in immediate runoff due to adsorption by particulate matter, is a long term contributor to eutrophication because it tends to settle in the lake where it may be resuspended in a bioavailable form.

To investigate the point source versus nonpoint source phosphorus issue, annual inputs from these sources were compared. The average annual input of total phosphorus (TP) to Falls Lake is 206 tons/year (USACOE, 1987). Nonpoint

source pollution accounts for 115 tons/year or 56 percent of this total phosphorous load. Although basin wide strategies are needed to mediate the total phosphorus load to Falls Lake, point source TP controls appear to be the most important component required to improve Falls Lake water quality, particularly in the headwaters section of the Lake. Although nonpoint sources contribute more than 50 percent of the TP load, the lower degree of bioavailability associated with nonpoint phosphorus and its infrequent input (i.e., during storm events) make it potentially less important than point source controls. When an effluent dominants the flow of a receiving water, as is the case in Ellerbe Creek during summer base flow conditions, then high effluent concentrations of bioavailable phosphorus being continuously discharged will cause eutrophication problems when conditions are right (i.e., adequate residence times, adequate sunlight, warm temperatures, and so on). This fact is the reason that large algal blooms have occurred downstream of the existing Eno River WWTP and Northside WWTP in the upper lake watershed.

The three treatment facilities that would be consolidated by the preferred alternative (Eno, Northside, and Little Lick) discharged approximately 39 tons/year during 1988. With TP effluents of 0.5 mg/L (April-October) and 2.0 mg/L (November-March), the Northside facility would discharge 34 tons/year and 50 tons/year respectively at Phase A and Phase B flow limits of 20 and 29 mgd. It is the recommendation of this EIS that the TP winter month effluent be lowered from 2.0 mg/L to 1.0 mg/L during Phase B. This reduction would lower the annual TP load from 50 tons/year to 32 tons/year, which represents a reduction of annual TP loads for both existing and the Phase A conditions, i.e., 39 and 34 tons/year.

Tables 4-6 and 4-7 present the total nutrient loads projected for the EIS study area given the two growth scenarios described in Sections 3.3.2.1 and 3.3.2.2. NCDEM (1989) estimated that nonpoint source pollution TN and TP loads for the Northside and Little Lick Basins would be 128 and 16 tons/year, which is very similar to the loads projected for the Eno Basin (i.e., 153 and 18 for the moderate growth scenario).

TABLE 4-6

NONPOINT SOURCE LOADING FACTORS
(lb/ac/yr)

Land Use	Total Nitrogen TN	Total Phosphorus TP
Rural Residential, R-1	3.0	0.2
Low Density Residential, R-2	6.7	0.8
High Density Residential, R-3	8.8	1.1
Commercial, C-4	13.2	1.6
Industrial, I-5	11.3	1.4
Office and Research, O/R-6	12.2	1.5
Agricultural, A-7	9.9	2.5
Open Space, O-8	0.6	0.1

SOURCE: Watershed Management Study, Lake Michie and Little River Reservoir Watersheds. November, 1988. County of Durham

TABLE 4-7

PROJECTED LAND USE ACRES, NONPOINT, AND POINT SOURCE LOADS
(lb/yr), Year 2010

Land Use	Low Scenario			Moderate Scenario		
	Acres	TN	TP	Acres	TN	TP
R-1	19,600	58,800	3,920	19,600	58,800	3,920
R-2	18,800	125,960	15,040	14,900	99,830	11,920
R-3	2,100	18,480	2,310	6,400	56,320	7,040
C-4	700	9,240	1,120	1,100	14,520	1,760
I-5	1,000	11,300	1,400	1,800	20,340	2,520
O/R-6	2,200	26,840	3,300	2,500	30,500	3,750
A-7	1,500	14,850	3,750	1,500	14,850	3,750
O-8	20,800	12,480	1,664	18,900	11,340	1,512
Subtotal	66,700	277,950	32,504	66,700	306,500	36,172
Nonpoint (tons/yr):	--	138	16	--	153	18
Point Source (tons/yr):	--	420	20	--	740	32
Total		558	38		893	50

NOTE: Acres are for the EIS Study Area, measured from Plates 14 and 15.

4.3.2 Groundwater Quality & Quantity

The preferred alternative N-EC would have a positive impact to groundwater quality associated with sewering failing on-lot system areas. There would be reduced nutrient loads to surface waters, decreased public health problems, and improved aesthetics. Areas of failing on-lot systems within the City of Durham defined Urban Growth Area would be provided sewer service during Phase A of the Preferred Alternative.

4.3.3 Terrestrial Ecosystems

Impacts to terrestrial ecosystems would result from conveyance system construction. This construction would be a short-term impact involving an initial right-of-way width clearing of about 80 feet. Impacts also would include long-term loss of natural vegetation and wildlife habitat from maintenance of a 20-foot right-of-way. Natural areas identified in Plate 10 that could be impacted in this way include Willie Duke's Bluff, Eno River Corridor, Little River Corridor, Wanderlust Diabase Uplands, Cabin Branch Bottomlands, and Cub Creek Greenway. Parks and Greenways that could be impacted include Willowhaven Country Club, Eno River State Park, Falls Lake Lands, River Forest Park, and Eno Greenway. Conveyance line routes should be planned so that they do not adversely impact these natural areas, especially the Falls Lake Lands used for game lands. Table 4-8 shows significant plants and animals that were listed by Sutter (1987) as being located within the natural areas identified in Plate 10. At this time, no U.S. Fish and Wildlife Service nationally endangered plant or animal species are permanent residents along the conveyance line locations shown in Plate 5. Several species are listed as Primary Proposed (PP) or Significantly Rare (SR) in North Carolina by the Plant Conservation Program. These species are not legally protected at this time (Sutter, 1987).

4.3.4 Aquatic Ecosystems

Ways in which the preferred alternative could impact aquatic ecosystems include stream crossings and erosion and sedimentation associated with conveyance system construction. The preferred alternative would involve the

Table 4-8

NATURAL AREAS, PARKS AND GREENWAYS, AND WILDLIFE AREAS
WITH POSSIBLE CONVEYANCE SYSTEM IMPACTS (ALTERNATIVE N-EC)

Location	Significant Plant or Animal Common Name	Significant Plant or Animal Scientific Name	Status	Significance
A	Atlantic Isopyrum	Isopyrum biternatum	SR	Plant species of state significance occurring in rich bottomland forests.
A, E	Douglass's Bittercress	Cardamine douglassii	SR	Plant species of state significance occurring in rich bottomland forests.
A	Dutchman's Breeches	Dicentra cucullaria	-	Regionally rare plant species associated with rich slopes and bottomlands.
A	Ginseng	Panex quinquefolius	-	Regionally rare plant on the state's special concern list.
A	Chestnut Oaks	Quercus michauxii	-	
A	Shagbark Hickories	Carya ovata	-	
A	James' Sedge	Carex jamesii	-	Uncommon plants found here (Willie Duke's Bluff).
A	Glade Fern	Athyrium pycnocarpon	-	
A	Walking Fern	Asplenium rhizophyllum	-	
A	Banebarry	Actaea pachypoda	-	
B,C	Roanoke Bass	Ambloplites cavifrons	-	Rare and threatened species of fish.
B,C	Carolina Madtom	Noturus furiosus	-	Rare and threatened species of fish.
B	Notched Rainbow	Villosa constricta	-	Rare and threatened species of fish.
B	Atlantic Pigtoe	Fusconaia masoni	-	Rare and threatened species of fish.
D	Wild Blue Indigo	Baptisia australis	SR	Significantly rare species of plant.
E	Lewis's Heartleaf	Hexastylis lewisii	PP	State-listed primary proposed plant species.
F	Red Cedars	Juniperus virginiana	-	Aesthetically important.

Location Key

A	Willie Duke's Bluff
B	Eno River Corridor
C	Little River Corridor
D	Wanderlust Diabase Uplands
E	Cabin Branch Bottomlands
F	Cub Creek Greenway

PP or SR: Listed as Primary Proposed (PP) or Significantly Rare (SR) in North Carolina by the Plant Conservation Program; species that may become Endangered or Threatened in the near future. These species are not legally protected.

Source: R. D. Sutter, et al, Inventory of Nature Areas and Rare Species of Durham County, 1987.

Table 4-9

POSSIBLE STREAM CROSSINGS ASSOCIATED
WITH THE N-EC PREFERRED ALTERNATIVE

A. Intermittent or Unnamed Stream

1. Approximately 20 throughout the service area

B. Named Streams

1. Crooked Creek - crossing near confluence with Eno River.

2. Eno River - crossing near old Eno WWTP.

3. Eno River - crossing near Falls Lake.

4. Cabin Branch Creek - crossing near SR1631 (Snow Hill Road).

5. Small reservoir near SR1002 (Mason Road) and Roxboro Road.

6. Little River - crossing between SR1628 (Orange Factory Road) and Norfolk and Western RR near Fairntosh. Wetlands may preclude the placement of this stretch of interceptor.

7. Ellerbe Creek - crossing at proposed Northside WWTP.

construction of 12 pump stations, approximately 200,000 feet of conveyance line, and an estimated 27 stream crossings. Possible stream crossings are listed in Table 4-9. The number could be reduced by designing line placements to minimize stream crossings. Fish and amphibians of special concern are listed in Table 4-8. No aquatic plants or animals within the EIS Study Area have been listed by the U.S. Fish and Wildlife Service as nationally endangered.

A direct impact to an aquatic ecosystem outside the EIS Study Area would occur with the Northside WWTP discharge to the Ellerbe Creek. Biological sampling conducted by NCDEM between 1979-81 indicates that the Ellerbe Creek is in poor biological condition. As described in Section 4.3.1, chemical quality of the Ellerbe Creek is expected to improve with the implementation of the preferred alternative. Whether the biological quality will improve depends upon the quality of the wastewater effluent and effects of channel erosion induced by the increased flow.

4.3.5 Economic (User Charges)

The economic impact of the preferred alternative would be the cost to consumers who use the system. Section 4.2.3 describes that under worst case conditions the annual cost per household would be about $340, which is less than the 1.75 percent of median family income EPA affordability criterion.

4.3.6 Noise, Odor and Air Quality

The greatest noise and air quality impacts would be associated with conveyance system construction. These impacts would be short-term, noise and dust related.

Twelve pump stations would be constructed with the preferred alternative. Existing residential areas that are nearby proposed pumping stations include Willowhaven Country Club, Continental Drive, Thunder Road, Dawn Trail, November Drive, and Riverdale Drive. Specific site placement of pumping stations should be designed to minimize possible noise impacts in these areas. Operation of the pump stations would create noise levels that should, on

average, be unnoticeable beyond a distance of 300 to 500 feet. With proper noise controls, composite transmission loss should be at least 50 dBA. Built-in noise controls could include double glaze windows, masonry exteriors, acoustical sealing of doors as well as caulking of building openings including pipes and vents. In addition to operation noises, there would be traffic noise and dust from pump station inspections. If pumping facilities are properly operated and maintained, odors should not be noticeable.

4.3.7 Archaeological and Historical Areas

Archaeological and historical areas are identified in Section 3.3.1.5 and Plate 12. Archaeological site locations were obtained from the Durham County Inventory of Critical Lands (TJCOG, 1985). Based on this information, the Northside wastewater treatment plant expansion site is not on an historical or archaeological site. However, excavation during the construction of conveyance lines could permanently destroy archaeological sites if care is not taken to preserve them. There are eight archaeological sites in the vicinity of proposed conveyance lines (Table 4-10). Preconstruction surveys by professional archaeologists should be conducted to minimize the potential for impacting these sites. Similarly, blasting and right-of-way acquisition could be conducted to minimize impact on historical areas and structures.

The conveyance lines may traverse the Bennehan-Cameron Plantation District, which is listed on the National Register. Another historic structure, West Point Mill, is in the immediate vicinity of the conveyance line proposed for the preferred alternative. To minimize the impacts on these sites, the conveyance line locations should be altered or mitigative measures used to enhance preservation during construction. Cemeteries nearby proposed conveyance system locations (Table 4-10) should be avoided during planning and design.

4.3.8 Recreation

The preferred alternative has two possible impacts to recreation areas: direct impacts associated with conveyance line construction and secondary

Table 4-10

POSSIBLE CONVEYANCE SYSTEM IMPACT TO
CULTURAL RESOURCE SITE BY ALTERNATIVE N-EC

Site Name	Location[1]	Description
A. Archaeological Sites		
N.A.	Northeast of Eno River Wastewater Treatment Plan (two sites).	N.A.
N.A.	Rose of Sharon Church.	N.A.
N.A.	Junction of Cabin Branch and Snow Hill Road.	N.A.
N.A.	East Side of Little River Between Snow Hill Road and Oxford Highway, south of Little River Reservoir.	N.A.
N.A.	Adjacent to Old Oxford Highway and below Fairntosh.	N.A.
N.A.	Along Eno River west of the Wastewater Treatment Plant on Rippling Stream Road.	N.A.
N.A.	Junction of Cabin Branch and Snow Hill Road.	N.A.
N.A.	North of Weaver (two sites).	N.A.
B. Historical Sites		
Benneham-Cameron Plantation District (National Register)	Norfolk and Western Railroad at Treyburn; between Snow Hill Road and Oxford Highways.	Plantation; house in Georgian style; collection of outbuildings.
C. Old Mill Sites		
West Point Mill	Eno River and Crooked Creek Confluence.	Textile mill used to produce cotton.
Semnett's Mill	Eno River near State Prison.	Textile mill used to produce cotton.

TABLE 4-10 (Cont'd.)

POSSIBLE CONVEYANCE SYSTEM IMPACT TO
CULTURAL RESOURCE SITE BY ALTERNATIVE N-EC

D. Cemeteries

N.A.	Norfolk and Western Railroad at Treyburn near Benneham-Cameron Plantation District.	N.A.
N.A.	Old Oxford Road south of Stageville Road and north of Snow Hill Road.	N.A.
N.A.	West of Carrington Jr. High.	N.A.

[1] Sites within 1,000 feet of proposed conveyance system components.

N.A. - Not available.

impacts associated with population growth. A conveyance line map (Plate 5) was compared to the recreation area map (Plate 10) to assess direct impacts. Table 4-11 lists recreation areas that could be directly impacted by conveyance line construction. Impacts would primarily be short-term, and include erosion, noise and dust. In addition to the sites listed in Table 4-11, the Northside Wastewater Treatment Plant is adjacent to the proposed route for the Ellerbe Creek Greenway. Long-term impacts, such as noise, dust, and odors associated with plant operation, to this proposed recreation area can be minimized with good plant management.

It appears from Table 4-12 that the Durham Study Area has sufficient acreage of recreational areas to support an increase in population brought on by the advent of public sewer. However, the areas will require improvements and more frequent maintenance to handle increased use. Much of the recreational area is contained in the Eno River State Park which may receive heavy use from outside the study area.

Although the present park system acreage is currently more than sufficient for the Durham area, it is important to maintain the park acreage to population ratio. Therefore, as the population of the Durham area increases, the amount of land dedicated to parks and open space should also increase proportionately. Land should be acquired by the County through fee-simple purchase or the dedication of land by developers as development occurs.

4.3.9 Transportation

The population growth resulting from expanded wastewater facilities will generate additional traffic and create demands for an improved roadway system. Proposed transportation system expansions are described in the thoroughfare plan for the Durham-Chapel Hill-Carboro (D-CH-C) Urban Area, a planning document delineating transportation facilities to satisfy projected needs. This document was prepared by the Transportation Study Group of the D-CH-C Urban Area with assistance by the NC Department of Transportation. The plan was reviewed during February and March 1988 and a Public Comment and Final Recommendations Report No. 3 was issued in March 8, 1989. Several short-term

Table 4-11

Recreation Areas Impacted by Northside Wastewater Treatment Plant and Its Conveyance System[1]

Site Name	Location	Description	Acreage
Eno River State Park	Along Eno River	State-owned; hiking trails; boat ramp.	1007.0
Falls Lake Lands	Surrounding Falls Lake	Owned by U.S. Army Corps of Engineers; national area.	
Eno Greenway	N. Roxboro Road	City-owned, hiking and jogging trails.	27.0
River Forest Park	N.A.	State-owned; hiking trails.	N.A.

[1] Impacted sites defined as those within 1,000 feet of proposed conveyance system components.

Table 4-12

Recreation Acreage

Year	Population	National Standard for Urban Park	Park Acres
1985	32,700	5.0 acres/1,000 population	163.5 need 1,325.0 have
1995	47,400	5.0 acres/1,000 population	237.0 need
2010	85,300	5.0 acres/1,000 population	426.0 need

Source: Urban Planning and Design Criteria, Joseph De Chiara and Lee Koppelman, 1982.

impacts that would be associated with thoroughfare construction are noise, dust, erosion, and loss of habitat. Stream crossing would represent the major impact to the natural environment. Long-term impacts would also be associated with new thoroughfares. Adjacent homes would experience higher noise levels and carbon monoxide (CO) gas from vehicle exhaust.

Roadways proposed by the thoroughfare plan would cross the Water Quality Basin Area; an area in which density controls are needed to control nonpoint source pollution. More roadways ultimately threaten watershed quality if rigorous nonpoint source runoff controls are not employed. A transportation EIS should be prepared for any transportation expansions that would lead to additional growth in the Water Quality Basin Area.

4.3.10 Community Services

Population increases projected during the planning period will necessitate additional fire, police, ambulance, school, and health care facilities and services. Failure to maintain or increase the existing facilities and service will result in a decreased standard of living in the area.

Projected fire protection needs are typically based on the number of firemen per 1,000 persons and water availability. However, the actual needs are based on the density, height and age of buildings, and the use and effectiveness of fire protection codes. The actual needs should be determined by the individual fire companies and these needs should be supported by local citizens and government. Table 3-20, presented in Section 3.3.2.5, provides a general indication of future needs for fire protection.

Similarly, the adequacy of police protection is typically evaluated by the number of officers per 1,000 persons. Police service needs are, therefore, directly related to population increases, but are also impacted by the amount of commercial development and local crime rates. A preliminary projection of the number of officers that will be required over the next 20 years is given in Table 3-20.

Ambulance and health care service needs are tied to the number of people in an area and the age of the population. Table 3-10, presented in Section 3.2.2, contains a projection for the number of hospital beds that will be needed through the planning period. Ambulance service needs are best projected by local persons. More detailed population analysis is needed to make a more detailed estimation of future needs in this area.

Educational facility requirements are set by population levels and composition and local policies on class size. Table 3-20 includes estimates on the number of children in the various school age groups. The number of classrooms, sizes of libraries, and other facilities needed to service these children should be determined by local school district policymakers.

4.3.11 Summary

A summary of impacts associated with the preferred alternative is given in Table 4-13. There are 29 impacts, 19 of which require mitigation. This table provides a description of the impacts and a course of mitigation associated with each impact. These descriptions are generalized. However, it should be noted that some impacts will be significantly easier to mitigate than others.

4.4 MITIGATIVE MEASURES

One of the major issues involved with this EIS has been nonpoint source pollution. Nonpoint source pollution would be a basin-wide secondary impact associated with population growth and land development resulting from the provision of a larger wastewater treatment facility, Nonpoint sources currently contribute 56 percent of the total phosphorus load to Falls Lake. This loading could increase with future population growth, if controls are not used to reduce nonpoint source pollution. Nonpoint source pollution controls are commonly referred to as Best Management Practices (BMP's). Table 4-14 lists existing BMP's for the EIS study area. The ordinances requiring these BMP's need strict enforcement to ensure BMP effectiveness. Structural BMP's require maintenance to further ensure effectiveness. In addition, the

TABLE 4-13

IMPACTS OF THE PREFERRED ALTERNATIVE

Type of Impact	Activity	Impact	Mitigation
Surface Water	1. Eliminate Eno River discharge.	a. Improved water quality. b. Higher dissolved oxygen c. Fewer algal blooms. d. Reduced flow during low flow conditions.	a. None required. b. None required. c. None required. d. At upstream locations reduce withdraws and increase flow augmentation.
	2. Increase Ellerbe Creek discharge to 30 mgd. TP effluent limit - 0.5 mg/L (April-October)	a. Lower instream TP conc. b. Increase flow during low flow conditions. c. Improved water quality. d. Possible toxicity and chlorophyll-a impairment in Ellerbe Creek/Falls Lake.	a. None required. b. None required. c. None required. d. Continue stream monitoring
	3. Continued TP loadings to Falls Lake.	a. Continued violations of chlorophyll-a standard.	a. Nonpoint source controls. Phosphate detergent ban.
Groundwater	1. Provide sewer service to failing septic tank areas.	a. Reduce NO_3 and pathogen contamination.	a. None required.
Terrestrial Ecosystems	1. Construction of sewage conveyance system.	a. Loss of natural vegetation along right-of-ways.	a. Use already cleared areas. Minimized right-of-way width.
Aquatic Ecosystems	1. Erosion and sedimentation during construction of conveyance system.	a. Short-term adverse impact to aquatic ecosystem.	a. Best management practices. Site inspections and line placement to minimize stream crossings.
	2. Transfer WW discharge from Eno River to Ellerbe Creek.	a. Improve biological quality of the Eno River. b. Potential improvement of Ellerbe Creek biological quality.	a. None required. b. None required.
	3. Excavation during stream crossings.	a. Disruption of aquatic life and habitat.	a. Erosion and sedimentation controls. Stream encroachment permit.

TABLE 4-13 (Cont'd.)

IMPACTS OF THE PREFERRED ALTERNATIVE

Type of Impact	Activity	Impact	Mitigation
Economics	1. Cost of wastewater treatment.	a. Estimated annual user costs would be $340 per household (see Table 4-5).	a. None - unavoidable impact.
Noise, Odor and Air Quality	1. Construction of sewage conveyance lines.	a. Short-term construction noise and dust.	a. Temporary noise barriers. Limit construction to normal working hours.
	2. Operation of pump stations	a. Low level, localized noise.	a. Acoustically design pump stations.
	3. Emergency generator operation at pump stations.	a. Loud noise (93-104 dBA) during operation.	a. Acoustically design generator placement. Limit maintenance to daytime hours.
Nonpoint Source Pollution	1. Agricultural and urban runoff	a. Increased loads of nutrients, heavy metals, and toxics.	a. Structural Best Management Practices and Land Use Controls.
Archaeological Sites	1. Conveyance line construction	a. Impacts from excavation near the 8 sites identified in Table 4-9.	a. Preconstruction survey by professional archaeologist to assess possible impacts.
Historic Areas	1. Conveyance line construction	a. Possible impacts to Benneham-Cameron Plantation District and West Point Mill.	a. Reroute proposed interceptor corridors. Use protective barrier, mechanical (rather than blasting) rock removal. Minimize vegetation removal.
	2. Secondary population growth	a. Increased visitation and possible vandalism throughout study area.	a. More frequent maintenance, zoning of surrounding areas.

TABLE 4-13 (Cont'd.)

IMPACTS OF THE PREFERRED ALTERNATIVE

Type of Impact	Activity	Impact	Mitigation
Recreation Areas	1. Conveyance line construction	a. Construction impacts near Eno State Park, Falls Lake Lands, Eno Greenway and River Forest Park.	a. Use already cleared land. Minimize vegetation removal. Use corridors for trails. Use noise and dust controls.
	2. Secondary population growth	a. Increased visitation and possible vandalism throughout study area.	a. More frequent maintenance, zoning of surrounding areas. Maintain acreage - population ratio for recreation facilities.
Transportation	1. Road construction	a. Construction related delays and detours.	a. Plan traffic and pedestrian control.
	2. Increased traffic	a. Additional traffic and congestion.	a. Improve current roadways and build new roadways.
		b. Increased noise, vehicle fumes, and potential for spills.	b. Improve traffic movement in the study area.
Community Services	1. Secondary population growth	a. Additional demand for services and facilities.	a. Increase personnel and facilities to meet demand.

following recommendations should be instituted to mitigate nonpoint source pollution impacts associated with the preferred alternative:

- An emphasis should be placed on the nonstructural land use control BMP's as well as structural BMP's because they have a lower risk of failure and do not require maintenance.

- Within the EIS Study Area and northern Durham County, the one lot per two acres and 6 percent impervious cover ceiling should be extended to include not only the WQCA, but also the WQBA.

- The Durham County and City Sedimentation and Erosion Ordinance should evaluate its present enforcement program and enhance existing programs as are needed.

- The multi-county coordination committee proposed by the County of Durham (1988) should be formed to handle regional coordination of watershed and nonpoint source pollution issues.

- In the Little River Reservoir and Lake Michie watersheds, consideration should be given to upgrading the WQBA and WQCA from a WS-III to a WS-II or WS-I classification. This stricter designation would reinforce local nonpoint source control programs.

Two impacts shown in Table 4-13 involve water quality impairment by the wastewater discharge. One is possible toxicity in Ellerbe Creek as a result of the stream being 90-95 percent wastewater during low flow conditions. The other is a continuation of chlorophyll-a violations in Falls Lake as a result of TP loads. Mitigation of these impacts cannot be achieved by stricter effluent limits because limit-of-technology TP effluent limits are proposed for the preferred alternative. The following mitigation is recommended for water quality impacts:

TABLE 4-14

EXISTING BEST MANAGEMENT PRACTICES WITHIN THE EIS STUDY AREA

Ordinance/Program	Type of BMP	Description
Durham County and City Watershed Ordinances	Nonstructural	1. One lot per 2 acres (6% impervious cover) in Water Quality Critical Area. 2. One lot per acre (15% impervious cover) in Water Quality Basin Area. 3. Other land use restrictions, e.g., no industry within the WQCA.
	Structural	1. Infiltration trenches, detention basins, and open space for infiltration. (In addition to the nonstructural BMP's.)
Durham County and City Sedimentation and Erosion Control Ordinance	Structural	1. For land disturbing activities: o silt fence curtains o buffer zones o graded slopes o detention basins
North Carolina Cost Share Program	Agricultural	1. List of practices include: o conservation tillage o diversions o filter strips o sediment basins o agricultural waste structures o strip cropping

Impact	Mitigation
1. Erosion of Ellerbe Creek	1. Bank Stabilization.
2. Toxicity of Northside Discharge	2. Industrial Pretreatment. Effluent Monitoring.
3. Total Phosphorus Loads to Ellerbe Creek and Falls Lake	3. State-of-the-art Removal. Water Quality Modeling/ Monitoring. Nonpoint Source Controls.

If violations of the chlorophyll-a standard continue and it is determined that the discharge is a significant contribution to these violations, NCDEM should pursue a variance or similar arrangement until proper improvements can be made.

Another preferred alternative impact is noise related resulting from pump station operation. A specific location away from the nearest noise sensitive receptor should be planned for each pump station. In addition, it is recommended that noise mitigation strategies be prepared as part of the pump station designs. Typical criteria for such strategies are that 55 dBA daytime and 45 dBA nighttime noise levels be achieved at the pump station property line. Wherever impacts are possible, a noise mitigation specialist should be consulted to ensure proper acoustical design.

Additional impacts for the preferred alternative (Table 4-13) are related to conveyance line construction. Noise and dust, short-term in nature, should be mitigated by limiting construction to normal daytime work hours and using noise barriers where necessary. Other construction impacts could affect aquatic and terrestrial ecosystems. Specific resources that may be impacted have been identified in Sections 4.3.4 and 4.3.3. NCDEM will require an assessment on the potential for impact to rare and endangered plants and animals, and will require coordination with appropriate state agencies to determine the extent of those surveys. The type and magnitude of mitigative measures required to protect a specific resource vary widely, depending upon the value of the resource and the expected impact. Three degrees of mitigation and corresponding potential mitigation measures are presented in Table 4-15. One concern is a number of possible stream crossings (Table 4-9)

TABLE 4-15

GENERAL MITIGATIVE MEASURES FOR INTERCEPTOR CONSTRUCTION

Degree of Mitigation	Potential Mitigative Measures
High	Completely re-route interceptor construction in specific areas to avoid impacting resource.
	Go ahead with construction: re-establish resources elsewhere.
	Go ahead with construction: restore resource to original condition.
	Seek expert guidance in planning and construction of corridors.
Moderate	Re-route interceptor slightly so as not to disturb resource.
	Re-establish topographic contours after construction and replant vegetation.
	Time construction to minimize some adverse impacts.
	Establish environmentally sound construction techniques to mitigate soil losses, habitat losses, and visual intrusions during and after construction.
	Confine construction to previously disturbed areas if possible.
	Route construction outside of dripline of major trees.
	Locate interceptor out of streambeds; do not interfere with stream flow or wetland processes.
Low	Practice environmentally sound construction and backfill techniques to reduce soil subsidence and erosion.
	Practice restorative post-construction techniques and maintenance of corridors.

and impacts that may occur in floodplain and wetland areas. The following mitigation measures should be applied:

- o Floodplains. Pump stations that must be placed in the floodplain are unavoidable impacts. Such locations will require flood protection, presumably levees, which will reduce the floodplain area. It is recommended that sites contained within levees be kept as small as possible to minimize the loss of floodplain.

- o Wetlands. Wetlands may be encountered along stream corridors. Construction in wetlands requires a permit from the U.S Army Corps of Engineers, as authorized by Section 404 of the Clean Water Act. Wetland impacts can be minimized through use of carefully controlled construction techniques and by the development of artificial wetlands to replace natural areas destroyed by construction.

Increased demands for recreational facilities and services should be met through a combination of public and private funds. An increasing number of recreational facilities are being developed by developers and maintained through homeowners associations. This is an effective method of providing localized recreational facilities without using public funds. Larger facilities are more likely to require public funding.

Construction impacts on the transportation system can be mitigated through the measures listed in Table 4-15 and by scheduling construction as much as possible during non-peak traffic hours. Excessive noise in residential areas can be mitigated through highway grading and structural noise barriers. Statistical analysis of spill probabilities associated with vehicular accidents determined that the likelihood of toxic chemical release to Falls Lake Watershed is extremely remote. It is recommended that Durham County investigate the use of roadside detention facilities to reduce impacts of spills on water supply in their region. Traffic congestion mitigation requires adequate projection of future traffic levels, planned roadway expansion, and new road construction.

Increased demands on community services are best met through the addition of staff and facilities. Preliminary projections for staffing requirements are provided in Table 3-20. Some staffing requirements and facility development costs can be offset through cooperation with private developers, as discussed in Section 4.3.

EPA-funded projects are subject to the requirements of Section 106 of the National Historic Preservation Act of 1966, the Archaeological and Historic Preservation Act of 1974, Executive Order 11593, and regulations of the Advisory Council on Historic Preservation (36 CFR Part 800). In essence, these laws and regulations require mitigation of impacts to historic or archaeological sites on, or eligible for, the National Register of Historic Sites. Mitigation would involve certification from the Division of Archives and History that the construction will not affect any known archaeological or historic sites on or eligible for the National Register.

Comment Letters and EPA Responses to Comments on the Draft EIS

Letters Requiring a Response

R-JC-1	Jim Clark - Save the Water!
R-GA-1	George Andrews - Durham County Resident
R-TR-1	A. Terry Rolan, Director - City of Durham, Department of Water Resources
R-SC-1	Ed Harrison - Sierra Club, Land Use Chair
R-SC-2	David Howells - Sierra Club, Water Quality Chair
R-KH-1	Kenneth Holt, Environmental Health Scientist, Center for Disease Control
R-JL-1	James Lee, Regional Environmental Officer, U.S. Department of the Interior
R-CJ-1	Chester Jenkins, Mayor, City of Durham
R-CD-1	City of Durham, Department of Water Resources
R-LS-1	Lawrence Saunders, Chief, Planning Division, Department of the Army
R-DB-1	David Brook, Deputy State Historic Preservation Officer
R-BDV-1	W. Boyd DeVane - North Carolina Division of Environmental Management, Department of Environment, Health, and Natural Resources
R-RH-1	Richard Hamilton, Assistant Director, North Carolina Wildlife Resources Commission
R-CT-1	Carol Tingley, North Carolina Department of Environment, Health, and Natural Resources, Division of Parks and Recreation
R-ST-1	Steve Tedder, Chief, Water Quality Section, Division of Environmental Management, Department of Environment, Health and Natural Resources

SAVE THE WATER!

We all need clean, safe and pure water to drink

Jim Clark
President

Official Comments
to the
United States Environmental Protection Agency
and the
North Carolina Division of Environmental Management
on the
Draft EIS, Durham-Eno River Sewage Plant
presented at the Public Hearing
February 20, 1990

Good evening... I'm Jim Clark, President of Save The Water and a candidate for Durham County Commissioner. I am also speaking this evening as a member of the EPA Advisory and Oversight Committee that has been meeting over the past two years to help prepare this landmark environmental study. On behalf of Save The Water, I first called for this critically important Environmental Impact Statement in July of 1985. In December of 1986 we finally persuaded the state Division of Environmental Management to begin this required study under the North Carolina Environmental Policy Act and then engaged the U.S. Environmental Protection Agency to join the study under the National Environmental Policy Act in 1987. The Durham community is fortunate to have this comprehensive environmental study to protect our vital drinking water supplies and we want to thank Mr. Bob Lord at EPA for arranging the study and Mr. John Hamilton at EPA and Mr. Trevor Clements at the State for their hard work on this EIS.

The good news is that this environmental study has averted a major environmental mistake... the proposed expansion of the Eno River sewage plant. Because of this study, the Eno River sewage plant will be closed and removed. That is a major victory for everyone who has worked so hard over the past five years to protect the drinking water supplies for Duham and Raleigh. It is now clear that if we had not been involved and successfully initiated this study, the Eno River sewage plant would have been expanded and precious drinking water would have been polluted.

1 The bad news is the study shows that there is no really good, ecologically safe alternative and that even the " Preferred Alternative " has major environmental problems.

We support the consolidation of the Eno River, Little Lick and Treyburn sewage plants into the Northside sewage treatment plant

Post Office Box 15795, Durham, North Carolina 27704

but we are very concerned about the continued pollution of Ellerbee Creek and Falls Lake which is, of course, the sole source of drinking water for the city of Raleigh.

2 This environmental study shows that Ellerbee Creek has been assigned a " poor biological rating, " and that during low flow conditions Ellerbee Creek could suffer " possible toxicity as a result of the stream being 90% - 95% wastewater. " Already Ellerbee Creek is officially listed as an " Impaired Water " under the Clean Water Act and the city is supposed to have an effective strategy to clean the creek up. It is rather ironic that the city's clean up strategy includes dumping three times more wastewater than Ellerbee Ceek now receives. We are also very concerned about the prediction by the State that water quality violations will probably still occur even after the new, state of the art sewage treatment plant is built.

3 Save The Water is also very concerned about the potential disposal and environmental problems from the sludge that will be generated by the new sewage plant. At least 5,400 dry tons of sludge is supposed to be spread on 1,080 acres of land but that assumes that the sludge will not have high concentrations of toxics and heavy metals and that over a thousand acres of land can be found nearby for sludge disposal. Land is scarce in Durham County and officials in Orange County have already moved to block disposal there so sludge disposal is definitely a serious problem. We request that more study be given to this problem and a specific solution be identified along with potential costs before Durham proceeds with any new sewage plants.

As you know, Save The Water has consistently been very concerned with two key neighborhood and citizen issues. The first is establishing as permanent policy that all of the city and county neighborhoods with failing septic tanks be served first as the highest priority for new treatment capacity, and that all of the neighborhoods be sewered before any new developments squeeze them out once again. From last week's Advisory Committee meeting we understand this to be the EPA recommendation as well. It just makes sense to solve the existing environmental problem we have with failing septic tanks first before giving very precious treatment capacity to new development.

4 The second citizen concern we have is the projected " rate shock " or the doubling or tripling of water and sewer rates to help pay for the sewage plant expansion. We are strongly opposed to putting the burden for new growth on the backs of Durham's citizens with a doubling or a tripling of water and sewer rates. That's not fair...that's not right so we ask the City to find other ways to finance the proposed improvements without any " rate shock ".

5 It was the consensus of the Advisory and Oversight Committee that in view of the potential ecological problems associated with

5 CONT'D

the expansion of the Northside sewage plant that a permit and expansion be considered only up to 20 mgd. After the new sewage plant was fully functioning any additional proposals for plant expansions would require additional study of the effluent from the new plant and the condition of Ellerbee Creek and another state permit before any further expansion could take place.

We ask EPA, the state DEM and the City to honor that consensus. Because of our concern about the continued pollution of Ellerbee Creek, we must strongly oppose any combined or provisional permit for an expansion of Northside to 29 mgd. We do not believe that Ellerbee Creek can possibly assimilate that much wastewater and the jury is still out as far as this EIS is concerned so no expansion beyond 20 mgd can be permitted at this time.

6

We also stongly request that the proposed Eno River pump station be limited to not more than 8 mgd. And we ask the EPA, the state DEM and the city to agree to hold the Treyburn developers to their promise to close the Treyburn sewage plant when the new Northside plant comes on line. Treyburn promised that their sewage plant was an interim solution until the new public sewage plant was built and that they would close it as soon as new capacity was available and we ask you to hold them to that important public commitment.

7

One other crucial fact that has emerged from this EIS is on page 3-42. " The Snow Hill Diabase Glade which is located at the junction of Snow Hill Road and Old Oxford Highway has more rare species than any other site in the Piedmont of North Carolina. The Smooth Coneflower and Tall Larkspur are found in the Snow Hill Diabase Glade. " This fact is so critically important because the proposed Outer Loop would go right through the Snow Hill Diabase Glade and with the Endangered Species Act and other key envionmental laws there is no chance the Outer Loop could pass the EIS process and damage such an ecologically special and valuable area so it is time for the city and county to abandon any plans for the drinking water polluting outer loop.

Once again, this EIS clearly points out that even the " Preferred Alternative " has serious environmental problems including the impacts on Ellerbee Creek, the 27 stream crossings of the 38 miles of new sewer lines and the 12 pump stations that would be constructed. The EIS shows natural areas that would be negatively impacted as well as valuable archaeological and historical sites that would be damaged and impacted. Even under best case there will be erosion and sedimentation pollution and substantial nonpoint source water pollution from the new growth stimulated by the proposed sewage plant expansion.

8

We request that both the EPA and the state Division of Environmental Management require the most stringent mitigation measures possible to minimize the environmental damage.

As the EIS points out, Falls Lake is already highly eutrophic with more than half of the phosphorus pollution coming from storm water runoff or non point source pollution. We can't afford to make any more mistakes when it comes to protecting our drinking water supplies.

Save The Water applauds the EPA and the state for strongly recommending needed improvements to our local watershed protection ordinances including a recommendation for WS-I watershed classification and protection and a 6% impervious surface limitation.

Natually, the members of Save The Water are very reluctant to accept the substantial environmental damage that the Northside sewage plant expansion would cause. In conclusion, we ask that the proposed sewage plant expansion be appoved only if:

9

1. The permit limits the expansion to the agreed 20 mgd.
2. The Eno River pump station is limited to 8 mgd.
3. The Eno River Sewage Plant, the Little Lick Sewage Plant and the Treybun Sewage Plant are closed and removed as promised.
4. The first new treatment capacity, and all necessary treatment capacity is allocated and reserved as the highest priority for complete sewer service to all of the neighbohoods with failing septic tanks.
5. There is no unfair water and sewer " rate shock " that doubles or triples water and sewer rates.

We ask you to incorporate our requests into your final recommendations in the Final EIS.

10

We ask that our comments and all public, state and federal comments be included in the Final Environmental Impact Statement and that the public be given one more opportunity to comment on this vital environmental study in a Final Public Hearing after the Final EIS is published.

As you know, we are making extremely important long range decisions with very high environmental stakes. Mistakes could pollute our drinking water so we ask both EPA and the state Division of Environmental Management to incorporate our comments into the final decisions as you follow through on the rest of this vital Environmental Impact Statement decision making process.

Thanks again for helping us save our drinking water.

Sincerely,

Jim Clark

Jim Clark
President

Letter R-JC-1
Final EIS
Jim Clark
Save the Water!

1. Section 3.3 of the Draft EIS discusses the environmental impacts of all the alternatives, while Section 4.3 discusses the environmental impacts of the Preferred Alternative. Table 4-13 lists the environmental impacts of the Preferred Alternative and potential mitigation measures. Most of the impacts from the preferred alternative can be mitigated. Furthermore, many areas that have failing septic systems that threaten public health will now be connected to the public sewer system. The wastewater flows from the basin will be conveyed to the new and expanded Northside Plant with discharge to Ellerbe Creek. Stream conditions in Ellerbe Creek may actually improve and a monitoring program will be put into place to review the impacts of increased wastewater discharges into this stream.

2. Biological sampling conducted by NCDEM between 1979-81 indicates that Ellerbe Creek is in poor biological condition. As described in Section 4.3.1 of the Draft EIS, chemical quality of the Ellerbe Creek is expected to improve with the implementation of the preferred alternative. Whether the biological quality will improve depends upon the quality of the wastewater effluent and effects of channel erosion induced by the increased flow.

   With the preferred alternative (Section 4.3), Ellerbe Creek would receive significantly higher treated effluent compared to the existing Northside WWTP discharge. The 29 mgd expansion is estimated to reduce BOD loads from 259 tons/year to 228 tons/year and NH_3-N loads would be reduced from 173 tons/year to 46 tons/year (NCDEM, 1989). The preferred alternative would have a beneficial effect on water quality because of these pollutant load reductions and because the increased volume of discharge should cause greater reaeration in Ellerbe Creek. In spite of these expected improvements to Ellerbe Creek water quality, NCDEM modeling still indicates that instream dissolved oxygen (DO) levels may fall below

the 5.0 mg/L minimum daily average standard. However, the modeling predicts that these low DO conditions are expected to be much less severe and less frequent than existing DO conditions. Following implementation of Phase A, Ellerbe Creek water quality monitoring and modeling would be conducted to reduce the uncertainty in these modeling predictions and to document the necessary effluent limits for Phase B.

3. Since the quality of Durham's sludge is expected to remain relatively free of metal and toxic contaminants and agricultural land is readily available, Durham's sludge will be applied to farmland for agricultural utilization. As such, the sludge will serve as a soil supplement supplying nutrients needed for crop growth. The NCDEM has a positive approach toward sludge disposal by land application. Their permitting requirements include soil, crop, and sludge analyses and evaluations. Sludge can be land applied to either dedicated or nondedicated sites. For the purpose of this EIS, it was assumed that sludge from all of the wastewater management alternatives would be land applied to nondedicated sites at agronomic rates.

   Respectively, about 5,400 and 8,400 dry tons per year of sewage sludge would be generated by the Phase A, 20 mgd and the Phase B, 29 mgd flows of the preferred alternative. About 1,080 and 1,680 acres, respectively, would be required to land apply this sludge at agronomic rates. The City of Durham is considering land application for sludge disposal. As part of this process, a contractor contacted farmers and estimated that 1,200 to 1,500 acres of agricultural land would be available for sludge application (Personal Communication with City of Durham Department of Water Resources, July 1989). The City of Durham is initiating a Comprehensive Sludge Management Study to further evaluate options for sludge disposal.

4. Under the preferred alternative, all users of the expanded Northside WWTP would pay the same rate except that county residents would continue to

pay twice the rate of city residents. User charges would be based on cost per 100 cubic feet of wastewater generated. The generation rate is assumed to be equivalent to the rate of water usage as measured by the user's water meter. However, in cases in which wastewater meters are installed, the sewer charge would be based on the sewage meter reading.

The economic impact of the preferred alternative would be the cost to consumers who use the system. Section 4.2.3 of the Draft EIS describes that under worst case conditions the annual cost per household would be about $340, which is less than the 1.75 percent of median family income EPA affordability criterion (4.3.5).

The rates proposed in the Draft EIS are for planning purposes only and could be higher or lower. However, it is important to note that rates will be based upon actual usage of the system. Those who use it will be charged accordingly.

5. Both NCDEM and the City of Durham have indicated they would conduct extensive monitoring in Ellerbe Creek after the Northside Plant is expanded to 20 mgd. This monitoring would provide information to assess the impacts on Ellerbe Creek and assist in determining if the stream can absorb the further impacts of expanding the Northside Plant from 20 to 29 mgd. It is not expected that the Northside Plant would be expanded to 29 mgd until these impacts are fully assessed by the monitoring program.

6. Toxicity in Ellerbe Creek is possible as a result of the stream being 90-95 percent wastewater during low flow conditions. Another possibility is a continuation of chlorophyll-a violations in Falls Lake may occur as a result of TP loads. Mitigation of these impacts cannot be achieved by stricter effluent limits because limit-of-technology TP effluent limits are proposed for the preferred alternative. If violations of the

chlorophyll-a standard continue and it is determined that the discharge is a significant contribution to these violations, the City of Durham may want to pursue a variance or similar arrangement until proper improvements can be made.

For the Ellerbe Creek preferred alternative, N-EC, applying more stringent effluent limitations to the Durham Northside wastewater treatment plant would improve Ellerbe Creek TN and TP conditions. Increasing the plant flow to 20 mgd from the existing average flow of 6.1 mgd is expected to have a beneficial flow augmentation effect. The increased flow would shorten the travel time necessary for the Northside wastewater effluent to flow through Ellerbe Creek into Falls Lake, which would decrease the likelihood of DO and chlorophyll-a violations. In spite of these expected improvements to Ellerbe Creek water quality, NCDEM modeling still indicates that DO standard violations are possible. Although modeling predicts that violations, if they occur, would be less severe and less extensive than existing violations.

7. The Preferred Alternative proposes 12 mgd of flow from both the Eno River Basin and Treyburn. The 12 mgd is based upon a moderate growth scenario that projects population and wastewater flows to the year 2010. Therefore, the 12 mgd provides for some growth and expansion in the Eno River Basin.

Eno River Service Area (mgd)

Eno Basin	-	9.036 mgd
Treyburn Basin	-	2.928 mgd
		11.964 mgd or 12 mgd

8. Environmental impacts are discussed in Response No. 1, R-JC-1. The number of possible stream crossings could be reduced by designing line placements that minimize stream crossings.

   In regard to archaeological and historical impact, EPA-funded projects are subject to the requirements of Section 106 of the National Historic Preservation Act of 1966, the Archaeological and Historic Preservation Act of 1974, Executive Order 11593, and regulations of the Advisory Council on Historic Preservation (36 CFR Part 800). In essence, these laws and regulations require mitigation of impacts to historic or archaeological sites on, or eligible for, the National Register of Historic Sites. Mitigation would involve certification from the Division of Archives and History that the construction will not affect any known archaeological or historic sites on or eligible for the National Register.

9. (1) Phase A of the Preferred Alternative limits the wastewater plant to 20 mgd.

   (2) The Eno River pump station will be designed for 12 mgd to accommodate projected flows to 2010. Lower capacity would simply result in another costly expansion by the year 2000 (see Table 4-13 in Chapter 4 of the Draft EIS).

   (3) It is anticipated that the Eno River, Little Lick and Treyburn Sewage Treatment Plants will be taken out of service once their flows are conveyed to the expanded Northside treatment plant.

(4) Those areas that have failing septic systems will be serviced by the expanded collection system and hopefully the real problem areas can be targeted for early service.

(5) Rates quoted in the Draft EIS are for planning purposes only. Actual rates could be higher or lower.

10. All comments made in the Draft EIS are incorporated in this Final EIS along with responses to pertinent comments.

February 20, 1990

Prepared statement for the EPA staff at public hearing of the above mentioned date, regarding the EIS Draft on the Eno Waste Water Treatment Plant.

My name is George Andrews. I have been a resident of Durham County my entire life. I have resided in the Northern part of the county for the last seven years.

I would first like to say, that I whole heartedly concur with the earlier comments made by Mr. Jim Clark.

I want to commend the EPA for the work which has gone into the EIS draft and for the draft itself.

My specific personal comments concerning the draft----, are, I'm sure important, -- vital-- and truly significant to all families and homeowners in Durham County; particularly those with an acute sense of fairplay.

1 While this is not a quote verbatim, The EIS draft projects water and sewer rates must increase by 100 - 200% to assist with financing water and sewer capacity expansion for planned development. A Durham City official recently conceded an expectation of at least a 100% increase for the same reason. To have to experience this kind of rate shock is almost unbelievable and would be grossly unfair to existing individual homeowners.

Recently, I received a survey conducted by the City Engineering Department, Division of Water and Sewer, 120 E. Parish Str., Durham, NC. The survey asked four questions. I want to focus on the first question, which asked If I would be willing to pay $2500.00 for water and Sewer lines for a 100 front ft. property.

As much as I would like to have city water and sewer services and while I would accept my responsibility to pay for my own installation, of water and sewer lines, pay city taxes after annexation, and then pay for the service monthly; I would not, in addition want to have to experience rate shock over and above everything else to subsdidize the water and sewer infrastructure costs for rich developers. Subsidize

2 The second point is that any capacity expansion ultimately approved should undoubtedly go first to the many, many individual homeowners, particularly in the Northern part of the county who are experiencing failing septic systems and significant water quality problems. THE EPA STATES IN THE EIS DRAFT IT WAS INFORMED BY THE Durham County Public Health Dept ~~that~~ IN 87 & 88 that as many as 50% of all on LOT Systems in Northern Durham County were failing

I hope you will give considerable weight to the points I have made here, as I have a deep and sound conviction they reflect the sentiments of a great many people in the Northern part of the county; People who at sometime in the not-to-distant future may not have access to acceptable water and sewer infrastructure at any price due to an understandably ever increasing treatment capacity crunch.

In closing, I would like to thank you again for your efforts and to request any assistance from you which may be available to aid those in the county who currently have the most immediate need for treatment capacity.

3 I would like these comments to become a part of the record of this meeting. Thank you!

Sincerely,

George Andrews
303 Northcliff Dr.
Durham, NC 27712

Letter R-GA-1
Final EIS
George Andrews
Durham County Resident

1. See Response No. 4, R-JC-1

   Additionally, Section 4.2.2 - Financing Alternatives of the Draft EIS discusses the Federal and State funds that may be available to finance the project. Unfortunately, residents of the proposed sewer service area must also bear some of the cost, and based upon Table 4.5, rates may increase significantly. However, these estimates are for planning purposes only. Actual rates could be higher or lower.

2. In Section 4.2.1 - Project Phasing of the Draft EIS, the DEIS states:

   > "It is the recommendation of this EIS that the failing on-lot system areas be given preference over new development when sewer extension permits are granted to the County of Durham".

   Also, Appendix A of the DEIS discusses the on-lot problem areas of the proposed project and recommends sewer service to these locations.

3. All comments made at the public meeting will be incorporated into the Final EIS.

CITY OF DURHAM
NORTH CAROLINA

CITY OF MEDICINE

DEPARTMENT OF WATER RESOURCES
101 CITY HALL PLAZA
DURHAM, NORTH CAROLINA 27701
(919) 560-4381

February 20, 1990

Mr. John Hamilton, Project Officer
Eno River EIS
Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

SUBJECT: Durham Eno River Wastewater Treatment Plant
Environmental Impact Statement

Dear John:

Please find attached my comments on the Draft Environmental Impact Statement. As you are well aware, the City of Durham has already received a permit for the expansion of the Northside Plant from its current permitted capacity of 10 MGD to a permitted capacity of 20 MGD, in order to provide the capacity needed for existing and projected development in the Northside and Little Lick Creek service areas. The original reason for development of the Eno EIS was to assist the State in making a decision on the issuance of a permit for wastewater treatment to serve the needs of the Durham Area Eno Basin. Because of the phased approach recommended by the EIS, a clear statement is needed on the permitting action which is being recommended by the EPA and the State of North Carolina in this joint EIS, so that the City of Durham can make reasonable plans for the orderly expansion of the Northside facility. I would like to suggest that if the final recommendation of the EIS is a Northside Plant with a capacity of 29 MGD, then it should be recommended that a permit be issued for this amount. The concerns for Water Quality Modeling could be addressed in such a permit through conditions written into the permit that would require the necessary monitoring and modeling prior to the issuance of the authorization to construct facilities beyond the existing permitted capacity of 20 MGD. In this way, all the parties concerned would have a clear understanding of what will be required prior to further expansion of the Northside WWTP.

(1)

I would like to personally thank you and the Environmental Protection Agency and the North Carolina Division of Environmental Management and your consultant Gannett Fleming, Environmental Engineers, Inc. for the tremendous efforts put

AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

Mr. John Hamilton
Page Two
February 20, 1990

forth in preparing this Environmental Impact Statement. I truly believe that the final outcome of this process has resulted in the selection of an alternative that will be good for both the City of Durham and the protection of our environment.

Sincerely,

DEPARTMENT OF WATER RESOURCES

A. T. Rolan
Director

ATR/cbt
0290004.jh

Attachments

cc: Mayor Chester Jenkins
City Council Members
Mr. Orville W. Powell
Mr. Cecil A. Brown
Mr. George Everett
Mr. Gordon C. Ruggles
Ms. Pat White, TJCOG

Letter R-TR-1
Final EIS
A. Terry Rolan, Director
City of Durham, Department
of Water Resources

1. Section 4.2.1 - Project Phasing of the Draft EIS states:

"A Finding of No Significant Impact was issued by NCDEM on April 28, 1989 for an expansion of the Northside WWTP to 20 mgd. NCDEM did not consider an application for an expansion to 29 mgd so as to not preclude or bias the findings of this EIS. The preferred alternative would be implemented with a two phase schedule. The first phase would involve expansion of the Northside plant from 9.5 mgd to 20 mgd. During the first phase, water quality monitoring and modeling of Ellerbe Creek and Falls Lake would continue. Any prior projections of water quality improvements and impairments would be refined and updated during this time. Effluent limit requirements for the second phase, i.e., the expansion from 20 to 29 mgd, would be further evaluated during this monitoring and modeling." (EPA/ NCDEM should probably address the issue of a "permitting action").

SIERRA CLUB
North Carolina Chapter

715 Arnette Avenue
Durham N.C. 27701

Regional Groups in North Carolina

BLUE RIDGE GROUP
Boone

BROAD RIVER GROUP
Shelby

CAPE FEAR GROUP
Wilmington

CAPITAL GROUP
Raleigh

CENTRAL PIEDMONT GROUP
Charlotte

COASTAL GROUP
New Bern

CYPRESS GROUP
Greenville

FOOTHILLS GROUP
Winston-Salem

HEADWATERS GROUP
Durham

HORACE KEPHART GROUP
Fayetteville

PIEDMONT PLATEAU GROUP
Greensboro

RESEARCH TRIANGLE GROUP
Chapel Hill

SANDHILLS GROUP
Southern Pines

SMOKY MOUNTAINS GROUP
Bryson City

SOUTH MOUNTAINS GROUP
Morganton

WENOCA GROUP
Asheville

Mr. Heinz J. Mueller, Chief
Environmental Policy Section
U.S. Environmental Protection Agency - Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Mueller:

This is a written edition of oral comments presented on February 20, 1990 concerning the Draft EIS for the Durham-Eno River Wastewater Facilities. Comments are on behalf of the N.C. Chapter of the Sierra Club, which I serve as Land Use Chair, and of the Headwaters Group of the Sierra Club, which I represented on EPA's Review Committee for this EIS. Statements here are meant to support fully the positions taken on this DEIS by Professor David Howells, Water Quality Chair for the N.C Sierra Club, and as well support positions taken over the last several years by the Headwaters Group and by the Conservation Council of N.C., for which I made EIS Scoping Requests in 1987.

First, I want to reiterate in particular certain of Prof. Howells' positions: (a) that Alt. N-EC appears to be the best choice under the circumstances as long as the inter-phase study is conducted as planned and the City of Durham consistently provides high quality operation and maintenance; (b) that a reexamination of the water rate structure is needed to prevent the encouragement of waste; (c) that surcharges be used to reduce organic leadings; and, above all, (d) that the EIS address the crucial fact that the upper end of Falls Lake is still not classified by the State for water-supply uses. I would add that current local watershed regulations are keyed to State surface water classifications in terms of regulatory boundaries. This issue will be discussed elsewhere in these comments.

In addition, I wanted to note that this lengthy process of EIS preparation - starting with NCDEM's request in Fall 1986 - has proven the importance of full investigation and citizen participation in protecting water quality. Originally the DEM expressed an "intent to issue" a permit to expand the discharge of the Eno River Wastewater Plant from 2.5 to 10 MGD. The Eno River Association, accompanied by the Conservation Council, the N.C. Sierra Club, and the N.C. Wildlife Federation, asked for extensive further study in an EIS. This citizen request, it must be emphasized, was based not only on fears of pointsource impacts on Falls Lake's water supplies, but also on the land use impacts of nonpoint pollution resulting from development in the entire watershed where sewer service might exist, and in other areas affected by development infrastructure. Our concerns about pointsource impacts appear to have been fully confirmed by the State's studies, which have led to Alt. N-EC, not an expansion of the Eno River Plant but instead a closure.

The scoping requests I submitted in 1987 to DEM and EPA focussed on the need for any EIS to comply fully with, first, the N.C. Environmental Policy Act, and, second, the National Environmental Policy Act, by thoroughly examining

not only the direct effects, but also the indirect effects and significance of this action, and as well "possible conflicts between the proposed activities and objectives" of different government plans, policies and controls in the affected area. We asked both DEM and EPA to recommend mitigation measures on the part of local governments: specifically, comprehensive stormwater management studies in both City and County; priorities for sewer service; installation of greenway trails simultaneous with installation of sewer lines served by any treatment expansion. We also asked both agencies to recommend prompt and timely implementation of recommendations from the Eno River Capacity Use Study and the Little River/Lake Michie Watershed Study.

(1) Because this final request was made not only in scoping documents but also by representatives from environmental groups in the EIS Review Committee, we are disappointed that the Capacity Use Area Study - the most comprehensive of its kind in this region - was not considered at all in this EIS. The downstream boundary of its study area was some three miles below the Eno discharge. Because of this significant omission, I asked the N.C. Natural Heritage Program to use the C.U.A. Study in its comments on this EIS, which focussed on biological impacts of flow reductions, particularly threatened species.

(2) Another singular omission - significant in view of the number of Review Committee requests for consideration - is discussion in Section 3.3.2.4. of a proposed interstate-level thoroughfare intended to serve major industrial and commercial development in the Eno River Service Area - the "Northern Durham Freeway." As presently proposed, this expressway would move between sections of the sewer service area by crossing the Water Quality Critical Area of Little River Reservoir at points 1.4 miles directly upstream from the public water supply intake and .7 mile upstream from the pool level. The 1988 regional thoroughfare plans clearly states this road would serve heavy development in the Eno basin, development too heavy to exist without centralized sewer, and ignoring this major indirect effect of the action may constitute a failure to comply with 40 CFR Part 1502.16 (b) and Part 1508.8 (b) (Regulations for Implementing NEPA).

(3) In addition to these requests to correct omissions, I also make a request intended to address the concern addressed by Prof. Howells regarding the lack of water-supply classification for the Durham sections of upper Falls Lake, and at the same time the mitigation measures requested by the Conservation Council in 1987. The wastewater plants of the City of Durham are currently operating under a Judicial Order of Consent (9/14/89). Among many provisions relating to wastewater treatment, there is one regarding nonpoint pollution. Section (p) requires that Durham

> Provide a certification for all new development projects (excludes City or County projects for areas with failing on-site treatment systems) in the Eno River Service Area requiring non-discharge permits for sewer lines indicating that the projects comply with State watershed protection guidelines regarding watercourse buffers and stormwater control (but not land use restrictions) for Class WS-II watersheds as defined in DEM Report 87-05..."Guidelines for Obtaining a Protective Surface Water Classification." Plans and specifications to verify compliance with watershed protection guidelines must also be provided.

(4) We request that EPA strongly recommend that this be a condition in the NCDEM permit for operation of any wastewater facility serving the Eno Basin, by extending this provision beyond the period when the Eno River EIS is approved. We also request that DEM and EPA investigate Durham's full compliance with this provision of the Court Order. The Eno River is distinguished among streams in the Durham urban services area by its consistent support of classified surface water uses, and occasional excedence of standards. Both State and Federal anti-degradation statutes, and forthcoming NPDES stormwater permitting programs, may make controls of this nature mandatory, particularly in river basins of good water quality such as the Eno.

Ed Harrison

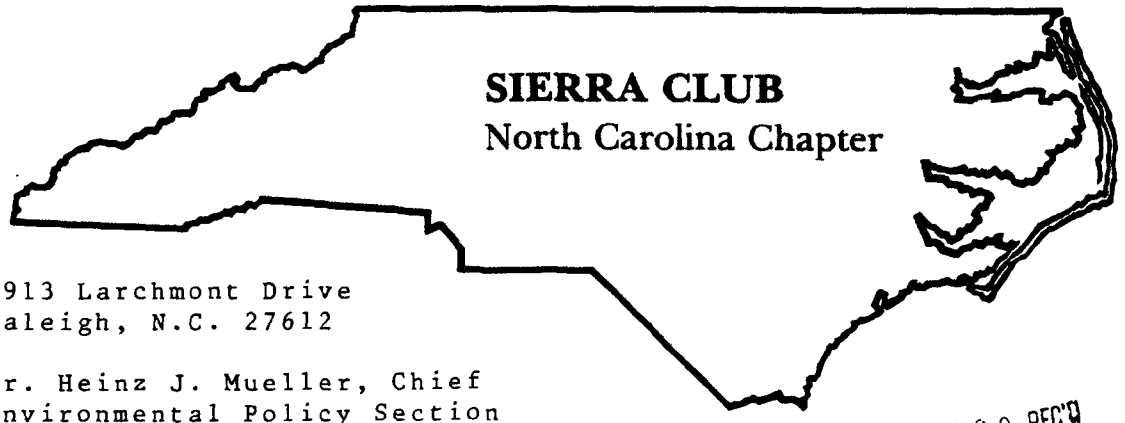
Letter R-SC-1
Final EIS
Ed Harrison
Sierra Club

1. The Eno River Capacity Use Investigation (State of North Carolina Division of Water Resources, August 1987) was used extensively in the preparation of the Task 305 Background Information Report (1988) and the draft Baseline Environmental Report (1987). It is referenced in both of these documents. Conclusions of the Capacity Use Investigation are incorporated in the Draft EIS via these two supporting documents.

2. A complete assessment of the impacts of the proposed Thoroughfare Plan is outside the scope of this EIS. However, information was presented in Section 3.3.2.4 on the proposed Thoroughfare Plan and a map of the proposed transportation systems presented in Plate 16. Furthermore, a Toxic Spill Analysis was conducted for a potential toxic spill at the Red Mill Road crossing of the Eno River. This analysis is contained in Technical Appendix III to the Draft EIS.

3. Since the City of Durham is a party to the Judicial Order of Consent it is assumed that the City is abiding by the provisions of the Consent Order including Section (p).

4. These are good points, but they are primarily enforcement actions which go beyond the scope of this EIS.



SIERRA CLUB
North Carolina Chapter

4913 Larchmont Drive
Raleigh, N.C. 27612

JAN 23 REC'D

Mr. Heinz J. Mueller, Chief
Environmental Policy Section
U.S. Environmental Protection Agency
Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Mueller:

I served on your EIS Review Committee for the Durham-Eno River Wastewater Facilities, Durham, North Carolina, and would like to comment on the Draft EIS. I cannot attend the public hearing scheduled for February 20 and ask that these comments be considered along with oral comments.

Alternative N-EC appears to be the best choice under the circumstances as long as the inter-phase study is conducted as planned and the City of Durham consistently provides the required high quality operation and maintenance to assure design performance. The history of BOD_5 violations, however, does raise serious questions as to what can be expected.

It is unclear to me how the required effluent BOD_5 can be attained with the proposed unit processes. I am referring to the unit processes cited in Table 3-2. Perhaps, there are omissions in the table. (1)

I presume that stand-by power and pumping equipment will be provided for the 12 mgd. pumping station at the Eno River site. Any bypassing of raw sewage could have disasterous consequences. (2)

Annual priority pollutant analysis would appear to be a minimum requirement. I suggest that any new industries be given close scrutiny in this regard including an initial priority pollutant analysis. (3)

I was pleased to see conservation measures being considered. The list of measures should also include a reexamination of the water rate structure to assure that this not encourage waste and unnecessary loading on the treatment plant. I strongly endorse the use of surcharges to reduce organic loadings - as proposed.

Regional Groups in North Carolina

BLUE RIDGE GROUP Boone
BROAD RIVER GROUP Shelby
CAPE FEAR GROUP Wilmington
CAPITAL GROUP Raleigh
CENTRAL PIEDMONT GROUP Charlotte
COASTAL GROUP New Bern
CYPRESS GROUP Greenville
FOOTHILLS GROUP Winston-Salem
HEADWATERS GROUP Durham
HORACE KEPHART GROUP Fayetteville
PIEDMONT PLATEAU GROUP Greensboro
RESEARCH TRIANGLE GROUP Chapel Hill
SANDHILLS GROUP Southern Pines
SMOKY MOUNTAINS GROUP Bryson City
SOUTH MOUNTAINS GROUP Morganton
WENOCA GROUP Asheville

To explore, enjoy, and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources ...

There are more reasons than stated on page 2-20 for reqiring industrial waste pretreatment. The most important would appear to be to avoid upset of the plant's biological systems by toxic components.

4 Is it advisable to provide for seasonal limits for phosphorus when a eutrophic lake serving as an important water supply source is immediately downstream? Isn't it likely that most phosphorus will be adsorbed on particulate matter and settle out, being available for recycling whenever growth factors are favorable?

5 In reading the section on primary impacts on surface water resources, I am struck by the lack of mention of the fact that the portion of Falls Lake bordering the Durham region is still classified as "C" and that the City of Durham has not taken steps to protect that watershed area through inclusion as a critical watershed area. This question was raised by Rep. Joe Hackney during a hearing by the Legislative Research Committee. The response by the City's representative - as I recall it - was that Durham had acted to protect its water supply sources and it was up to Raleigh to do the same. I am enclosing copies of correspondence between the Division of Environmental Management and me pertaining to this and copies of the City of Raleighs request to the State to reclassify. I am told that the Division of Environmental Management has taken no steps toward reclassification of the full lake WS-III. The point here is not that the State is failing to protect lake waters as presently classified, but that the "C" classification is leading Durham into a posture of disregarding critical watershed designation and thus permitting an intensity of development along the lower Eno River that is almost certain to have an undesirable effect on the State Capital's water supply. I believe that this issue is germain to the Eno River Wastewater Treatment plant EIS.

I hope these comments will be useful to you in preparing the final EIS and related actions.

CC: Councilwoman Mary Cates
Ed Harrison
Bill Thomas
Randy Schenck
Bill Holman
Steve Tedder, DEM

Sincerely yours,

David H. Howells

David H. Howells
Water Quality Chair
North Carolina Chapter
Sierra Club

Letter R-SC-2
Final EIS
David Howells
Sierra Club

1. Table 3-2, as included in the draft EIS, is complete. BOD removal for each of the alternatives will be accomplished by either the conventional activated sludge unit process or the biological phosphorus removal unit process. Biological phosphorus removal is a modification of the conventional activated sludge process that achieves biological uptake of phosphorus, BOD removal, and nitrification by contacting the wastewater with a cycle of anaerobic, anoxic, and aerobic sludges. Since its introduction in the 1970's, the biological phosphorus removal process has become a proven method for the combined removal of BOD and phosphorus.

2. Providing standby power and duplicate pumping units is a standard design practice incorporated in all large wastewater pumping stations. The Eno River pumping station will be designed to handle the projected peak instantaneous wastewater flow with one pump out-of-service. The facility will also be equipped with an emergency generator to provide backup power during periods when the main power supply is interrupted.

3. Section 2.3.6 - Industrial Pretreatment of the Draft EIS discusses the limits imposed by the City of Durham. These limits are generally more stringent than the Federal guidelines. Furthermore, the DEIS states in Section 2.3.6 that:

> "The effluent from any future industries would be evaluated to establish the discharge permit limits that the industries would be required to meet. An additional measure to control hazardous materials at industries is the Emergency Planning and Community Right to Know Act (SARA Title III). It requires that industries submit Emergency and Hazardous Chemical Inventory Forms to a local fire company, the Local Emergency Planning Committee, and the State Emergency Response Commission (40 CFR Part 370)".

Letter R-SC-2
Final EIS
David Howells
Sierra Club

4. There are seasonal limits proposed for Total Phosphorus (TP). TP effluent limits of 0.5 mg/L (April-October) and 2.0 mg/L (November-March) have been established. The Draft EIS recommended that the 2.0 mg/L (November-March) be lowered to 1.0 mg/L to obtain further reductions at TP loadings.

5. For response to this comment, the reader is referred to the following letter.?

Response to David Howells letter R-SC-2

We agree with Mr. Howells that it is important to note that the entire lake is not classified a water supply. The Environmental Management Commission, in their original actions, declined to classify the upper portions of the Lake as water supply because of the dischargers in that area and the probable unsuitability for using those waters as water supplies. They did indicate a desire to provide necessary protection for all water supply intakes. There have been requests to classify the upper portions of the Lake as water supply and the Division of Environmental Management is doing monitoring to determine if the quality of those waters is acceptable. If it appears they meet the conditions for reclassification, an official request will be made to the Commission to take the issue to public hearing.

Durham and Durham County have both provided some additional protection for those portions of the Lake not classified as water supply, especially in the areas around the Little Lick, Panther, and Ellerbe Creek portions of the Lake. Reclassification of the entire Lake would bring more nonpoint source protection to the remaining portions of the Lake. The City of Durham should evaluate the impacts of such a reclassification and provide the information to the Division of Environmental Management as they consider this action.

enonote

R-KH-1

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333

February 15, 1990

FEB 20 REC'D

Heinz J. Mueller, Chief
Environmental Policy Section
U.S. Environmental Protection Agency
Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Mueller:

We have completed our review of the Draft Environmental Impact Statement (DEIS) for the Durham-Eno River, North Carolina Wastewater Treatment Plant and Service Area. We are responding on behalf of the U.S. Public Health Service. Technical assistance for this review was provided by the Environmental Sanitation Group, Environmental Hazards and Health Effects Division, Center for Environmental Health and Injury Control, Centers for Disease Control.

This DEIS has been well written and generally describes potential impacts and appropriate mitigation measures. We do, however, offer several comments for your consideration.

We agree with and encourage the idea that conservation should be viewed as a long-term method of reducing water consumption and promoting more efficient use of scarce water resources. While the DEIS notes that the use of water saving devices is a conservation measure, it does not indicate if the measure will be used. Consideration may be given to requiring water conservation devices as part of the building permit system. (1)

On page 3-12, Table 3-2 is unclear as to what is the BOD removal process for alternatives "EN-ER, NT-EC/LA (Northside), N-EC, N-NR, and R-NR." (2)

It is stated on page 4-34 that "if violations of the chlorophyll-a standard continue, and if it is determined that the discharge is a significant contribution to these violations, NCDEM should pursue a variance or similar arrangement until proper improvements can be made." If the chlorophyll-a standard is expected to continue to be violated, the discharge may be a significant contribution. Therefore, it may be prudent to plan for this now rather than postponing such actions. (3)

Thank you for the opportunity to review and comment on this DEIS. Please insure that we are included on your mailing list for future DEIS'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 R-KH-1
Final EIS
Kenneth W. Holt
U.S. Department of Health
and Human Services
Center for Disease Control

1. The requirement of water conservation devices is a city/county matter that must be implemented at that level.

   While we promote the use of water conservation practices, they are not used in developing flow projections since there are no assurances that the individual home owner will actually put into use any water conservation measures or devices.

2. Table 3-2 on page 3-12 of the draft EIS includes two unit processes capable of removing BOD. The conventional activated sludge process is proposed for BOD removal for alternatives EN-LA and NT-EC/LA (Treyburn). The remaining alternatives will use the biological phosphorus removal unit process for BOD reduction. Biological phosphorus removal is a modification of the conventional activated sludge process that achieves biological uptake of phosphorus, BOD removal, and nitrification by contacting the wastewater with a cycle of anaerobic, anoxic, and aerobic sludges.

3. We would agree with this statement. If a detailed monitoring program shows that chlorophyll-a violations continue to occur, then the implementation of Best Management Practices must take place in the EIS study area. Table 4-14 of the Draft EIS provided a list of BMP's that are currently in use in the Basin. Since non-point sources are a major contributor to Total Phosphorus loading, they must be implemented and enforced.

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

TAKE PRIDE IN AMERICA

FEB 10 1990
FEB 15 1990

ER-90/4

Mr. Heinz J. Mueller, Chief
Environmental Policy Section
U.S. Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Mueller:

The Department of the Interior has reviewed your Draft Environmental Impact Statement on Durham-Eno River, North Carolina Wastewater Treatment Plant and Service Area. We provide the following comments.

1 The document does not mention the mineral resources (clay and crushed stone) of the area. We believe that mineral resources would not be significantly affected by any of the proposed alternatives. Nevertheless, we suggest that subsequent versions of the document include a description of mineral resources of the area. If no impacts would occur, then a statement to that effect should be included. Such an inclusion would provide users of the documents with knowledge that mineral resources had been considered during project planning.

Thank you for the opportunity to comment.

Sincerely,

James H. Lee

James H. Lee
Regional Environmental Officer

Letter R-JL-1
Final EIS
James Lee
U.S. Department of the Interior

1. The geology and soils of the area were discussed in Chapter 3 of the Draft EIS. Although the location does have several active crushed stone and shale/clay quarries, these quarries should not be affected by the proposed project. The primary purpose for reviewing geology and soils was to determine groundwater resources in the study area.

CITY OF DURHAM
NORTH CAROLINA

MAR 01 1990

CITY OF MEDICINE

THE MAYOR
101 CITY HALL PLAZA
DURHAM, NORTH CAROLINA
27701

February 23, 1990

Mr. John Hamilton, Project Officer
Eno River EIS
Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

SUBJECT: Draft EIS, Durham-Eno River, North Carolina
Wastewater Treatment Plant and Service Area

Dear Mr. Hamilton:

I would like to take this opportunity to express the City of Durham's appreciation to you and your staff for the thorough and professional manner in which the above subject study has been conducted. I would like to have the following comments included as a part of the Public Hearing record.

1. The City of Durham, North Carolina requests that both Phase A (already permitted) and Phase B as described in Chapter Four (4) be recommended for permitting immediately, with the provision that Phase B authorization to construct be contingent on satisfying water quality requirements as determined by the State. This action will allow for much more effective project planning in Phase A and will enable the City of Durham to adjust revenue forecasting over a longer and more stable planning period, thereby minimizing "rate shock". (1)

2. The City of Durham, North Carolina requests strong emphasis be placed on the fact that the preferred alternative has positive impacts on existing water quality of the Neuse Basin and that those costs related to improving water quality be funded by both the State and Federal funds to the maximum amount possible. Currently only about 22% of the project has tenative commitment for funding with revolving loans from the Federal Government. (2)

AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

3

3. The City of Durham requests that in Section 4.3, some discussion be provided concerning the positive economic effects of providing wastewater capacity for orderly growth in northern Durham County, specifically in the areas of employment and small business opportunities.

Your assistance in having these comments included in the Hearing Record will be appreciated.

Sincerely,

Chester L. Jenkins

Chester L. Jenkins
Mayor

CLJ/cbt
0290315.jh

cc: Mr. George Everett, Division of Environmental Management
Mr. Orville W. Powell, City Manager
City Council Members
Mr. A. T. Rolan, Director, Department of Water Resources

Letter R-CJ-1
Final EIS
Chester L. Jenkins, Mayor
City of Durham

1. The preferred alternative of this draft EIS involves a 29 mgd advanced treatment plant at the Northside location with discharge to Ellerbe Creek. The DEM has already issued NPDES permit NC0023841 for a 20 mgd expansion of the Northside facility. At this time, neither EPA nor DEM anticipate the need for an additional EIS or public hearing prior to the issuance of a permit for the 29 mgd expansion. DEM will not make a final permitting decision or issue authorization to construct until impacts to water quality from the Phase A expansion have been observed through the critical portion of at least one summer period (i.e., June through September). Thus, the time period for Phase B expansion approval will be affected by the date that the Phase A expansion actually comes on-line. It is expected that this decision will be made within 12 to 24 months following the on-line data for Phase A.

   In making the permitting decision, DEM will analyze any effluent data and samples which have been collected in the receiving stream, Ellerbe Creek, including the self monitoring data collected by the City of Durham (Table 1). In addition, DEM plans to collect supplemental information for modeling purpose and further water quality impact evaluation. Emphasis will be placed on dissolved oxygen (DO), instream toxicity, and eutrophication through updating DEM's current water quality models and/or performing additional analyses. Evaluation criteria will center around maintenance of State water quality standards and supporting "Best Use" of the receiving waters as defined by Ellerbe Creek's water quality classification.

2. Section 4.3.1 - Surface Water Resources of the DEIS enumerates all the positive effects the proposed project will have on the Neuse Basin.

   Section 4.2.2 - Financing Alternatives of the DEIS discusses the various State and Federal monies available for the project. According to this

Table 1: Instream Monitoring Requirements
Ellerbe Creek, Durham County, North Carolina
Northside WWTP Phase A Expansion

A. October - May Sampling Requirements

Effluent Characteristic	Measurement Frequency	Sample Type	Sample Locations
BOD, 5 day, 20oC	Three/week	Grab	U1,U2,U3
Dissolved Oxygen	Three/week	Grab	U1,U2,U3
Fecal Coliform	Three/week	Grab	U1,U2,U3
Temperature	Three/week	Grab	U1,U2,U3
Conductivity	Three/week	Grab	U1,U2,U3

B. June - September Sampling Requirements

Effluent Characteristic	Measurement Frequency	Sample Type	Sample Locations
Dissolved Oxygen	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6
Temperature	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6
Conductivity	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6
Total Nitrogen	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6
Total Phosphorus	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6
Ammonia-Nitrogen	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6
Total Kjeldahl N	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6
Phosphate	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6
pH	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6
Chlorophyll_a	Weekly (am & pm)	Grab	U1,U2,U3,U4,U5,U6

C. Notes:

1. Sampling to begin June 1991 and continue until the issuance of the NPDES permit for the Phase B expansion (29 mgd).

2. Sample locations are U1 - East Club Boulevard, U2 - Glenn Road, U3 - Red Mill Road, U4 - Old Railroad Trestle, U5 - New Railroad Trestle, U6 - I85 or other site near mouth of Falls Lake.

3. Following completion of the Phase A expansion the NCDEM will add Ellerbe Creek to the list of streams scheduled for biological assessment classification.

section, up to $10.5 million would be available on an annual basis for this project.

3. It is difficult within the context of the Draft EIS to quantify employment and small business opportunities in the EIS study area. Section 3.3.2.3 of the Draft EIS looks at Economics and Employment and discusses the positive impacts the project will have on employment and economic growth in the study area.

COMMENTS BY THE CITY OF DURHAM

DEPARTMENT OF WATER RESOURCES

DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR DURHAM-ENO RIVER WASTEWATER TREATMENT PLANT AND SERVICE AREA

DATED SEPTEMBER, 1989

1. Page ES-6 Description of Preferred Alternative This section discusses the proposed phasing of the Northside Expansion and the recommended limits associated with the phased expansion. This section should be revised to clearly state what the State of North Carolina and the Environmental Protection Agency proposes for the permitting process. It should include how these issues will be addressed by revisions to the existing permit for the Northside Plant. As stated in this paragraph, the necessity for a more stringent phosphorus limit of 1 mg/L, should be evaluated during the phase A monitoring and modeling program. The requirements for this monitoring and modeling program should be clearly defined both in terms of parameters to be monitored and modeled as well as sample locations and the duration of the monitoring program in order to generate the quantity of data needed to carry out the predictive modeling. Phase A of the Northside Expansion will not be completed before January, 1994. If the Phase B Expansion is to be completed on time, there would only be one year of monitoring with the new facilities on line prior to the initiation of the Phase B construction in January, 1995. Approximately one year would be required in order to design the facilities needed for Phase B. The facilities being provided in Phase A which will include both biological phosphorus removal and chemical phosphorus removal should be capable of meeting the 1 mg/L phosphorus limit if that is required. However, if more stringent limits for other paramaters were required which would result in a significant change in the facilities needed in Phase B as a result of the proposed monitoring and modeling program, then a redesign of the Phase B facilities would be required. This would result in a delay of Phase B implementation. Because of this problem, it would be helpful to the City of Durham for the monitoring and modeling determination to be made based on the available data at that time and should be decided no later than January, 1994.

2. Page ES-7 - The third paragraph discusses mitigation efforts. It may be helpful to include in the appendix, a copy of the City of Durham's Watershed Protection Ordinance in addition to the County Ordinance. It may also be helpful to include a copy of the Judicial Consent Order entered into

by the State and the City which addresses some of the concerns included in the mitigation for Phase A. It may also be helpful to include in this section a discussion of the impact of the recent change in the State guidelines for the protection of water supply watersheds which severely limits the land area available for land application of sludges in the Durham area. It may also be helpful to include a discussion of the proposed demonstration project by the City of Durham for sludge land filling and treatment of sludge by high ph lime stabilization or cement kiln dust. A copy of the proposals presented to the State of North Carolina is attached.

(2) CONT'D

3. Page 2-8 - The flow projections contained in Table 2-3 appear to predict an annual average flow of 12 MGD. Recent changes in the enforcement strategy of the Division of Environmental Management have resulted in a determination that a maximum monthly flow which exceeds the permitted capacity of the treatment facility is considered a violation of the NPDES Permit. With this problem in mind, it would appear that the annual average flow projections should be adjusted by a peaking factor in order to determine the actual treatment plant capacity needed in order to avoid a violation of the monthly average flow.

(3)

4. Page 3-2 - The City of Durham has recently had the firm of Hazen and Sawyer, Consulting Engineers evaluate the routing of the force main from the Eno Plant to the Northside Plant. The route selected by Hazen and Sawyer differs slightly from that shown in the EIS. We would suggest that the EIS be amended to reflect the current thinking of the City relative to this force main routing. A copy of the analysis and routing by Hazen and Sawyer is attached.

(4)

5. Page 3-11 - The EIS does not recognize that both Eno and the Northside Plants are currently required by the NPDES Permit to show no whole effluent chronic toxicity. Because of the current concern for the creation of chlorination by-products even in a facility which would include both chlorination and dechlorination, the City plans to include ultraviolet disinfection in lieu of chlorination and dechlorination for the expanded Northside Plant. The EIS should be amended to reflect the current NPDES requirements and to address the issue of chlorination by-products.

(5)

6. Page 3-12 - Table 3-2 on this page includes only biological phosphorus removal under the Northside alternatives. Can it be assumed that this process will also meet the nitrification requirements at this facility?

(6)

7. Page 3-29 - The water quality modeling effort completed in March, 1989 is referred to on this page. The discussion includes the involvement of NCDEM Technical Support Unit and USEPA, but makes no mention of the efforts by the City of

(7)

Durham during the summer of 1988 in collecting the required water quality data. Because of the level of effort put forth by the City of Durham's staff in accumulating this data, it would appear that some mention of our involvement would be appropriate.

8. Page 4-8 - Table 4-3 on this page does not appear to agree with Table 3-5 on Page 3-18.

9. Page 4-9 - Table 4-4 appears to have some areas related to footnotes which should be corrected in the final document. This Table should also be revised to make clear that these costs do not include any cost for upgrade to the existing Northside Plant and does not include any cost for the Lick Creek Pump Station and Force Main which are included in the current City's estimates. These costs also do not include new facilities for sludge handling at the Northside Plant which result from the loss of sand drying beds which will result from the construction of the new facilities. These costs also do not include any cost for the proposed sludge demonstration project which is included in the City's estimate of cost. These cost also do not include any cost associated with expansion capacity needed in the Little Lick Creek and Northside service areas. Based on detailed preliminary engineering efforts by Hazen and Sawyer, I would estimate that all of the above would be equal to approximately $36,224,000 with approximately $5,604,000 of that cost being associated with capacity expansions for the Northside and Little Lick Creek Basins. A copy of the cost summary prepared for the City by Hazen and Sawyer for both the Northside and Farrington Road projects which attempts to distinguish the cost for improvements to these facilities for both upgrading of treatment as well as expansion of capacity is provided for your information.

10. Page 4-10 - The date for the City Bond Referendum should be changed to November, 1990. The tenative amount of the bond authorization for improvements to both the Farrington Road Plant and Phase A of the Northside Plant would be approximately $92.5.

11. Page 4-13 - A copy of the City's current projections of the rate impact of the proposed bond issue is attached for your information.

12. Page 4-17 - Table 4-7 indicates that the point source nitrogen and phosphorus loads would be the same for both the low growth scenario and the moderate growth scenario. This does not seem to be a reasonable assumption. Is there an error in this table?

Letter R-CD-1
Final EIS
Department of Water
Resources
City of Durham

1. The response to this comment is contained in the response to Letter R-CJ-1 comment Number 1.

2. Both the City of Durham's Watershed Protection Ordinance and the Judicial Consent Order have been appended to the Final EIS. Sludge disposal is an on-going issue to be resolved between the City of Durham and the NCDEM (see Judicial Order of Consent, Appendix C). At this time, land application is one of several options for sludge disposal.

3. All the facilities described in the draft EIS are referred to in terms of their annual average design flows. In practice, any wastewater treatment facility to be provided as part of the Durham project should be designed with sufficient capacity to treat the maximum monthly flow and still achieve the effluent requirements. The NPDES permit for the treatment facility will set forth the conditions for the discharge of both the maximum monthly flow and the annual average flow. Therefore, it is not necessary to adjust the annual average flow projections to avoid a violation of the NPDES permit for influent flows equal to or less than the projected monthly maximum flow.

4. Routing of sanitary sewers for the purposes of the draft EIS have been shown in Plate 5 of the draft EIS. As is standard engineering practice, site survey will determine the precise route during the design phase of the project.

5. The fact that the City of Durham is required by its NPDES permit to conduct whole effluent toxicity testing of the Northside discharge is added to the Executive Summary of this final EIS. Chapter 4 is amended to point out that ultraviolet disinfection may be used to eliminate the formation of chlorination by-products.

6. Your assumption is correct. The biological phosphorus removal processes referred to in Table 3-2 were sized and costed to include sufficient detention time in the oxic stages of the process to achieve the required level of ammonia oxidation.

7. The City of Durham along with the NCDEM technical support unit should be credited for the water quality modeling effort performed during the summer of 1988.

8. Table 4-3 - Total Project Costs - as noted are reported in 1992 dollars. Although not specifically noted on Table 3-5, its costs are reported in 1989 dollars. The difference between the reported costs in the two tables corresponds to the variation in dollar years.

9. As stated on page 4-7 of the Draft EIS, the EIS study area includes only the Eno Service Area and the costs presented in the report reflect costs only to the Eno Service Area. Therefore, your statement on the other costs required for service to the Northside and Little Lick Basins not included in the report is correct. However, as you reported, Table 4-4 of the Draft EIS does contain several errors regarding footnotes. This Table will be corrected in the final document.

10. In Section 4.2.2 of the final EIS, the date for the City Bond Referendum is changed to November 1990.

11. The correct point source loads for the low growth scenario are 420 tons/yr total nitrogen and 20 tons/yr total phosphorus. These numbers are shown in Table 4-7 of the final EIS.

MAR 0 5 REC'D

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1890
WILMINGTON, NORTH CAROLINA 28402-1890

March 1, 1990

IN REPLY REFER TO
Planning Division

Mr. Heinz J. Mueller, Chief
Environmental Policy Section
U.S. Environmental Protection
Agency, Region IV
345 Courtland Street, NE.
Atlanta, Georgia 30365

Dear Mr. Mueller:

Thank you for the opportunity to review the Draft Environmental Impact Statement for the Durham-Eno River Wastewater Facilities, Durham, North Carolina. The report is well written and appears to address most of our concerns about potential impacts to Falls Lake and the government-owned lands that surround the project. The following comments are provided for your consideration.

We share your concern about potential water quality impacts to Falls Lake, particularly in the Ellerbe Creek arm of the project, and support your plan to monitor water quality and to do further modeling at Falls Lake during Phase A (upgrading and operation of the Northside Treatment Plant from 9.5 mgd to 20 mgd). Since the determination that Falls Lake can absorb the additional wastewater without ill effects is based on modeling and assumptions that in turn rely upon skillful technical operation of an advanced wastewater treatment facility, information obtained from the monitoring and modeling should be extremely useful in determining how well state-of-the-art technology is performing at the treatment facility and how, or if, to proceed with Phase B (increase capacity from 20 mgd to 29 mgd). Given the importance of Falls Lake for water supply, recreation, and fish and wildlife, please continue your already intensive efforts to protect and enhance water quality conditions.

1 It appears from plate 5 that several force mains and gravity lines are proposed to cross federally-owned lands at Falls Lake that are designated for permanent wildlife management. In fact, gravity line FL1-1 crosses one of the waterfowl subimpoundments which will be operated to attract migratory waterfowl for hunting. It is the policy of the Corps that these lands are not available for utility easements if there are alternatives. Such alternatives would include use of private lands, highway rights-of-way, and use of existing utility easements. Prior to submitting a request for use of Falls Lake

project lands, the Falls Lake Resource Manager should be contacted so that appropriate Wilmington District elements can field review any preliminary plans with you. Final plans should be submitted to that office with your request for approval.

2 The first sentence under Falls Lake, on page 4-15, should read, "Falls Lake is a highly eutrophic body of water with mean chlorophyll-a concentrations that can exceed 60 ug/l during warm months in its headwaters (NCDEM, 1989; and USACOE, 1988)." The second sentence under the second paragraph of Falls Lake, on page 4-15, should read, "The average annual input of total phosphorus (TP) to Falls Lake is 206 tons/year (USACOE, 1988)." All references to the average annual input of TP to Falls Lake should use the 206 tons/year figure. This figure represents the average for the 4-year period of July 1983 through June 1987 as reported in Falls Lake, N.C., Water Quality Study, Year 4 (July 1986-June 1987), which was prepared in 1988 for the U.S. Army Corps of Engineers, Wilmington District, by Water and Air Research, Inc.

Department of the Army permit authorization, pursuant to Section 404 of the Clean Water Act of 1977, as amended, will be required for the discharge of excavated or fill material in waters of the United States or any adjacent and/or isolated wetlands in conjunction with the proposed action. Specific permit requirements will depend on design of the project, extent of fill work within streams and wetland areas (dimensions, fill amounts, etc.), construction methods, and other factors. When final plans are developed, including the extent and location of development within waters of the United States and wetlands, they should be submitted to our Regulatory Branch for a project-specific determination of Department of the Army permit requirements.

Again, thank you for the opportunity to participate in the development and evaluation of alternative plans and to review the DEIS. If there are any questions about our comments, please contact Mr. Coleman Long, Environmental Resources Branch, at (919) 251-4751.

Sincerely,

Lawrence W. Saunders
Chief, Planning Division

Letter R-LS-1
Final EIS
Lawrence Saunders
U.S. Department of the Army,
Corps of Engineers

1. The impact to Falls Lake lands has been noted on page 4-18, Section 4.3.3 and Table 4-11 of the draft EIS. Mitigation measures, including rerouting sewer corridors, are listed in Table 4-15 of the draft EIS. The routing of sanitary sewers shown in Plate 5 has been for planning purposes. Site surveys during the design phase will determine exact locations.

2. The comment has been noted and incorporated in the final EIS.

MAR 08 REC'D

North Carolina Department of Cultural Resources

James G. Martin, Governor
Patric Dorsey, Secretary

Division of Archives and History
William S. Price, Jr., Director

March 2, 1990

Mr. Heinz J. Mueller, Chief
Environmental Policy Section
U.S. Environmental Protection Agency
Revion IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: Draft EIS, Durham-Eno River Wastewater
Facilities, Durham County, CH 90-E-0000-0444

Dear Mr. Mueller:

We have received notification from the State Clearinghouse concerning the above project.

In terms of archaeological resources, the information contained in your document is out of date and the site location map should not have been included. The site location information was supplied to the staff of the Triangle J Council of Governments in 1985 with the understanding that this information was not to be made available to the general public or to be published. According to North Carolina General Statutes 70-18, the locations of archaeological sites are confidential to avoid the risk of harm to the resources. Publication in a public document such as the draft environmental impact statement is definitely harmful to the preservation and integrity of the archaeological resources in question. Plate 12 and any other specific locational references to archaeological resources should be deleted from this document prior to the publication of the FEIS.

In the future, your staff should consult with the State Historic Preservation Office concerning potential project effects upon archaeological resources rather than rely on second-hand information which may or may not be correct.

The area of the Northside wastewater treatment plant has been surveyed previously by an archaeologist and the expansion will have no effect upon archaeological resources. The DEIS shows the location of several pumping stations, force mains, and gravity sewers that may have an adverse effect upon such resources. We recommend that those facilities outside of existing rights-of-way be surveyed by an experienced archaeologist prior to project construction.

109 East Jones Street • Raleigh, North Carolina 27601-2807

Enclosed is a list of archaeological consultants who have conducted or expressed an interest in conducting contract work in North Carolina. Individual files providing additional information on the consultants may be examined at the State Historic Preservation Office's Office of State Archaeology, 421 North Blount Street, Raleigh. If additional names are desired, you may consult the current listing of the members of the Society of Professional Archeologists, or contact the society's secretary/treasurer, J. Barto Arnold, III, P.O. Box 13265, Austin, Texas 78711-3265. Any of the above persons, or any other experienced archaeologist, may be contacted to conduct the recommended investigations.

We have conducted a search of our maps and files and have located nine structures of historical or architectural importance within the general area of the project. Due to the nature of the proposed work, however, we anticipate no impacts upon these historic structures.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act of 1966 and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106, codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Ms. Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763.

Sincerely,

Renee Gledhill-Earley

for David Brook
Deputy State Historic Preservation Officer

DB:slw

Enclosure

cc: State Clearinghouse

Letter R-DB-1
Final EIS
David Brook
State Historic Preservation
Office

1. For response to this entire letter, the reader is referred to the following letter by Heinz J. Mueller, Chief, Environmental Policy Section, EPA Region IV, Atlanta.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

MAR 15 1990

Mr. David Brook
Deputy State Historic Preservation Officer
North Carolina Department of Cultural Resources
109 East Jones Street
Raleigh, North Carolina 27601-2807

Re: Draft EIS, Durham-Eno River Wastewater
March 2, 1990, Comment Letter

Dear Mr. Brook:

Thank you for the referenced letter and your comments on the Draft EIS. We appreciate the time you spent in reviewing the material, and are pleased the project does not appear to have any impact upon historic structures.

Your letter expressed concern that the archaeological site location data were made available in the Draft EIS, and that these data were provided by the the Triangle J Council of Governments. My staff obtained the site locations from the Durham County Inventory of Critical Lands, published in 1985 by the Triangle J Council of Governments. As this Inventory is a public document describing area historical resources, my staff reasonably assumed the site data were cleared for publication. We share your concern for the protection of archaeological sites, and will coordinate with your office to protect these resources.

Your letter contained the comment that our cultural resources material was not up to date, and may or may not be correct. Further, your staff indicated by telephone (March 9, 1990) that more current information would not have been forthcoming had we asked for it. This poses for us an obvious dilemma: since new site material 1) is not present in the Draft EIS, 2) would not have been available to us had we requested it, and 3) was not made available to the public, it would appear the lack of current information met your stated need for site confidentiality. We are somewhat mystified as to the basis of this comment.

Our cultural resources data in the Draft EIS consisted of dots on a USGS quad sheet which were displayed to determine their proximity to wastewater treatment facilities, interceptor lines, and pumping facilities. Since specific street addresses of the sites were not provided in the Draft EIS, we do not believe the security of these resources was seriously compromised.

I want to reiterate my offer to cooperate with your Department in future planning on federal projects in North Carolina. Your request for more consultation on matters concerning historical resources is appropriate.

Sincerely, Original Signed by Heinz J. Mueller

Heinz J. Mueller, Chief
Environmental Policy Section
Federal Activities Branch

R-BDV-1

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Environmental Management
512 North Salisbury Street • Raleigh, North Carolina 27611

James G. Martin, Governor
William W. Cobey, Jr., Secretary

George T. Everett, Ph.D.
Director

April 2, 1990

Mr. John Hamilton
U.S. Environmental Protection Agency
345 Courtland Street, NE
Atlanta, GA 30365

Dear Mr. Hamilton:

Enclosed are comments received from the North Carolina Wildlife Resources Commission and the Division of Parks and Recreation concerning the draft Eno River EIS. These comments were recevied prior to February 26, 1990. Since that time we have met with representatives from both agencies and offer the following summaries and guidance in responding to their concerns.

Wildlife Resources Commission

WRC supports the preferred alternative but has concerns regarding secondary impacts of the project on WRC Gamelands and wetlands in the upper reaches of the Falls Lake and its tributaries. Listed below are specific issues of concern to WRC.

1. Reduction of flows to headwaters of Falls Lake and less available water in Flat Creek for subimpoundments

An important feature of the Gamelands is a series of waterfowl subimpoundments located along Flat Creek just upstream from its confluence with the Eno River (highlighted in green on the enclosed map). These are diked high ground or flood plain lands that are to be flooded each Fall for use by overwintering waterfowl. Water is to be pumped in from Flat Creek. The subimpoundents are now under construction and are to be flooded for the first time this coming Fall (October/November). Even though the pumping sites are located upstream from the Eno, the reach of Flat Creek from which the water would be pumped is part of the impounded backwaters of Falls Lake, just like the lower end of the Eno.

1 WRC staff are concerned that reducing the flow to the Eno could reduce the amount of water available for pumping, although they have no evidence that this will or will not occur. The US Army Corps of Engineers designed the dikes and have information

1 CONT'D

on the water depths in the area and the volume of water available for pumping. They should also have information on the flow rate and capacity of the pumps. While DEM is not convinced that there will be a significant problem, it is a sensitive issue that should be addressed.

2. Construction of sewer lines across State Gamelands and wetlands in the vicinity of Falls Lake:

2

For many years the Corps and State leasing agencies have taken a strong stand against allowing roads and utility corridors (water and sewer, natural gas, electricity) to be constructed on or across these lands. Without such a policy, the agencies are concerned that the resources at the site would be become fragmented and be made more susceptible to intrusion from dirt bikes and ATV's, serious problems elsewhere on project lands. It is therefore recommended that the EIS inform readers of this policy and that an effort be made to ensure that the sewer lines shown in the EIS be routed so as not to encroach on project lands other than along existing highway corridors.

WRC also recommends that sewer lines be routed, to the extent possible, to avoid impacting wetlands (both on and off the project lands), and, where impacts are unavoidable, that proper mitigation be provided as set forth in their letter.

3. Secondary impacts of induced development encroaching on Gamelands boundaries.

3

WRC has been concerned for a number of years with the potential impact of residential development along the edge of the Gameland areas. At the present time, hunting is allowed on these lands; however, as more homes are built along the project boundaries, hunter safety zones will encroach into the Gamelands and possibly cause the elimination of hunting in some areas. This does not appear to be an issue that can be resolved through this EIS. Chances are that it would eventually occur with or without this project. It is recommended, however, that the EIS acknowledge this as a potential long term secondary impact that should be brought to the attention of the local governments.

4. Support for implementation of nonpoint source BMP's.

4

WRC believes all efforts should be made to have nonpoint sources BMP's implemented within the EIS project area.

Division of Parks and Recreation

The Division of Parks and Recreation (DPR) has two major areas of concern as presented below.

Mr. John Hamilton
April 2, 1990
Page 3

1. Reduced flow in the Eno River and impacts to rare, threatened and endangered aquatic species.

DPR advises that a number of listed or potential rare, threatened or endangered animal species may be inhabiting the reach of the Eno below the plant discharge. In fact, while no recent studies have been performed to determine whether any inhabit the area, DPR believes that the reach of the river below the outfall could provide a unique habitat for these species on the Eno due to the artifically high flow of water from the plant during extreme low flow periods.

While it is recognized that limited stream flow on the Eno can at times be stressful to aquatic life, DEM believes that the long term impacts to water quality from removing the plant would outweigh the flow benefits. Just recently, for example, the plant failed its whole effluent toxicity test due to high residual chlorine levels (0.8 mg/l) in its effluent. Mollusks, in particular, are very sensitive to chlorine and would be hit hard by such events.

A spokesperson for our Biological Assessment Group, which has conducted many surveys of the Eno upstream from the plant, has stated that even during the extreme low flow conditions of 1988, aquatic benthos in the Eno were readily found. In fact, the biological quality of the stream seemed to improve during those periods meaning that biologists were able to find somewhat higher numbers and a wider variety of pollution intolerant benthic species. Overall, little impact would be expected from removal of the discharge and many benefits might be realized.

2. Proximity of sewer lines to registered natural areas.

(5) DPR is concerned that the DEIS does not specifically state what efforts, if any, will be made to avoid registered natural areas. It is recommended that the EIS be amended, as necessary, to address avoidance of these areas. You may want to reference the DEM requirements found in 15A NCAC 214.0205(d)(3)(E) which, at a minimum, must be followed (copy enclosed).

Please contact either me or Mr. Alan Clark if you have any questions.

Sincerely,

Boyd DeVane

W. Boyd DeVane

Enclosures

Letter R-BDV-1
Final EIS
W. Boyd DeVane
North Carolina Department of
Environmental Management

1. The preferred alternative will remove approximately 1-2 mgd of wastewater flows from the Eno River and 10-12 from proposed maximum flows. This is a positive impact since the Eno River will no longer be a receiving stream for wastewater. There will be some reduction in flows that are inevitable if wastewater collected in the Eno River watershed are conveyed to the Ellerbe Creek Watershed. The more important consideration is non-point sources continuing to be a threat to the Eno River. Best management practices as discussed in Chapter 4 of the Draft EIS must be put into place to reduce non-point problems. There is also the possibility of augmenting flows on the downstream section of the Eno River with discharges from the Little River Reservoir. Any flow augmentation, however, would be a second priority to meeting the potable water needs placed upon this reservoir.

2. See Response No. 1, R-LS-1.

   Additionally, efforts will be made to avoid impacting wetlands. However, if it becomes necessary to cross a wetland, the required permits will be obtained and mitigation will be established.

3. Section 3.3.2.9 of the Draft EIS - Archaeological, Historical, and Recreational Resources, discusses the secondary impacts of a population increase. It is acknowledged that the growth impacts in the area could eliminate hunting in many areas.

4. Elimination of failing on-lot systems will reduce much of the non-point source pollutants. Section 4.3.1 - Surface Water Resources of the DEIS states that:

   "Although non-point sources contribute more than 50 percent of the TP load, the lower degree of bioavailability associated with

non-point phosphorus and its infrequent input (i.e., during storm events) make it potentially less important than point source controls".

Section 4.4 of the Draft EIS discussed the use of BMP's as a mitigative factor in reducing non-point source pollution.

5. See Response No. 4, R-CD-1.

Additionally, every effort will be made both during and after construction of the proposed project to avoid identified natural areas. Compliance with the North Carolina Department of Natural Resources can be expected.

R-RH-1

North Carolina Wildlife Resources Commission

512 N. Salisbury Street, Raleigh, North Carolina 27611, 919-733-3391
Charles R. Fullwood, Executive Director

MEMORANDUM

TO: Melba McGee, Planning and Assessment
Dept. of Environment, Health & Natural Resources

FROM: Richard D. Hamilton
Assistant Director Richard D. Hamilton

DATE: February 23, 1990

SUBJECT: Durham-Eno River Wastewater Facilities EIS, Project #90-0444, Durham County, North Carolina.

The Wildlife Resources Commission (WRC) has reviewed the Environmental Impact Statement (EIS) and biologists on our staff are familiar with habitat values of the project area. Our comments are provided in accordance with provisions of the North Carolina Environmental Policy Act (G.S. 113A-1 et seq., as amended; 1 NCAC 25 and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Of the alternatives proposed in the EIS, the WRC supports the preferred alternative N-EC. However, we have several concerns with potential impacts to wildlife, associated habitat and possible mitigation.

(1) One of these concerns is the alteration to the flow regime of the Eno River by elimination of the wastewater discharge. While such elimination will improve water quality in the Eno River, it will also result in a 55 percent flow reduction during low flow conditions. The WRC has several waterfowl impoundments nearing completion in the area - specifically on Little River and Flat River. These impoundments utilize stream water for filling and any diminution of supply, particularly in low water situations, will drastically affect project operation. We feel this impact has not been thoroughly addressed from a mitigation

1 CONT'D standpoint. We recommend mitigation in the form of water allocation from either wells or municipal water supply to flood these impoundments should the need occur.

2 Construction of sewage conveyance lines with proposed crossings of Falls Lake Gamelands, wetlands and/or flood plains should be rerouted and primary and secondary impacts resulting from unavoidable circumstances should receive a high degree of mitigation as defined in the EIS. A mitigation alternative to consider is to require land use zoning that would create a no-development buffer adjacent to gamelands which would help protect these valuable recreational lands from secondary impacts associated with increased development.

3 Wetlands loss should be mitigated in accordance with the WRC mitigation policy and any lands received should also be protected against future development by zoning laws and placed under WRC jurisdiction. We also recommend that conveyance line right-of-ways be revegetated with plant species compatible with wildlife habitat enhancement.

4 The WRC strongly urges implementation of the Best Management Plans (BMP) to protect against non-point sources of pollution. Without these mitigative measures (BMP) and follow-up for compliance these valuable aquatic resources in the project area will undergo significant environmental degradation.

Thank you for the opportunity to review and comment on this EA project. If we can provide further assistance, please call on us.

RBH/lp

cc: Denny Baumbarger, Wildlife Management Coordinator
Roger Jones, District 5 Fisheries Biologist
Larry Warlick, District 5 Wildlife Biologist

Letter R-RH-1
Final EIS
Richard Hamilton, Assistant Director
North Carolina Wildlife Resources Commission

1. While it is true that there will be a predicted 55 percent flow reduction in the Eno River by the elimination of the wastewater discharge during low flow conditions, the Section 4.1 states that:

> "Water quality improvements to the Eno River and Little Lick Creek will occur when the existing wastewater discharges are eliminated. Ellerbe Creek water quality improvement is expected during low flow conditions because of flow augmentation by the highly treated wastewater effluent. These water quality improvements should also have a positive impact on the Eno River, Ellerbe Creek, and Little Lick Creek headwaters of Falls Lake".

Recommending water allocation for the waterfowl impoundments is probably beyond the scope of the EIS.

2. See Response No. 1, R-BDV-1.

3. See Response No. 2, R-BDV-1.

Additionally, an effort will be made to revegetate any impacted areas with species compatible with wildlife habitats.

4. See Response No. 4, R-BDV-1.

R-CT-1

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Parks and Recreation
512 North Salisbury Street • Raleigh, North Carolina 27611

James G. Martin, Governor
William W. Cobey, Jr., Secretary

Dr. Philip K. McKnelly
Director

February 19, 1990

MEMORANDUM

TO: Melba McGee

FROM: Carol Tingley C Tingley

SUBJECT: 90-0444 EPA DEIS, Durham-Eno River Wastewater Treatment Plant

The Division of Parks and Recreation has reviewed the Draft Environmental Impact Statement for the Durham-Eno River Wastewater Treatment Plant and Service Area. We have two major concerns with the project as proposed: adverse impacts to aquatic species in the Eno River resulting from reduced flow volumes; and, adverse impacts to significant natural areas resulting from construction of conveyance lines.

Aquatic Impacts

Although diverting wastewater discharge from the Eno River to Ellerbe Creek would improve the river's water quality, the detrimental impacts of reduced flow volumes on the river's aquatic communities could actually outweigh any benefits. Section 4.3.1 of the DEIS states that removing the existing discharge from the Eno River would result in a 55% reduction in water flow in the Eno during low-flow conditions. Low-flow periods are the time of greatest stress on the aquatic fauna, so a flow reduction of the proposed magnitude would be very significant. Furthermore, the predicted reduction was calculated for current conditions; future additional reductions in Eno River flow may result from meeting the increased water demands of northern Orange and Durham Counties.

Diminished flow conditions are already creating environmental problems in the Eno watershed. According to the Eno River Capacity Use Investigation conducted by DNRCD (not cited in the DEIS), current levels of monthly flow, measured relative to a baseline established from records between 1941 and 1970, have resulted in significant habitat losses for all life stages of an important indicator species, the redbreast sunfish (Lepomis auritus). The report also states that the existing situation is leading to still further reductions in habitat, and that continued low flows could diminish the river's capacity to support populations of Roanoke bass and other game fish (Main Report, Eno River Area Capacity Use Investigation, DNRCD; 1987).

The aquatic communities that would be affected by the reduction in flow contain a number of threatened or significantly rare species of animals, not adequately recognized in the DEIS. Table 4-8 of the DEIS lists only four animals of special significance: the roanoke bass (Ambloplites cavifrons), Carolina madtom (Noturus furiosus), notched rainbow mussel (Villosa constricta), and Atlantic pigtoe mussel (Fusconaia masoni). Although none of these were designated as listed species, reflecting conditions existing at the time of the Durham County Inventory (Sutter, 1987), legal protection is now being adopted by the State of North Carolina for all these species except for the notched rainbow. The roanoke bass and Carolina madtom are both proposed for Special Concern status, while the Atlantic pigtoe is considered Threatened within North Carolina, and is also a possible candidate for Federal listing (John Alderman, Piedmont Project Leader, Nongame and Endangered Wildlife Program; pers. comm.).

New listings are also proposed for a number of other species recorded from the Eno River, but not mentioned in the DEIS. The new listings are based on recent, more complete research into the status of the populations and habitats of these species. The green floater mussel (Lasmigona subviridis) is proposed as State Endangered; the yellow lampmussel (Lampsilis cariosa) is proposed as State Threatened; and the Neuse River waterdog (Necturus lewisii) is proposed as Special Concern. In addition to these species already recorded for the Eno, several others that have been proposed for listing can also be expected to occur in the Eno (John Alderman, pers. comm.). These include the triangle floater (Alasmidonta undulata), brook floater (Alasmidonta varrucosa), and squawfoot (Strophitus undulatus), all of which are proposed for State Threatened status. There is also an historic record for the dwarf wedge mussel (Alasmidonta heterodon) from the Little River. This is a candidate for Federal Endangered status and should also be carefully looked for in the Eno before any further environmental degradation takes place (J. Alderman, pers. comm.).

Many of the above species are highly vulnerable to extreme or chronic low flow conditions. Recent studies have shown that many of these species are already in severe decline throughout the state due to extensive habitat disturbances. Therefore, flow reductions in the lower Eno River could result in significant population losses. Relative to the potentially disastrous consequences of flow reductions, the two positive effects on aquatic communities that are mentioned in the DEIS are comparatively minor. First, the water quality enhancement this project would bring about for Ellerbe Creek is certainly desirable, but would not offset any loss of the rare species that are found in the biologically richer Eno River. In contrast to the significant communities of aquatic organisms found in the Eno, none have been recorded from Ellerbe Creek, not surprisingly given its heavy load of pollution and much smaller natural stream flow. Second, while the improvement in water quality in the Eno resulting from the elimination of discharge from the Eno Wastewater Plant again seems desirable, a potentially offsetting effect would be the elimination of waters needed to dilute effluents and non-point runoff from upstream, further exacerbating the problems associated with low-flow conditions.

The potential significance of these effects on aquatic communities has been largely overlooked in the DEIS. Table 4-13 lists as a mitigation for reduced flow the possibility of reducing upstream water withdrawals and increasing upstream flow augmentation. Because of the significant impacts of flow reduction, we would like to see a detailed discussion of the feasibility of these mitigation measures, the effectiveness of such measures in minimizing the effects of the proposed flow diversion, and the means by which a commitment to these measures can be insured. Any approval of the proposed project should be contingent on the concurrent implementation of adequate mitigation. If the proposed mitigation measures cannot adequately compensate for the anticipated flow reduction, additional project design alternatives which do not involve total removal of the Eno River discharge need to be considered.

Sewer Line Construction

Our second major concern with the proposed project relates to the potential for damage to terrestrial communities due to construction of new sewer lines. While these secondary impacts would follow from the adoption of any of the alternative plans described in the DEIS, the preferred plan would affect the greatest number of sites. As shown in Table 3-12, areas that would be affected under the N-EC plan include portions of the Eno River State Park, Falls of the Neuse Gamelands, River Forest Park, Eno Greenway, and six natural areas included in the Durham County Inventory: Willie Duke's Bluff, Wanderlust Diabase Uplands, Cabin Branch Bottomlands, Cub Creek Greenway, Little River Corridor, and Eno River Corridor.

In the discussion of mitigation efforts, the DEIS suggests that "conveyance line routes should be planned so that they do not impact these natural areas, especially the Falls Lake Lands used for game lands" (p. 4-18). There is an EMC regulation that prohibits all construction of sewer lines or extensions on sites listed on the State Registry of Natural Areas unless the N.C. Environmental Management Commission agrees that no prudent, feasible or technologically possible alternative exists (T15: 02H.0205 3E). This regulation applies to Willie Duke's Bluff, Cabin Creek Bottomlands, and sections of the Eno River State Park, all of which have been registered. It may also come to apply to other sites included on the above list.

We note that the sewer line routes shown in the DEIS are not always consistent with the City of Durham's recent sewer line route proposal. Since alternative sewer line routes are not presented or discussed in the DEIS, we assume that the routes shown in the document are not meant to indicate the final route selection, but only to show a possible alternative. If this is the case, the DEIS should make this clear, so that approval of the routes shown in the document is not implied. Selection of sewer line routes should undergo a separate, detailed environmental review, complete with an evaluation of environmentally less damaging alternatives. If the economic or technological viability of the proposed treatment plant alternative is dependent on the siting of any conveyance line through a natural area, so that future evaluation of alternatives would be constrained, that should be stated.

Attach rule

We are also concerned about the effects of increased development pressure on rare species and significant natural areas in the project's service area. Improved mechanisms for protecting these areas should go hand in hand with any actions that would result in accelerated development.

In summary, the proposed project may result in an improvement in water quality for the Eno River, and we agree that the alternative of expanding the Eno River wastewater plant to a 12 mgd discharge would be detrimental. Nevertheless, the impacts of the project on aquatic communities in the river and terrestrial communities along the sewer lines are potentially of major significance. Both of these issues need further evaluation of alternatives and clarification of mitigative measures.

Thank you for the opportunity to review this project.

cc: Charles Roe, Natural Heritage Program

5111

Letter R-CT-1
Final EIS
Carol Tingley
State of North Carolina
Department of Environment,
Health, and Natural
Resources
Division of Parks and
Recreation

1. For response to the issues raised concerning both aquatic impacts and sewer line construction, the reader is referred to Letters R-BDV-1 and R-CJ-1 and the responses to those letters.

R-ST-1

JUN 07 REC'D

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Environmental Management
512 North Salisbury Street • Raleigh, North Carolina 27611

James G. Martin, Governor
William W. Cobey, Jr., Secretary

George T. Everett, Ph.D.
Director

May 30, 1990

Mr. John Hamilton
Environmental Policy Section
Federal Activities Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30305

Dear Mr. Hamilton:

We have reviewed the draft version of the Final Environmental Impact Statement and have the following comments. We hope these comments will provide enough information to enable the consultant to prepare the final document. However, we ask that we be informed as soon as possible of any problems that you or the consultant see that could deter its completion. Also, we would appreciate you letting us know when all the changes have been made and document is complete.

1.) On page ES-2, the statement on line 10 on "two existing ordinances" should be written to give an better idea of what those ordinances are. Also, the "15 NCAC 28.0211" on line 19 should read "15A NCAC 2B .0211".

2.) On page 4-18, section 4.3.3, the statement on line 10 says the conveyance line routes should "not impact these natural areas." It should be made clear what "impact" means. Is this "do not cross" or "do not adversely impact"?

1

3.) On the response to letter R-JC-1, the 50 mg/l should read 5.0 mg/l. Also, the 5,400 and 8,400 dry tons per day (item 3.) seem to be in error. Are these dry tons per year? Item 6 should be modified from "NCDEM may want to pursue a variance" to "the City of Durham may...".

4.) In the Agency response to letter R-SC-2, I have attached a proposed response to number five for consideration.

1 CONT'D

5.) In the Agency response to letter R-CJ-1, number 1, the third sentence should be rewritten to read as follows: "At this time, neither EPA nor NCDEM anticipate the need for an additional EIS prior to the issuance of a permit for the 29 mgd expansion." Also, the Table referenced as Table 1 is missing station U1 as an upstream monitoring location for part B, June-September sampling requirements.

6.) In the response to letter R-CD-1, a proposed EIS response to item number 1 is attached as provided in Trevor Clements' May 24, 1990 letter to Boyd DeVane. (The other comments in the letter have been incorporated in the above responses.)

7.) In response to letter R-BDV-1, item 1, it is probably correct to say that the preferred alternative will remove approximately 1-2 mgd of wastewater from the Eno River (10-12 from the proposed maximum flows). Since the existing flow from the Eno plant is less than 2 mgd, your response should be reworded to more precisely provide this information.

If you have any questions about our comments or need additional information, please call Boyd DeVane in our Water Quality Planning Branch.

Sincerely,

Steve Tedder, Chief
Water Quality Section

cc: Trevor Clements
Tim Donnelley
Boyd DeVane
Dennis Ramsey

Hamilton.1

DIVISION OF ENVIRONMENTAL MANAGEMENT

May 24, 1990

MEMORANDUM

To: Boyd DeVane

From: Trevor Clements TC

Subject: Durham-Eno River Final EIS Review

Per your request, I have reviewed the Final EIS for the Durham-ENO River Service area. Focus was placed on review and comment to the letters submitted to EPA regarding the draft EIS and EPA's subsequent response. The following comments are offered:

Regarding the response to Jim Clark (R-JC-1):

Item 6 - Should modify "NCDEM may want to pursue a variance" to "the City of Durham may ...."

Regarding the response to Chester Jenkins (R-CJ-1):

Item 1 - The Table referenced as Table 1 is missing station U1 as an upstream monitoring location for part B, June - September sampling requirements.

Regarding the response to City of Durham (R-CD-1):

Item 1 - The parameters to be monitored during first phase expansion are listed in Table 1 of the response to Mr. Chester L. Jenkins (R-CJ-1). In addition to the information collected by the City, DEM will undoubtedly collect supplemental information for modeling purposes and further water quality impact evaluation of the Phase A expansion. Additional studies by DEM may include long-term BOD sampling to establish instream reaction rates and loading, time-of-travel studies to evaluate hydraulic flushing within the Ellerbe Creek arm of Falls Lake, biological monitoring of Ellerbe Creek to establish its bioclassification Post Phase A expansion, and ambient lake monitoring to evaluate water quality and phytoplankton. A final permitting decision and/or an authorization to construct will not be issued by DEM until the impacts to water quality from the Phase A Expansion can be observed through the critical portion of at least one summer period (i.e., June through September). Thus, the time period for Phase B expansion approval will be affected by the date that the Phase A expansion actually comes on time. DEM expects that this decision will be made within 12 to 24 months of that time.

These are my only comments at this time. Please let me know if I can be of further assistance in this matter.

TC/am

Letter R-ST-1
Final EIS
Steve Tedder, Chief
Water Quality Section
North Carolina,
Division of Environmental
Management

1. All of the comments and responses in this letter have been incorporated with the final revision of the Final EIS.

Public Hearing Responses

Public Hearing Responses

R-FS-1 Frank Smiley, Chamber of Commerce in Durham

R-KR-1 Ken Reckhow, Associate Professor of Water Resources at Duke Univeristy

R-BH-1 Becky Heron, Vice Chair of Durham County Board of Commissioners

1 recommendation of the EIS is the Northside plant with a
2 capacity of 29 million gallons per day, then it should be
3 recommended that a permit be issued for this amount. The
4 concerns for water quality modeling could be addressed in
5 such a permit through conditions written into the permit
6 that would require the necessary monitoring and modeling
7 prior to the issuance of the authorization to construct
8 facilities beyond the existing permitted capacity of 20 MGD.
9 In this way, all the parties concerned would have a clear
10 understanding of what would be required prior to further
11 expansion of the Northside plant.
12 I would like to personally thank you and the
13 Environmental Protection Agency and the North Carolina
14 Division of Environmental Management and your consultant,
15 Gannett Fleming, Environmental Engineers, for the tremendous
16 effort put forth in preparing this environmental impact
17 statement. I truly believe that the final outcome of this
18 process has resulted in the selection of an alternative that
19 will be good for both the City of Durham and the protection
20 of our environment. Thank you.
21 PRESIDING OFFICER HAMILTON: Thank you, Terry.
22 Mr. Smiley, would you like to speak?
23 STATEMENT OF FRANK SMILEY
24 MR. SMILEY: Mr. Chairman, my name is Frank
25 Smiley with the Chamber of Commerce in Durham. And unlike

(Mr. Smiley's question is on the next page of transcript.)

1 the first speaker tonight who has yet to disclose to any of
2 us whether Save the Water represents one person or maybe as
3 many as three or four. I want you to understand that the
4 Greater Durham Chamber of Commerce represents over 1,500
5 businesses in the county and over 3,500 individuals. Our
6 directory list is available for you and the public at any
7 time.
8 I want to speak to you tonight only in support of
9 the statement just presented by Terry Rolan, particularly
10 in the section where he said that he would like to suggest
11 that if a final recommendation of EIS is a northside plant
12 with a capacity of 29 MGD, then it should be recommended
13 that a permit be issued for this amount.
14 We in the Chamber of Commerce strongly support
15 that proposal from the City of Durham. Thank you very much.
16 PRESIDING OFFICER HAMILTON: Thank you, sir.
17 Dr. Reckhow.
18 STATEMENT OF DR. KEN RECKHOW
19 DR. RECKHOW: My name is Ken Reckhow. I'm an
20 Associate Professor of Water Resources at Duke University,
21 and I'd like to start out by complimenting John Hamilton and
22 EPA and the Division of Environmental Management, as well as
23 Gannett Fleming for -- for a superb job. I thought that the
24 report was first rate and the patience and deliberations
25 over the course of our study and the work with the committee

(Dr. Reckhow's question is on the next page of transcript.)

Letter R-FS-1
Final EIS
Public Meeting
Frank Smiley
Chamber of Commerce in
Durham

1. See Response No. 1, R-TR-1.

1 was excellent.

2 I'd like to use the opportunity -- this

3 opportunity to raise a couple of issues with regards to

4 waste water treatment in Durham. The first issue is that I

5 hope that in the future that the public presentations of the

6 bond issue -- the bond referendum by the City correctly

7 notes the fact that a portion of the cost of the waste water

8 treatment plant, both this as well as Harrington, is

9 associated with growth. And a portion is associated with

10 our -- our need to meet state and federal water quality

11 standards, but a portion is associated with growth.

12 And I think it's important that the citizens of

13 Durham are aware of the fact that there is a cost to growth.

14 And in making their decision with regards to the bond, they

15 explicitly accept that, if, indeed, the bond is approved.

16 That's one issue.

17 The second issue I would like to use this

18 opportunity to raise is that if the 20 MGD plant is approved

19 and built on Ellerby Creek that, we use the opportunity

20 after that plant is in place and after we have acquired some

21 water quality data on the impact of that discharge on

22 Ellerby Creek, we use those data and we use that opportunity

23 to study and model the impact of the 20 MGD plant on the

24 receiving water bodies and we, in turn, use that to make a

25 judgment concerning whether or not the proposed 29 MGD is

Letter R-KR-1
Final EIS
Public Meeting
Ken Reckhour
Associate Professor of Water Resources at Duke University

1. See Response No. 1, R-TR-1 and Response No. 1, R-CJ-1.

you have a transcript of what...

MR. HARRISON: Yeah. Do you want one or two?

PRESIDING OFFICER HAMILTON: One would be sufficient.

(Mr. Harrison proffers document to Hearing Officer Hamilton.)

PRESIDING OFFICER HAMILTON: Thank you very much.

Ms. Register, would you like to speak? I have you down as a "maybe."

MS. REGISTER: No.

PRESIDING OFFICER HAMILTON: Okay.

All right. I have exhausted all of the people who wished to speak as they registered. Are there any people who would like to make any comments at this time?

MS. HERON: I would.

PRESIDING OFFICER HAMILTON: Yes, ma'am.

STATEMENT OF BECKY HERON

MS. HERON: I'm Becky Heron and I'm Vice Chair of the Durham County Board of Commissioners. And I just wanted to bring out just two or three concerns that I have and I think probably the Board has, but specifically, myself. I feel that any new capacity that will become available because of the expansion of the plants, that this should go to neighborhoods with failing septic tanks and also to areas that property has not been developed because

1 CONT'D

it did not meet the requirements for septic tanks.

My second concern is the -- in your report, I believe you stated that there could be a substantial increase in water rates with these future expansions. And that is a concern of mine also. The impact that this will have on low income people and that I just don't think the rate payers need to subsidize these new expansions that would go to new development. They certainly should pay their fair share.

2

I also feel that as the Eno plant is phased out, that it should be completely closed and removed from the site so there's no temptation to go back. And any package plants in the service area should be -- the use of those plants should be discontinued and closed out and removed so that they would come under this new capacity and we would not have the problems that we are having now in certain parts of Durham County with package plants.

3

Those are my comments. Thank you.

PRESIDING OFFICER HAMILTON: Thank you very much. Are there any other people that wish to make any comments at this time? Terry.

STATEMENT OF TERRY ROLAN

MR. ROLAN: I'd like to just clarify one point. Mr. Andrews referred to the City Engineering Department at Parrish Street. That is the County Engineering Department

Letter R-BH-1
Final EIS
Public Meeting
Becky Heron
Vice Chairman of Durham
County Board of
Supervisors

1. See Response No. 2, R-GA-1.

2. See Response No. 1, R-GA-1.

3. The Eno River Wastewater Treatment plant would be converted to a pumping station. Dismantling of the current facility is really a decision by the City of Durham. However, it is assumed that the Eno River plant would no longer have a valid NPDES permit from NCDEM. Users of package treatment plants would be required to be a part of the new systems just as homes with failing septic systems would be required to join the new wastewater collection system.

Letters Not Requiring A Response

Letters Not Requiring a Response

NR-HS-1	Hazen and Sawyer, Demonstration Landfill Project
NR-HS-2	Hazen and Sawyer, Design Criteria for Eno Pump Station and Force Main
NR-HS-3	Hazen and Sawyer, CKD Pilot Unit
NR-SC-3	David Howells, Sierra Club, Water Quality Chair
NR-CR-1	Dempsey Benton, Jr., City of Raleigh, City Manager
NR-CR-2	Avery Upchurch, City of Raleigh, Mayor

HAZEN AND SAWYER, P.C.
CONSULTING ENGINEERS

January 3, 1990

Mr. J. Gordon Layton, Head
Solid Waste Section
Dept. of Environment, Health, and
Natural Resouces
P.O. Box 2091
Raleigh, NC 27602-2091

Re: City of Durham
Demonstration Landfill Project

Dear Gordon:

Enclosed please find a draft conceptual plan for a demonstration landfill project for the City of Durham, NC. The intent of the project is to investigate the viability of co-disposal of sludge with municipal solid waste on a relatively small scale and under controlled conditions. We feel that the information and knowledge obtained through this project will be extremely beneficial to the State as a whole since many municipalities are presently faced with the difficult task of funding alternative means of sludge disposal.

We respectfully request your review of this conceptual plan; and if your schedule permits, we would like to set up a meeting in mid January to discuss it further and answer any questions you or your staff may have. Please give me a call after you have had a chance to review the plan, and we can arrange a meeting. Please feel free to distribute copies of the plan to other interested Divisions within the Department of Environment, Health, and Natural Resources.

Needless to say, we are very excited about this project and look forward to working very closely with you and your staff as it develops. Thank you for your time and consideration.

Very truly yours,

HAZEN AND SAWYER, P.C.

Robert S. DiFiore

Robert S. DiFiore, P.E.
Vice President

RSD/jhl
Enclosures
cc: Mr. Terry Rolan
Mr. Tom Glenn
Mr. Tom Bastable
Mr. Gordon Ruggles
Mr. Mike Hebert
Ms. Terri Compton

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Conceptual Plan for a Demonstration Co-disposal Landfill Project

ISSUED FOR REVIEW ONLY

City of Durham, North Carolina

BACKGROUND

The City of Durham, like other municipalities across the State, faces the difficult task of planning for future disposal of municipal solid waste (MSW). Approximately 630 tons per day on a 7-day basis are presently disposed of at the City's sanitary landfill and approximately 190 tons per day are disposed of at the demolition landfill. The City is presently in the process of siting and permitting a new landfill as part of its integrated solid waste management plan. The plan also includes provisions for extensive recycling programs and future waste-to-energy facilities; possibly in conjunction with neighboring Orange County. Although the City supports the State's recommended hierarchy of solid waste management which places landfills as the least desirable alternative, the City recognizes that regardless of the extent of recycling programs, waste-to-energy facilities, and other viable alternatives, landfilling will still be a component of the City's integrated solid waste management plan.

The City also faces the difficult problem of planning for future disposal of sludges from their water and wastewater treatment plants. Under current average flow conditions, approximately 25 dry tons per day (DTPD) of solids are generated with over 56 DTPD anticipated by year 2020 from all treatment plants.

In the past, the City disposed of treatment plant sludges at the municipal solid waste landfill, incorporating sludge with daily and final cover material. This practice of co-disposal with MSW was once widely used throughout the State. Concerns relative to groundwater contamination, increased leachate production, and differential settlement, however, prompted the State Department of Health - Solid and Hazardous Waste Branch to ban the disposal of sludge in MSW landfills allowing only small amounts, applied at agronomic rates and mixed with the landfill's final cover soils. This ban took effect in March, 1989. Since this time the City has contracted with a haul-and-spread land application contractor for disposal of sludge in a liquid or solid form. This option is presently classified as an interim sludge disposal method until long-term options can be identified.

SLUDGE MANAGEMENT PLAN

As part of the City's long-term planning for wastewater treatment and plant expansions, a comprehensive sludge management plan, including treatment and disposal alternatives is being performed. The study is evaluating both short- and long-term alternatives for sludge management including continued contract land application, landfilling in a sludge monofill, co-disposal with MSW, in-vessel composting, incineration and cement-kiln dust (CKD) stabilization.

Based on the economic evaluations and accounting for the uncertainty associated with the draft EPA Part 503 Sewage Sludge Requirements, the following course of action is recommended for the short term (5-year plan):

- Continue land application by contract operator to augment and provide back-up to the intermediate and long-term disposal plan.

HAZEN AND SAWYER, P.C.
Engineers

- Implement cement-kiln-dust (CKD) stabilization facilities at both the Northside and Farrington Road Wastewater Treatment Plants. The CKD process will be utilized as a primary means of sludge disinfection and stabilization, and will condition the sludge to a form where it can be more readily marketed and/or disposed of. It is the intent that CKD stabilization could continue to be used for back-up regardless of which long-term disposal alternative is implemented.
- Pursue co-disposal of sewage sludge with MSW as a primary disposal means for stabilized (digested) sludge and a secondary means of disposing CKD stabilized sludge.

CO-DISPOSAL WITH MSW

As previously discussed, the practice of disposing sewage and water plant sludges in MSW landfills was widely used in North Carolina prior to the ban on this method in March, 1989. Since that time several municipalities have been forced to find alternative disposal methods, and many have turned to contract land application programs. However, rising costs, competition for available land, proposed tighter restrictions on sludge application rates, and other factors have created much concern relative to long-term success of this disposal method and have compelled municipalities to look toward other, more reliable disposal methods to augment and/or backup their land application programs.

Much has been written in the past relative to the advantages and disadvantages of co-disposal. As new landfills are constructed with positive groundwater protection features such as synthetic liners and leachate collection systems, many concerns relative to co-disposal should be minimized. The advantages of this alternative include:

- An economically viable method to dispose of digested and/or CKD stabilized sludge at a time when other disposal alternatives are facing both sharp increases in cost and/or tighter regulatory requirements.
- Provide a source of material to augment daily and final cover requirements.
- Enhance biodegradation rates, leachate quality, and gas production, reducing volume over the long-term and providing a potential energy resource.

Although sludge is considerably denser than compacted solid waste, the total volume generated is relatively small compared to the total solid waste stream. Sludge will also tend to fill voids within the solid waste cells. Based on existing sludge and solid waste generation rates, approximately 1200 cubic yards (c.y.) of landfill volume are required per day as compared to 120 c.y. required for sludge, an approximate 10:1 ratio. This ratio would be even greater if all of or a portion of the sludge could be utilized for daily cover.

As new hi-tech lined landfills are developed, emphasis will be placed on minimizing total surface area to be lined, thus encouraging mounding or going up in elevation to the maximum extent practical. This approach, however, will likely result in a shortage of available on-site cover soils requiring expensive importation of off-site materials. The use of digested or CKD stabilized sludge to either augment or substitute for on-site cover soils can, therefore, provide a substantial economic benefit.

Finally, there has been considerable debate relative to the overall short- and long-term effects of sludge on MSW landfills. Rates of biodegradation, gas production, and impacts on leachate quality have been studied, although primarily on a theoretical and/or bench scale basis. Very little full-site data is available, especially under new hi-tech landfilling methods employing liners, leachate collection and more sophisticated gas monitoring and extraction systems.

In an effort to better define and understand these complex technical issues and to maintain as many economically viable and environmentally sound alternatives for both sludge and solid waste disposal, the City proposes to develop a demonstration co-disposal landfill project. It is intended that the project be a cooperative and coordinated effort between the City's Water Resources and Sanitation Departments, the State of North Carolina, Department of Environment, Health and Natural Resources, the academic community as well as other interested private and public sector agencies, including the U.S. Environmental Protection Agency (USEPA).

DEMONSTRATION LANDFILL PROJECT

The proposed demonstration project will be a multi-celled, lined state-of-the-art landfill, designed to accept both sludge and solid waste under several different conditions. Special emphasis will be placed on features to facilitate the collection of data relative to leachate quantities and quality, gas production, etc. The primary goal of the project is to demonstrate the viability of co-disposal of sludge and solid waste as an environmentally sound, economically attractive means for sludge disposal.

It is proposed that the facility be located on a parcel of land adjacent to the Northside WWTP and the existing city landfill (see drawing SK-1, attached). A site with approximately eight and one-half (8.5) acres of usable landfill space is available. The site offers substantial advantages due to its close proximity to the existing Northside treatment plant and City landfill including short haul distances, facilities for handling and treating leachate, availability of existing equipment, i.e., compactors, excavators, bulldozers, scales, etc., and other operational considerations.

The active landfill area will be configured to provide for as many as four (4) discrete cells to accommodate different sludge and solid waste combinations. For example, one cell may receive solid waste alone, one cell may receive only sludge and others receive combinations of sludge (digested or CKD stabilized) and solid waste. The residential compactor truck fraction of the MSW stream would be targeted (preferably after recyclables have been removed) since it is likely that this fraction of the waste stream will continue to be landfilled in the future.

The individual cells would generally be sized based on volumetric ratios of the various combinations of sludge and solid waste so that cells would fill over the same period. Therefore, comparative data relative to leachate and gas quantity and quality can be evaluated on a common time scale. A preliminary layout of the cells is included in Sketch SK-2 attached.

The demonstration co-disposal landfill project will provide some additional short-term benefits for both the City's Water Resources and Sanitation Departments, including:

- An alternative means of sludge disposal until EPA Part 503 Sewage Sludge Regulations are finalized.
- Additional life at the City's existing landfill by diversion of a portion of the waste stream to the demonstration site.
- Savings in cover soils, assuming sludge can be used as a cover (or mixed with natural soils) in the demonstration landfill. This will allow some of the excavated soils from the demonstration landfill to be utilized at the existing landfill where mounding is being practiced.
- An opportunity to gain knowledge and "hands-on" experience with the construction, operation, and maintenance of liners, leachate, and gas collection systems, etc., prior to implementing those systems on a much larger and costlier scale in the future.

PROJECT PARTICIPATION COSTS AND FUNDING

In order for the project to be implemented, it must gain the full support of the Department of Environment, Health and Natural Resources, since the practice of co-disposal is presently not allowed under Solid Waste Branch regulations. The information and knowledge obtained from this project may provide significant benefits to other counties and municipalities throughout the State. Through the State, the U.S. Environmental Protection Agency should be consulted to not only gain their support on a technical basis but also explore the funding potential of an innovative project of this nature.

It is further proposed to utilize environmental engineering students from the academic community to aid in the comprehensive sampling, monitoring and testing programs that will be required. Private sector support and involvement should also be sought through liner material suppliers, etc., since this would provide them with an excellent forum to demonstrate their products under a variety of conditions.

Preliminary capital costs for an 8.5-acre demonstration landfill project are estimated at approximately $1,580,000 including engineering and contingencies. This is somewhat higher on a per-acre basis than a full-scale (100^{+} acre) landfill since economies of scale are not realized for such a small facility. Assuming 24,500 wet tons of sludge and approximately 148,000 tons of solid waste are disposed of over the life of the landfill, the capital cost for disposal would equate to approximately $9.16/ton exclusive of operating costs.

SUMMARY

In summary, co-disposal of sludge with solid waste may be an environmentally sound and cost-effective means of sludge disposal for many municipalities across the State. For small municipalities it may be the only affordable means of sludge disposal. With all new MSW landfills requiring positive groundwater protection including liners and leachate collection systems, several of the previous environmental concerns relative to co-disposal are minimized.

The City of Durham is committed to developing long-term solutions to both sludge and solid waste disposal. Tens of millions of future dollars will be spent by both the Water Resources and Sanitation Departments in implementing their respective long-term disposal methods. This is an opportune time to give strong consideration to all viable alternatives that integrate sludge and solid waste disposal.

ISSUED FOR REVIEW ONLY

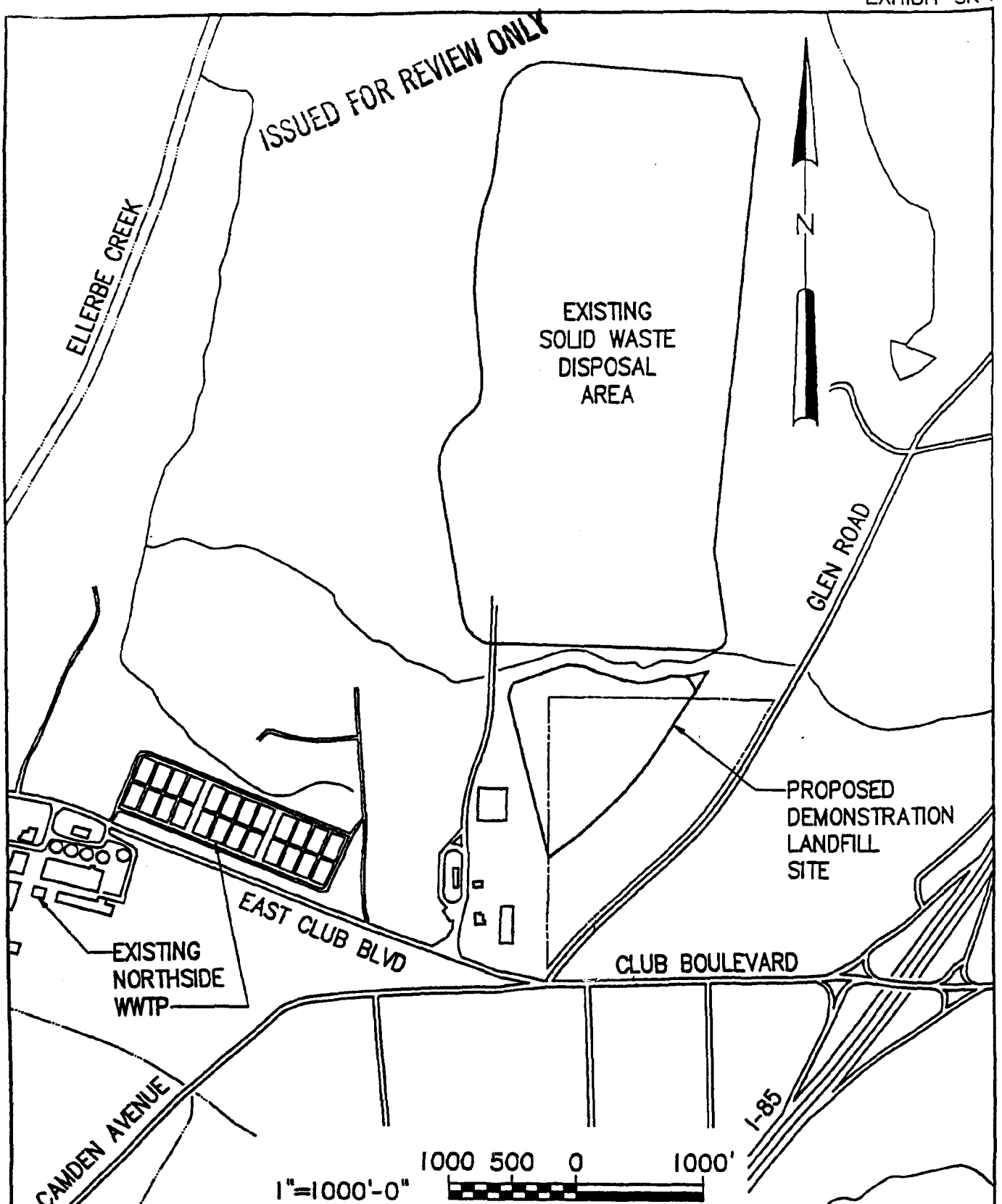
Capital Cost Estimates for an 8.5 Acre Demonstration Landfill

Item	Unit	Quantity	Total Dollars
Land Acquisition	10,000/AC	14	140,000
Access Roads/Paving	LS	—	30,000
Liner System (Single, 60 MIL)	50,000/AC	8.5	425,000
Leachate Collection	25,000/AC	8.5	212,500
Leachate Pumping	LS	—	80,000
Fencing	25/LF	4,000	100,000
Monitoring Wells	3,000 EA	8	24,000
Site Clearing	5,000/AC	8.5	42,500
Stormwater Retention/ Erosion Control	LS	—	40,000
Liner Earthwork	20,000/AC	8.5	170,000
		Subtotal	1,264,000
Engineering and Contingencies @ 25%			316,000
		Total	$1,580,000

Cost per Usable Acre = $186,000

HAZEN AND SAWYER, P.C.
Engineers

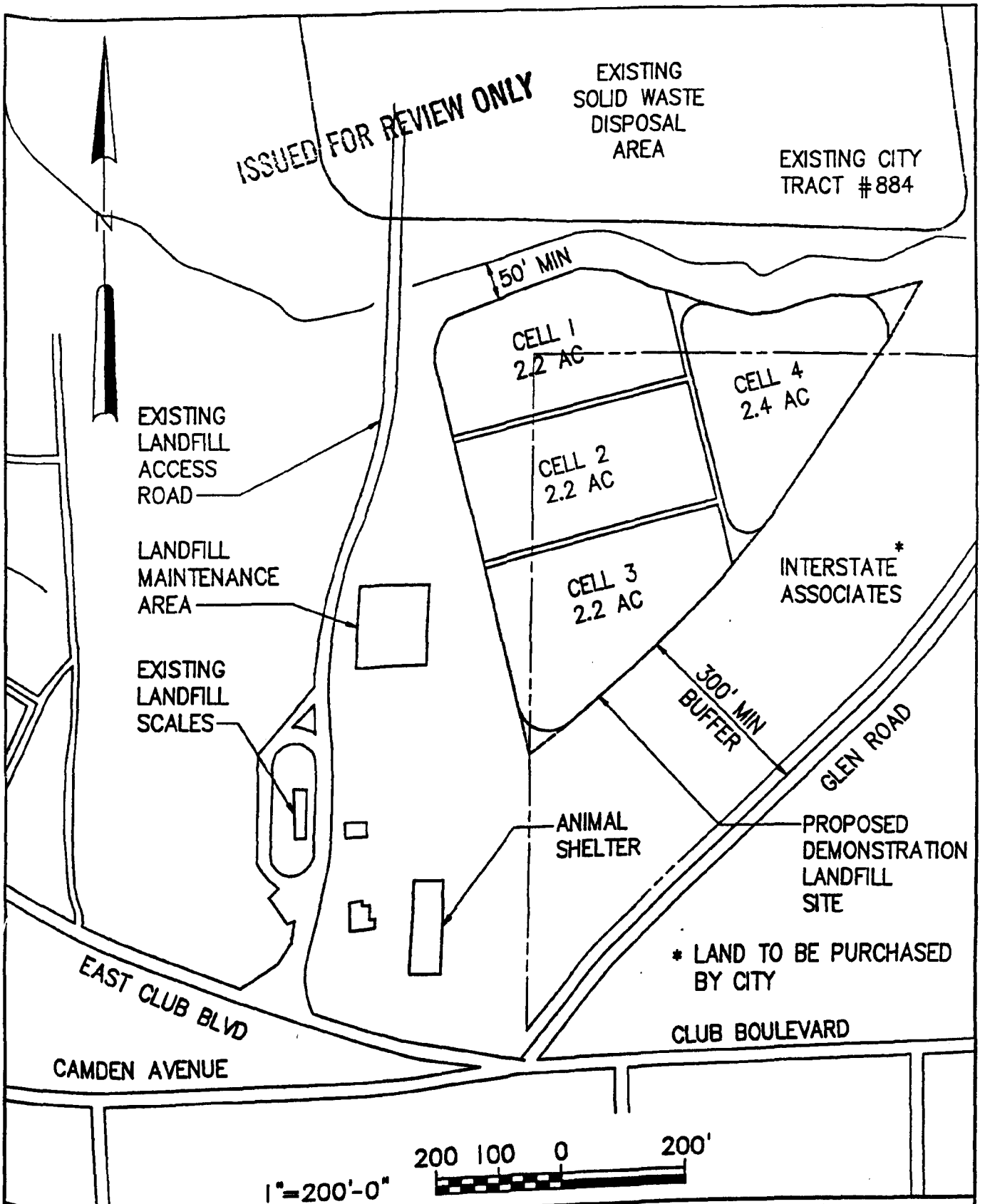
EXHIBIT SK-1



HAZEN AND SAWYER, P.C.
Consulting Engineers
RALEIGH, NORTH CAROLINA

CITY OF DURHAM
DEMONSTRATION LANDFILL PROJECT
LOCATION MAP

EXHIBIT SK-2



HAZEN AND SAWYER, P.C.
Consulting Engineers
RALEIGH, NORTH CAROLINA

CITY OF DURHAM
DEMONSTRATION LANDFILL PROJECT
CELL LAYOUT

HAZEN AND SAWYER, P.C.
CONSULTING ENGINEERS

DATE: December 7, 1989

MEMORANDUM

TO: Northside STP File

FROM: Don Cordell DCordell

SUBJECT: Design Criteria for Eno Pump Station and Force Main

Based on the anticipated outcome of the Eno EIS, wastewater from the Eno basin, including Treyburn, will be pumped to the Northside STP. This memo develops preliminary design criteria, operating protocol and suggests sizes for the Eno to Northside force main.

Existing and Future Facilities

Flows from the following pumping stations are considered:

P.S. "G"	-	existing interim pump station at Treyburn; will be replaced by future P.S. "A" at Treyburn. Pumps into existing 12-inch force main.
DTI	-	proposed temporary pump station to serve Durham Tech at Treyburn; will be replaced by future P.S. "A" at Treyburn. Pumps into existing 12-inch force main.
P.S. "A"	-	future permanent pump station at Treyburn. All wastewater from Treyburn will ultimately be tributary to this station.
Eno P.S.	-	proposed pump station that will replace existing Eno STP
Lutraville	-	existing pumping station at Eno Industrial Park that discharges to gravity sewer tributary to existing Eno STP. Treyburn P.S. "C" and "TB" currently pump to this station. These flows will be rerouted to P.S. "A" at a future date.

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A 12-inch force main is in service from Treyburn to the existing Eno STP. From Infinity Rd. at Snowhill Rd. to the southwestern boundary of Treyburn, a 30-in pipe intended for the permanent force main from Treyburn is in place and currently in use as a potable water line feeding Treyburn. This line can be converted to wastewater service when flows dictate.

Design Objectives and Assumptions

The City desires to minimize series pumping, particularly in the case of flows from Treyburn P.S. "A". Given the existing or proposed location of the major pump stations, it is reasonable and economical to share a common force main from the Eno STP to the Northside plant. Initial flows from pump station G and DTI at Treyburn will be repumped at Eno. Once pump station A at Treyburn is on-line, the Eno P.S., P.S.A at Treyburn and Lutraville will share a common force main to the Northside STP. Force mains, pumps and wet wells should be sized such that pumps at each station move along their respective pump curve to adjust to the total flow in the force main possible under any combination of pumps. No other interlocks between pump stations would be required under this scenario.

Design Wastewater Flows

Design flows are generally derived from the Eno EIS with input from H&S based on anticipated development of Treyburn. Peaking factor assumed at 2.5 times average daily flow. Flows were developed for the design year of 2010, initial conditions represented by three variations based on the phased implementation of P.S. A at Treyburn and ultimate development of the basin. Based on the present rate of development at Treyburn, Initial Condition A is expected to exist for the next 0-5 years. Initial Condition B would exist perhaps through the year 2000, with Initial Condition C (same as Design Year) therafter. Design flows for each condition are as follows:

DESIGN FLOWS IN MGD

Pump Station	Initial Condition "A"		Initial Condition "B"		Initial Condition "C"		Year 2010		Ultimate	
	ADF	PHF	ADF	PHF	ADF	PHF	ADF	PHF	ADF	PHF
Treyburn "G"	0.44	1.1	---	---	---	---	---	---	---	---
DTI	0.05	0.135	---	---	---	---	---	---	---	---
Treyburn "A"	---	---	0.6[a]	1.6[a]	3.0	7.5	3.0	7.5	3.0	7.5
Eno	6.0	15.0	6.0	15.0	6.0	15.0	9.0	22.5	20	50
	Prior to P.S. "A" Construction use 12-inch FM		P.S. "A" on-line use 12" FM		P.S. "A" on-line use 30" FM					

[a] Hydraulic limit of 12-inch FM

Force Main Routing and Profile

Force main from Eno to Northside assumed to parallel existing gravity sewer from Eno to Old Oxford Highway (SR 1004) and then parallel County Hamlin Road project to a point east of Ellerbee Creek and then parallel to Creek on City property to Northside plant. Additional R/W requirements expected to be minimal, if any. Alternate routings not considered. Plan of force main route included as Attachment No. 1.

Profile from P.S. G to Northside STP included as Attachment No. 2. Controlling high point occurs near the intersection of Old Oxford Highway and Hamlin Road. (See related discussion under Hydraulic Considerations.)

Hydraulic Considerations

Force main data is as follows:

	Treyburn P.S. A	Eno P.S.
Total Length	33,000 ft.	24,800 ft.
to interconnection	11,200 ft.	3,000 ft.
to high point	21,000 ft.	12,800 ft.
Hazen and Williams "C"	110	110

Preliminary pipeline sizes were selected based on the following criteria:

Maximum velocity at PHF: 6-8 fps

Maximum TDH - ± 200 feet; Limited by maximum head for non-clog pumps

Selections are as follows:

	Treyburn to Eno	Eno to Northside
Initial Condition "A"	12	36
Initial Condition "B"	12	36
Initial Condition "C"	30	36
Year 2010	30	36
Ultimate	30	36 + 30

Force main sizes for Treyburn to Eno are based on previous design work with all or portions of each line in place. Several combinations were considered for the Eno to Northside section.

Based on anticipated initial flow conditions, the Eno force main must be at least 30-inch diameter to limit TDH to less than 200 ft. (See Attachment 3 for head conditions based on 24-inch.) If a 30-inch line is provided, additional pipe capacity will be needed by the design year of 2010. Maximum total flow through the 30-inch line for a TDH of 200 feet would be 26-27 mgd (± 19 mgd from Eno) versus a need for 30 mgd at the design year. If a parallel 36-inch force main were provided, the combination of the 30 and 36 would be adequate through ultimate conditions. Once installed, the 36-inch would be used alone until flows increased adequately to maintain velocity in the parallel 30 and 36-inch pipes.

If the initial Eno-to-Northside pipe size is increased to 36 inches, a single pipe would be adequate through the design year up to a total flow of ± 32-33 mgd (± 25 mgd from Eno). A 30-in parallel force main would still be necessary to handle ultimate flows. This combination is considered to be the most appropriate and is recommended for design.

Attachment 4 summaries preliminary TDH determinations for each wastewater flow regime based on an initial 36-inch FM with a future parallel 30-inch for ultimate conditions. It is contemplated that the pumps at each station will

be selected based on the highest TDH condition that would prevail when both pump stations are on-line. When either station pumps alone, the discharge rate would increase along the characteristic pump curve. TDH determinations should be adjusted based on ground profile surveys of the final force main route.

Design conditions would be as follows:

	P.S. "A"			Eno P.S.		
	Q	TDH-feet		Q	TDH-feet	
	mgd	Alone	Combined	mgd	Alone	Combined
Initial Condition "A"	--	--	--	15	116	--
Initial Condition "B"	1.6	143	157	15	116	119
Initial Condition "C"	7.5	108	131	15	116	130
Design 2010	7.5	108	149	22.5	134	153
Ultimate	7.5	106	166	50	162	176

Lutraville flows are assumed to be introduced into the common force main downstream of the controlling high point. Attachment 4 also indicates the available flow that can be introduced at this point without influencing the hydraulics for P.S. "A" or Eno. The minimum flow under any condition (2.3 mgd) is significantly greater than flows anticipated from the Lutraville station.

Downsizing of the force main beyond the high point was also evaluated (see attachment 5). If the pipe size were reduced to 30-inches, flow from Lutraville would influence Eno/P.S. A hydraulics by the year 2010. Maintaining the force main at 36-inches avoids this complication and this approach is recommended.

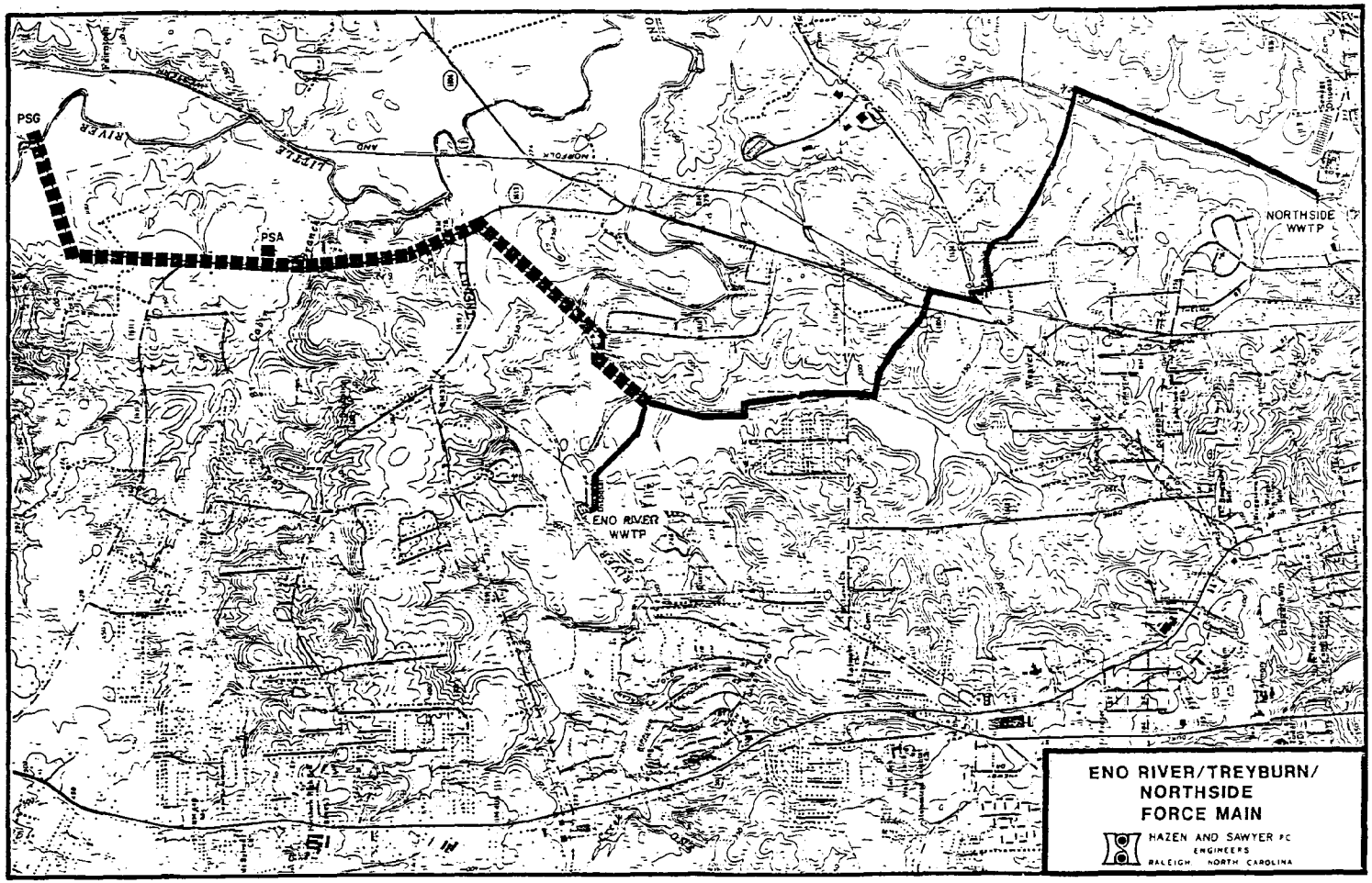
Minimum Pumping Rate

Given the size of the initial force main relative to actual flows expected when the system is placed into service, it will not be practical to maintain scouring velocities during the early service years. For large diameter force mains, experience on other projects (primarily Florida) indicates that low initial velocities do not complicate system operation or compromise performance. Velocities of 0.5 fps have been used successfully. To the

extent that deposition does occur, local velocities within the line would increase based on the effective pipe cross-section. Given this experience, pumping rates of 2-2.5 mgd are considered acceptable and can be used for pump selection. Design capacities will probably dictate higher pumping rates.

Variable Speed Pumping

While it is of potentially less significance for the early year flows, the range of flows expected is such that variable speed pumping equipment should be provided at the Eno and perhaps at P.S. A as well. Variable speed will become mandatory at the higher flows since the force main will terminate at the Northside Plant with no opportunity for peak attenuation. For a multiple pump design, it would not be necessary for every unit to be equipped with variable speed. If at least two units were variable speed (for mechanical redundancy), additional units could be constant speed.


PSG
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NORTHSIDE
FORCE MAIN
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RALEIGH NORTH CAROLINA

Attachment No. 3

24"Φ Eno to Northside

01-Dec-89

(1) Initial Condition A => Before Pump Station A
System Characteristics from Eno River to Northside

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)
ADF	6	24	12800	3.0	100	128
PHF	15	24	12800	7.4	100	217 ← NG

(2a) Initial Condition B => Pump Station A
System Characteristics for 12" Force Main.

Combine PSA Flow with
Eno River Flow

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)
ADF	0.6	12	11200	1.2	6	6.6	24	9800	3.3	95	122
PHF	1.6	12	11200	3.2	15	16.6	24	9800	8.2	95	250 ← NG
	0.6	12	11200	1.2	0	0.6	24	9800	0.3	95	103
	1.6	12	11200	3.2	0	1.6	24	9800	0.8	95	144

∴ FM must be > 24"Φ to limit TDH

(2b) Initial Condition B => Eno Pump Station
System Characteristics from Eno to Northside

Combined Eno River Flow with P.S. A Flow

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)
ADF	6	24	3000	3.0	0.6	6.6	24	9800	3.3	100	125
PHF	15	24	3000	7.4	1.6	16.6	24	9800	8.2	100	235 ← NG
	6	24	3000	3.0	0	6	24	9800	3.0	100	121
	15	24	3000	7.4	0	15	24	9800	7.4	100	217

(3a) Initial Condition C => Pump Station A
System Characteristics for 30" Force Main.

Combine PSA Flow with
Eno River Flow

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)
ADF	3	24	11200	1.5	6	9	24	9800	4.4	95	135
PHF	7.5	24	11200	3.7	15	22.5	24	9800	11.1	95	312 ← NG
	3	24	11200	1.5	0	3	24	9800	1.5	95	105
	7.5	24	11200	3.7	0	7.5	24	9800	3.7	95	148

(3b) Initial Condition C => Eno Pump Station
System Characteristics from Eno to Northside

Combined Eno River Flow with P.S. A Flow

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static Head (ft.)	TDH (ft.)
ADF	6	24	3000	3.0	3	9	24	9800	4.4	100	140
PHF	15	24	3000	7.4	7.5	22.5	24	9800	11.1	100	316 ← NG
	6	24	3000	3.0	0	6	24	9800	3.0	100	121
	15	24	3000	7.4	0	15	24	9800	7.4	100	217

Final

Attachment 4
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30-Nov-89

(1) Initial Condition A => Before Pump Station A
System Characteristics from Eno River to Northside

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)
ADF	6	36	12800	1.3	100	104
PHF	15	36	12800	3.3	100	116

(2a) Initial Condition B => Pump Station A
System Characteristics for 12" Force Main.

Combine PSA Flow with Eno River Flow

Maximum Q from Lutrawilla (w/10 foot head reserve)

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)	Add. Q
ADF	0.6	12	11200	1.2	6	6.6	36	9800	1.4	95	105	30.3
PHF	1.6	12	11200	3.2	15	16.6	36	9800	3.6	95	157	20.3
	0.6	12	11200	1.2	0	0.6	36	9800	0.1	95	103	36.3
	1.6	12	11200	3.2	0	1.6	36	9800	0.4	95	143	35.3

(2b) Initial Condition B => Eno Pump Station
System Characteristics from Eno to Northside

Combined Eno River Flow with P.S. A Flow

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)	
ADF	6	36	3000	1.3	0.6	6.6	36	9800	1.4	100	103	30.3
PHF	15	36	3000	3.3	1.6	16.6	36	9800	3.6	100	119	20.3
	6	36	3000	1.3	0	6	36	9800	1.3	100	103	30.9
	15	36	3000	3.3	0	15	36	9800	3.3	100	116	21.9

(3a) Initial Condition C => Pump Station A
System Characteristics for 30" Force Main.

Combine PSA Flow with Eno River Flow

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)	
ADF	3	30	11200	0.9	6	9	36	9800	2.0	95	102	27.9
PHF	7.5	30	11200	2.4	15	22.5	36	9800	4.9	95	131	14.4
	3	30	11200	0.9	0	3	36	9800	0.7	95	97	33.9
	7.5	30	11200	2.4	0	7.5	36	9800	1.6	95	108	29.4

(3b) Initial Condition C => Eno Pump Station
System Characteristics from Eno to Northside

Combined Eno River Flow with P.S. A Flow

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static Head (ft.)	TDH (ft.)	
ADF	6	36	3000	1.3	3	9	36	9800	2.0	100	106	27.9
PHF	15	36	3000	3.3	7.5	22.5	36	9800	4.9	100	130	14.4
	6	36	3000	1.3	0	6	36	9800	1.3	100	103	30.9
	15	36	3000	3.3	0	15	36	9800	3.3	100	116	21.9

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Final
Attachment 4
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30-Nov-89

(4a) Year 2010 => Pump Station A System
System Characteristics from PSA to Northside

	Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia (in.)	Eq Pipe D (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2
ADF	3	30	0	30.0	11200	0.95	0.00
PHF	7.5	30	0	30.0	11200	2.37	0.00
	3	30	0	30.0	11200	0.95	0.00
	7.5	30	0	30.0	11200	2.37	0.00

Addtional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static Head (ft.)	TDH (ft.)	
9	12	36	9800	2.6	95	105	24.9
22.5	30	36	9800	6.6	95	149	6.9
0	3	36	9800	0.7	95	97	33.9
0	7.5	36	9800	1.6	95	108	29.4

Maximum Q from Lutravilla (w/10ft head reserve)

(4b) Year 2010 => Eno Pump Station System
System Characteristics from Eno to Northside

	Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia (in.)	Eq Pipe D (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2
ADF	9	0	36	36.0	3000	0.00	1.97
PHF	22.5	0	36	36.0	3000	0.00	4.93
	9	0	36	36.0	3000	0.00	1.97
	22.5	0	36	36.0	3000	0.00	4.93

Combined Eno River Flow with P.S. A Flow

Addtional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static Head (ft.)	TDH (ft.)	
3	12	36	9800	2.6	100	110	24.9
7.5	30	36	9800	6.6	100	153	6.9
0	9	36	9800	2.0	100	106	27.9
0	22.5	36	9800	4.9	100	134	14.4

(5a) Ultimate Flows => Pump Station A System
System Characteristics from PSA to Northside

	Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia (in.)	Eq Pipe D (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2
ADF	3	30	0	30.0	11200	0.9	0.0
PHF	7.5	30	0	30.0	11200	2.4	0.0
	3	30	0	30.0	11200	0.9	0.0
	7.5	30	0	30.0	11200	2.4	0.0

Addtional Flow (MGD)	Total Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia. (in.)	Eq. Pipe Dia. (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2	TDH (ft.)	
20	23	36	30	43.2	9800	3.1	2.8	108	36.8
50	57.5	36	30	43.2	9800	7.8	6.9	166	2.3
0	3	36	30	43.2	9800	0.4	0.4	97	56.8
0	7.5	36	30	43.2	9800	1.0	0.9	106	52.3

(5b) Ultimate Flows => Eno Pump Station System
System Characteristics from Eno to Northside

	Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia (in.)	Eq Pipe D (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2
ADF	20	36	30	43.2	3000	2.7	2.4
PHF	50	36	30	43.2	3000	6.8	6.0
	20	36	30	43.2	3000	2.7	2.4
	50	36	30	43.2	3000	6.8	6.0

Combined Eno River Flow with P.S. A Flow

Addtional Flow (MGD)	Total Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia. (in.)	Eq. Pipe Dia. (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2	TDH (ft.)	
3	23	36	30	43.2	9800	3.1	2.8	114	36.8
7.5	57.5	36	30	43.2	9800	7.8	6.9	176	2.3
0	20	36	30	43.2	9800	2.7	2.4	111	39.8
0	50	36	30	43.2	9800	6.8	6.0	162	9.8

30" Ø FM
Eno to Northside

Attachment 4
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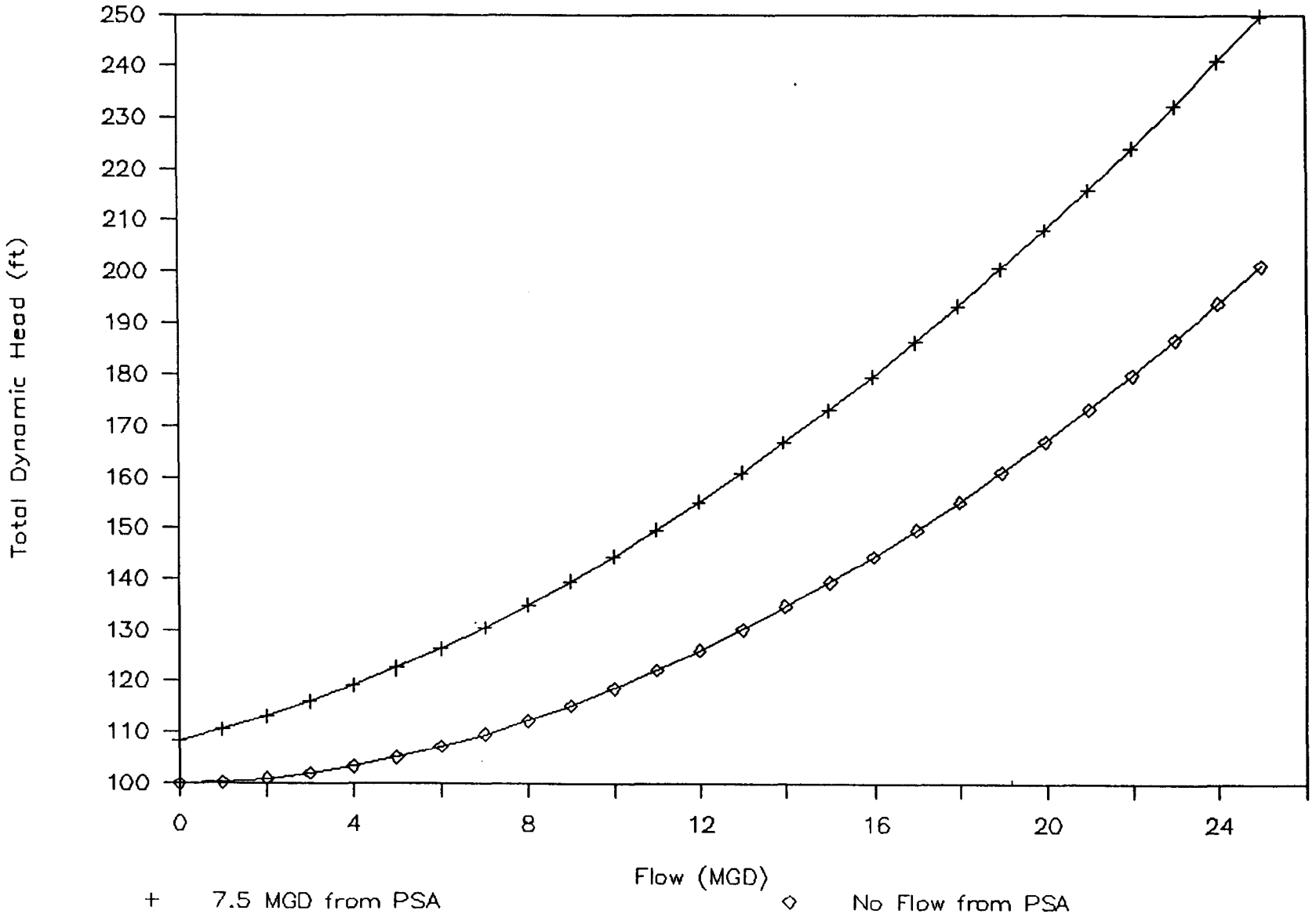
System Curve – Eno Pump Station (2010)

Flows from PSA => 3.0 – 7.5 MGD



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36"ϕ FM
Eno to Northside
Attachment 4
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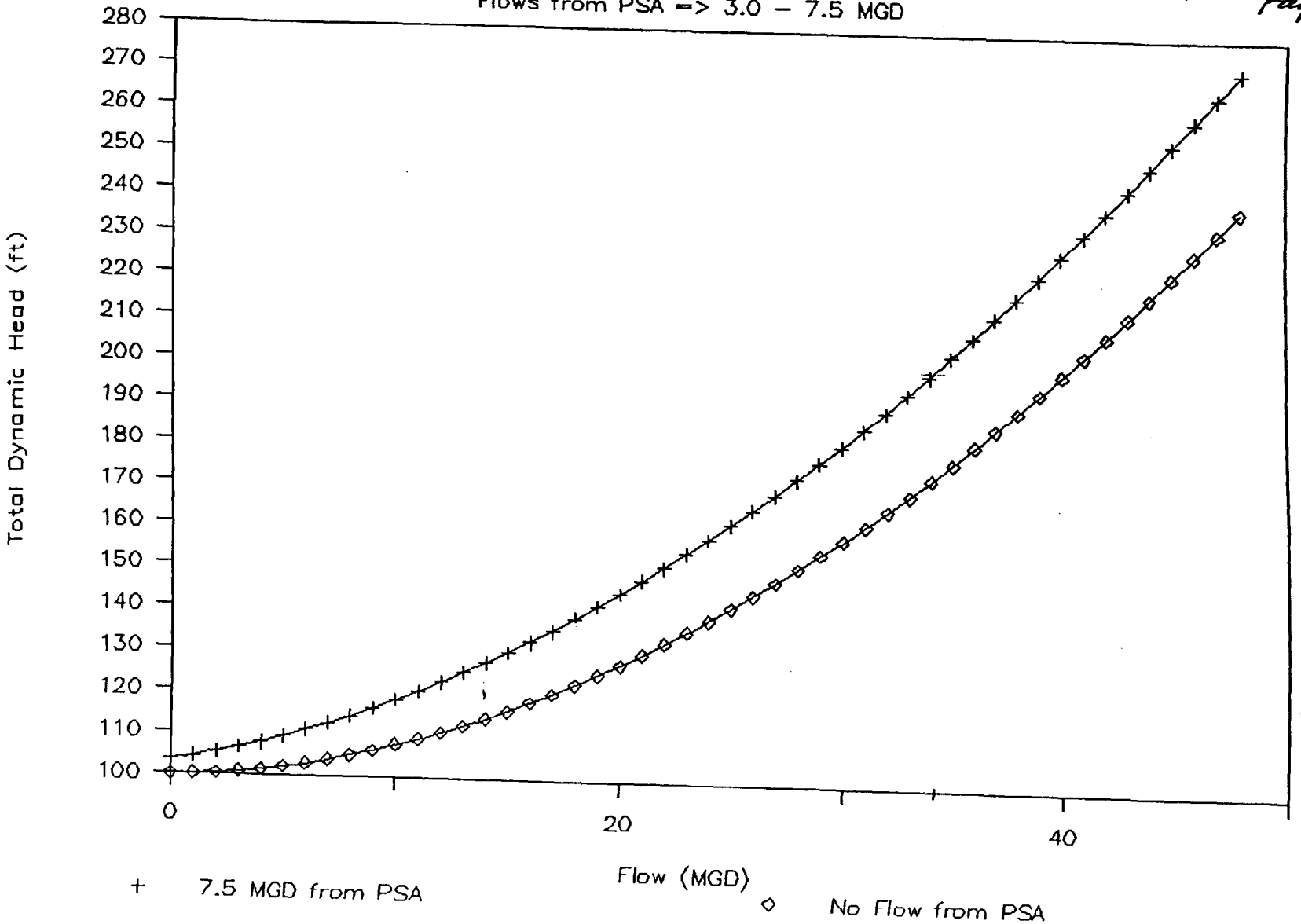
System Curve – Eno Pump Station (2010)

Flows from PSA => 3.0 – 7.5 MGD



NR-21

Final
Attachment 4
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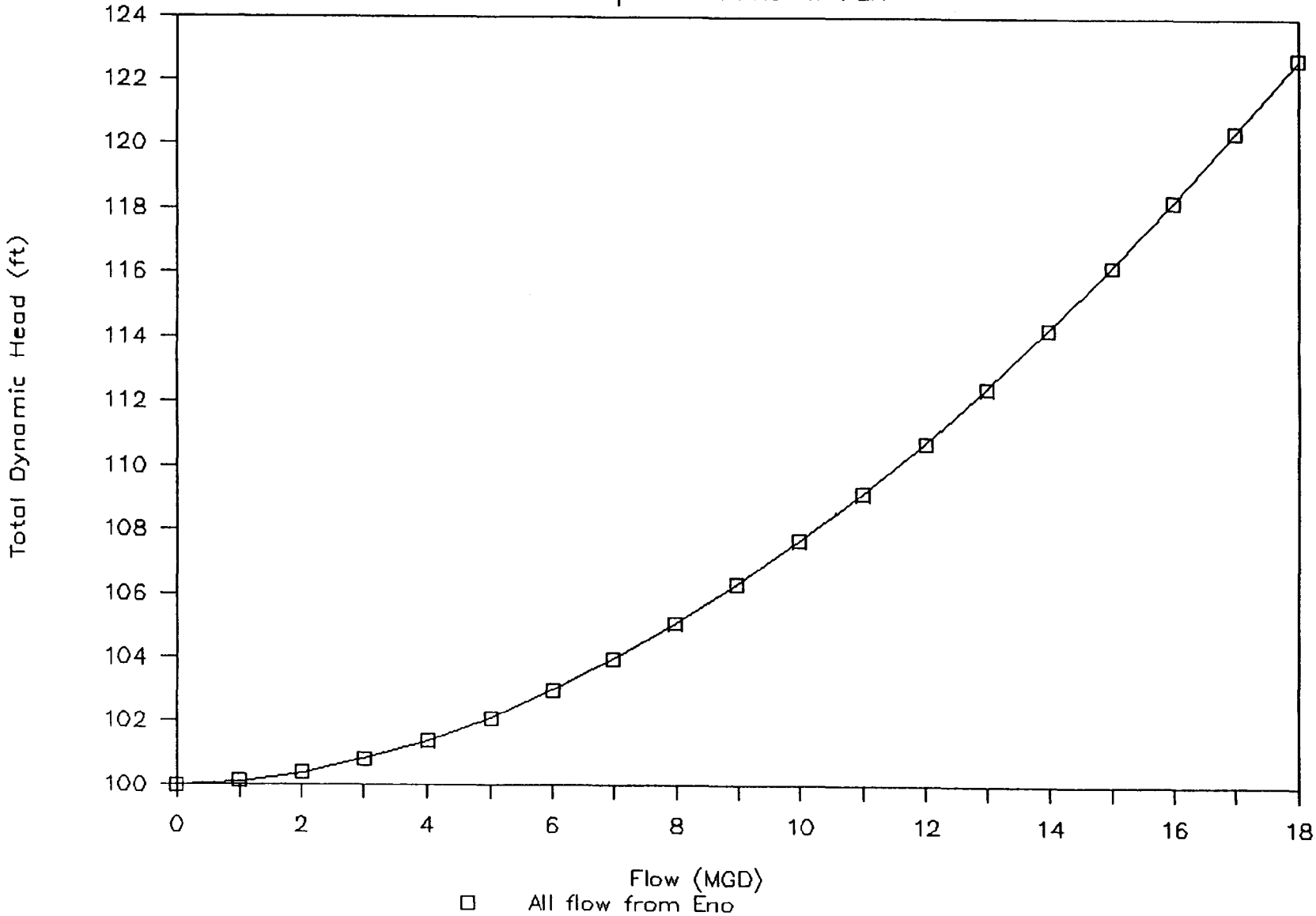
System Curve For Eno Pump Station

Eno Pump Station Prior to PSA



NR-22

Final
Attachment 4
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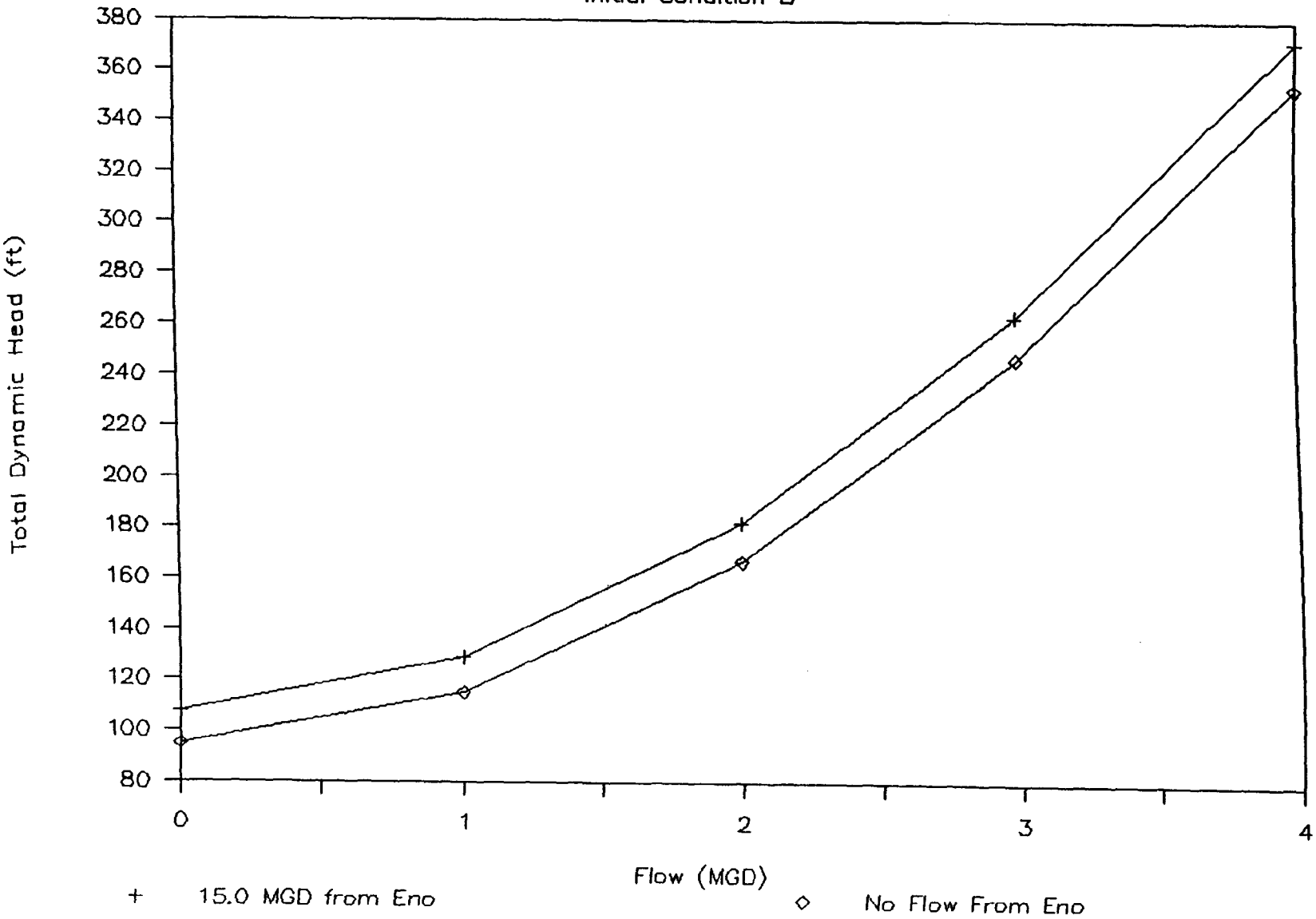
System Curve For Pump Station A

Initial Condition B



NR-23

Attachment 4
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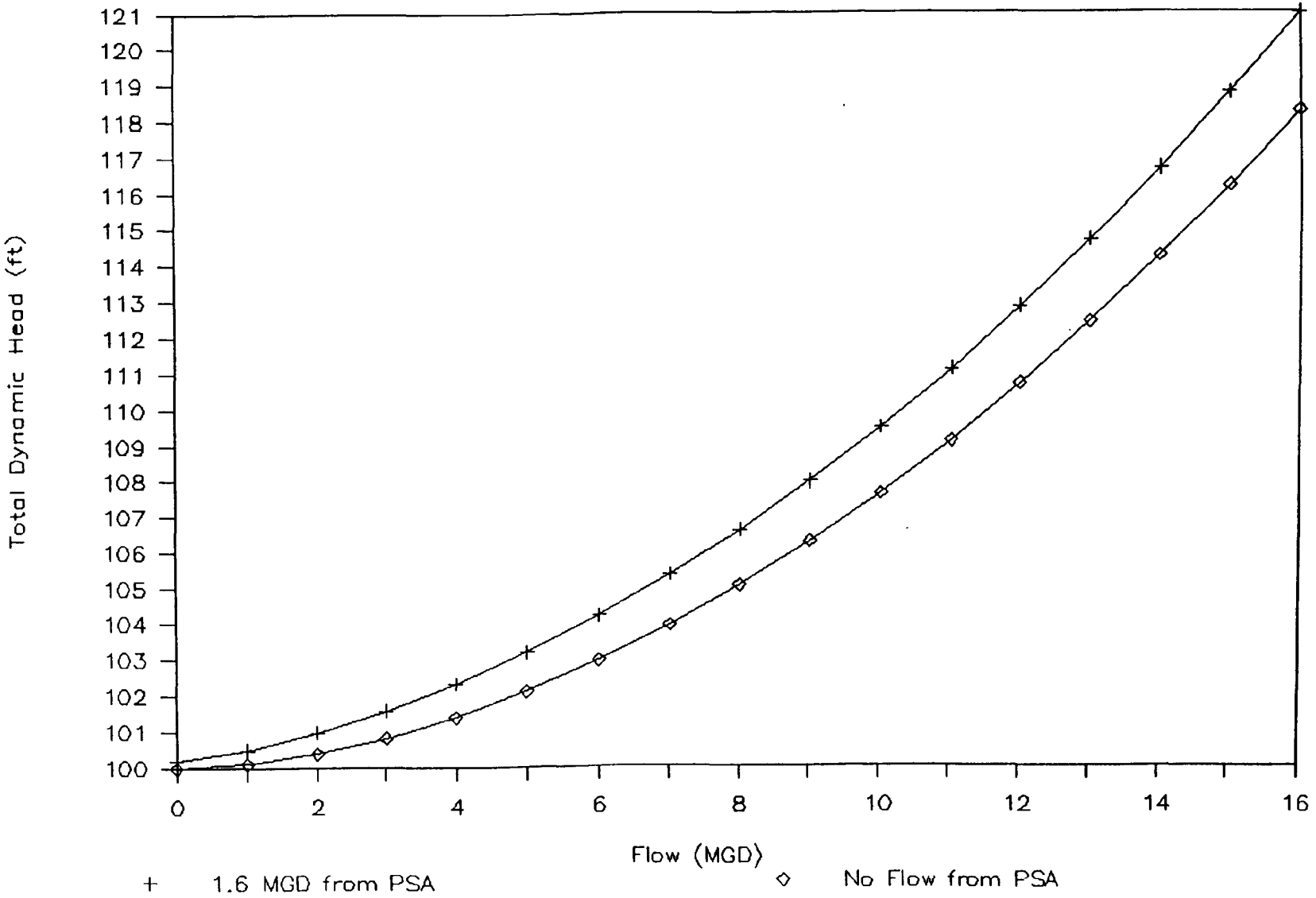
System Curve For Eno Pump Station

Initial Condition B



NR-24

Final

Attachment 4
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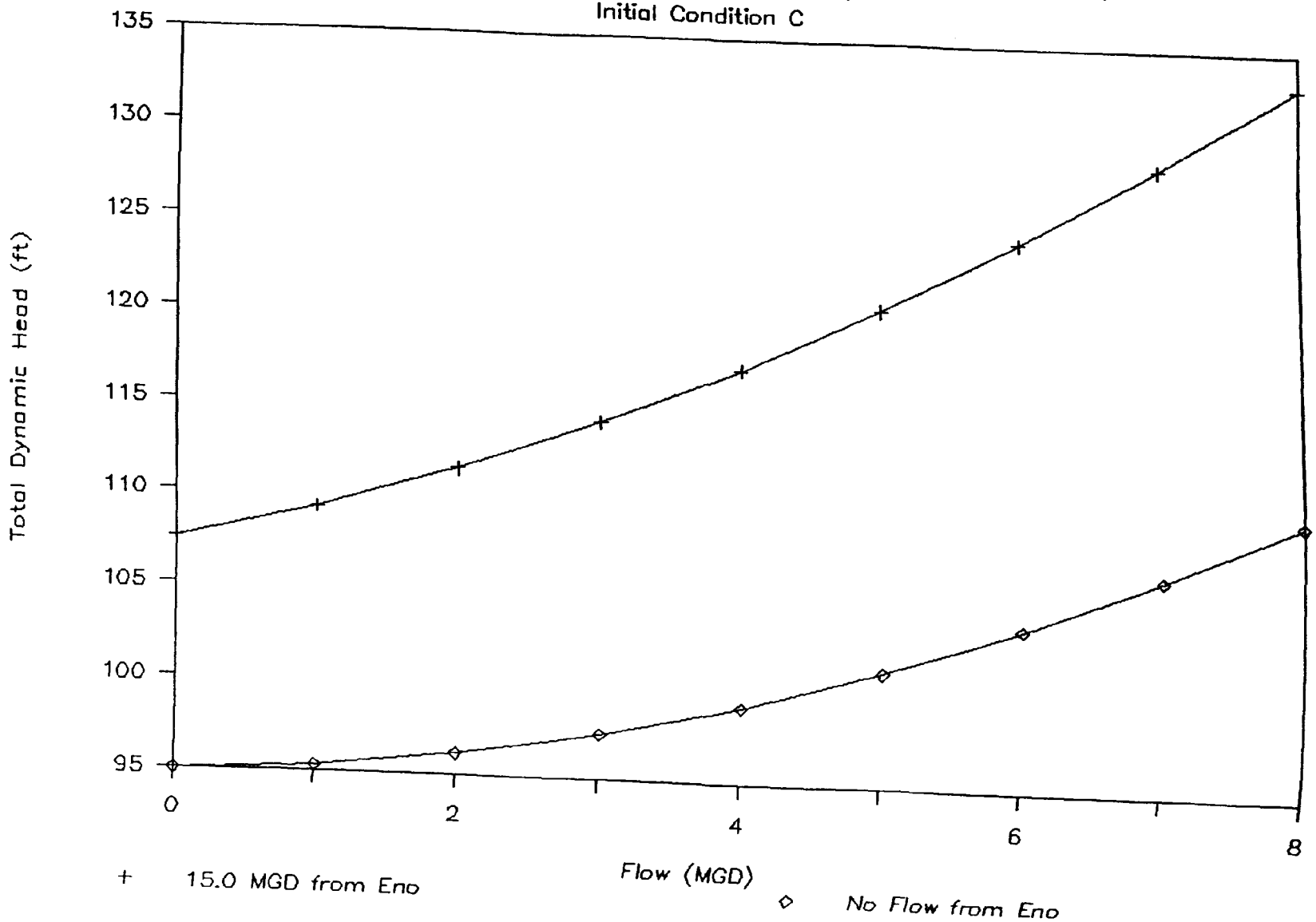
System Curve For Pump Station A

Initial Condition C



NR-25

Final
Attachment 4
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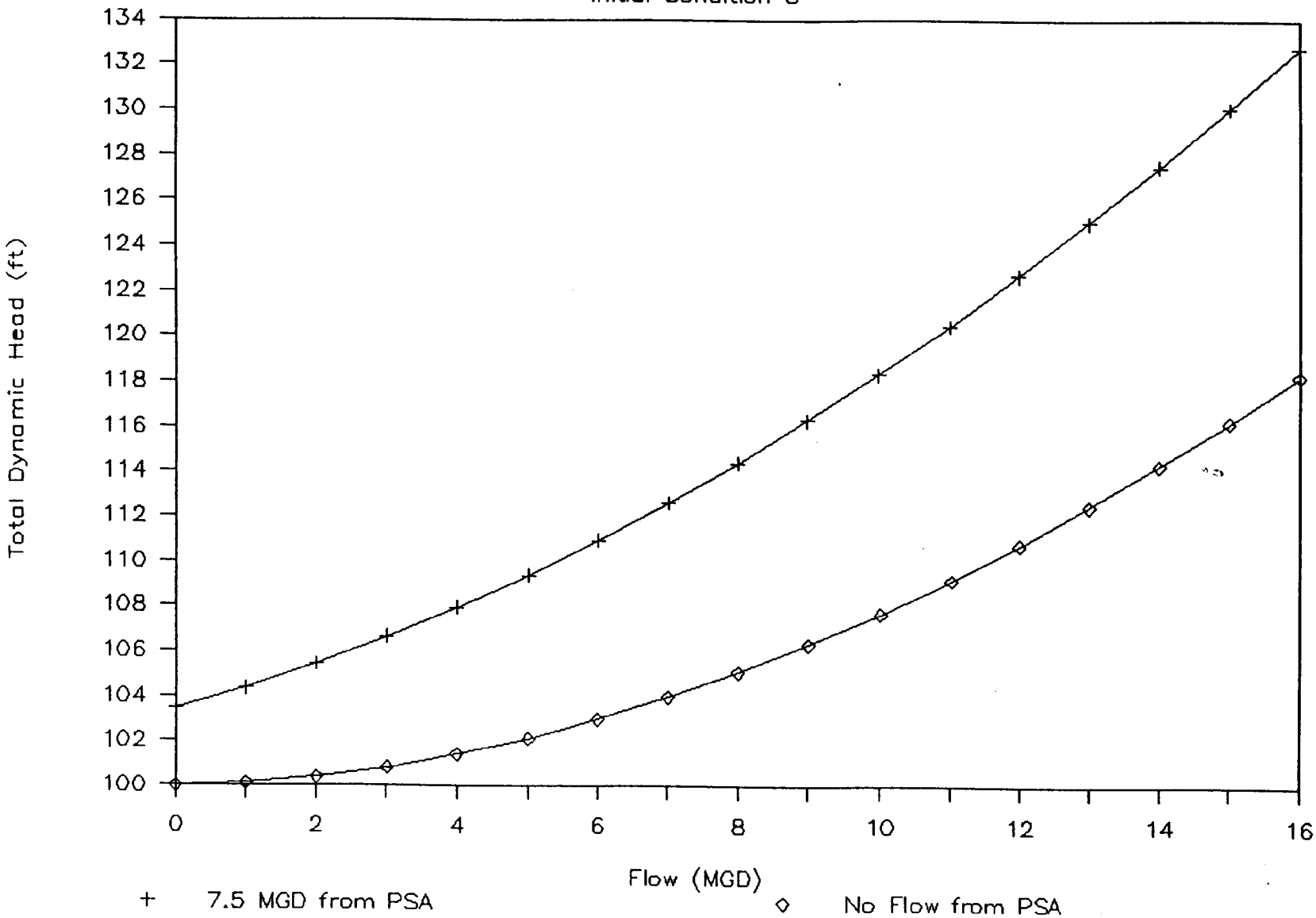
System Curve For Eno Pump Station

Initial Condition C



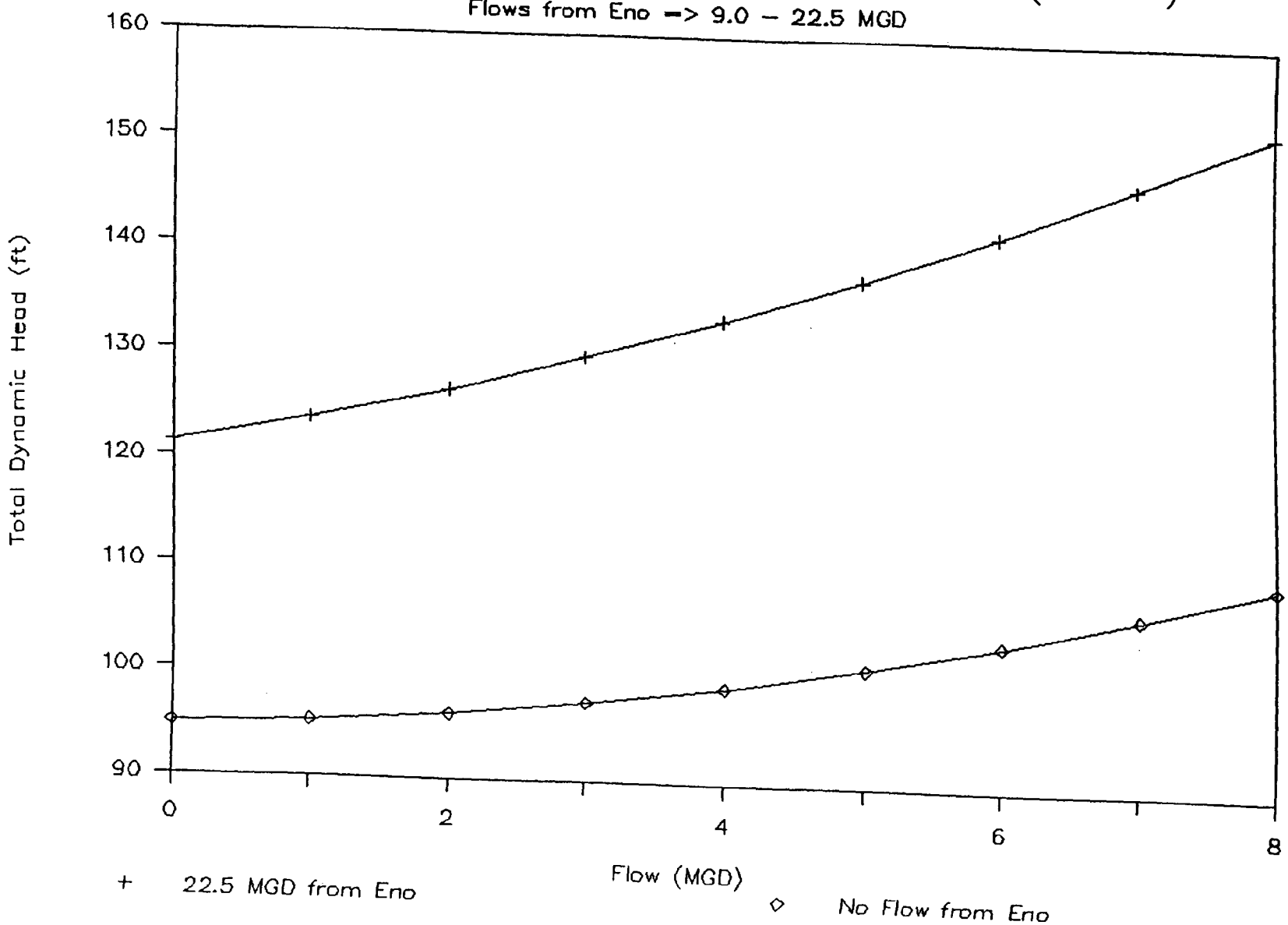
NR-26

Final

Attachment 4
Page 10/13

System Curve For Pump Station A (2010)

Flows from Eno => 9.0 – 22.5 MGD



NR-27

Final
Attachment 4
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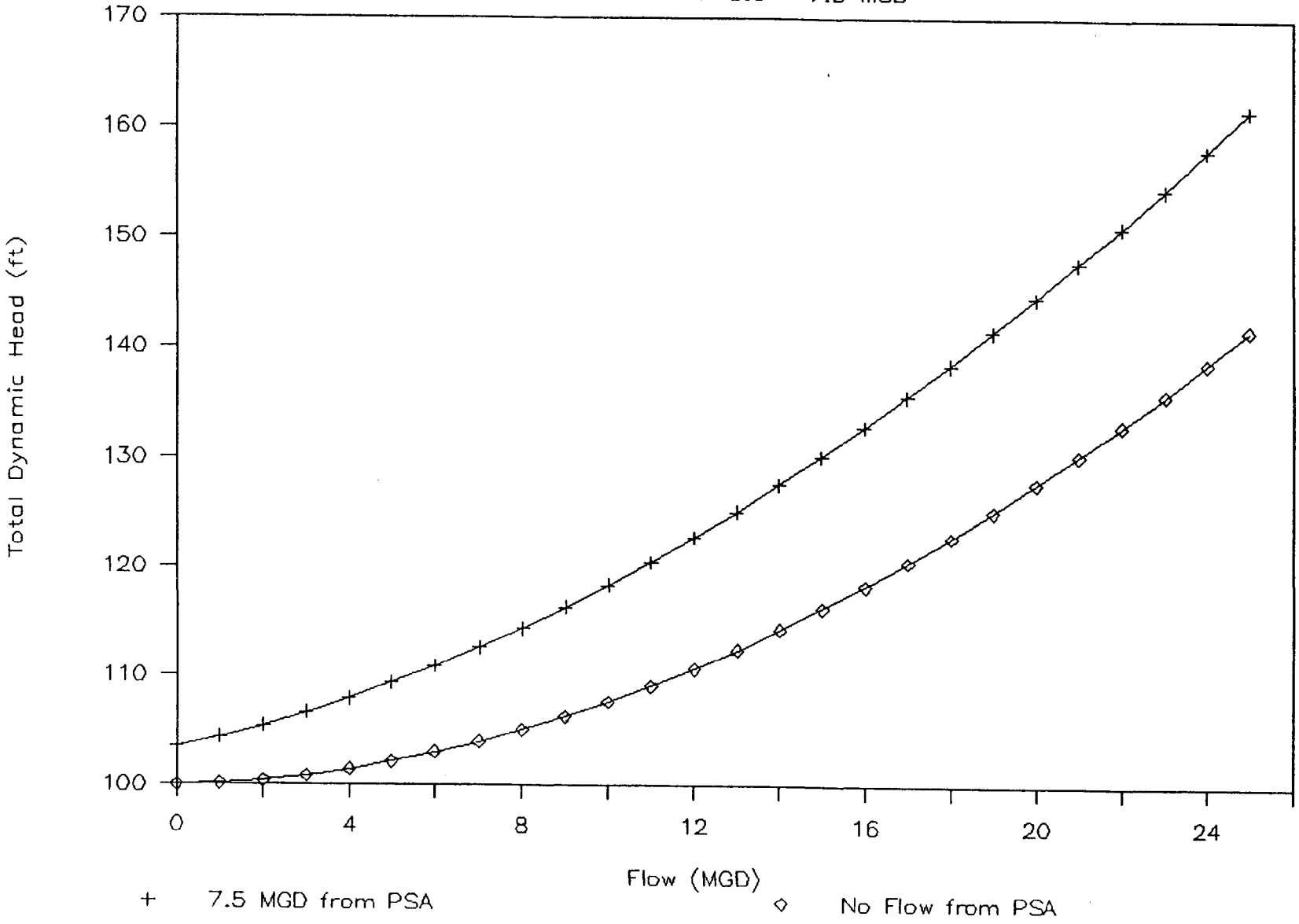
System Curve – Eno Pump Station (2010)

Flows from PSA => 3.0 – 7.5 MGD



NR-28

Final
Attachment 4
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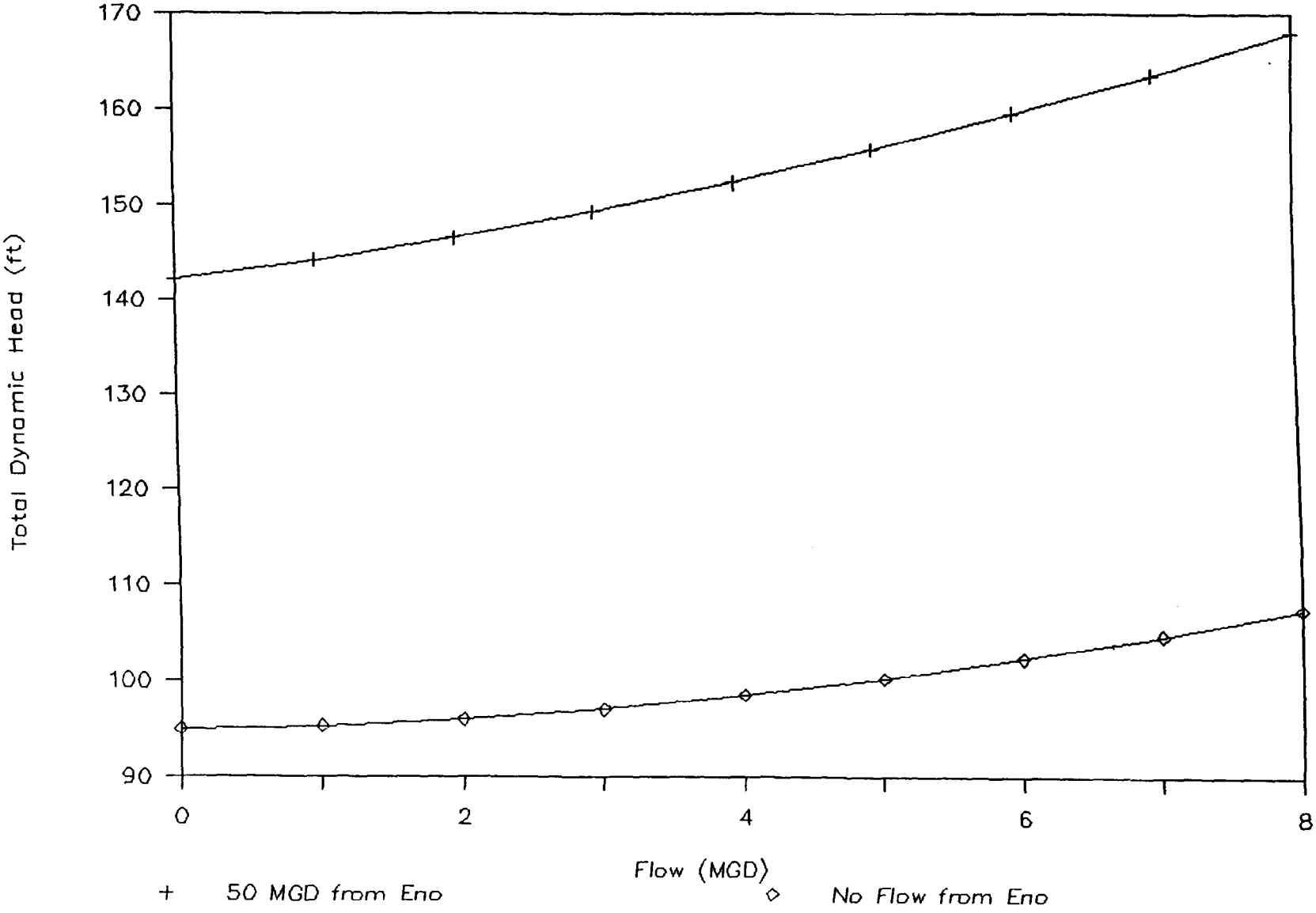
System Curve – Pump Station A (Ult.)

Flows from Eno => 20 – 50 MGD



NR-29

Final

Attachment 4
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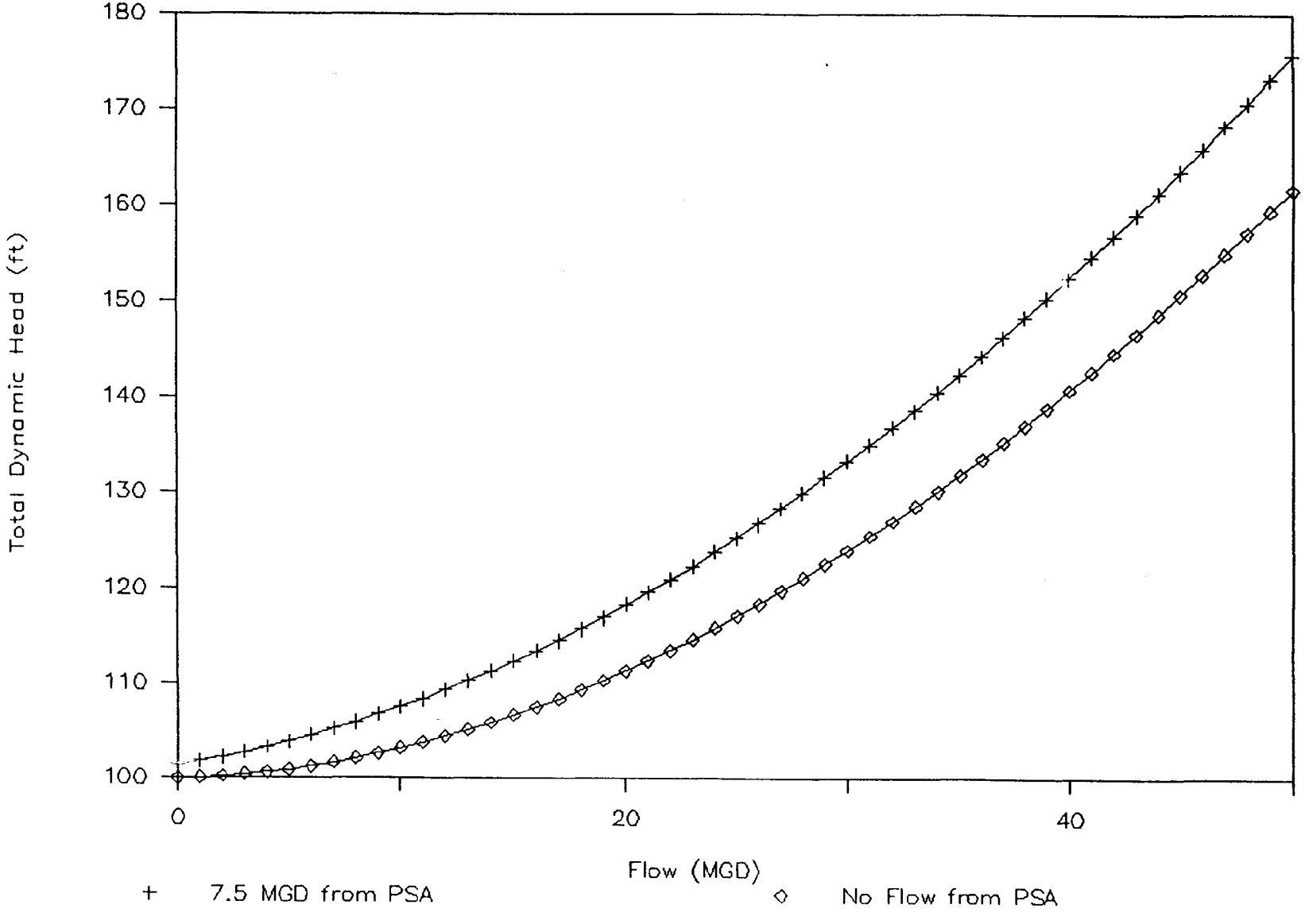
System Curve – Eno Pump Station (Ult.)

Flows from PSA => 3.0 – 7.5 MGD



NR-30

06-Dec-89

(1) Initial Condition A => Before Pump Station A
System Characteristics from Eno River to Northside

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)
ADF	6	36	12800	1.3	100	104
PHF	15	36	12800	3.3	100	116

Additional Q @ Lutraville (w/10 ft head buffer)

(2a) Initial Condition B => Pump Station A
System Characteristics for 12" Force Main.

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)
ADF	0.6	12	11200	1.2
PHF	1.6	12	11200	3.2
	0.6	12	11200	1.2
	1.6	12	11200	3.2

Combine PSA Flow with Eno River Flow

SIZED DOWN TO D = 30 IN.

Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)	Add. Q w/ d= 36 (36")	Add. Q w/ d= 30 (30")
6	6.6	36	9800	1.4	95	105	30.3	16.3
15	16.6	36	9800	3.6	95	157	20.3	6.3
0	0.6	36	9800	0.1	95	103	36.3	22.3
0	1.6	36	9800	0.4	95	143	35.3	21.3

(2b) Initial Condition B => Eno Pump Station
System Characteristics from Eno to Northside

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)
ADF	6	36	3000	1.3
PHF	15	36	3000	3.3
	6	36	3000	1.3
	15	36	3000	3.3

Combined Eno River Flow with P.S. A Flow

Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)	Add. Q w/ d= 36	Add. Q w/ d= 30
0.6	6.6	36	9800	1.4	100	103	30.3	16.3
1.6	16.6	36	9800	3.6	100	119	20.3	6.3
0	6	36	9800	1.3	100	103	30.9	16.9
0	15	36	9800	3.3	100	116	21.9	7.9

(3a) Initial Condition C => Pump Station A
System Characteristics for 30" Force Main.

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)
ADF	3	30	11200	0.9
PHF	7.5	30	11200	2.4
	3	30	11200	0.9
	7.5	30	11200	2.4

Combine PSA Flow with Eno River Flow

Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static H (ft.)	TDH (ft.)	Add. Q w/ d= 36	Add. Q w/ d= 30
6	9	36	9800	2.0	95	102	27.9	13.9
15	22.5	36	9800	4.9	95	131	14.4	0.4
0	3	36	9800	0.7	95	97	33.9	19.9
0	7.5	36	9800	1.6	95	108	29.4	15.4

← < 0.5 but OK based on 10 ft reserve head

(3b) Initial Condition C => Eno Pump Station
System Characteristics from Eno to Northside

	Flow (MGD)	Pipe D (in.)	Length (ft.)	Velocity (ft/sec)
ADF	6	36	3000	1.3
PHF	15	36	3000	3.3
	6	36	3000	1.3
	15	36	3000	3.3

Combined Eno River Flow with P.S. A Flow

Additional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static Head (ft.)	TDH (ft.)	Add. Q w/ d= 36	Add. Q w/ d= 30
3	9	36	9800	2.0	100	106	27.9	13.9
7.5	22.5	36	9800	4.9	100	130	14.4	0.4
0	6	36	9800	1.3	100	103	30.9	16.9
0	15	36	9800	3.3	100	116	21.9	7.9

← ok.

NR-31

Attachment 3
Page 1/2

06-Dec-89

(4a) Year 2010 => Pump Station A System
System Characteristics from PSA to Northside

	Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia (in.)	Eq Pipe D (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2
ADF	3	30	0	30.0	11200	0.95	0.00
PHF	7.5	30	0	30.0	11200	2.37	0.00
	3	30	0	30.0	11200	0.95	0.00
	7.5	30	0	30.0	11200	2.37	0.00

Addtional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static Head (ft.)	TDH (ft.)	Add. Q w/ d= 36	Add. Q w/ d= 30
9	12	36	9800	2.6	95	105	24.9	10.9
22.5	30	36	9800	6.6	95	149	6.9	-7.1
0	3	36	9800	0.7	95	97	33.9	19.9
0	7.5	36	9800	1.6	95	108	29.4	15.4

(4b) Year 2010 => Eno Pump Station System
System Characteristics from Eno to Northside

	Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia (in.)	Eq Pipe D (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2
ADF	9	0	36	36.0	3000	0.00	1.97
PHF	22.5	0	36	36.0	3000	0.00	4.93
	9	0	36	36.0	3000	0.00	1.97
	22.5	0	36	36.0	3000	0.00	4.93

Combined Eno River Flow with P.S. A Flow

Addtional Flow (MGD)	Total Flow (MGD)	Pipe Dia. (in.)	Length (ft.)	Velocity (ft/sec)	Static Head (ft.)	TDH (ft.)	Add. Q w/ d= 36	Add. Q w/ d= 30
3	12	36	9800	2.6	100	110	24.9	10.9
7.5	30	36	9800	6.6	100	153	6.9	-7.1 ← NG
0	9	36	9800	2.0	100	106	27.9	13.9
0	22.5	36	9800	4.9	100	134	14.4	0.4

(5a) Ultimate Flows => Pump Station A System
System Characteristics from PSA to Northside

	Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia (in.)	Eq Pipe D (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2
ADF	3	30	0	30.0	11200	0.9	0.0
PHF	7.5	30	0	30.0	11200	2.4	0.0
	3	30	0	30.0	11200	0.9	0.0
	7.5	30	0	30.0	11200	2.4	0.0

Addtional Flow (MGD)	Total Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia. (in.)	Eq. Pipe Dia. (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2	Static Head (ft.)	TDH (ft.)
20	23	36	30	43.2	9800	3.1	2.8	95	108
50	57.5	36	30	43.2	9800	7.8	6.9	95	166
0	3	36	30	43.2	9800	0.4	0.4	95	97
0	7.5	36	30	43.2	9800	1.0	0.9	95	106

(5b) Ultimate Flows => Eno Pump Station System
System Characteristics from Eno to Northside

	Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia (in.)	Eq Pipe D (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2
ADF	20	36	30	43.2	3000	2.7	2.4
PHF	50	36	30	43.2	3000	6.8	6.0
	20	36	30	43.2	3000	2.7	2.4
	50	36	30	43.2	3000	6.8	6.0

Combined Eno River Flow with P.S. A Flow

Addtional Flow (MGD)	Total Flow (MGD)	Pipe 1 Dia. (in.)	Pipe 2 Dia. (in.)	Eq. Pipe Dia. (in.)	Length (ft.)	Velocities (ft/sec) V 1	V 2	Static Head (ft.)	TDH (ft.)
3	23	36	30	43.2	9800	3.1	2.8	100	114
7.5	57.5	36	30	43.2	9800	7.8	6.9	100	176
0	20	36	30	43.2	9800	2.7	2.4	100	111
0	50	36	30	43.2	9800	6.8	6.0	100	162

Attachment 5
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HAZEN AND SAWYER, P.C.
CONSULTING ENGINEERS

January 26, 1990

Mr. Arthur Mouberry, Regional Supervisor
Department of Environment, Health &
Natural Resources
Division of Environmental Management
3800 Barrett Drive
Room 101
Raleigh, NC 27609

Re: CKD Pilot Unit
City of Durham, NC

Dear Mr. Mouberry:

In response to your request for more information pertaining to the cement kiln dust (CKD) sludge stabilization pilot unit to be demonstrated at the wastewater treatment plants in Durham, NC, we have enclosed the following:

- Equipment description including a brochure on the batch mixer and a sheet of photos of the pilot unit.
- Process description.
- Site plans showing proposed location of pilot unit and heat curing area at both Northside and Farrington Road WWTP. Existing sand drying beds will be used for the heat curing areas at both plants. Runoff from these areas is collected and returned to the head of the treatment plant.

An area next to the existing drying beds will be paved to accommodate the pilot unit at Northside. Drainage from this area will be collected and drained to the existing subnatant lines from the drying beds. The area will be used for sand storage in the future.

4000 WESTCHASE BOULEVARD • SUITE 550 • RALEIGH, NC 27607 • (919) 833-7152 • FAX (919) 833-1828
RALEIGH, NC • CHARLOTTE, NC • NEWPORT NEWS, VA • HOLLYWOOD, FL • NEW YORK, NY

We are requesting approval to operate the unit at the Northside and/or Farrington Road WWTP for 30 to 90 days at a processing rate of approximately 100 wet tons of sludge per day. The City of Durham will monitor and record the temperature, pH and solids concentration of the treated sludge for the duration of the pilot test. The stabilized sludge will then be distributed to the general public and various city and state organizations such as Parks and Recreation and NCDOT. Written information clearly stating appropriate uses and warnings regarding N-Viro soil will accompany all sludge distributed.

If you have further questions, please call.

Very truly yours,

HAZEN AND SAWYER, P.C.

Robert S. DiFiore

Robert S. DiFiore, P.E.
Vice President

RSD/jhl
Enclosures
cc: Mr. A.T. Rolan
Mr. Tom Glenn
Mr. Gordon Ruggles
Ms. Terri Compton

CEMENT KILN DUST PILOT FACILITY
CITY OF DURHAM, NC

Equipment Description:

- One McLanahan 15 cy Batch Mixer, Truck Mounted (Brochure Attached)

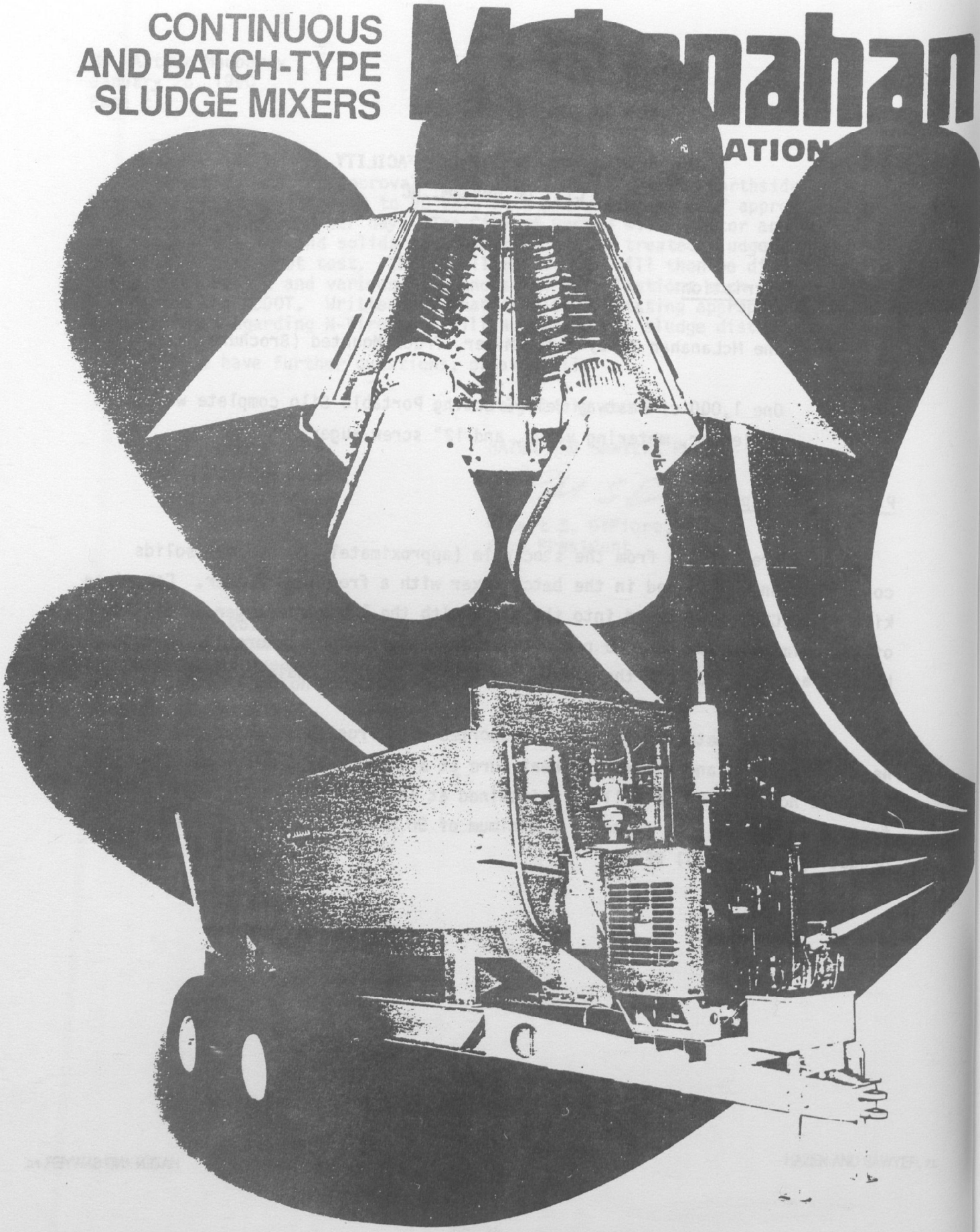
- One 1,000 cf Fastway Self-Erecting Portable Silo complete with dust collector, metering valve, and 12" screw auger

Process Description:

Dewatered sludge from the stockpile (approximately 30 percent solids concentration) is loaded in the batch mixer with a front-end loader. Cement kiln dust (CKD) is metered into the mixer with the 12" screw auger at a ratio of approximately .3 tons CKD per wet ton of sludge. The mixture is thoroughly blended and removed from the mixer with a built-in drag chain conveyor.

The mixed material is then transported with front-end loaders to the heat curing area and allowed to heat cure at a minimum of 52 degrees C for at least 12 hours. The pH will be maintained at 12 or above for 72 hours. The treated sludge will be dried to a minimum of 50 percent solids, thereby producing N-Viro Soil PFRP.

CONTINUOUS AND BATCH-TYPE SLUDGE MIXERS



McLANAHAN PL

BLENDMASTER.
FOR CONTINUOUS MIXING.

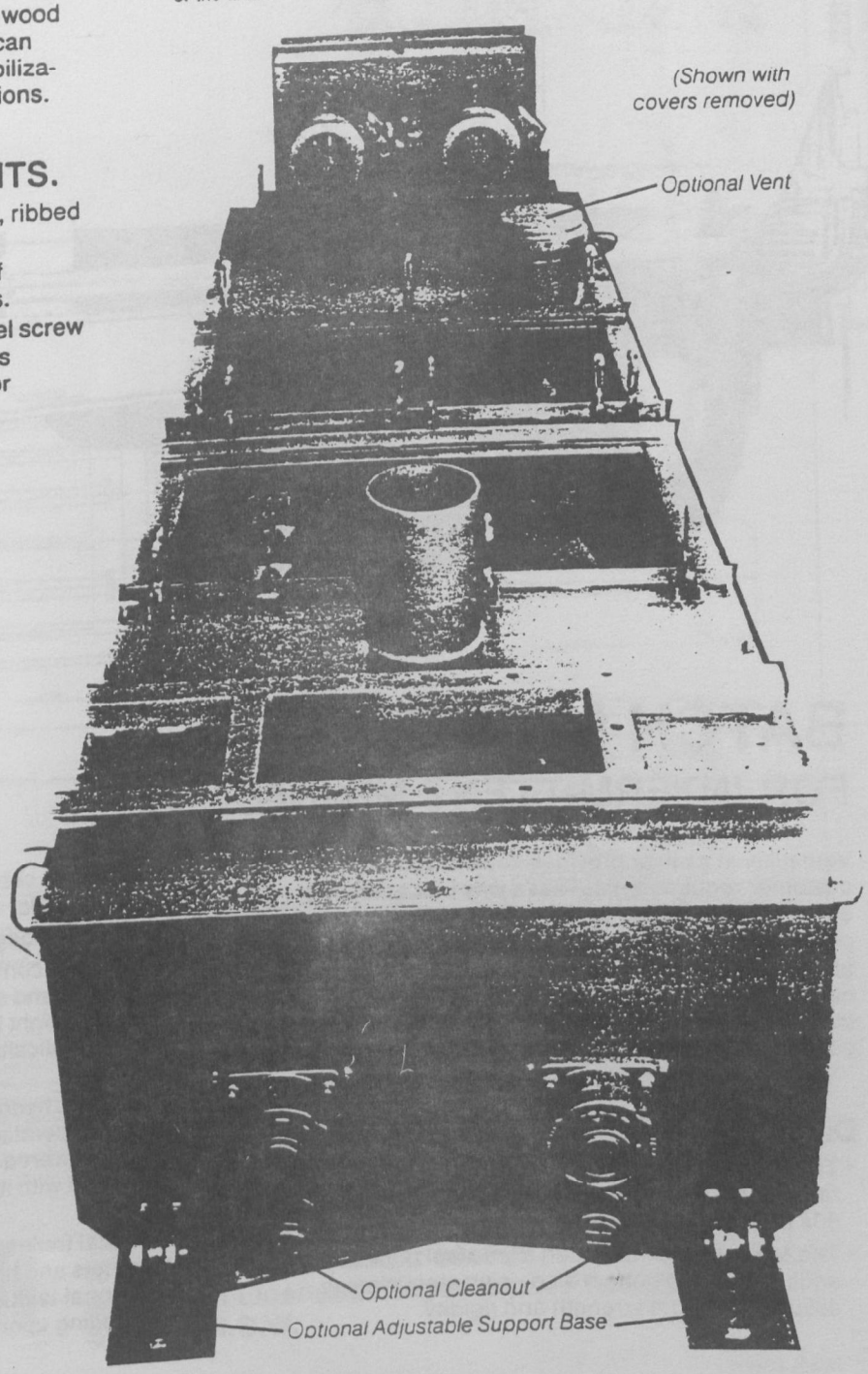
McLanahan Blendmaster Pug Mill Mixers put power and durability to work in a variety of mixing applications. For dependability and overall processing capability, it can't be beat for mixing sludge with wood chips or other bulking agents for composting. It can also provide uniform mixing required in lime stabilization of sludge for soil additive or land fill applications.

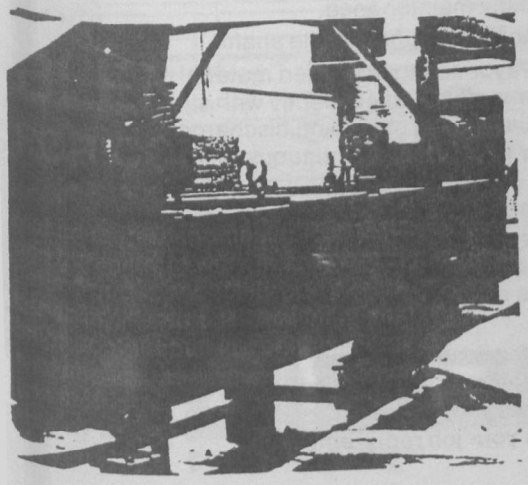
Size	Capacity TPH @ 50 PCF	Recommended Motor Horsepower @ 1800 RPM	Weight Less Motor
18" x 10'	36	2 @ 10	4,700 #
24" x 12'	80	2 @ 20	9,000 #
30" x 15'	150	2 @ 30	11,800 #
36" x 18'	230	2 @ 40	14,700 #
44" x 20'	305	2 @ 50	24,500 #

Pug Mill capacity is directly proportional to the bulk density of the final mixture and paddle shaft R.P.M.

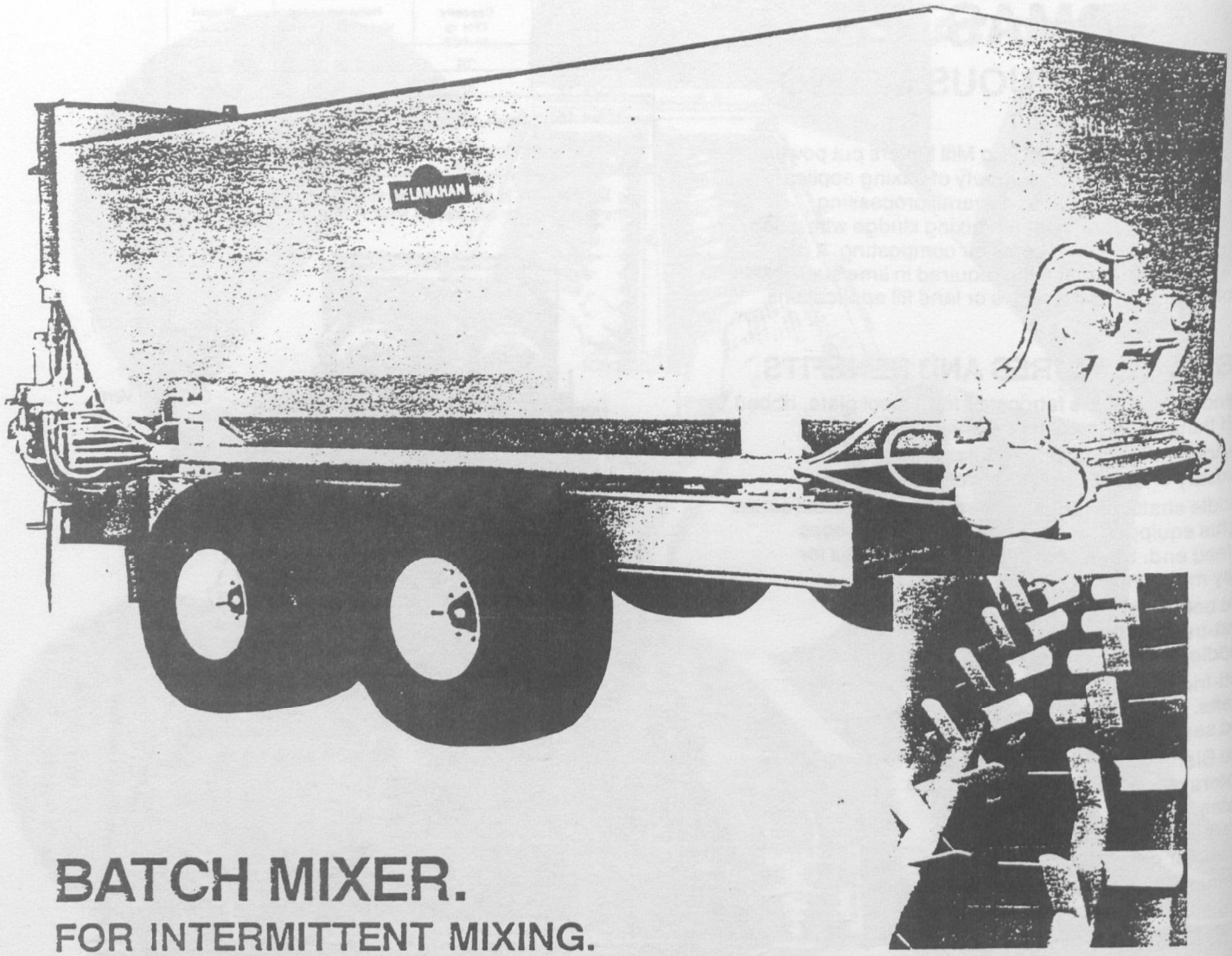
DESIGN FEATURES AND BENEFITS.

- Blendmaster box is fabricated from steel plate, ribbed and flanged for maximum rigidity.
- Flanged hopper accommodates attachment of auxiliary chutes or hoppers provided by others.
- Paddle shafts of structural steel pipe have steel screw flights equipped with renewable wearing shoes at feed end. Shafts are flanged at both ends for easy maintenance.
- The bolt-on paddles are high carbon steel, heat-treated to a Brinell of 500 to 600. Paddle bases are welded to the shafts.
- Anti-friction bearings support paddle shafts. Bearings are mounted outboard and sealed with Spirolox ring seals.
- The Blendmaster is V-belt driven by two motors mounted on adjustable base plates. Variable speed drives are available. Drive can be located at feed or discharge end.
- Protective top covers over entire mixing sections are removable for maintenance and inspection.





G MILL MIXERS.



BATCH MIXER.

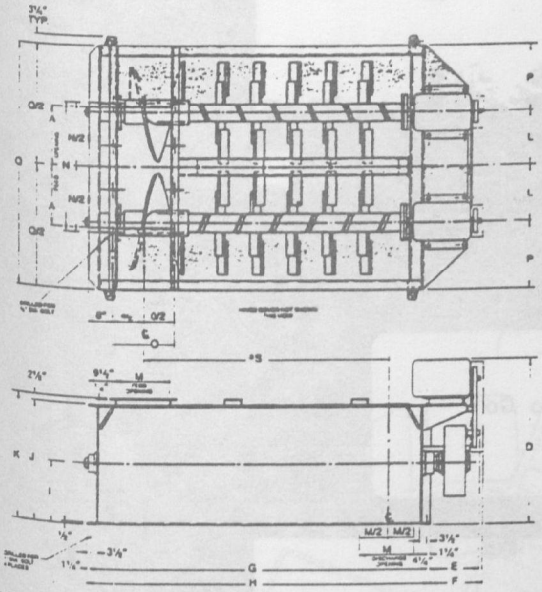
FOR INTERMITTENT MIXING.

Versatility in a mixer provides several options for customer requirements. That's why McLanahan's 30" x 15' Batch Mixer is available in stationary and portable designs to meet your specific needs. A portable unit, powered by a diesel or tractor PTO engine, can be trailer mounted and outfitted with rubber tires for plant mobility. The stationary batch mixer is powered by an electric motor.

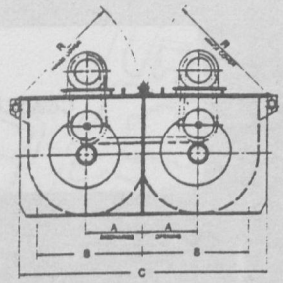
DESIGN FEATURES AND BENEFITS.

- The Batch Mixer can handle up to 405 cubic feet of feed material having a combined bulk density of 50# per cubic foot.
- The Mixer box is fabricated from steel plate at ends, sides and bottom also using steel plate to assure maximum strength and rigidity.
- Two paddle shafts with weld-on carbon steel paddles are flanged for easy maintenance.
- Anti-friction bearings support paddle shafts.
- Drag chain conveyor advances mixed material to the discharge end smoothly and efficiently with sturdy conveyor flight bars. Drag chain and discharge door are hydraulically powered for continuous reliable operation.
- The unit is hydraulically operated via conveniently located operator controls. Each shaft is independently powered by a shaft-mounted reducer which is equipped with its own hydraulically operated gear motor.
- Optional trailer, fabricated from structural steel channels and heavy-duty pipe, is among a number of additional features which may be specified, depending upon your job requirements.

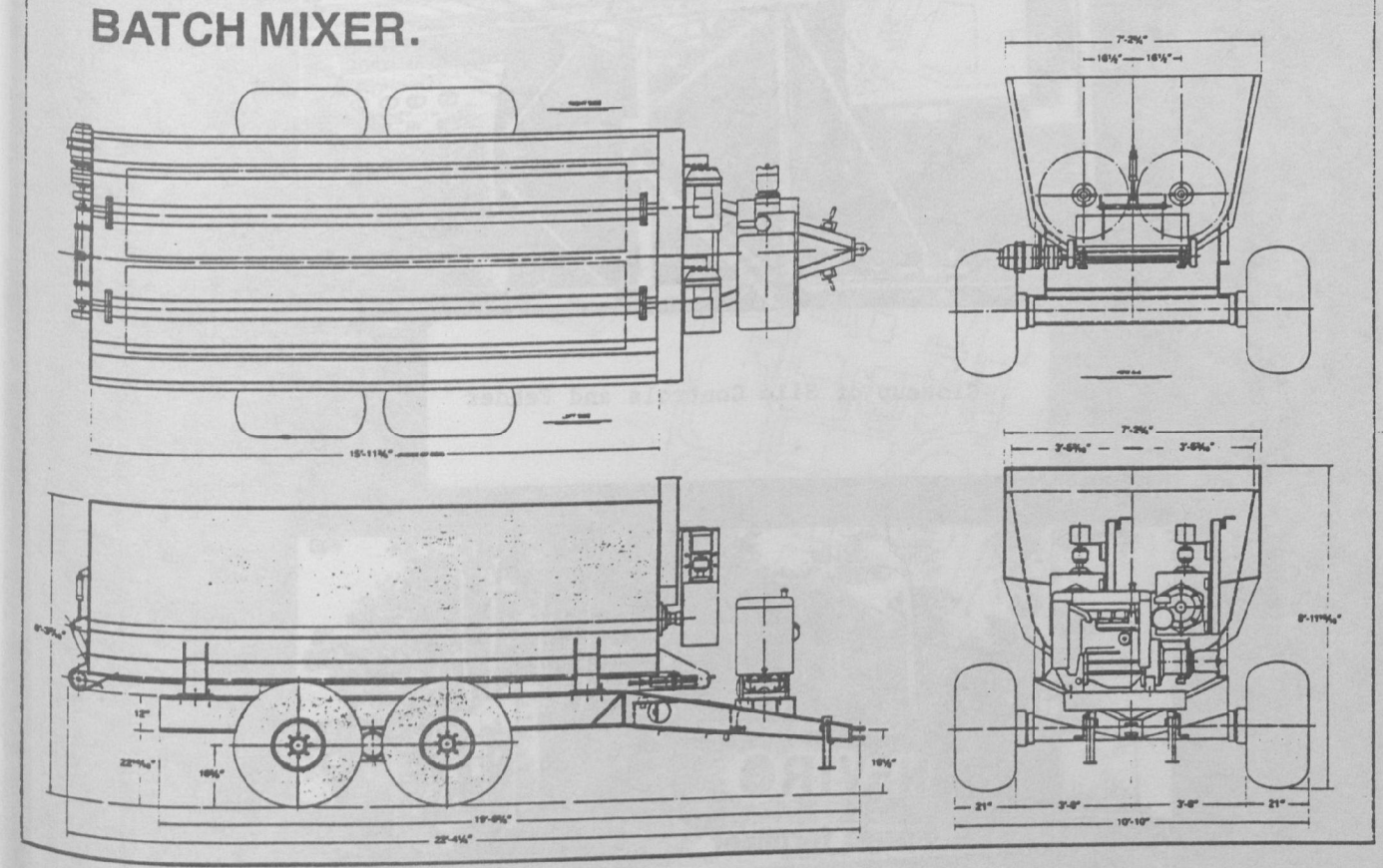
BLENDMASTER.



SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
10' x 12'-6"	11"	20"	4'-0½"	3'-6"	10½"	6'-[illegible]	11'-1½"	11'-0½"	11'½"	2'-0½"	2'-7½"	10"	10"	4 SP. @ 6¾" = 2'-1"	2 SP. @ 9¾" = 10"	1-½"	3'-0½"	2'-0"	6'-11½"
14' x 12'-6"	10"	2'-0"	3'-0½"	4'-1½"	10½"	10'-½"	10'-0½"	13'-0½"	14½"	2'-11½"	3'-7½"	10"	10"	4 SP. @ 7½" = 2'-6"	2 SP. @ 9½" = 10	17½"	3'-0½"	2'-0"	10'-11½"
20' x 12'-6"	10"	2'-0"	3'-0½"	5'-0½"	21½"	20"	10'-0½"	15'-0½"	17½"	3'-0½"	3'-7½"	10"	10"	4 SP. @ 6¾" = 2'-11"	2 SP. @ 10½" = 21"	20½"	3'-0½"	2'-0"	13'-0½"
20' x 12'-6"	10½"	2'-0"	3'-0½"	5'-7½"	2'-0½"	2'-0"	10'-0½"	15'-0½"	20½"	3'-0½"	4'-7½"	10½"	2'-0"	5 SP. @ 6¾" = 3'-0½"	3 SP. @ 9" = 2'-0"	20½"	3'-0½"	2'-0"	10'-0½"
24' x 20'-6"	22"	3'-10"	3'-0½"	6'-7½"	3'-0"	3'-0"	21'-0½"	21'-0½"	2'-0½"	4'-7½"	4'-0½"	22"	2'-0"	4 SP. @ 11½" = 2'-11"	3 SP. @ 9" = 2'-0"	2'-3½"	3'-0½"	4'-0"	10'-3½"

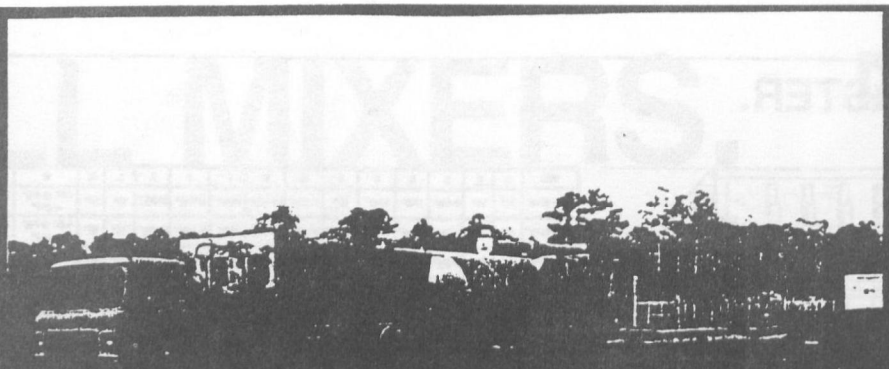


BATCH MIXER.

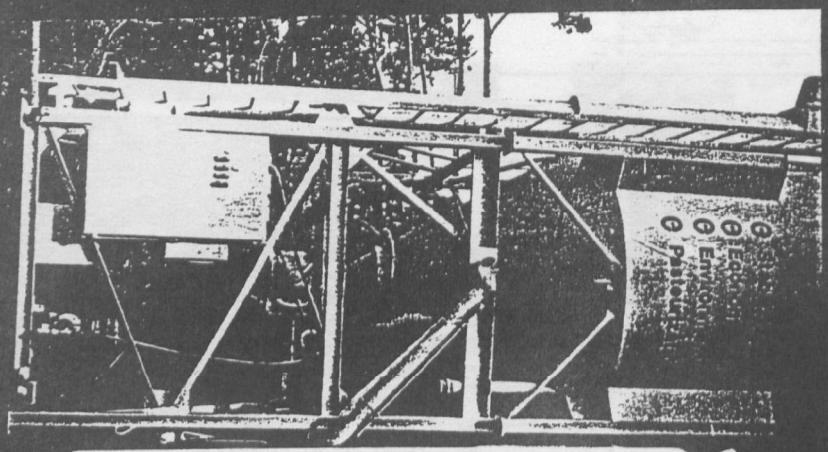


McLanahan CORPORATION

200 Wall Street, Hollidaysburg, PA 16648
(814) 695-9807 TELEX: 866602
Australian Licensee: Noyes Bros. Pty. Ltd.,
Sydney, N.S.W.

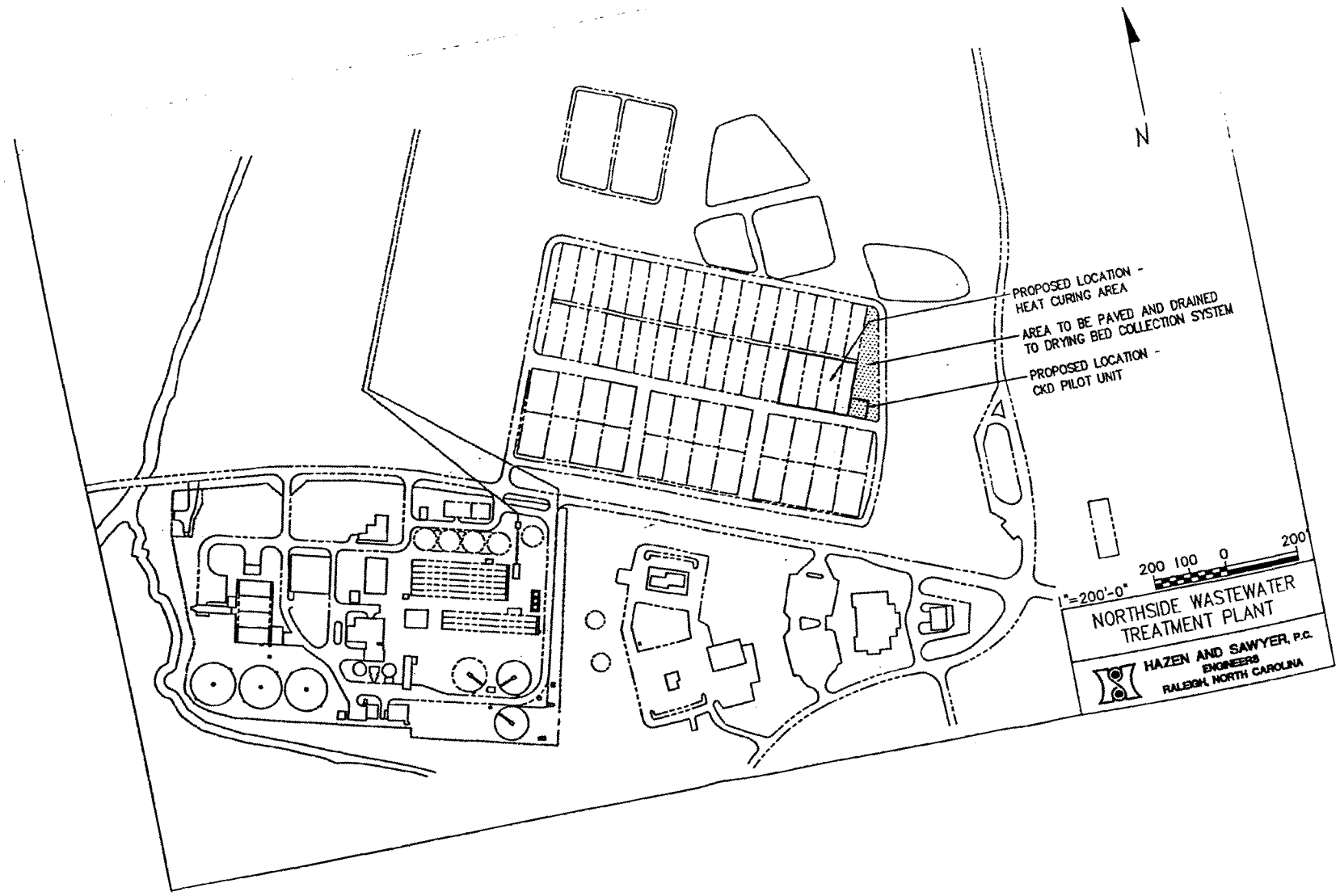


Complete Plant Ready To Go



Closeup of Silo Controls and Feeder

Overall View of McLanahan Mixer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PROPOSED LOCATION - CKD PILOT UNIT
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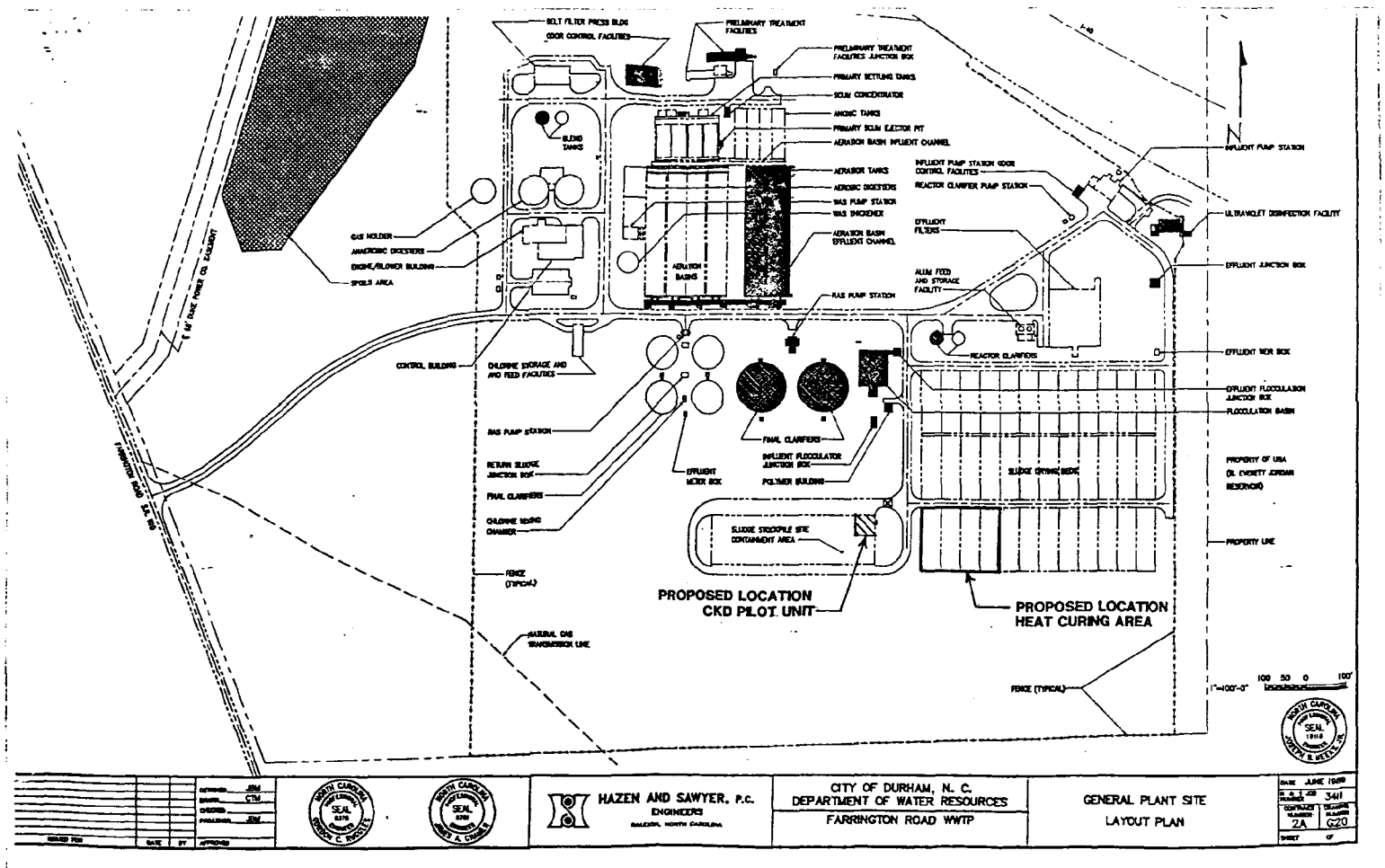
NORTHSIDE WASTEWATER TREATMENT PLANT
HAZEN AND SAWYER, P.C.
ENGINEERS
RALEIGH, NORTH CAROLINA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ANOXIC TANKS
PRIMARY SCUM EJECTOR PIT
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BLEND TANKS
AERATION TANKS
AEROBIC DIGESTERS
WAS PUMP STATION
WAS THICKENER
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EFFLUENT FLOCCULATION JUNCTION BOX
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PROPERTY LINE
GAS HOLDER
ANAEROBIC DIGESTERS
ENGINE/BLOWER BUILDING
SPOILS AREA
CONTROL BUILDING
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RAS PUMP STATION
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FINAL CLARIFIERS
CHLORINE MIXING CHAMBER
FINAL CLARIFIERS
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SLUDGE DRYING BEDS
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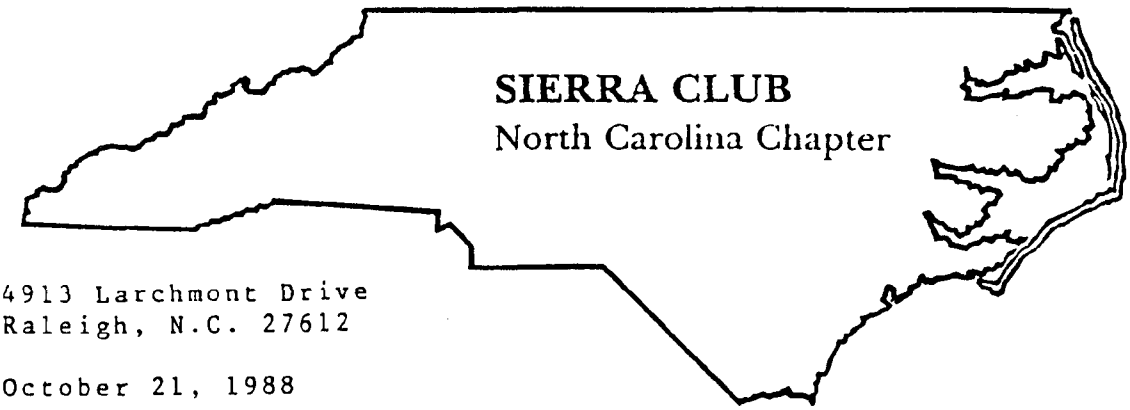
HAZEN AND SAWYER, P.C.
ENGINEERS
RALEIGH, NORTH CAROLINA
CITY OF DURHAM, N. C.
DEPARTMENT OF WATER RESOURCES
FARRINGTON ROAD WWTP
GENERAL PLANT SITE
LAYOUT PLAN
DATE JUNE 1989
H & S JOB NUMBER 3411
CONTRACT NUMBER 2A
DRAWING NUMBER G20
SHEET OF
DATE BY APPROVED



SIERRA CLUB
North Carolina Chapter

4913 Larchmont Drive
Raleigh, N.C. 27612

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WENOCA GROUP
Asheville

October 21, 1988

Mr. R. Paul Wilms, Director
Division of Environmental Management
PO Box 27687
Raleigh, NC 27611-7687

Dear Paul:

At the time the Environmental Management Commission was considering reclassification of Falls Lake to A-II in 1983 the staff proposed that there was no need to reclassify waters in the upper portion of the Lake because of the protection afforded by Par. .0203 entitled, "Protection of Waters Downstream of Receiving Waters." As the EMC Hearing Officer, I preferred the less ambiguous alternative of reclassification of all Lake waters to A-II, but was persuaded to accept the staff recommendation. The final position as stated on page A-7 of the August 9, 1983 public hearing report was as follows:

> "In response, the staff reiterated (a) that water supply intakes are not expected in the tributaries or upper segments, (b) the class A-II waters will be protected since discharges to the tributaries and upper segments will have additional requirements if they could significantly impact class A-II waters during a malfunction, and (c) that dischargers which cannot significantly impact water supply intakes should not be burdened with unnecessary requirements."

I believe that ex perience gained since the 1983 reclassification demonstrates that while Par. .0203 provides a good backstop position it is not a substitute for more explicit action when such is available. The experience I refer to involves permitting action by the State in which .0203 was apparently not applied and local government action involving land use controls wherein the classification of adjacent - not downstream - waters was the controlling factor.

On July 29, 1987, I wrote concerning a decision by permit staff that "pumping station 'C' of a sewer line serving the Treyburn project did not require standby power (which would have been required for WS-III waters) because it is to be located in Class 'C' waters - a tributary to the Eno River." In your response of August 26, 1987, you stated that you had instructed your permit review staff to require all future pump stations in the Falls Watershed to meet the requirements for discharge into Class B and Ws-III waters. As long as the present ambiguity

remains, however, a possibility of another mistake remains. It was not clear from your response, incidentally, whether the Division required the installation of standby power at that pump station or whether the corrective action simply applies to new permits.

An even more troublesome problem involves local government land use decisions in areas bordered by Class C waters where downstream WS-III waters are presumed to be protected by Par. .0203. This was disclosed at the September 23, 1988 meeting of the General Assembly's Watershed Protection Legislative Study Committee. In commenting on the relative amounts of critical watershed protection areas provided to Durham's Flat and Little River watersheds vs Raleigh's Falls Lake watershed, Representative Joe Hackney asked for an explanation. Terry Roland, Durham's Water Resources Director, answered forthrightly that in the City's ordinance Durham tried to use existing stream classifications (C) as guidance for critical watershed designation. As Representative Hackney observed, "Durham has done a good job in protecting its watersheds." There is far less protection provided for Raleigh's Falls Lake watershed because of the lower C classification of adjacent waters. So, it is perfectly clear in this situation that Raleigh's watershed is not receiving the same protection as Durham because of the fact that Par. .0203 does not influence local land use decisions.

All of this seems to argue for reclassification of all of Falls Lake waters to WS-III as promptly as possible so that there can be no further infractions of these kinds.

By copies of this letter to Mayor Avery Upchurch, Members of the Raleigh City Council, and City Manager Dempsey Benton, I am suggesting that Raleigh might find it in its own interest to initiate a reclassification request to bring all Falls Lake waters within a WS-III classification.

Thank you for your attention to this important matter.

CC: EMC Chairman Charles Baker
Mayor Upchurch
Members of Raleigh City Council
Raleigh City Manager Benton
Kim Martin Shaffer
Linda Rogers
Ed Holland
Bill Holman
Jill Heaton
Members WQ Comm.(drafts)

Sincerely yours,

David H. Howells

David H. Howells
Water Quality Chair
N.C. Chapter Sierra Club

City Of Raleigh
North Carolina

November 9, 1988

Mr. Paul Wilms, Director
N. C. Division of Environmental Management
P.O. Box 27687
Raleigh, NC 27611-7687

Subject: Reclassification of the City of Raleigh Raw Water Reservoirs

Dear Mr. Wilms:

In January of 1986 the City requested consideration by your staff of reclassifying our raw water supply reservoirs (Lakes Benson and Wheeler and Falls Lake). Your staff responded in April of that year, indicating the difficulties in supporting the specific reclassifications we had requested for the Lakes, but we understood your staff intended to proceed with reclassification of all of these lakes to the highest classification they could support to the N. C. Environmental Management Commission. Recently, we have learned that only the lower portion of Falls Lake (from Little Lick Creek arm to the dam) currently is classified as WS-III. Although the City realizes the WS-III classification carries no discharge or watershed development restrictions, we wish to request you consider reclassification of the entire lake from the dam to the confluence of the Eno and Flat Rivers to maintain consistency through the lake to WS-III.

Also, pursuant to the intent of the City Council's Resolution No. 1986-77 (copy attached), I wish to request on their behalf reclassification of the various streams which are tributaries to Falls Lake and also Lake Benson and Lake Wheeler and their various tributary streams to the highest classification which their existing condition can be supported by staff to the N. C. Environmental Management Commission. We believe the following tributary reclassifications can be supported by your staff's investigation:

<u>Lake Wheeler</u>	WS-II NSW
Long Branch	WS-II NSW
Lynn Branch	WS-II NSW
Speight Branch	WS-II NSW
Woodys Lake and Stream	WS-II NSW
Dutchman's Branch	WS-II NSW
Swift Creek	WS-II NSW

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Lake Benson	WS-II NSW
Silver Lake, Yates Mill Pond and Stream	WS-II NSW
Buck Branch	WS-II NSW
Reedy Branch	WS-II NSW
Swift Creek	WS-II NSW
Falls Lake	
Beaverdam Creek	WS-II NSW
Robertson Creek	WS-II NSW
Reedy Branch	WS-II NSW
Cedar Creek	WS-II NSW
Smith Creek	WS-II NSW
Little Beaverdam Creek	WS-II B NSW
Little Beaverdam Creek	WS-II NSW
New Light Creek	WS-II NSW
West Prong	WS-II NSW
Buckhorn Creek	WS-II NSW
Mill Creek	WS-II NSW
Rocky Branch	WS-II NSW
Upper Barton Creek	WS-II NSW
Upper Barton Creek	WS-II NSW
Unnamed Tributary @ Camp Adventure	WS-II B NSW
Unnamed Tributary @ Camp Adventure	WS-II NSW
Lower Barton Creek	WS-II NSW
Water Fork	WS-II NSW
Pierce Creek	WS-II NSW
Lowery Creek	WS-II NSW
Horse Creek	WS-II NSW
Mud Branch	WS-II B NSW
Mud Branch	WS-II NSW
Cedar Creek	WS-II NSW
Jennys Branch	WS-II NSW
Honeycutt Creek	WS-II NSW
Unnamed Tributary @ Camp New Life	WS-II B NSW
Unnamed Tributary @ Camp New Life	WS-II NSW

On behalf of the City, I wish to thank you for your consideration and cooperation of this matter. If you or your staff have any questions concerning our request, please direct them to either Carl Simmons or Dale Crisp at (919) 890-3400. We look forward to the additional protection these reclassifications will provide to our raw water supplies water quality in the near future.

Sincerely,

Dempsey E. Benton, Jr.
City Manager

DEBjr/spw
cc: Public Utilities Director
Assistant Public Utilities Director
NCDEM Attn: Steve Zoufaly

FEB 0

City Of Raleigh
North Carolina

FEB 05 REC'D

January 29, 1990

Mr. Heinz J. Mueller, Chief
Environmental Policy Section
United States Environmental Protection Agency
Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Mueller:

On behalf of the City of Raleigh we would like to commend you for the excellent study that was done on the Durham Eno River wastewater facility. We appreciate being a part of your review team on this project and feel that this process worked quite well.

The City concurs in the findings of the draft EIS and believes that the consolidation of the treatment facilities in northern Durham into one at the Northside Treatment Plant, along with the mitigative measures, will provide the best water quality protection for this upper reach of Falls Lake.

In closing I realize that this was a long study and involved many hours from your agency and that of the N. C. Division of Environmental Management, but I think it was truly worthwhile. Our concerns and earlier comments have been accommodated in this report. The City is very appreciative, and we want to thank you for all of your efforts.

Yours truly,

Avery C. Upchurch
Mayor
City of Raleigh

ACU/spw
cc: Mayor of Durham

OFFICES · 222 WEST HARGETT STREET · RALEIGH, NORTH CAROLINA 27602

Transcript of Public Hearing on February 20, 1990 on Draft EIS

BEFORE THE

U.S. ENVIRONMENTAL PROTECTION AGENCY

	)
In the Matter of:	)
ENVIRONMENTAL IMPACT STATEMENT	)
	)

PUBLIC HEARING

February 20, 1990

Durham City Hall

Durham, North Carolina

The above entitled matter came on for Public Hearing pursuant to Notice at 7:03 p.m.

PRESENT WERE:

ON behalf of the Environmental Protection Agency

JOHN HAMILTON, Presiding Officer

MARK MUMMERT, EPA Contractor on EIS

BOYD DEVANE, North Carolina Division of Environmental Management, Water Quality Section

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1 P R O C E E D I N G S

2 PRESIDING OFFICER HAMILTON: Good evening. This
3 is the public hearing meeting. My name is John Hamilton. I
4 represent the Environmental Protection Agency of Region IV,
5 and I will be tonight's hearing officer. Heinz Mueller was
6 scheduled to be the hearing Officer, but he has influenza.
7 So, he was unable to make it today.

8 I want to welcome everybody to the hearing. This
9 is a public hearing. This is your hearing, and its purpose
10 is to make information available to the public on the Eno
11 River Waste Water Treatment Plant expansion.

12 We want to receive public and Agency comments on
13 the Draft Environmental Impact statement that was released
14 in December of 1989, so please feel free to participate. If
15 you have not filled out a registration card when you came
16 in, please do so now and indicate your interest in making a
17 statement if you wish to do so. Even if you don't wish to
18 make a statement, fill out a card anyway so we can have your
19 mailing address. This will become part of our official
20 hearing record and it also gives us a way to provide
21 information on the results of the hearing.

22 With me tonight on my left is Boyd DeVane. He
23 represents North Carolina Division of Environmental
24 Management, Water Quality Section. On my right is Mark
25 Mummert. He is EPA's contractor on this EIS. He's followed

1 the project for approximately two years and is very familiar
2 with the technical details.
3 Our court reporter is Bill Warren.
4 Are there any elected officials here tonight?
5 Please stand and identify yourself.
6 (No response.)
7 PRESIDING OFFICER HAMILTON: Okay, I don't see any
8 officials.
9 The authority for tonight's hearing comes from
10 the National Environmental Policy Act, which is often
11 referred to as NEPA. This requires the examination of any
12 action carried out by the federal government that may have
13 an impact on the environment.
14 In addition, Title II of the Clean Water Act
15 provides money for construction and upgrading of publicly
16 owned waste water treatment plants. Subsequent amendments,
17 however, have replaced the Title II money with a loan
18 program known as the State Revolving Loan Program, which is,
19 by and large, under state control.
20 North Carolina requested in May of 1987 that EPA
21 prepare the Environmental Impact Statement. Under EPA rules
22 and regulations, all findings of the EIS are to be made
23 public, and the public has the right to comment on the draft
24 up to 45 days after its being available. And, this
25 particular draft was available January 6th of 1990.

All comments that are made at this hearing are being recorded by our court reporter, and these will become part of the final EIS.

The type of hearing we are having tonight is an informational type of hearing and I wanted to lay out some of the ground rules that we will follow. There will not be any cross-examination of any speakers. This is an information type hearing, so if you wish to make a statement, you may do so. I will not permit cross-examination of speakers by anyone. If you wish to ask questions of the speakers after the hearing, you, of course, are free to do so. I may interrupt on occasion and ask for the people who have made statements to maybe repeat what they've said for purpose of clarification.

When you are speaking, please identify yourself so the court reporter can identify you in the transcript. And, if you have a written statement, I would appreciate your submitting that. If you submit a written statement, this will become part of the EIS.

If you are an individual, I'm going to ask you to limit the length of your time to approximately three or four minutes. If you represent a group, we'll give you more time to speak, maybe five or six minutes.

All comments will be accepted by EPA up to 45 days after the Notice of Availability, and let me correct

1 for the record that the Draft was available on January 6,
2 1990 -- January 5, 1990, not the 6th. That makes the close
3 -- close of comments will end the end of business day the
4 26th of February.
5 The Draft EIS will then be revised and prepared
6 as a final EIS, and the final EIS will include a summary of
7 the findings, what our preferred alternative is going to be,
8 a transcript of the hearing. The document will then be made
9 available to the public.
10 The EIS will then go to the Regional
11 Administrator of Region IV, and he will make his
12 determination and publish a Record of Decision which will
13 appear in the Federal Register. And, if you've registered
14 for this hearing, you will then be advised of the Regional
15 Administrator's decision at that time.
16 We had planned to give a technical presentation
17 of the material here today, going through the process; but
18 as I look around the room, I see largely familiar faces, so
19 I'm going to ask if there are any here tonight who would
20 like to hear the technical presentation. Alternatively, I
21 could waive the technical presentation and get on to the
22 public comments. Is there anybody here who wishes to see
23 the technical presentation?
24 (No response.)
25 PRESIDING OFFICER HAMILTON: Don't be bashful.

We've got it prepared. We're ready to do it. On the other hand, if y'all know what the issues are -- in that case, since there are no comments, no requests for the technical presentation, I'm going to waive the technical aspect of what we're doing here and open the floor to public comments.

MR. MUMMERT: John, should I get the people who just came in?

PRESIDING OFFICER HAMILTON: The question is -- go ahead and get the people who have just come in.

All right. The first person that registered to speak was Jim Clark. So, Jim, I'm going to turn things over to you.

STATEMENT OF JIM CLARK

MR. CLARK: Good evening. I'm Jim Clark, President of Save the Water and a candidate for the Durham County Commission. I am also speaking this evening as a member of the EPA Advisory and Oversight Committee that has been meeting over the past two years to help prepare this landmark environmental study.

On behalf of Save the Water, I first called for this critically important Environmental Impact Statement in July of 1985. In December of 1986, we finally persuaded the State Division of Environmental Management to begin this required study under the North Carolina Environmental Policy Act, and then, fortunately, engaged the U. S. Environmental

1 Protection Agency to join the study under the National
2 Environmental Policy Act of 1987.
3 The Durham community is fortunate to have this
4 comprehensive environmental study to protect our vital
5 drinking water supplies, and we'd like to thank Mr. Bob Lord
6 at EPA for arranging the study and Mr. John Hamilton at EPA,
7 Mr. Trevor Clements at the State for their hard work on this
8 EIS.
9 The good news is that this environmental study
10 has averted a major environmental mistake, which was the
11 proposed expansion of the Eno River Sewage Plant. Because
12 of this study, the Eno River Sewage Plant will be closed and
13 removed, and that is a major victory for everyone who has
14 worked so hard over the past five years to protect the
15 drinking water supplies for Durham and Raleigh. It is now
16 clear that if we had not been involved and successfully
17 initiated this study, the Eno River Sewage Plant would have
18 been expanded and precious drinking water would have been
19 polluted.
20 The bad news is the study shows that there is no
21 really good ecologically safe alternative, and even the
22 "preferred alternative" has major environmental problems.
23 We support the consolidation of the Eno River Little Lick
24 and Treyburn Sewage Plant into the Northside Sewage
25 Treatment Plant, but we're still very concerned about the

1 continued pollution of Ellerby Creek and Falls Lake which
2 is, of course, the sole source of drinking water for the
3 city of Raleigh.
4 This environmental study shows that Ellerby Creek
5 has been assigned a "poor biological rating" and that during
6 low flow conditions, Ellerby Creek could suffer "possible
7 toxicity as a result of the stream being 90 to 95 percent
8 waste water." Already, Ellerby Creek is officially listed
9 as an impaired water under the Clean Water Act, and the city
10 is supposed to have an effective strategy to clean the
11 creek up. It's rather ironic that the city's clean-up
12 strategy includes dumping three times more waste water than
13 Ellerby Creek now receives.
14 We're also very concerned about the prediction by
15 the State in this Environmental Impact Statement that water
16 quality violations will probably still occur, even after the
17 new state-of-the-art treatment plant is built.
18 Save the Water is also very concerned about the
19 potential disposal and environmental problems from the
20 sludge that will be generated by the new sewage plant. At
21 least 5,400 dry tons of sludge is supposed to be spread on
22 1,080 acres of land; but, that assumes the sludge will not
23 have high concentrations of toxics and heavy metals and that
24 over 1,000 acres of land can be found nearby for sludge
25 disposal. Land is scarce in Durham County, and officials in

1 Orange County have already moved to block disposal there.
2 So, sludge disposal is definitely a serious
3 problem. We request that more study be given to this
4 serious problem and a specific solution be identified, along
5 with potential costs, before Durham proceeds with any more
6 sewage plants.
7 As you know, Save the Water has consistently been
8 concerned with two key neighborhood and citizen issues. The
9 first is establishing as permanent policy that all of the
10 city and county neighborhoods with failing septic tanks be
11 served first as the highest priority for new treatment
12 capacity and that all of the neighborhoods be sewered before
13 any new development squeezes them out once again.
14 From last week's Advisory Committee meeting, we
15 understand this is to be the EPA recommendation as well. It
16 just makes sense to solve the existing environmental problem
17 we have with failing septic tanks before giving very
18 precious treatment capacity to new development.
19 The second citizen concern we have is the
20 projected rate shock or the doubling or tripling of water
21 and sewer rates to help pay for this sewage plant expansion.
22 We are strongly opposed to putting the burden of new growth
23 on the backs of Durham citizens with the doubling or
24 tripling of water and sewer rates. That's just not fair.
25 You know, that's not right, so we ask the city to find

1 other ways to finance the proposed improvements without any
2 unfair rate shock.
3 It was the consensus of the Advisory and
4 Oversight Committee that in view of the potential ecological
5 problems associated with the expansion of the Northside
6 Sewage Plant that a permit and expansion be considered only
7 up to 20 million gallons a day. After the new sewage plant
8 was fully functioning, any additional proposals for plant
9 expansion would require additional study of the actual
10 effluent from the new plant and the condition of Ellerby
11 Creek before any other state permit could be issued. We
12 ask the EPA and the State Division of Environmental
13 Management and the city to honor that consensus.
14 Because of our concern about the continued
15 pollution of Ellerby Creek, we must strongly oppose any
16 combined or provisional permit for an expansion of Northside
17 to 29 million gallons a day. We do not believe that Ellerby
18 Creek can possibly assimilate that much waste water, and the
19 jury is still out as far as this EIS is concerned, so we
20 believe that no expansion beyond 20 million gallons should
21 be permitted at this time.
22 The fact is, we really don't need the sewage
23 megaplants. We've got much better things to do with our
24 bond money and our tax money, such as improving our schools,
25 which is a much higher priority than big, expensive sewage

1 plants.

2 We also strongly request that the proposed Eno
3 River pump station be limited to not more than 8 million
4 gallons a day, and we ask that EPA and the State Division of
5 Environmental Management and the city agree to hold the
6 Treyburn developers to their promise to close the Treyburn
7 Sewage Plant when the new Northside Plant comes on line.

8 Treyburn promised that their sewage plant would
9 be an interim solution until the new public sewage plant was
10 built and that they would close it as soon as new capacity
11 was available, so we ask you to hold them to that important
12 public commitment.

13 One other crucial fact that has emerged from this
14 EIS is on page 3-42, and I quote the study. It says, "The
15 Snowhill die base glade, which is located at the junction of
16 Snowhill Road and Old Oxford Highway, has more rare species
17 than any other site in the piedmont of North Carolina. The
18 smooth cone flower and tall larkspur are found in the
19 Snowhill die base glade."

20 This fact is so critically important because the
21 proposed outer loop highway would go right through the
22 Snowhill die base glade. And with the Endangered Species
23 Act and other key environmental laws, there is no chance
24 that the outer loop could pass the EIS process and damage
25 such an ecologically special and valuable area. So, it's

time for the city and county to abandon any plans for the drinking water polluting outer loop.

Once again, this EIS clearly points out that even the preferred alternative has serious environmental problems, including the impacts on Ellerby Creek, the 27 stream crossings of the 38 miles of new sewer lines, and the 12 pump stations that would be constructed.

The EIS shows natural areas that would be negatively impacted, as well as valuable archeological and historical sites that would be damaged and impacted. Even under best case, there will be erosion and sedimentation pollution and substantial non-point source water pollution from the new growth stimulated by the proposed sewage plant expansion. We request that both EPA and the State require the most stringent mitigation measures possible to minimize the environmental damage.

As the EIS points out, Falls Lake is already highly eutrophic, with more than half of the phosphorus pollution coming from storm water runoff or non-point source pollution. We can't afford to make any more mistakes when it comes to protecting our drinking water supplies. Save the Water applauds the Environmental Protection Agency and the State for strongly recommending needed improvements to our local watershed protection ordinances, including a recommendation for WS1 watershed classification and

1 protection and a 6 percent impervious surface limitation.
2 Naturally, the members of Save the Water are very
3 reluctant to accept the substantial environmental damage
4 that the Northside Sewage Plant expansion would cause. But,
5 in conclusion, we ask that the proposed sewage plant
6 expansion be approved only if, number 1, the permit limits
7 the expansion to the agreed 20 million gallons a day.
8 Number 2, that the Eno River pump station is
9 limited to 8 million gallons a day.
10 Number 3, that the Eno River Sewage Plant, the
11 Little Lick Sewage Plant, and the Treyburn Sewage Plant are
12 all closed and removed as promised.
13 Number 4, that the first new treatment capacity
14 and all necessary treatment capacity is allocated and
15 reserved as the highest priority for complete sewer service
16 to all the neighborhoods with failing septic tanks.
17 And, number 5, that there is no unfair water and
18 sewer rate shock that doubles or triples water and sewer
19 rates for Durham County citizens. We ask you to incorporate
20 our request into your final recommendations in the final
21 EIS.
22 As you know, we are making extremely important
23 long-range decisions with very high environmental stakes.
24 Mistakes could pollute our drinking water, so we ask both
25 EPA and the State Division of Environmental Management to

1 incorporate our comments into the final decisions as you
2 follow through on the rest of this vital Environmental
3 Impact Statement decision-making process.
4 As far as the potential rate shock, I would say
5 to the voters, let's just say no to water and sewer rate
6 shock." Vote for Jim Clark for County Commissioner, and
7 together, we'll fight the doubling and tripling of our water
8 and sewer rates. Thanks again for helping save our water.
9 PRESIDING OFFICER HAMILTON: Thank you, Jim.
10 Mr. George Andrews.
11 STATEMENT OF GEORGE ANDREWS
12 MR. ANDREWS: My name is George Andrews. I have
13 been a resident of Durham County my entire life. I have
14 resided in the northern part of the county the last seven
15 years.
16 I'd first like to say that I wholeheartedly
17 concur with the earlier comments made by Mr. Clark. I want
18 to commend the EPA for the work which has gone into the EIS
19 Draft and the Draft itself.
20 PRESIDING OFFICER HAMILTON: Mr. Andrews, could
21 you get closer to the microphone, please, sir?
22 MR. ANDREWS: Yes, sir.
23 My specific personal comments concerning the draft
24 are, I'm sure, important, vital and truly significant to all
25 families and homeowners in Durham County, particularly those

within an acute sense of fair play.

While this is not a quote verbatim, the EIS Draft projects water and sewer rates must increase by 100 to 200 percent to assist with financing water and sewer capacity expansion for planned development. A Durham city official recently conceded an expectation of at least a 100 percent increase for the same reason. To have to experience this kind of rate shock is almost unbelievable and would be grossly unfair to existing individual homeowners.

Recently, I received a survey conducted by the City Engineering Department Division of Water and Sewer, 120 East Parrish Street. The survey asked four questions. Now, I want to focus on the first question which asked if I would be willing to pay $2,500 for water and sewer lines for a 100-foot front property.

As much as I would like to have city water and sewer services and while I would accept my responsibility to pay for my own installation of water and sewer lines, pay city taxes after annexation, and then pay for the service monthly, I would not, in addition, want to have to experience rate shock over and above everything else to subsidize the water and sewer infrastructure costs for rich developers.

The second point is that any capacity expansion ultimately approved should undoubtedly go first to the many,

1 many individual homeowners, particularly in the northern
2 part of the county, who are experiencing failing septic
3 systems and significant water quality problems. The EPA
4 states in the EIS Draft, it was informed by the Durham
5 County Public Health Department in -- it was either 1987 or
6 1988, that as many as 50 percent of all systems in northern
7 Durham County were currently failing.
8 I hope you will give considerable weight to the
9 points I have made here, as I have a deep and sound
10 conviction they reflect the sentiments of a great many
11 people in the northern part of the county. People who at
12 some time in the not-too-distant future may not have access
13 to acceptable water and sewer infrastructure at any price
14 due to an understandably ever-increasing treatment capacity
15 crunch.
16 In closing, I would like to thank you again for
17 your efforts and to request any assistance from you which
18 may be available to aid those in the county who currently
19 have the most immediate need for treatment capacity. I
20 would like these comments to become a part of the record of
21 this hearing. Thank you.
22 PRESIDING OFFICER HAMILTON: Thank you, Mr.
23 Andrews. If I could have a copy of those. Thank you very
24 much.
25 (Mr. Andrews proffers document to Hearing Officer

1 Hamilton.)

2 HEARING OFFICER HAMILTON: Mr. Rolan.

3 STATEMENT OF TERRY ROLAN

4 MR. ROLAN: My name is Terry Rolan. I'm Director
5 of Water Resources for the City of Durham, and I would like
6 to just read the letter that I've just given John.

7 "Please find attached my comments on the Draft
8 Environmental Impact Statement. As you are well aware, the
9 City of Durham has already received a permit for the
10 expansion of the northside plant from its current permitted
11 capacity of 10 million gallons a day -- per day, to a
12 permitted capacity of 20 million gallons a day in order to
13 provide the capacity needed for existing and projected
14 development in the Northside and Little Lick Creek service
15 areas.

16 The original reason for development of the Eno
17 EIS was to assist the State in making a decision on the
18 issuance of a permit for waste water treatment to serve the
19 needs of the Durham area Eno Basin. Because of the phased
20 approach recommended by the EIS, a clear statement is needed
21 on the permitting action which is being recommended by the
22 EPA and the State of North Carolina in this joint EIS so
23 that the City of Durham can make reasonable plans for the
24 orderly expansion of the Northside facility.

25 I would like to suggest that if the final

1 recommendation of the EIS is the Northside plant with a
2 capacity of 29 million gallons per day, then it should be
3 recommended that a permit be issued for this amount. The
4 concerns for water quality modeling could be addressed in
5 such a permit through conditions written into the permit
6 that would require the necessary monitoring and modeling
7 prior to the issuance of the authorization to construct
8 facilities beyond the existing permitted capacity of 20 MGD.
9 In this way, all the parties concerned would have a clear
10 understanding of what would be required prior to further
11 expansion of the Northside plant.
12 I would like to personally thank you and the
13 Environmental Protection Agency and the North Carolina
14 Division of Environmental Management and your consultant,
15 Gannett Fleming, Environmental Engineers, for the tremendous
16 effort put forth in preparing this environmental impact
17 statement. I truly believe that the final outcome of this
18 process has resulted in the selection of an alternative that
19 will be good for both the City of Durham and the protection
20 of our environment. Thank you.
21 PRESIDING OFFICER HAMILTON: Thank you, Terry.
22 Mr. Smiley, would you like to speak?
23 STATEMENT OF FRANK SMILEY
24 MR. SMILEY: Mr. Chairman, my name is Frank
25 Smiley with the Chamber of Commerce in Durham. And unlike

1 the first speaker tonight who has yet to disclose to any of
2 us whether Save the Water represents one person or maybe as
3 many as three or four. I want you to understand that the
4 Greater Durham Chamber of Commerce represents over 1,500
5 businesses in the county and over 3,500 individuals. Our
6 directory list is available for you and the public at any
7 time.
8 I want to speak to you tonight only in support of
9 the statement just presented by Terry Rolan, particularly
10 in the section where he said that he would like to suggest
11 that if a final recommendation of EIS is a northside plant
12 with a capacity of 29 MGD, then it should be recommended
13 that a permit be issued for this amount.
14 We in the Chamber of Commerce strongly support
15 that proposal from the City of Durham. Thank you very much.
16 PRESIDING OFFICER HAMILTON: Thank you, sir.
17 Dr. Reckhow.
18 STATEMENT OF DR. KEN RECKHOW
19 DR. RECKHOW: My name is Ken Reckhow. I'm an
20 Associate Professor of Water Resources at Duke University,
21 and I'd like to start out by complimenting John Hamilton and
22 EPA and the Division of Environmental Management, as well as
23 Gannett Fleming for -- for a superb job. I thought that the
24 report was first rate and the patience and deliberations
25 over the course of our study and the work with the committee

1 was excellent.

2 I'd like to use the opportunity -- this

3 opportunity to raise a couple of issues with regards to

4 waste water treatment in Durham. The first issue is that I

5 hope that in the future that the public presentations of the

6 bond issue -- the bond referendum by the City correctly

7 notes the fact that a portion of the cost of the waste water

8 treatment plant, both this as well as Harrington, is

9 associated with growth. And a portion is associated with

10 our -- our need to meet state and federal water quality

11 standards, but a portion is associated with growth.

12 And I think it's important that the citizens of

13 Durham are aware of the fact that there is a cost to growth.

14 And in making their decision with regards to the bond, they

15 explicitly accept that, if, indeed, the bond is approved.

16 That's one issue.

17 The second issue I would like to use this

18 opportunity to raise is that if the 20 MGD plant is approved

19 and built on Ellerby Creek that, we use the opportunity

20 after that plant is in place and after we have acquired some

21 water quality data on the impact of that discharge on

22 Ellerby Creek, we use those data and we use that opportunity

23 to study and model the impact of the 20 MGD plant on the

24 receiving water bodies and we, in turn, use that to make a

25 judgment concerning whether or not the proposed 29 MGD is

1 appropriate.

2 In effect, I'm saying we revisit the analysis

3 that was so well done at this point, but does not have the

4 benefit of the actual plant in place and has a water quality

5 evaluation of that plant.

6 Thank you.

7 PRESIDING OFFICER HAMILTON: Thank you, Ken.

8 Mr. Harrison.

9 STATEMENT OF ED HARRISON

10 MR. HARRISON: I have written comments for you,

11 but the oral will be a little looser than they are.

12 PRESIDING OFFICER HAMILTON: Thank you.

13 MR. HARRISON: I'm Ed Harrison from Durham. I

14 was a member of the EIS Review Committee. These comments

15 are on behalf of the North Carolina Chapter of the Sierra

16 Club, for which I am the Land Use Chair, and they are meant

17 to support fully the positions taken on the EIS by Professor

18 David Howell, who is the Water Quality Chair for the North

19 Carolina Sierra Club. And, as well, they support positions

20 taken over the last four years by the Head Waters Group of

21 the Sierra Club and by the Conservation Council of North

22 Carolina, for whom I made a scoping request to DM and to EPA

23 in 1987.

24 I wanted to reiterate some of David Howell's

25 positions, and then I'll move on from there. He believes

1 that alternate NEC, which is the recommended alternate,
2 appears to be, as he says, "The best choice under the
3 circumstances as long as the interphase study is conducted
4 as planned and the City of Durham consistently provides high
5 quality operation and maintenance." And I support that
6 language completely.
7 He also believes, as we do in Durham, that a re-
8 examination of the water rate structure is needed to grant
9 encouragement of waste, and we are both real encouraged, as
10 are our many Sierra Club members, to see any consideration
11 of conservation at all in the impact statement, and I will
12 add, I feel it needs to be a somewhat expanded
13 consideration. And there is at least one public interest
14 group in Durham that has put together some studies on
15 conservation.
16 And Professor Howell and I also advocate the use
17 of surcharges to reduce organic loadings. I think we'll see
18 in the future that that concept is going to be carried a lot
19 further. The Sierra Club, this year, is going to begin
20 advocating a pollution tax.
21 And, above all -- and I will expand a lot beyond
22 what Professor Howell said, we would like the EIS to
23 address the crucial fact that the upper end of Falls Lake is
24 still not classified by the state for water supply uses.
25 I'd add that current local watershed

1 regulations, particularly those in Durham County, which has
2 most of the jurisdiction out there. Everything outside the
3 city limits is under Durham County's zoning ordinance in
4 that part of the county; that they -- those regulations are
5 key to the state surface water classifications in terms of
6 regulatory boundaries. The boundaries for different parts
7 of the regulated watershed area flex depending on whether it
8 is a WS or a class C.
9 And none of us were really aware of that. I had
10 to tell Professor Howell. I think Mr. DeVane will
11 understand that, you know, you tell Professor Howell he's
12 wrong, he says, I think you're wrong, too. And, I told
13 him, actually, I was right. And he checked with the
14 division, and it turned out I was right. I read the
15 watershed ordinance real carefully eight or ten times, and
16 that's what I came out with.
17 And I wanted to note that this lengthy process of
18 EIS preparation, starting with the DEM'S request in fall
19 1986 to the City, proves the importance of full
20 investigation and citizen participation in protecting water
21 quality. It turns out that originally, the DEM expressed an
22 intent to issue a permit. That's the term, "intent to
23 issue." I'm someone who reads every permit that's intended
24 to issue or deny in the state, and most of them are intend
25 to issue. And, the permit, of course, was to expand the

1 discharge from two and a half to ten million gallons a day.
2 Four environmental groups, the Eno-River
3 Association, along with the Conservation Council, the North
4 Carolina Sierra Club, and the North Carolina Wildlife
5 Federation, went to Paul Wilms, then Director of DEM, and
6 asked for extensive further study in EIS. And the request,
7 I want to emphasize, was based not only on fears of point
8 source impacts on Falls Lake's water supplies, but also on
9 the land use impacts of non-point pollution which will
10 result from development in the whole watershed where there
11 might be sewer service and in other areas affected by
12 development infrastructure.
13 And it looks like our point source concerns were
14 quite justified. They were confirmed by the state studies,
15 which is, of course, not an expansion, but a closure of the
16 plant. That's a lot of difference. That's a lot different
17 from the permit that was supposed to be issued. And I
18 think maybe we'll see that there are a lot of other permits
19 around the state that if this kind of study were done -- I
20 wouldn't wish it on anybody. I've talked with Mr. Rolan
21 plenty about this. You wouldn't wish it on anybody, but it
22 may change the status of quite a few permits when they come
23 up for renewal throughout North Carolina.
24 The scoping request that I gave to DEM in 1987 and
25 then to EPA focused on the need for any impact statement to

1 comply fully with first, the North Carolina Environmental
2 Policy Act, CEPA, as we call it. And second, the National
3 Environmental Policy Act. And this would be by thoroughly
4 examining not only the direct effects, but also the indirect
5 effects and significance of the action, as well as "possible
6 conflicts between proposed activities and objectives of
7 state, local, and federal governments; plans, policies, and
8 controls in the affected area."
9 And we asked -- and particularly in the case of
10 DEM, I made this request after a lot of discussion with the
11 staff. We asked the agencies to recommend mitigation
12 measures on the part of local governments, taking the Sierra
13 Club position, which we are holding more strongly through
14 the 80's and now into the 90's that a lot of environmental
15 control can be happening at the local level that isn't.
16 And I think the state Sediment Control Program is the best
17 example of that.
18 And the specific mitigation measures that we
19 asked for were comprehensive storm water management studies
20 and programs in both city and county, priorities for sewer
21 service, and what seems like a minor request, but if you're
22 on a city commission that deals with this, it's pretty
23 major, installation of greenway trail simultaneous with
24 installation of sewer lines served by any treatment
25 expansion.

1 And we also asked both agencies to recommend
2 prompt and timely implementation of recommendations from
3 both the Eno River Capacity Use Study and the Little River
4 Lake Nickie Watershed Study.
5 And because this final request about these
6 studies was made not only in scoping documents, but also by
7 myself and a number of other environmental group
8 representatives in the EIS Review Committee, we were
9 disappointed with the Capacity Use Study -- which is the
10 most comprehensive of its kind in this region, really, the
11 Division of Water Resources has ever done in North Carolina,
12 was not considered and not referenced in the impact
13 statement. And this is not because the service area was not
14 included. The downstream boundary of the study area was
15 three miles below the Eno discharge, not above.
16 And because of this significant omission, I asked
17 the North Carolina Natural Heritage Program, which deals
18 with endangered, threatened, and special concern species, to
19 use the Capacity Use Study and its comments on the impact
20 statement. And you should have had a set of comments from
21 Charles Rowe, the Director of that program, which focus on
22 the biological impacts of flow reductions, particularly in
23 threatened species.
24 I would recommend that you pay some attention to
25 that Natural Heritage comments. You will see some things

1 you really haven't seen. They're a pretty smart shop and
2 they get into a lot of stuff. And I was really sorry that
3 particularly the Capacity Use Study was omitted.
4 Another omission, and that's one omission -- but
5 it's nothing in view of how many times in the Review
6 Committee we asked that it be considered, is in Section
7 3324, which discusses transportation. And there is no
8 mention of a proposed interstate level thoroughfare intended
9 to serve major industrial and commercial development in the
10 Eno River service area called the Northern Durham Freeway.
11 And as presently proposed, this expressway would
12 move between sections of the sewer service area by crossing
13 the water quality critical area of the Little River
14 reservoir at points, by my measurement on large scale maps,
15 1.4 miles directly extreme from the water supply intake
16 itself and .7 of a mile from the pool.
17 The 1988 regional thoroughfare plans, which still
18 contain this proposal, clearly states this road would serve
19 certain heavy development in the Eno Basin, development
20 which is too heavy to exist without central sewer. And, I
21 wanted to contend that ignoring this major indirect effect
22 of the action may constitute a failure to comply. And, I've
23 got the numbers here. It's regulations for implementing
24 NEPA, 40CFR, 150216(B). That's the language that still
25 stands.

1 And finally, besides wanting you to correct
2 omissions, I wanted to make a request to address the
3 concern that David Howell has raised regarding the lack of
4 water supply classification for the Durham sections of upper
5 Falls Lake and at the same time, address the mitigation
6 measures that the Conservation Council asked for three years
7 ago.
8 The waste water plants in Durham are currently
9 operating under a judicial order of consent of September 14,
10 1989. And there are a lot of provisions relating to waste
11 water treatment, and I don't want to address those.
12 There is one unique provision regarding non-point
13 pollution. It's Section P on page 11 of that document.
14 And, I think Mr. DeVane said he was going to try to get the
15 JOC today. The section requires that Durham must provide a
16 certification for all new development projects, excluding
17 city or county projects for areas of failing on-site
18 treatment systems in the Eno River service area, which
19 require non-discharge permits for sewer lines. Indicating
20 that the projects comply with state watershed protection
21 guidelines regarding water course buffers and storm water
22 control, but not land use restrictions for class WS2
23 watersheds, as defined in the DEM report guidelines for
24 obtaining a protective service water classification. And it
25 also requires that plans and specifications to verify

1 compliance have to be provided.

2 These particular provisions in those guidelines,
3 which are rapidly over the course of this year turning into
4 regulations, require, among other things, on all-new
5 development to control the first half inch of runoff and
6 that there be a 50-foot minimum vegetative buffer adjacent
7 to all perimeter tributaries.

8 Those are provisions that are complied with
9 within the areas regulated by Durham's both county and city
10 watershed ordinance. In a lot of cases, the person on the
11 planning staff who spends the most time with those
12 ordinances indicates to me that no other sections of the
13 zoning ordinance outside the watershed ordinance, address
14 these at all. That there are no such requirements.

15 There are stream buffer requirements within the
16 city and within the territory. They are not nearly so
17 stringent and there are now velocity control requirements,
18 but that is not the same as the runoff control, according to
19 DEM. I think it's not out of the question the city could
20 pull this off, and that's why I'm bringing it up.

21 And we were requesting that EPA strongly
22 recommend that this be a condition in the DEM permit for
23 operation of any waste water facilities serving the Eno
24 Basin by extending this provision beyond the period when the
25 Eno River EIS is approved. The last sentence of the

1 provision says that it would go off on approval of EIS.
2 And this could be restricted to the Eno Basin. And for one
3 reason in particular that of all the streams in the urban
4 services area of Durham, that Eno is distinguished by being
5 one that supports its uses.
6 There are an awful lot of streams around here.
7 Ellerby Creek is one which has no recent history --
8 certainly none in this century, of supporting fishable or
9 swimmable standards, and certainly not water supply. But
10 the Eno -- very likely, in large part because of the state
11 and city park buffers, tends to be fairly high quality and
12 also that there are no major point sources above the Durham
13 plant, except for Hillsborough.
14 And we also would like DEM and EPA to see that
15 Durham is actually complying with this provision in the
16 judicial order. And it's conceivable that both state and
17 federal anti-degradation statutes, insofar as we understand
18 them, and forthcoming NPDS storm water permitting programs
19 could make controls of this nature mandatory. And it would
20 be a good idea to move ahead and get them underway. And
21 this would be particularly in river basins of good water
22 quality, such as the Eno.
23 Thank you. No particularly new ideas here, but I
24 wanted to get them across.
25 PRESIDING OFFICER HAMILTON: Okay, thank you. Do

1 you have a transcript of what...

2 MR. HARRISON: Yeah. Do you want one or two?

3 PRESIDING OFFICER HAMILTON: One would be

4 sufficient.

5 (Mr. Harrison proffers document to Hearing Officer

6 Hamilton.)

7 PRESIDING OFFICER HAMILTON: Thank you very much.

8 Ms. Register, would you like to speak? I have

9 you down as a "maybe."

10 MS. REGISTER: No.

11 PRESIDING OFFICER HAMILTON: Okay.

12 All right. I have exhausted all of the people who

13 wished to speak as they registered. Are there any people

14 who would like to make any comments at this time?

15 MS. HERON: I would.

16 PRESIDING OFFICER HAMILTON: Yes, ma'am.

17 STATEMENT OF BECKY HERON

18 MS. HERON: I'm Becky Heron and I'm Vice Chair of

19 the Durham County Board of Commissioners. And I just

20 wanted to bring out just two or three concerns that I have

21 and I think probably the Board has, but specifically,

22 myself. I feel that any new capacity that will become

23 available because of the expansion of the plants, that this

24 should go to neighborhoods with failing septic tanks and

25 also to areas that property has not been developed because

1 it did not meet the requirements for septic tanks.
2 My second concern is the -- in your report, I
3 believe you stated that there could be a substantial
4 increase in water rates with these future expansions. And
5 that is a concern of mine also. The impact that this will
6 have on low income people and that I just don't think the
7 rate payers need to subsidize these new expansions that
8 would go to new development. They certainly should pay
9 their fair share.
10 I also feel that as the Eno plant is phased out,
11 that it should be completely closed and removed from the
12 site so there's no temptation to go back. And any package
13 plants in the service area should be -- the use of those
14 plants should be discontinued and closed out and removed so
15 that they would come under this new capacity and we would
16 not have the problems that we are having now in certain
17 parts of Durham County with package plants.
18 Those are my comments. Thank you.
19 PRESIDING OFFICER HAMILTON: Thank you very much.
20 Are there any other people that wish to make any comments at
21 this time? Terry.
22 STATEMENT OF TERRY ROLAN
23 MR. ROLAN: I'd like to just clarify one point.
24 Mr. Andrews referred to the City Engineering Department at
25 Parrish Street. That is the County Engineering Department

that he received correspondence from, rather than the City. I just wanted to clarify that. The City's address is City Hall Plaza.

PRESIDING OFFICER HAMILTON: Thank you.

Okay, are there any other comments?

(No response.)

PRESIDING OFFICER HAMILTON: I want to clarify something that -- several of the speakers have alluded to the Review Committee, and I think it would be worthwhile just to tell everyone what the Review Committee was. This was a group of, oh, about 24, 25, 26 people -- it fluctuated as people dropped off and wished to be added, that was formed in November/December of 1987. I was not at the project at that time, but I think it was formed under Bob Lord, my predecessor. And this Review Committee had a wide representation, including citizens, scientists, environmental interests, state and city people, engineers and developers, real estate people.

And we met seven times. The first meeting was, I gather, an introductory meeting. I was not there. That was on January 28th of '88. We met again in April of '88. We introduced the contractor and what the study was going to be. On July 28, 1988, we helped make the land use maps of the draft that you -- some of you have seen, these large fold-out maps. We met again in October and developed the

1 growth rate scenarios, which were particularly difficult
2 because we had to prognosticate what the growth of an area
3 is going to be 20 years down the line. And, I hope we've
4 done it well. It's impossible to predict exactly what the
5 future will bring. On April 6th, we met again and looked at
6 the alternative evaluations and saw what alternatives would
7 work and what would not, largely predicated upon cost and
8 environmental considerations. The 19th of June, we worked
9 on the draft alternative report. And, we met again just
10 last week, February 13, 1990. We were concerned with rates,
11 what performance requirements would be and some of the
12 concerns concerning the second update from 20MGD to 29 or 30
13 MGD.
14 And I want to take this time to thank most
15 sincerely the committee members. We would meet at 7:00 or
16 7:30 and wouldn't get through until sometimes 11:00, 11:30
17 in the evening. And an awful lot of hard work was put into
18 this by the committee members, and they waded through
19 volumes of technical material that we had generated and had,
20 I think, significant impact. It was a good group and lively
21 discussions and I think it certainly changed the direction
22 of many issues that we were examining. And it was an
23 excellent group to work with, and I think the process was
24 extremely helpful to us because many, many of the
25 recommendations the group put in -- the group requested, we

1 did, in fact, incorporate. I would say, most of the
2 recommendations that the group made were, in fact, included
3 in the draft.
4 We will -- I acknowledge the omissions that Ed
5 Harrison referred to, and we will, on the final draft, put
6 in the Eno Capacity Study that he referenced. We missed --
7 of the hundreds of documents that we reviewed, this one
8 slipped through, and we will correct that omission in the
9 final draft.
10 Boyd, do you have anything you want to say?
11 MR. DEVANE: John, I just want to thank you and
12 thank EPA and the consultant. I've been impressed
13 throughout this with the -- especially the patience of John.
14 I feel like he's been very open in considering comments,
15 diverse comments from many different people. I've just been
16 impressed with the way he's handled it, and I think he'll
17 consider the comments that he's heard tonight in preparing
18 the final document. I feel good about the process. I feel
19 good -- I reiterate his comments about the committee. It
20 was a learning process for us. I learned especially a lot
21 from attending those meetings, and I appreciate the time
22 that you've put in it, too.
23 PRESIDING OFFICER HAMILTON: All right. Thank
24 you very much.
25 I'm going to ask one more time if there is anybody

in the audience that wishes to have any comments.

(No response.)

PRESIDING OFFICER HAMILTON: Thank you very much. I'm going to adjourn the meeting at this time. Thank you for your attention.

(Whereupon, the hearing was adjourned at 7:58 p.m.)

REPORTER'S CERTIFICATE

CASE TITLE: Environment Impact Statement

HEARING DATE: February 20, 1990

LOCATION: Durham, North Carolina

I hereby certify that the proceedings and evidence are contained fully and accurately on the tapes and notes reported by me at the hearing in the above case before the Environmental Protection Agency.

DATE: March 1, 1990

William L. Warren

WILLIAM L. WARREN
Brandenburg & Hasty
231 Fairview Road
Ellenwood, GA 30049

APPENDIX A

tion with Fayetteville Street; extending then approximately four hundred (400) feet with the centerline of Fayetteville Street to its intersection with the I. L. "Buck" Dean Freeway.

c. *Planning requirements.* No development, land-disturbing activity, or site improvement activity shall occur within the district and no building permit shall be issued for construction or other activity within the district prior to the approval of a site plan for the subject property. All such site plans shall comply with the site plan provisions of Section 24-12.1 "Site Plans" and shall be approved by city council. All development activities or site work conducted after the approval of the site plan shall comply with the specifications of the approved site plan for the subject property. The subdivision review board may approve minor amendments to the approved site plan for development in the district.

d. *Building height limits.* Buildings within the downtown transition area district may exceed the maximum height limit established for the underlying zoning district provided a use permit is granted by the board of adjustment.

Before granting a use permit for a building to exceed the maximum height limit established for the underlying zoning district, the board of adjustment shall make the findings set forth in section 24-20.B.5 and shall also find that:

(1) The proposed plan provides adequate light, air and open space for an urban environment.
(2) The proposed plan adequately protects surrounding properties from adverse effects.
(3) The proposed plan provides for safe traffic and pedestrian movements.

8. Regulations for development within critical watershed areas.

a. *[Intent and purpose.]* In order that the City of Durham, Durham County and surrounding areas may continue to have a healthy economic climate, it is essential that adequate supplies of drinking water be assured. Con-

flicts can arise in meeting this goal when industrial, urban or suburban development occurs within areas that are close to water supply reservoirs. Sedimentation and erosion from development can and has reduced the storage capacity of reservoirs. Storm runoff from developed areas can introduce pollutants into the drinking water supply, making water treatment more complicated and expensive. Effluent from nearby wastewater treatment plants can release phosphorous and other pollutants into the water supply, making water either undrinkable, expensive to treat, or unusable for recreation purposes. Certain types of industrial land uses create the risk of chemical spills occurring and contaminating the nearby reservoir before the spill can be contained.

The purpose of the critical watershed district is to establish measures to protect the quality of the present and future water supply for the city, county and neighboring localities. Because these protective measures allow some latitude with land uses, and because the district is not intended to prescribe a specific land use, but rather a range of acceptable land uses, the critical watershed district is designed as an overlay district. Within the range of land uses which can be located within the district, there are established in this section performance standards which apply to development which occurs there.

b. *Establishment of district.* The critical watershed district may be established for certain lands within the watershed of any public drinking water reservoir which lies within or adjacent to Durham County. The district shall consist of two parts: (1) a Water Quality Critical area; and (2) a Limited Industrial Area.

A water quality critical area may be established for land which lies adjacent to the shoreline of the reservoir at normal pool level and extends within the watershed area of the reservoir to a point beyond either the ridge line of the reservoir watershed or one mile

from the shorelines of the reservoir at normal pool level, whichever is the shorter distance. The boundaries for the critical area shall be set at places readily identifiable on the official zoning map, such as streams, roads or property lines. In a case where the one mile distance is the shortest applicable distance, and where there are no nearby identifiable features on the zoning map to place the critical area boundary, said boundary may be set at the nearest identifiable map feature between one and two (2) miles from the shoreline at normal pool level.

A limited industrial area may be established for the remaining part of the watershed area of the reservoir. For portions of the watershed draining directly to the A II (water supply) segments of the reservoirs, any limited industrial area may extend from the water quality critical area to the boundaries of that portion of the watershed. For portions of the reservoir watershed not draining directly to the A II segments of the reservoir, the limited industrial area may extend from the water quality critical area boundary to a distance of up to one-half (½) mile from any publicly held lands acquired for the reservoir. The limited industrial area shall not overlap the water quality critical area, but shall be placed only in those areas meeting the above criteria which also extend beyond the water quality critical area. The boundaries for the limited industrial area shall be set at places readily identifiable on the zoning map, such as streams, roads or property lines.

c. *Site plan requirement.* Except for single-family detached homes constructed within a "minor" subdivision of less than five (5) parcels, all forms of development within the critical watershed district shall be required to have a site plan prepared and approved before any building permits or and disturbing activity takes place. All single-family homes exempted from the site plan requirement are still subject to all other requirements of this section and in order to receive a building per-

mit, a scaled drawing shall be submitted which indicates how the applicable requirements will be met. All site plans required under this section shall conform with the site plan provisions of section 24-12.1, and unless other requirements in the zoning ordinance specify otherwise, final approval authority shall be vested in the subdivision review board. All development activities or site work conducted after approval of the site plan shall conform with the specifications of said site plan. Minor amendments to established site plans for development in the district may be amended through action of the subdivision review board. For the purposes of this section, development shall be defined as any new building activity (1) outside any subdivisions of record which are at least partially complete and (2) consistent with the elements described in the definition for development found in section 24-1.

d. *Land use restrictions.* Generally, the underlying zoning district(s) shall control the land uses permitted, within the critical watershed district. Besides those limitations, however, there may be several other permitted use limitations which apply. Those further limitations are:

(1) *Water quality critical area.* In addition to the limitations on permitted uses prescribed for the underlying zoning district, the following restrictions shall apply to the water quality critical area portion of the district.

(a) *Industries.* No industries or any other businesses which distribute or warehouse industrial materials may be located within the water quality critical area.

(b) *Offices.* Offices shall only be permitted on land parcels of no less than one acre. Also, no office use on a single parcel of land shall have more than three thousand (3,000) square feet of gross floor area. Offices shall meet all other requirements of this section. These restrictions shall not be construed as to prohibit home occupations as defined in section 24-12P.

(c) *Commercial and service establishments.* Uses which provide for the sale of motor fuel for motor vehicles are prohibited within the water quality critical area. Other commercial and service establishments shall only be permitted on land parcels of no less than one acre. Also, no commercial or service establishment on a single parcel of land shall have more than three thousand (3,000) square feet of gross floor area. Commercial and office uses shall meet all other requirements of this section. These restrictions shall not be construed as to prohibit home occupations as defined in section 24-12P.

(d) *Residential.* There are no additional restrictions on the type of residential land use allowed within the water quality critical area.

(e) *Landfills or waste disposal.* No landfills or waste disposal facilities of any kind (except for septic tanks) may be located within the water quality critical area.

(2) *Limited industrial area.* In addition to the limitations on permitted uses prescribed in the underlying zoning district, the following restrictions shall apply to the limited industrial area.

(a) *Industries.* Only those industries which do not use, store or produce quantities or substances equal to or exceeding the threshold amounts listed on the CERCLA or Michigan Lists of hazardous materials may be located within the limited industrial area within a use permit. For industries classified as "Tier III" industries (which excludes industries using hazardous wastes and industries using or producing substances which present an immediate hazard to health, safety or the environment), which use or produce one or more substances on the above lists in at least the threshold amounts, a use permit from the board of ad-

justment shall be required. No Tier I or II industries shall be allowed within the limited industrial area.

In addition to the normal review criteria considered for the use permit, the board shall consider the special requirements for hazardous materials uses found in section 24-12KK of the zoning ordinance. The board, in issuing such use permit, may designate conditions it feels are reasonable and appropriate to ensure continued compliance with the requirements for the use permit, as described in section 24-12KK.2.

(b) *Offices.* There are no additional restrictions on the type of office land uses allowed within the limited industrial area.

(c) *Commercial and service establishments.* There are no additional restrictions on the type of commercial and service establishments allowed within the limited industrial area.

(d) *Residential.* There are no additional restrictions on the type of residential land use allowed within the limited industrial area.

(e) *Toxic or hazardous waste disposal.* No facilities which dispose of toxic or hazardous wastes may be located within the limited industrial area.

e. *Impervious surface limitations.* In order to prevent an excessive amount of stormwater runoff from damaging the water quality of the reservoirs, it is necessary to encourage as much infiltration as possible of runoff from hard surfaces onto land areas which can absorb and filter runoff. For the purposes of this section, an impervious surface is defined as a surface composed of any material that impedes or prevents natural infiltration of water into the soil. Impervious surfaces may include, but are not limited to: Roofs, streets, parking areas, tennis courts, driveways, patios, sidewalks, and any concrete, asphalt or compacted gravel surface. Im-

pervious surface calculations for an individual development, shall be cumulative for original construction or any subsequent additions which are made. The following impervious surface limits shall be applied to the critical watershed district as specified below.

(1) *Water quality critical areas.* There shall be a limitation of no more than six (6) per cent of the land area of that portion of a single development located within the boundaries of the water quality critical area which may be covered by an impervious surface. Roof areas of residential buildings may be excluded from the impervious surface calculations if roof runoff is kept from directly or indirectly entering street or parking/driveway drainage systems, but rather is directed to infiltrate the first one inch of stormwater across lawn or natural vegetation areas within the confines of the particular development in which the roof is located.

(2) *Limited industrial areas.*

(a) For a development or portion of a development within the limited industrial area which does not have public sewer service connected to it, there shall be a limitation of no more than twelve (12) per cent of the land area of that development within the limited industrial area which is covered by an impervious surface.

(b) For a development or portion of a development within the limited industrial area which does have public sewer service connected to it, there shall be a limitation of no more than thirty (30) per cent of the land area of that development within the limited industrial area which is covered by an impervious surface.

(c) Exceptions to the impervious surface limitations specified in (a) and (b) above may be granted by city council, upon recommendation from the subdivision review board. Consideration of whether to grant such relief shall be

based on a demonstration, to the council's satisfaction, that the site plan reflects special features to safeguard against contamination of stormwater leaving the property, including the infiltration, retention or detention of the first one-half (½) inch of stormwater runoff from impervious surfaces.

f. *Special runoff and drainage control requirements.* It is necessary to impose several requirements on development in the critical watershed district in order to prevent damage to water quality that is not necessarily attributed to an individual property within a development. These requirements are as specified below.

(1) *Stormwater runoff retention.* For development within the water quality critical area, measures shall be employed to infiltrate or retain the first one-half (½) inch of stormwater runoff from impervious surfaces during a storm occurring within a twenty-four-hour period. For development within the limited industrial area, measures shall be employed to infiltrate, retain or detain (detention being least preferred) the first one-half (½) inch of stormwater runoff. Methods to accomplish that infiltration, retention or detention shall be shown on the site plan. The area to which this requirement shall apply may be for each individual lot within a single development, or, the development as a whole. If the developer elects to satisfy this requirement for the development as a whole, the site plan shall indicate how any devices or structures used to accomplish the retention or infiltration shall be maintained.

(2) *Reserved.*

(3) *Street runoff and drainage.* New streets constructed within the water quality critical area shall not require curb and gutter. New streets which cross perennial streams within the water quality critical area shall be designed in such a way to avoid direct runoff from pavement surface into the stream

it crosses. Such design features shall be indicated on the site plan.

(4) *Underground fuel or chemical tanks.* There shall be no underground fuel or chemical storage tanks allowed within either the water quality critical area or the limited industrial area. For the purposes this section, underground refers to the burial of such tanks below the surface of the ground or the covering of them by a berm built above grade. Spill containment measures (i.e. dikes, double-lined tanks, etc.) must be taken for any fuel or chemical tank.

g. *Sewer service limitations.* Several limitations on sewer service and wastewater treatment facilities are imposed within the critical watershed district in order to prevent discharges of untreated or inadequately treated wastewater into the water supply, and to prevent dense urban development patterns from encroaching into the district, creating risks of stormwater runoff contamination. Those limitations and restrictions are described below.

(1) *Water quality critical areas.* The following sewer facilities restrictions shall apply within the water quality critical area portion of the district.

(a) *Wastewater treatment facilities.* No new public or private wastewater treatment plants or community sewage treatment facilities of any kind shall be allowed.

(b) *Sewer service.* No sewer lines shall be extended into the water quality critical area, except for cases meeting either of the following two (2) criteria:

(i) Public gravity flow sewer lines to serve a development pursuant to a contract between the city and a developer which was executed prior to June 1, 1987, may be allowed, subject to such limitations and conditions as the city council may prescribe.

(ii) Public gravity flow sewer lines may be extended to an already existing use or

structure for which a health hazard has been documented by the county health department, subject to city council approval.

(2) *Limited industrial areas.* The following sewer facilities restrictions shall apply within the limited industrial area portion of the districts.

(a) *Wastewater treatment facilities.* No privately owned discharging wastewater treatment facilities shall be allowed within the limited industrial area, and no expansions of existing private discharging wastewater treatment facilities shall be allowed.

(b) *Industrial pretreatment plants.* Pretreatment facilities for use by industrial firms to prepare wastewater for discharge into the public wastewater collection or treatment system shall be allowed within the limited industrial area.

(c) *Discontinued use of private surface discharge facilities.* After a reasonable time to comply is set by the city council, no person shall continue to operate or use a private surface-discharge sewage treatment system when publicly owned sewer lines are extended to or adjacent to the property served by the private system.

h. *Application of these regulations to project partially complete.* For any development which has received before August 13, 1984, either preliminary plat approval or site plan approval, and which is at least partially complete, any subsequent phases of said development included in the plat or plan which was approved may be completed without being subject to the additional regulations imposed in the critical watershed district. Any additions, expansions, or phases which deviate significantly from a site plan or preliminary plat approved before that date shall be subject to the critical watershed district regulations. The subdivision review board shall make the determination as to whether any change from a previously approved plat or plan is significant. A development shall be deemed at least partially com-

plete if occupancy permits have been issued for any of the structures contemplated in the approved plat or plan.

9. Stream buffer area.

a. *Buffer required.* A permanent undisturbed buffer area shall be provided along both sides of all streams. The purpose of this buffer area shall be to provide for infiltration of storm water into the ground, to help maintain a stream's capacity for carrying off storm water by reducing sedimentation, and to improve water quality by filtering out pollutants before they reach the stream. Within the required buffer area, no clearing or grading other than selective thinning and ordinary maintenance of existing vegetation shall be permitted.

b. *Width of buffer.* The width of the required buffer area shall be based on the size of the drainage basin served by a stream and shall be determined as follows:

(1) *Major streams.* A buffer area which is a minimum of fifty (50) feet wide shall be provided parallel to the channel of all major streams. The width of this buffer area shall be measured from the edge of the stream bank. Major streams shall be defined as those watercourses which have a drainage basin of at least one (1) square mile and are those streams for which floodway and floodway fringe boundaries are established on the official City of Durham Flood Boundary and Floodway Maps.

(2) *Minor streams.* A buffer area which is a minimum of twenty-five (25) feet wide shall be provided parallel to the channel of all minor streams. The width of this buffer area shall be measured from the edge of the stream bank. Minor streams shall be defined as those watercourses which have a drainage basin of less than one (1) square mile and greater than fifty (50) acres.

c. *Variance from buffer requirements.* In a case where an individual property has been rendered unusable due to the establishment of the buffer area, and where a

proposed use would otherwise be in compliance with existing zoning ordinances, there shall be grounds for a variance, provided that the conditions set forth in section 24-20.C. "Variances" of the zoning ordinance are met.

The board of adjustment shall grant the minimum variance necessary to afford appropriate relief under this section. The board may attach such reasonable conditions to the grant of a variance as it deems necessary to achieve the purposes of this section. Variances which involve construction within established floodway fringe districts shall be granted only in compliance with the floodway requirements of section 24-4.D.4.

d. *Uses permitted by right.* The following developments are permitted as a matter or right in stream buffer areas: Streets, driveways, bridges, culverts, overhead utility lines, railway lines, creek and storm drainage facilities, stream obstruction removal, stream reconstruction, sewage or water treatment plant outlets, water supply intake structures, recreation uses and other similar public, community or utility uses. Such developments shall be designed in a manner which minimizes intrusion into the required buffer area. (Ord. No. 5055, §§ 3, 10, 1-2-79; Ord. No. 6289, § 1, 10-3-83; Ord. No. 6947, § 1, 9-5-84; Ord. No. 6472, § 1, 9-6-84; Ord. No. 7610, §§ 1, 2, 5-6-85; Ord. No. 6919, § 1, 5-5-86; Ord. No. 6984, § 1, 6-16-86; Ord. No. 7211, §§ 5—7, 5-18-87; Ord. No. 7271, § 1, 7-28-87; Ord. No. 7299, § 1, 8-17-87; Ord. No. 7374, § 1, 11-16-87; Ord. No. 7428, § 3, 12-7-87; Ord. No. 7504, § 1, 5-16-88; Ord. No. 7647, § 2, 10-3-88; Ord. No. 7934, § 1, 10-16-89)

Sec. 24-4.1. Rural district.

A. *Purpose and intent.* The purpose of the rural districts is to protect and preserve the open, rural character of nonurban land; to protect and preserve agricultural lands, horticultural lands and forest lands for the performance or maintenance of their functions and to encourage the location of such uses in areas of least conflict with potential urban uses, and to control, through the

APPENDIX B

GUIDELINES FOR OBTAINING A PROTECTIVE SURFACE WATER CLASSIFICATION

North Carolina Department of
Environment, Health, and Natural Resources
Division of Environmental Management
Water Quality Section

DECEMBER, 1987

Revised
September, 1989

This document has been approved

R. Paul Wilms
Director

30 October 1989
Date

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PURPOSE

The purpose of the water supply (WS) protection program is to provide an opportunity for communities to work together with the state in providing enhanced protection for their water supply from pollution sources. If local governments develop a watershed management program that controls pollutants from nonpoint sources in their particular watershed, the state will control the number and type of point sources allowed in the watershed. Combining the efforts of these governing bodies should provide and maintain a desirable level of watershed protection.

The guidelines presented here are not rules, but are minimum criteria that should be used by local governments as a pattern for establishing their individual water supply watershed protection standards. However, General Statue 143, ammended June 23, 1989, will establish mandatory minimum management requirements by January 1, 1991. By July 1, 1992 all local governments must have approved local water supply management and protection ordinances that at least meet the minimum mandatory requirements. It is anticipated that mandatory requirements will be similar to the requirements presented in this document.

WS CLASSIFICATION

New water supply classifications became effective February 1, 1986 and have three classes (WS-I, WS-II and WS-III). These classes are defined according to the amount and types of permitted point source discharges as well as a requirement to control nonpoint sources of pollution. Class WS-I watersheds must have no point source discharges. Domestic discharges (including schools and individual homes) and approved non-process (cooling) water discharges are allowed in Class WS-II watersheds. In addition, WS-I and WS-II watersheds must have local land use management programs to protect water supplies from nonpoint sources of pollution. All nonpoint source control programs must be approved by the Environmental Management Commission (EMC) as part of public proceedings to reclassify the water body.

Class WS-III waters are stream segments with no categorical prohibitions on point source discharges in the watersheds. Local nonpoint source control programs are not required; however, in reclassification proceedings for WS-III waters, a detailed evaluation of point sources including toxic substances is conducted. While not required, the implementation of a nonpoint source control program for portions of the watershed, particularly near the water supply intake or in rapidly developing areas, is highly recommended.

INITIAL CHANGES

All waters previously classified as A-I became Class WS-I when the water supply classes were revised. At present, these waters are considered to have a nonpoint source management program which requires the watershed to remain undisturbed and uninhabited (since that was the requirement for Class A-I

waters). All other waters previously classified as A-II became Class WS-III. Many of these waters may qualify for either the WS-I or WS-II classification. Reclassification of WS-III waters to a more protective class is initiated on the request of a local water authority or government followed by a detailed watershed evaluation by DEM and the development of a watershed protection program by local governments. Once the official resolution is received from the local governing body, any new application for an NPDES permit (point source discharge) in a proposed WS-I or WS-II watershed will be closely evaluated and may not be acted on until the reclassification procedure is complete.

ACTIONS NEEDED

There are five main actions local government must take in order for the state to proceed with the local government's request. These actions include:

1. collecting water supply information,
2. determining the most appropriate WS classification based on state guidelines,
3. developing control strategies,
4. adopting and implementing control strategies, and
5. submitting a proposed protection package to the EMC.

In collecting water supply information, a community must define its actual water supply needs over a reasonable planning period, determine all potential water supply sources and describe the selected watershed in detail. The next action is to determine the appropriate "WS" classification. This may require assistance by DEM or other state agencies for specific data needs, evaluation of the data base by the state, and state recommendations for classification of the watershed. The third action (develop control strategies) includes specific strategies for controlling nonpoint sources of pollution. The fourth action is adoption/implementation of these strategies by local government and adjoining jurisdictions within the watershed. The final local government action is to submit the watershed management package to the EMC for its preliminary assessment.

The state will take two actions after the final local watershed protection plan is submitted to DEM and the EMC. First, public hearing(s) will be held in the vicinity of the water supply to provide the EMC with oral and written comments from the public about the proposed water supply classification. After all comments are summarized in the proceedings report, the hearing officer will review the document and any other related material. Upon completion of the review, the hearing officer will submit the local water supply protection plan and the reclassification action along with his or her recommendation to the EMC for appropriate action. Table 1 summarizes the state and local actions needed.

Table 1

Actions Needed by Local and State Government

I. Local Government Actions

A. Collect Water Supply Information
1. Define water needs (projected volume over time) [1]
2. Determine potential water supply sources (location & yield) [1]
3. Define specific watershed with respect to:
a) land use [2]
b) point sources [3]
c) nonpoint sources [3,4]
d) water quality [3]

B. Determine Appropriate WS Classification [3]
1. State will provide assistance with specific watershed data needs if necessary
2. Evaluate baseline data
3. Recommend classification (WS-I, WS-II, WS-III)

C. Develop Control Strategies
1. Point sources [3]
2. Non-point sources [3,4]

D. Adopt and Implement Control Strategies
Adopt necessary regulations and ordinances to control the sources of nonpoint source pollution [2,3]

E. Submit Proposed Classification Package to the Environmental Management Commission for Preliminary Assessment

II. State Actions

A. Provide Guidance and Technical Assistance

B. Hold Public Hearing(s)

C. Present Final Package to Environmental Management Commission for Appropriate Action

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1. Cooperation with Division of Water Resources
2. Cooperation with Division of Community Assistance
3. Cooperation with Division of Environmental Management
4. Cooperation with Divisions of Soil and Water Conservation, Land Resources, Environmental Health and Forest Resources

POINT SOURCE STRATEGY

The Division of Environmental Management (DEM) already has a well established point source program and is delegated authority by the U.S. Environmental Protection Agency to issue National Pollution Discharge Elimination System (NPDES) permits. This program regulates discharges by permitting, monitoring, and reducing pollutants from entering North Carolina's surface waters. By preventing or limiting the number and type of dischargers into WS-I and WS-II watersheds, the potential pollutants that are associated with these sources will be greatly reduced or eliminated from a water supply watershed. Large WS-III watersheds are also being investigated for possible toxic sources. Thorough investigations have already been completed on two Piedmont reservoirs documenting both point and nonpoint sources of toxicants with recommendations for future DEM action. Other WS-III watersheds will also be investigated in the future to document potential water quality problems.

Within a water supply (WS) watershed much greater scrutiny will be placed on any point source discharger. Close attention will be paid to compliance records, ambient data, bioassays, benthic macroinvertebrate evaluations, facility age and possible violations. The Division of Environmental Health in the Department of Environment, Health and Natural Resources must approve any discharger that locates within WS classified waters. In some cases, communities are actively trying to remove point source dischargers from their water supply watersheds. Methods have included connecting the facility to a sewer line; converting the discharger to a nondischarging land application system; or constructing a large nondischarging subsurface system. These strategies should also greatly reduce the risk of contamination from point source dischargers.

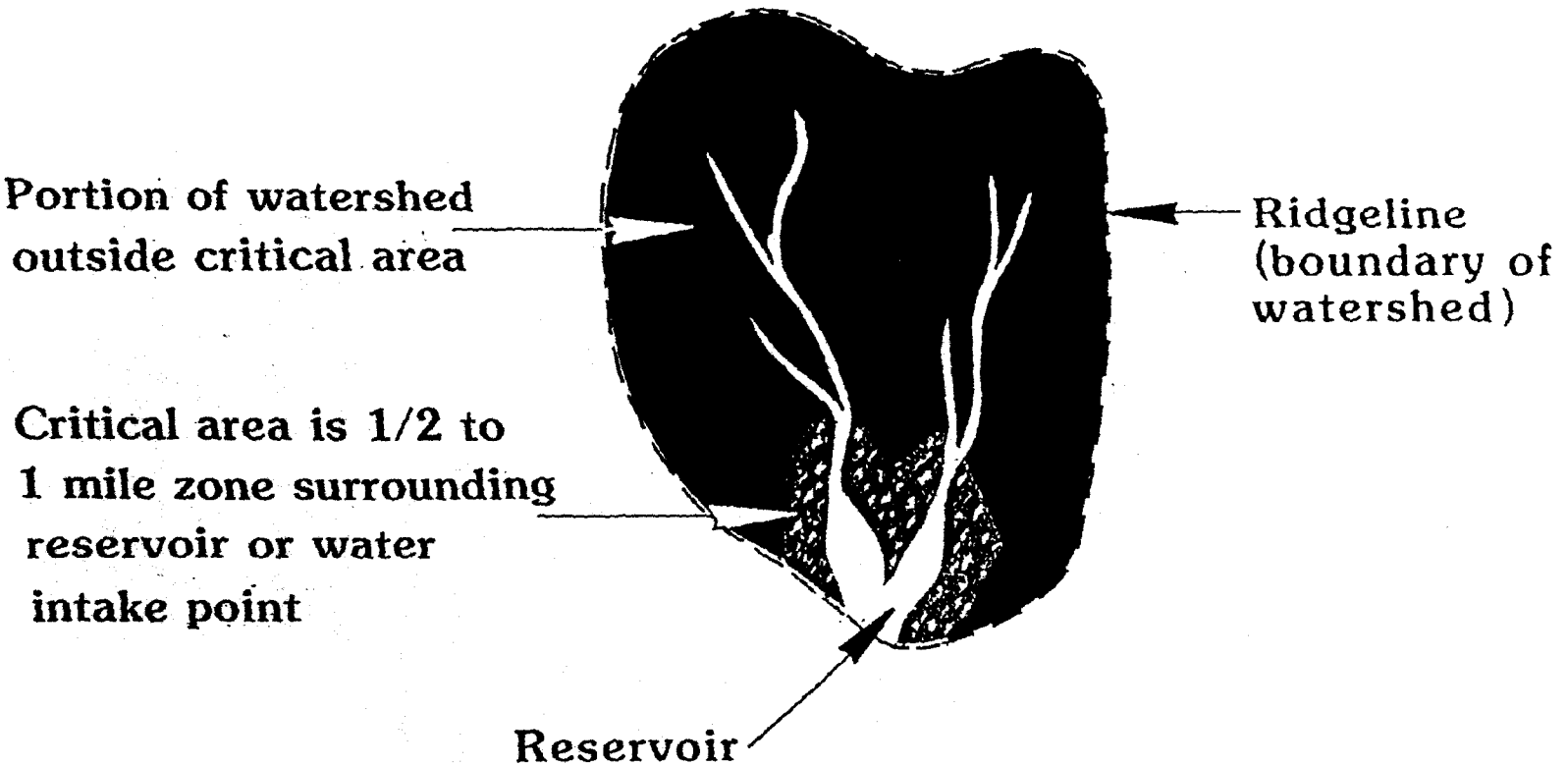
In addition the General Procedures section, 15 NCAC 2B .0101 (e)(5) designates all WS-I and WS-II water supply watersheds as High Quality Waters (HQW). The supplemental HQW classification is implemented to protect waters with quality higher than the standards. The provisions of the HQW classification can be found in the Antidegratation Policy, 15 NCAC 2B .0201 (d)(1). Within HQW watersheds new NPDES wastewater dischargers will be required to meet more stringent treatment standards as described in 15 NCAC 2B .0201 (d)(1)(B). Also, discharges from new single family residences will be prohibited. Those existing single family residences that must discharge will install a septic tank, dual or recirculating sand filters, disinfection and step aeration.

NONPOINT SOURCE STRATEGY

Local governments within a water supply watershed need to develop their own nonpoint source control program. All programs should address methods of controlling surface water runoff from new development. The statewide program guidelines only deal with surface water pollution sources; however, the Division of Environmental Health in the Department of Environment Health and Natural Resources and DEM's Groundwater Section also have

FIGURE 1

SURFACE WATER SUPPLY WATERSHED
(guideline concept)



regulations addressing subsurface water pollution sources.

DEM guidelines address two portions of a watershed: the portion outside the critical area, and the critical area as shown in Figure 1. Control measures for the portion of the watershed outside of the critical area should include: 1) density limits on new development; 2) natural vegetative buffers adjacent (both sides) to all perennial tributaries flowing to the reservoir or direct intake with width determined from a minimum 50 foot buffer plus 4 times the slope (ex. 5% slope, buffer = 50 + 4 * 5 = 70'); 3) hazardous materials inventories and certain restrictions placed on their use, storage and transportation; and 4) control of runoff from the rainfall from new development if the impervious surface is greater than the set standards. Generally, WS-I watersheds should only have low density development and therefore would not require structural controls. The primary structural means of controlling runoff should be the use of wet detention basins. Methods for sizing and designing wet detention basins can be found in the EPA document "Methodology for Analysis of Detention Basins for Control of Urban Runoff Quality", (September 1986) and the State of Maryland document "Feasibility and Design of Wet Ponds to Achieve Water Quality Control", (July, 1986) [both documents are available from DEM].

The critical area, defined as the area adjacent to the reservoir or water intake location, needs the greatest amount of protection because of its proximity to the water supply. The critical area should extend 1/2 to 1 mile from the reservoir's high water mark or intake point depending on the watershed size. A water supply watershed equal to or greater than 100 square miles should have a 1 mile critical area while watersheds less than 100 square miles could have as little as a 1/2 mile critical area. The reasoning behind this recommendation is that larger watersheds will have more potential sources of pollution; therefore, more protection should be provided near the intake by the creation of a larger critical area.

Control measures within the critical area should include: 1) no sewer connections (only allow septic tanks) except to deal with specific problems; 2) density limits on new development of 1 dwelling/2 acres (approx. 6% impervious surface); 3) natural vegetative buffers adjacent (both sides) to all perennial tributaries flowing to the reservoir or direct intake with width determined from a minimum 50 foot buffer plus 4 times slope (ex. for 5% slope, buffer = 50 + 4 * 5 = 70') (for more details of this method refer to Orange County Soil Erosion and Sedimentation Control Ordinance, see contact person listed in Appendix D); 4) no commercial or industrial areas within the critical area.

Check to see if skill appropriate contact person.

Specific strategies for WS-I, WS-II and WS-III watersheds have been compiled in the form of program outlines. These outlines are given in Tables 2 to 4. It should be noted that these represent the minimum acceptable requirements for a reclassification. Local governments are encouraged to take more stringent actions to provide greater protection (less risk of a pollution event degrading the water quality of the source).

Table 2. PROGRAM OUTLINE FOR WS-I

GOAL

Protect water supplies in undeveloped watersheds from being polluted by point and nonpoint sources and allow the watershed to remain in primarily an undeveloped state.

APPROACH

1. State Action - prevent any NPDES applications (point sources) from being permitted in a WS-I watershed.
2. Local action - develop, implement, and enforce a comprehensive nonpoint source control program to reduce water pollution from human activities within the watershed in areas such as agriculture, commercial & residential development, mining, landfills, forestry and toxic & hazardous materials.

LOCAL ACTIONS

1. Entire Watershed
   a) local sedimentation and erosion control program
   b) county soil and water plans for critical erosion areas,
   c) land use mapping and planning,
   d) recommended land use regulations
      1) development should be limited to 1 dwelling unit per 2 acres; small businessess or similar activities serving the population in the watershed should be restricted to built-upon area of about 6%; on rare ocasions built-upon area may exceed 6%, but development must control runoff from the first one inch of rainfall; development should not exceed 35% built-upon area,
      2) local governments should assume the ultimate responsibility for the proper operation and maintenance of all stormwater control structures in the watershed,
      3) a vegetative buffer should be maintained adjacent to all perennial tributaries; width may be determined by adding 50 to 4 times the slope (ex. for 5% slope, buffer width would be 50 + 4 * 5 = 70 ft),
      4) inventory should be maintained on all hazardous materials used and stored in the watershed and hazardous spill strategies should be developed as appropriate,
      5) no land application of sludge except where permitted with special conditions on a case-by-case basis where no practicable alternative exists,
      6) landfills should not be allowed (existing areas may be allowed on a case-by-case basis).
      7) a non-discharging system of treating wastewater is allowed, but only in cases were the treated wastewater originates within the watershed.
2. Critical Area - portion of watershed where water supply intake is located
   a) area to encompass one half or one mile from the reservoir's conservation pool elevation or one mile distance upstream from water intake site (1/2 mile if watershed is less than 100 square miles)
   b) recommended land use regulations
      1) no sewer connections except to deal with specific problem areas; limited number of small businesses,

2) no commercial or industrial development,
3) new development limited to a density of 1 dwelling/ 2 acres or 80,000 square foot lot size (approx. 6% built-upon area),
4) vegetative buffer around reservoir at least 100 feet and greater depending on soil type and slope; stream or river used as direct intake will have buffer 100 feet from banks landward for a distance of 1/2 or 1 mile upstream (1/2 mile if watershed is less than 100 square miles); if 50 plus 4 times slope is greater than 100 feet then this value should be used as the width of the buffer,
5) no permanent structures should be built in the vegetative buffer,
6) no industrial or commercial hazardous material use or storage (limited existing uses may be allowed),
7) no land application of sludge,
8) special ordinances to consider - floodway, sedimentation, unsuitable land, zoning, subdivision, mobile home, etc.

3. Special Use Provisions -New development not complying with the above requirements could be allowed on a case-by-case basis if special safeguards against contamination are proposed and approved by the appropriate state authority.

Table 3. PROGRAM OUTLINE FOR WS-II

A. GOAL

Protect water supplies in moderately developed watersheds from being polluted by point and nonpoint sources and allow the watershed to remain in a moderately developed state.

B. APPROACH

1. State Action - Limit the number and type of NPDES applications (point sources) to be permitted in a WS-II watershed to domestic discharges only. Exceptions may be made by the EMC for some mining and non-process industries. WS-II watersheds are classified as HQW and therefore NPDES wastewater dischargers are subject to treatment standards as set in 15 NCAC 2B .0201 (d)(1). ← include copy of rule in appendices.
2. Local Action -develop a comprehensive nonpoint source control program to reduce water pollution from human activities within the watershed from agriculture, commercial & residential development, mining, landfills, forest and from toxic & hazardous materials. Under some circumstances a water supply having a potential WS-II rating may request a WS-I classification. This would require documentation of steps to be taken in removing any point source (within 3 months). After one year, documentation must be submitted to DEM which indicates the progress toward removal of these point sources.

C. LOCAL ACTIONS (Nonpoint sources)

1. Entire Watershed
   a) local sedimentation and erosion control program,
   b) county soil and water plans for criteria erosion areas,
   c) land use mapping and planning,
   d) recommended land use regulations should include the following requirements:
      1) all new development should control the runoff from rainfall events as outlined below:

impervious %	runoff to control
12 - 30	1st 1/2"
30 - 70	1st 1"

      2) local governments should assume the ultimate responsibility for the proper operation and maintenance of all stormwater control structures in the watershed,
      3) vegetative buffer should be maintained adjacent to all perennial tributaries, with width in feet equal to 50 plus 4 times the slope (ex. for 5% slope, buffer width would be 50 + 4 * 5 = 70 ft),
      4) all hazardous materials that are used and stored in the watershed should be inventoried,
      5) the land application of sludge material is allowed, but should be limited to areas in the headwaters of the watershed away from the critical area and should primarily handle domestic and municipal sludge,
      6) new landfills are not allowed (existing areas may be allowed on a case-by-case basis)
2. Critical Area - portion of watershed where water supply intake is located,

a) area to encompass one half or one mile from reservoirs conservation pool elevation or one mile distance upstream from water intake (1/2 mile if watershed is less than 100 square miles)

b) recommended land use regulations,
   1) no sewer connections except to deal with specific problem areas; limited number of small businesses,
   2) no commercial or industrial development.
   3) new development limited to 1 dwelling/2 acres or 80,000 square foot lot size (approx. 6% built-upon area),
   4) vegetative buffer around reservoir at least 100 feet and greater depending on soil type and slope; stream or river used as direct intake will have buffer 100 feet from banks landward for a distance of 1/2 or 1 mile upstream (1/2 mile if watershed is less than 100 square miles), if 50 plus 4 times the slope is greater than 100 feet, then use this value as the width of the buffer,
   5) no permanent structure should be built in the vegetative buffer,
   6) no hazardous material use or storage (limited existing uses may be allowed),
   7) no land application of sludge material,
   8) special ordinances to consider - floodway, sedimentation, unsuitable land, zoning, subdivision, mobile home, etc.

3. Special Use Provisions - New development not complying with the above requirements could be allowed on a case-by-case basis if special safeguards against contamination are proposed and approved by the appropriate state authority.

D. STATE ACTIONS (Point sources)

1. Identify domestic dischargers and their effluent characteristics
   a. Review compliance and ambient water quality data related to facility.
   b. Review facility age and water quality violations.
   c. Seek additional physical, chemical or biological data that may be needed, especially toxicant and bioassay data.
2. Recommend methods to control any point source problem. This may include modifying treatment procedures, installing new equipment, upgrading an entire system, and wastewater treatment reliability measures may be needed. A spill/failure containment plan may also be required.
3. Evaluate the potential for future domestic dischargers (number, type, and location).

Table 4. PROGRAM OUTLINE FOR WS-III

A WS-III water supply would have the same requirements as the old A-II classification. This classification has no categorical restrictions on watershed development or discharges unlike the restrictions placed on WS-I and WS-II water supplies However, these watersheds also need protection from sources of point and nonpoint pollution. DEM has an ongoing program to investigate toxic substances in large watersheds (typically WS-III water supplies). To date, two Piedmont water supply sources have been evaluated. The resulting reports include in-depth evaluations of possible toxicant sources in the watersheds, analysis of available toxicant data from point and nonpoint sources, and recommendations for future DEM actions to protect these lakes from toxicants. Future studies will focus c other large watersheds to address similar water quality concerns

The nonpoint source control program for a WS-III watershed would be similar to one for a WS-II watershed and allow sewer extensions outside the critical area (designed to mimic the designation of critical areas for WS-II) . High potential for contamination of the water supply would prevent hazardous waste facilities from locating within the watershed. Point and non-point sources should be controlled within the critical area as these location are more sensitive to pollutant effects. However, more flexibility would be allowed for growth of urban areas if appropriate measures are taken to plan development and control runoff.

LEGAL MECHANISMS

There appear to be five legal bases that local governments can utilize in implementing a nonpoint source control program. They include general ordinance-making power, zoning authority, subdivision control, soil erosion/sedimentation control, and local board of health regulations. All these devices have certain jurisdictional questions that must first be answered. For assistance in deciding which legal mechanism to utilize, please contact the local Regional Office of the Division of Community Assistance or the Institute of Government in Chapel Hill.

FURTHER INFORMATION

Specific information about the different aspects of the water supply protection program can be obtained in the form of appendices to this basic guideline document. These subjects include definitions of water supply terms, background of new WS classification, communities with WS protection regulations, communities with surface water supplies, specific items for structural and nonstructural nonpoint source control measures, maps of WS-I, WS-II, and WS-III locations and water quality standards that apply. Please contact Steve Zoufaly, Coordinator, Water Supply Protection Program, DEHNR - DEM, P.O. Box 27687, Raleigh, North Carolina, 27611 or call (919) 733-5083 to obtain copies of this material.

APPENDIX C

STATE OF NORTH CAROLINA

COUNTY OF DURHAM

IN THE GENERAL COURT OF JUSTICE
SUPERIOR COURT DIVISION
89 CVS 03348

STATE OF NORTH CAROLINA, ex rel William W. Cobey, Jr., Secretary, Department of Environment, Health, and Natural Resources, and ex rel ENVIRONMENTAL MANAGEMENT COMMISSION,

Plaintiff,

v.

CITY OF DURHAM,

Defendant.

CONSENT JUDGMENT
(JOC # 89-03)

THIS CAUSE came on to be heard this day before the undersigned Judge of Superior Court upon joint appearance by the parties, who have announced to the Court that all matters in controversy between them as alleged in the Complaint have been settled and that they have consented to the entry of the Consent Judgment upon the following stipulations and terms:

STIPULATED FACTS

1. The plaintiff is the sovereign State of North Carolina. The Department of Environment, Health, and Natural Resources (DEHNR) is an agency of the State established pursuant to NCGS 143B-275, et seq; and William W. Cobey, Jr. is its Secretary. The Environmental Management Commission (EMC) is an agency of the State established pursuant to NCGS 143B-282, et seq

2. The defendant, City of Durham, in the County of Durham, North Carolina, is an incorporated municipality established and created under North Carolina law. The current mayor of Durham is Wilbur P. Gulley, upon whom service of process may be made pursuant to Rule 4(j)(5)a of the Rules of Civil Procedure.

3. The City of Durham holds North Carolina NPDES Permit No. NC0047597 for operation of an existing wastewater treatment works, the Farrington Road Wastewater Treatment Plant, and for making an outlet therefrom for treated wastewater to New Hope Creek, Class "C-NSW" waters of this State, in the Cape Fear River Basin. The City of Durham holds North Carolina NPDES Permit No. NC0026336 for operation of an existing wastewater treatment works, the Eno River Wastewater Treatment Plant, and for making an outlet therefrom for treated wastewater to the Eno River, Class "C-NSW" waters of this State, in the Neuse River Basin. The City of Durham holds North Carolina NPDES Permit No. NC0026310 for operation of an existing wastewater treatment works, the Little Lick Creek Wastewater Treatment Plant, and for making an outlet therefrom for treated wastewater to Little Lick Creek, Class "C-NSW" waters of this State, in the Neuse River Basin. The City of Durham holds North Carolina NPDES Permit No. NC0023841 for operation of an existing wastewater treatment works, the Northside Wastewater Treatment Plant, and for making an outlet therefrom for treated wastewater to Ellerbe Creek, Class

"C-NSW" waters of this State, in the Neuse River Basin. The City of Durham does not have approved facilities and permits to entirely accommodate sludge disposal for these wastewater treatment facilities. The City cannot consistently comply with Toxicity limits proposed in the NPDES Permits for these four wastewater treatment plants and these limits have been adjudicated by the City. The City is noncompliant with the final effluent limit for Mercury contained in the NPDES Permit at the Farrington Road WWTP and will not be able to meet the proposed limits for Nickel, Cadmium, and Lead contained in the draft NPDES Permit. Intensive water quality field and monitoring studies indicate that existing final limits for oxygen-consuming wastes are not protecting the dissolved oxygen standards in New Hope Creek, the Eno River and Ellerbe Creek. Nutrient inputs from the Farrington Road, Eno River and Northside wastewater treatment plants are contributing to local eutrophication problems and violations of the chlorophyll a and dissolved gases standards in the downstream receiving waters. The City wants to consolidate the four wastewater treatment facilities into two expanded facilities while eliminating the remaining two facilities. This consolidation of the plants may cause the two facilities to exceed their current design capacities for flow. This order will allow the orderly transfer of flows during the construction period. Compliance will require preparation of plans and specifications for and construction and operation

of, additional treatment works as well as detailed planning evaluations to comply with sludge disposal, toxicity reduction and pretreatment program requirements. The noncompliance with final effluent limitations and requirements constitutes causing and contributing to pollution of the waters of the State, and the City is within the jurisdiction of the Commission as set forth in NCGS Chapter 143, Article 21.

4. The City of Durham, due to its noncompliance and desire to expand its present waste treatment capacity, must provide financing for, plan and construct treatment works which will treat the wastewater presently being discharged and any additional wastewater desired to be discharged, to the extent that the City will be able to comply with final permit effluent limitations and requirements.

5. In response to the National Municipal Policy, 49 F.R. 3832, January 30, 1984, adopted by the United States Environmental Protection Agency for assuring compliance with the federal Clean Water Act, 33 U.S.C. §1342, by publicly-owned treatment works, and in recognition of that Act's July 1, 1988, deadline for compliance [§1311 of the Act initially required compliance by July 1, 1977, but extensions of time were granted until July 1, 1988 if construction was required for compliance, pursuant to §1311(i)], the Department and Commission have identified the Farrington Road Wastewater Treatment Plant, the Eno River Wastewater Treatment Plant, the Little Lick Creek Wastewater Treatment Plant, and the Northside Wastewater Treatment

Plant of the City of Durham as facilities which were not in compliance due to extraordinary circumstances. The City has appropriated funds and contracted with a consulting engineer who will investigate in detail the present procedures at the treatment facilities and the waste streams being received, and will make recommendations for changes and procedures necessary to bring the City into compliance with final effluent limitations. The City has also indicated that it will redraw boundaries of the service areas for the Eno River and Northside Wastewater Treatment Plants to address existing facilities and existing on-site wastewater treatment systems.

STIPULATED TERMS

6. The defendant, City of Durham, waives service of process, accepts service of the Complaint, and admits all averments contained in the Complaint.

7. The defendant, City of Durham, shall pay all court costs in this cause.

8. The parties agree that this Consent Judgment supersedes the requirements of any previously entered Special Orders by Consent and constitutes full settlement of all matters referred to in the Complaint, with the following caveat: the plaintiff reserves all rights to otherwise assess appropriate civil penalties pursuant to NCGS 143-215.6(a) in connection with the future operation of the

Farrington Road Wastewater Treatment Plant, the Eno River Wastewater Treatment Plant, the Little Lick Creek Wastewater Treatment Plant and the Northside Wastewater Treatment Plant by the defendant City of Durham, including but not limited to any failures to comply with interim effluent limitations and monitoring requirements, with the exception of the interim effluent limitation for effluent toxicity which both parties agree may be heard and considered by the court on an appropriate motion for relief of any civil penalties imposed by DEHNR. The parties further agree this Consent Judgment is supplementary to the obligations of the defendant under state and federal water quality statutes.

9. The defendant, City of Durham, agrees to perform all of the following:

(a) During the period of this Consent Judgment, meet and comply with the final terms and conditions of the permits for each of the City's wastewater treatment plants, except as such terms and conditions are modified by Attachments A, B, and C attached hereto.

(b) Upon entry of the Consent Judgment, undertake the following activities in accordance with the indicated time schedule:

1) Plant Construction

i) Submit plans and specifications to DEHNR, which are sufficient to obtain its approval, for improvements to the Farrington Road Wastewater Treatment Plant and the Northside Wastewater Treatment Plant, including description of funding sources no later than 15 months after issuance of NPDES Permits for the expanded facilities which allow a capacity of at least 20 mgd per plant.

ii) Award contracts no later than 6 months after approval of plans and specifications by DEHNR, for the respective plant.

iii) Begin construction (contractor on site and mobilizing) no later than 3 months after contract award for the respective plant.

iv) Complete construction (all treatment units necessary for achieving compliance are functional) no later than 3 years after construction initiation for the respective plant.

v) Cease the discharges from the Eno River Wastewater Treatment Plant and the Little Lick Creek Wastewater Treatment Plant no later than 1 month after completion of construction at the Northside WWTP.

vi) Attain compliance with all final effluent limitations at the Farrington Road and Northside WWTPs no later than 3 months after construction completion of the respective plant.

2) Sludge Management

i) Submit a short-term sludge management plan to DEHNR which is sufficient to obtain its approval, on or before October 1, 1989. This plan must include an inventory of all existing sludge including the identification of permanent and temporary sludge holding facilities, provisions for the disposal of all existing sludge and all sludge generated in the interim, and provisions for the return of all identified temporary sludge holding areas to their original state.

ii) Begin implementation of the approved short-term plan no later than 45 days after approval by DEHNR of the plan submitted under 2(i) above.

iii) Submit a plan for sludge disposal from the two expanded facilities, to DEHNR which is sufficient to obtain its approval on or before August 1, 1990.

This plan may be flexible in that alternative disposal methods may be proposed for various stages in the life of the expanded facilities.

iv) Complete disposal of all sludge in temporary holding facilities identified in the short-term management plan and return to their original state no later than 1 year after approval of the short-term sludge plan by DEHNR.

v) Begin implementation of the approved plan for disposal of sludge from the expanded facilities no later than 3 months after construction completion.

3) Toxicity Evaluation

i) Obtain the services of a consultant laboratory for the purpose of conducting toxicity reduction evaluations at the four wastewater treatment plants on or before September 1, 1989.

ii) Submit a plan for toxicity reduction evaluations for the four wastewater treatment plants to DEHNR which is sufficient to obtain its approval, which includes but is not limited to waste minimization, identification of toxic constituents and treatment for removal of toxicity on or before November 1, 1989. The proposals for the Eno River and Lick Creek WWTPs may include a bench scale treatment test using the proposed treatment scheme at the expanded Northside WWTP, and using influent concentrations in the approximate concentrations which these facilities will contribute to the Northside facility when connected.

iii) Begin implementation of the approved toxicity reduction evaluation plan no later than 60 days after approval of the plan by DEHNR.

4) Pretreatment

i) Submit a plan for a long-term monitoring program for all four wastewater treatment facilities to DEHNR which is sufficient to obtain its approval, to

collect data to derive removal efficiencies over each unit operation and collect data for upstream and domestic contributions for use in future headworks analyses, on or before August 1, 1989.

ii) Begin implementation of the approved monitoring plan no later than 30 days after approval by DEHNR.

(c) During the time in which this Consent Judgment is effective, comply with the interim effluent limitations and monitoring requirements contained in Attachments A, B, and C. Notwithstanding their inclusion in this Order, the requirements contained in Attachments A, B, and C shall be considered as normal permit limitations, with all rights, obligations, liabilities, procedures, and defenses under state and federal law available to both parties for violation of these limitations. Specifically, penalties assessed, if any, for violation of the requirements in Attachments A, B, and C may be subject to appropriate challenge under the Administrative Procedures Act. Additional monitoring may be required by the Director on a case-by-case basis. These new monitoring requirements may be contained in either a new NPDES permit or a letter from the Director.

(d) No later than 14 calendar days after any date or time identified for accomplishment of any activity listed in 9(b) above, submit to the DEHNR, attention Director of Division of Environmental Management, written notice of compliance or noncompliance therewith. In the case of noncompliance, the notice shall include a statement of the reason(s) for noncompliance, remedial action(s) taken, and a statement identifying the extent to which subsequent dates or times for accomplishment of listed activities may be affected.

(e) Submit semiannual reports to the Raleigh Regional Office containing information on sludge disposal activities including sludge quantities and origination, disposal locations, and waste sludge in storage. The report which will be due on February 1 of each year will be a comprehensive report of the last year's activities. The report due on August 1 of each year will be a brief summary of activities for the last 6 months.

(f) Submit quarterly reports to the Raleigh Regional Office concerning the progress made on the toxicity reduction evaluations.

(g) Reopen some or all industrial pretreatment permits if it is determined that the toxicity can be reduced most effectively through pretreatment at the industries.

(h) Enforce the water conservation provisions of the State Building Code as it applies to new residential construction (Volume 11 - Chapter IV 401.2, 401.3).

(i) Implement the pretreatment program as approved by the Director, including the enforcement of both categorical pretreatment standards and local limits. Modify the City's sewer use ordinance to adopt new and modified local limits as necessary to ensure compliance with State and Federal pretreatment regulations.

(j) Continue its program of infiltration/inflow identification and correction and submit reports to the DEHNR Raleigh Regional Office by the last day of each calendar quarter.

(k) Deny acceptance of any septage, sludge, or residue from any domestic or industrial septic tank, pretreatment facility, or wastewater treatment facility into the Eno River and Lick Creek Wastewater Treatment Plants or into any portion of the sewerage systems that are tributary thereto.

(l) Design of the expanded treatment facilities at the Farrington Road and Northside WWTPs shall include the necessary facilities for the positive removal of grease and scum from the affected process units and/or facilities to keep grease from entering the primary treatment units. Design shall include provision for acceptance of grease trap pumpage.

(m) Should it become necessary to by-pass treatment components, the City of Durham must obtain approval from the Director. Scheduled by-passes will only begin after prior approval has been received from the Director. Unforeseen by-passes must be reported to the Director as quickly as possible but in no case later than 24 hours after the event begins and must be followed up within five (5) working days with a written request for approval. By-passes conducted in accordance with the Director's approval will not constitute a violation of this consent judgment.

(n) Require connection of dwelling units within the City limits to the City's sanitary sewer system when the existing wastewater disposal system is determined to be inadequate or "failing" based upon written certification by either the Division of Environmental Management or the Durham County Health Department.

(o) Give priority for extension of sewer lines and installation of sewer taps to areas within the city limits when the Durham County Health Department identifies them through written notification to the City that a health hazard exists due to "failing" septic tank systems.

(p) Provide a certification for all new development projects (excludes City or County projects for areas with failing on-site treatment systems) in the Eno River Service Area requiring nondischarge permits for sewer lines indicating that the projects comply with State watershed protection guidelines regarding watercourse buffers and stormwater control (but not land use restrictions) for Class "WS-II" watersheds as defined in DEM Report No. 87-05 (December 1987) "Guidelines for Obtaining a Protective Surface Water Classification". Plans and specifications to verify compliance with watershed protection guidelines must also be provided. Submission of certifications and plans/specifications is only required until the Eno River Environmental Impact Statement is approved.

(q) Provide provisions detailing the City's redrawing of the service area boundaries of the Eno River WWTP and the Northside WWTP to reflect the pumping of 450,000 GPD of wastewater from the Mitsubishi facility to the Northside WWTP and to reflect the pumping of 410,000 GPD of wastewater from Durham County areas to the Northside WWTP to accommodate areas with failing on-site treatment systems.

(r) Provide provisions for pumping from the Farrington Road and Little Lick Creek WWTPs to the Northside WWTP if necessary. The allowance of this pumping is pursuant to the provisions of NCGS 143-215.67(b).

(s) Submit plans and specifications for pump stations and outfall lines from the Eno River, Lick Creek, or the Farrington Road WWTP within 90 days of the last day of the month in which the 12 mohth flow average reaches 2.13 mgd at the Eno River WWTP, 1.28 mgd at the Lick Creek WWTP, or 11.05 mgd at the Farrington Road WWTP. For the Eno Wastewater Treatment Plant, this can alternately include the submission of plans and specifications for a pump station and/or sewer lines from Mitsubishi and/or to serve Durham County's area of failing septic tanks.

(t) Advertise the above-mentioned pump stations and outfall lines for bids within 45 days of the last day of the month in which the 12 month flow average reaches either 12.35 mgd at the Farrington Road WWTP (unless construction of the Farrington Road WWTP expansion will be completed within 9 months), 1.43 mgd at the Lick Creek WWTP, or 2.38 mgd at the Eno River WWTP.

(u) Begin construction of any of the above-mentioned pump stations within 6 months of the last day of the month in which the 12 month flow average reaches either 12.35 mgd at the Farrington Road WWTP (unless construction of the Farrington Road WWTP expansion will be completed within 9 months), 1.43 mgd at the Lick Creek WWTP, or 2.38 mgd at the Eno River WWTP.

(v) Withdraw the request for an adjudicatory hearing concerning the limits contained in the current NPDES permits for the Farrrington Road, Eno River, Little Lick Creek, and Northside WWTPs by contacting the Office of Administrative Hearings no later than 14 days following issuance of this Consent Judgment.

10. This consent judgment may be reopened after the toxicity reduction is complete:

(i) to include additional construction dates, and an extension of the deletion of toxicity limits and/or relaxation of metals limits, if once the cause of the chronic toxicity is identified, it is determined that tested and proven treatment technologies are available to reduce the toxicity and the treatment can be performed most efficiently and cost effectively at the City of Durham Wastewater Treatment Plants; or

(ii) to extend the deletion of toxicity limits and/or relaxation of metals limits until construction will be completed to allow time for industries to install necessary treatment facilities if it is determined that the treatment can most efficiently and cost effectively

be conducted through pretreatment; or (iii) to include an extension of the deletion of toxicity limits and additional requirement for a toxicity reduction evaluation plan if implementing the approved toxicity reduction plan necessitates such extensions.

11. This consent judgment may be reopened to include additional time to submit a description of funding sources and any other dates affected, if adequate documentation of the need for additional time is submitted to the Director of the Division of Environmental Management.

12. Additional sources of waste flows are prohibited by NCGS 143-215.67(a). However, notwithstanding the entry of this Consent Judgment, the plaintiff Commission, or its delegate, may allow the City of Durham to accept additional waste flows to its Farrington Road Wastewater Treatment Plant, Eno River Wastewater Treatment Plant, Lick Creek Wastewater Treatment Plant and Northside Wastewater Treatment Plant, pursuant to the provisions of NCGS 143-215.67(b), where appropriate. In addition, waste flows to the Eno River Wastewater Treatment Plant may not exceed 2.5 MGD during the pendency of the Eno River Environmental Impact Statement. The Division of Environmental Management may review on a case-by-case basis each sewer line project submitted in the Eno River Service Area to determine whether it complies with State guidelines for watershed protection in Class "WS-II" watersheds."

13. Unless excused under Paragraph 14, the defendant City of Durham, shall pay the plaintiff Department and Commission the following stipulated penalties for failure to meet the deadlines set out in Paragraph 9(b):

	DEADLINE	PENALTY AMOUNT
1)	Plans and specifications	$100/day for first 7 days, and $500/day thereafter
2)	Award Contracts	same
3)	Construction initiation	same
4)	Construction completion	same
5)	Cease discharge from Eno River and Little Lick Creek WWTPs	same
6)	Compliance as of the date specified in paragraph 9 (b) (1) (vi)	
	Northside WWTP	$10,000 (single penalty)
	Farrington Road WWTP	$10,000 (single penalty)
7)	Short-term sludge management plan	$100/day for first 7 days, and $500/day thereafter
8)	Implement short-term sludge management plan	same
9)	Sludge management plan for the two expanded facilities	same
10)	Close out sludge storage areas	same
11)	Implement sludge management plan for the two expanded facilities	same
12)	Obtain consultant for TRE	same
13)	Submit TRE plan	same

14)	Implement TRE plan	same
15)	Submit pretreatment monitoring plan	same
16)	Implement pretreatment monitoring plan	same

Payments shall be made by certified check, made payable to the "Department of Natural Resources and Community Development", and shall be made within fourteen (14) days following demand by the plaintiff.

14. Stipulated penalties are not due if the defendant, City of Durham satisfies the plaintiff Department, or this Court, that non-compliance was caused by events or circumstances beyond the defendant's control. Such events or circumstances do not include failure to obtain state or federal grant funding, failure to schedule or pass necessary bond referenda, or other failures to obtain necessary financing(unless the consent judgment is reopened in accordance with paragraph 11), but may include delays caused by contractors provided that such delays could not be reasonably anticipated by the Defendant and that Defendant has made its best efforts to avoid and minimize such delays. Any dispute which arises concerning whether stipulated penalties are due will in the first instance be subject to informal negotiations between the parties, initiated by written request. If the parties cannot resolve the dispute within 30 days from the date of the request, the dispute may be referred by any party to the Court for judicial resolution. If exigencies require, a party may refer the

matter to the Court prior to the expiration of the 30-day period; and the 30-day period may be extended or shortened by mutual agreement of the parties or by Court order. The filing of a petition seeking dispute resolution as to the payment of stipulated penalties will not extend or postpone the defendant-City obligations, and upon dispute resolution the defendant-City shall have the burden of proof.

15. Notwithstanding any provision of this order to the contrary, in the event that, during the pendency of this Order, fines are assessed or other enforcement action is brought against the City for violation of the toxicity limits contained in Attachments A and B, the court may determine whether such fines may be imposed, and in what amount, taking into account among other things, the feasibility of compliance with the limits and the reasonableness of the City's efforts to comply.

16. The terms of this Consent Judgment may be enforced by and through the contempt powers of the Court.

17. This Consent Judgment shall terminate three (3) years and six (6) months after construction initiation; except that determinations of final compliance made by the State, payment of any due penalties by the Defendant, and request for dispute resolution may be made within 60 days thereafter. Following the expiration of this Consent Judgment, any permit violations will be subject to all enforcement procedures as allowed by G.S. 143-215.6.

IT IS THEREFORE, upon the consent of the parties and without the taking of any testimony, ORDERED ADJUDGED and DECREED;

1. The above stipulated facts and terms, as agreed to by the parties, are hereby made specific findings and orders of this Court.

2. The parties, with Court approval, may jointly modify the provisions of this Consent Judgment.

3. The Court shall retain necessary jurisdiction of this matter for purposes of enforcing the terms of the Consent Judgment; for purposes of determining any matters in dispute; and for purposes of determining any motions for further relief based on changes of circumstances.

This the 14 day of September 1989.

BY CONSENT:

FOR THE CITY OF DURHAM

City Manager

Assistant City Attorney

FOR THE DEPARTMENT OF
ENVIRONMENT, HEALTH, AND NATURAL RESOURCES
AND ENVIRONMENTAL MANAGEMENT COMMISSION

Director, Division of
Environmental Management

LACY H. THORNBURG
ATTORNEY GENERAL

ASSISTANT ATTORNEY GENERAL

Judge of Superior Court

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning on the effective date of the Order and lasting until December 31, 1989, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations Other Units (Specify) Monthly Avg.	Weekly Avg.	Monitoring Requirements Measurement Frequency	Sample Type	*Sample Location
Flow	10.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	7.0 mg/l	10.5 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	2.0 mg/l	3.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)			Monthly	Composite	E
Total Phosphorus			Weekly	Composite	E
Mercury			Monthly	Composite	E
Zinc			Monthly	Composite	E
Copper			Monthly	Composite	E
Cyanide			Monthly	Grab	E
Chromium	75.0 ug/l***	50.0 ug/l	Daily	Composite	E
Nickel			Daily	Composite	E
Cadmium			Daily	Composite	E
Lead			Daily	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E
Conductivity			*	Grab	U,D
Total Phosphorus			*	Grab	U,D
PO_4			*	Grab	U,D
TKN			*	Grab	U,D
NO_2 + NO_3			*	Grab	U,D
NH_3 as N			*	Grab	U,D
pH			*	Grab	U,D

* Sample locations: E - Effluent, I - Influent, U - Upstream fifty (50) feet above discharge, D - Downstream 1) at DN_2, above subimpoundment, 2)at NCSR 1107, 3) at DN5 five miles downstream.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

** The monthly average effluent BOD_5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

*** Daily maximum limitation.

**** See Attachment B, Pages 1 and 2 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April and July.

***** See Attachment C, Page 1 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on the effective date of the Order and lasting until December 31, 1989, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
Flow	10.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	10.0 mg/l	15.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	4.0 mg/l	6.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)			Monthly	Composite	E
Total Phosphorus			Weekly	Composite	E
Mercury			Monthly	Composite	E
Zinc			Monthly	Composite	E
Copper			Monthly	Composite	E
Cyanide			Monthly	Grab	E
Chromium	75.0 ug/l***	50.0 ug/l	Daily	Composite	E
Nickel			Daily	Composite	E
Cadmium			Daily	Composite	E
Lead			Daily	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E
Conductivity			*	Grab	U,D

C-21

Sample locations: E - Effluent, I - Influent, U - Upstream fifty (50) feet above discharge, D - Downstream at NCSR 1107.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

* The monthly average effluent BOD_5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

*** Daily maximum limitation.

**** See Attachment B, Pages 1 and 2 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April, and July.

***** See Attachment C, Page 1 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning on January 1, 1990 and lasting until December 31, 1990, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations Other Units (Specify) Monthly Avg.	Weekly Avg.	Monitoring Requirements Measurement Frequency	Sample Type	*Sample Location
Flow	13.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	7.0 mg/l	10.5 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	2.0 mg/l	3.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Mercury			Monthly	Composite	E
Zinc			Monthly	Composite	E
Copper			Monthly	Composite	E
Cyanide			Monthly	Grab	E
Chromium	75.0 ug/l****	50.0 ug/l	Daily	Composite	E
Nickel			Daily	Composite	E
Cadmium			Daily	Composite	E
Lead			Daily	Composite	E
Toxicity	*****		Quarterly	Composite	E
Pollutant Analysis	******		Annually		E
Oil & Grease			Monthly	Grab	E
Conductivity			*	Grab	U,D
Total Phosphorus			*	Grab	U,D
PO_4			*	Grab	U,D
TKN			*	Grab	U,D
NO_2 + NO_3			*	Grab	U,D
NH_3 as N			*	Grab	U,D
pH			*	Grab	U,D

C-23

Sample locations: E - Effluent, I - Influent, U - Upstream fifty (50) feet above discharge, D - Downstream 1)at DN2 above subimpoundment, 2) at NCSR 1107, 3) at DN5 five miles downstream.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

* The monthly average effluent BOD_5 and Total Suspended Residue concentrations shall not exceed 15% of the respective influent values (85% removal).

** Quarterly average limitation.

*** Daily maximum limitation.

**** See Attachment B, Pages 1 and 2 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April and July.

***** See Attachment C, Page 1 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on January 1, 1990 and lasting until December 31, 1990, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
Flow	13.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	10.0 mg/l	15.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	4.0 mg/l	6.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Mercury			Monthly	Composite	E
Zinc			Monthly	Composite	E
Copper			Monthly	Composite	E
Cyanide			Monthly	Grab	E
Chromium	75.0 ug/l****	50.0 ug/l	Daily	Composite	E
Nickel			Daily	Composite	E
Cadmium			Daily	Composite	E
Lead			Daily	Composite	E
Toxicity	*****		Quarterly	Composite	E
Pollutant Analysis	******		Annually		E
Oil & Grease			Monthly	Grab	E
Conductivity			*	Grab	U,D

C-25

Sample locations: E - Effluent, I - Influent, U - Upstream fifty (50) feet above discharge, D - Downstream at NCSR 1107.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

* The monthly average effluent BOD_5 and Total Suspended Residue concentrations shall not exceed 15% of the respective influent values (85% removal).

** Quarterly average limitation.

*** Daily maximum limitation.

**** See Attachment B, Pages 1 and 2 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April, and July.

***** See Attachment C, Page 1 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning on January 1, 1991 and lasting until 3 months after construction completion, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
Flow	13.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	7.0 mg/l	10.5 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	2.0 mg/l	3.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Mercury			Monthly	Composite	E
Zinc			Monthly	Composite	E
Copper			Monthly	Composite	E
Cyanide			Monthly	Grab	E
Chromium	75.0 ug/l****	50.0 ug/l	Daily	Composite	E
Nickel	75.0 ug/l****	50.0 ug/l	Daily	Composite	E
Cadmium	4.5 ug/l****	2.0 ug/l	Daily	Composite	E
Lead	34.5 ug/l****	25.0 ug/l	Daily	Composite	E
Toxicity	*****		Quarterly	Composite	E
Pollutant Analysis	******		Annually		E
Oil & Grease			Monthly	Grab	E
Conductivity			*	Grab	U,D
Total Phosphorus			*	Grab	U,D
PO_4			*	Grab	U,D
TKN			*	Grab	U,D
NO_2 + NO_3			*	Grab	U,D
NH_3 as N			*	Grab	U,D

C-27

Sample locations: E - Effluent, I - Influent, U - Upstream fifty (50) feet above discharge, D - Downstream 1)at DN2 above subimpoundment, 2) at NCSR 1107, 3) at DN5 five miles downstream.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

* The monthly average effluent BOD_5 and Total Suspended Residue concentrations shall not exceed 15% of the respective influent values (85% removal).

** Quarterly average limitation.

*** Daily maximum limitation.

***** See Attachment B, Pages 3 and 4 of 16; Chronic Toxicity (Ceriodaphnia) P/F at 99%, October, January, April and July.

****** See Attachment C, Page 1 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on January 1, 1991 and lasting until 3 months after construction completion, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
Flow	13.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	10.0 mg/l	15.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	4.0 mg/l	6.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Mercury			Monthly	Composite	E
Zinc			Monthly	Composite	E
Copper			Monthly	Composite	E
Cyanide			Monthly	Grab	E
Chromium	75.0 ug/l****	50.0 ug/l	Daily	Composite	E
Nickel	75.0 ug/l****	50.0 ug/l	Daily	Composite	E
Cadmium	4.5 ug/l****	2.0 ug/l	Daily	Composite	E
Lead	34.5 ug/l****	25.0 ug/l	Daily	Composite	E
Toxicity	*****		Quarterly	Composite	E
Pollutant Analysis	******		Annually		E
Oil & Grease			Monthly	Grab	E
Conductivity			*	Grab	U,D

C-29

* Sample locations: E - Effluent, I - Influent, U - Upstream fifty (50) feet above discharge, D - Downstream at NCSR 1107.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

** The monthly average effluent BOD_5 and Total Suspended Residue concentrations shall not exceed 15% of the respective influent values (85% removal).

*** Quarterly average limitation.

**** Daily maximum limitation.

***** See Attachment B, Pages 3 and 4 of 16; Chronic Toxicity (Ceriodaphnia) P/F at 99%, October, January, April and July.

****** See Attachment C, Page 1 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning on the effective date of the Order and lasting until December 31, 1990, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
Flow	2.5 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	5.0 mg/l	7.5 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	2.0 mg/l	3.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	7.0 mg/l	7.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Cadmium			Monthly	Composite	E
Chromium			Monthly	Composite	E
Nickel			Monthly	Composite	E
Lead			Monthly	Composite	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Silver			Monthly	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E

C-31

Sample locations: E - Effluent, I - Influent, U - Upstream, D - Downstream.

* The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

** Quarterly average limitation.

*** See Attachment B, Pages 5 and 6 of 16. Chronic Toxicity (Ceriodaphnia) Monitoring only at 72%, October, January, April and July.

****See Attachment C, Page 2 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on the effective date of the Order and lasting until December 31, 1990, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Flow	2.5 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	10.0 mg/l	15.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	4.0 mg/l	6.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Cadmium			Monthly	Composite	E
Chromium			Monthly	Composite	E
Nickel			Monthly	Composite	E
Lead			Monthly	Composite	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Silver			Monthly	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E

C-33

Sample locations: E - Effluent, I - Influent, U - Upstream, D - Downstream.

* The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

** Quarterly average limitation.

*** See Attachment B, Pages 5 and 6 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 72%, October, January, April and July.

****See Attachment C, Page 2 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning January 1, 1991 and lasting until 1 month after construction completion of the Northside WWTP, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Flow	2.5 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	5.0 mg/l	7.5 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	2.0 mg/l	3.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	7.0 mg/l	7.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)	***		Monthly	Composite	E
Total Phosphorus	2.0 mg/l****		Weekly	Composite	E
Cadmium	6.3 ug/l****	2.8 ug/l	Daily	Composite	E
Chromium	104 ug/l****	69 ug/l	Daily	Composite	E
Nickel	104 ug/l****	69 ug/l	Daily	Composite	E
Lead	47 ug/l****	35 ug/l	Daily	Composite	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Silver			Monthly	Composite	E
Toxicity	*****		Quarterly	Composite	E
Pollutant Analysis	******		Annually		E
Oil & Grease			Monthly	Grab	E

Sample locations: E - Effluent, I - Influent, U - Upstream, D - Downstream.

The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal)

* Quarterly average limitation.

** Daily average limitation.

*** See Attachment B, Pages 7 and 8 of 16; Chronic Toxicity (Ceriodaphnia) P/F at 72%, October, January, April and July.

*** See Attachment C, Page 2 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on January 1, 1991 and lasting until 1 month after construction completion of the Northside WWTP, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Flow	2.5 MGD		Continuous	Recording	I or E
BOD, 5Day, 20°C **	10.0 mg/l	15.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH_3 as N	4.0 mg/l	6.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO_2 + NO_3 + TKN)	***		Monthly	Composite	E
Total Phosphorus	2.0 mg/l****		Weekly	Composite	E
Cadmium	6.3 ug/l****	2.8 ug/l	Daily	Composite	E
Chromium	104 ug/l****	69 ug/l	Daily	Composite	E
Nickel	104 ug/l****	69 ug/l	Daily	Composite	E
Lead	47 ug/l	35 ug/l	Daily	Composite	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Silver			Monthly	Composite	E
Toxicity	*****		Quarterly	Composite	E
Pollutant Analysis	******		Annually		E
Oil & Grease			Monthly	Grab	E

C-37

* Sample locations: E - Effluent, I - Influent, U - Upstream, D - Downstream.

** The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

*** Quarterly average limitation.

**** Daily average limitation.

***** See Attachment B, Pages 7 and 8 of 16; Chronic Toxicity (Ceriodaphnia) P/F at 72%, October January, April and July.

****** See Attachment C, Page 2 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning on the effective date of this order and lasting until December 31, 1990, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
Flow	1.5 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	5.0 mg/l	7.5 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	2.0 mg/l	3.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	6.0 mg/l	6.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E

C-39

Sample locations: E - Effluent, I - Influent, U - Upstream, D - Downstream at the bridge at SR 1814.

* The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

** Quarterly average limitation.

*** See Attachment B, Pages 9 and 10 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April and July.

****See Attachment C, Page 3 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on the effective date of this order and lasting until December 31, 1990, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
Flow	1.5 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	10.0 mg/l	15.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	4.0 mg/l	6.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	6.0 mg/l	6.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E

C-41

Sample locations: E - Effluent, I - Influent, U - Upstream, D - Downstream at the bridge at SR 1814.

The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

* Quarterly average limitation.

** See Attachment B, Pages 9 and 10 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April and July.

***See Attachment C, Page 3 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning on January 1, 1991 date of this order and lasting until 1 month after construction completion of the Northside WWTP, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
Flow	1.5 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	5.0 mg/l	7.5 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	2.0 mg/l	3.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	6.0 mg/l	6.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E

C-43

* Sample locations: E - Effluent, I - Influent, U - Upstream, D - Downstream at the bridge at SR 1814.

** The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

*** Quarterly average limitation.

**** See Attachment B, Pages 11 and 12 of 16; Chronic Toxicity (Ceriodaphnia) P/F at 99%, October, January, April and July.

*****See Attachment C, Page 3 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on January 1, 1991 and lasting until 1 month after construction completion of the Northside WWTP, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Flow	1.5 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	10.0 mg/l	15.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	4.0 mg/l	6.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	6.0 mg/l	6.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E

C-45

Sample locations: E - Effluent, I - Influent, U - Upstream, D - Downstream at the bridge at SR 1814.

* The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

** Quarterly average limitation.

*** See Attachment B, Pages 11 and 12 of 16; Chronic Toxicity (Ceriodaphnia) P/F at 99%, October, January, April and July.

****See Attachment C, Page 3 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

Stream samples shall be collected three times per week during June, July, August and September and once per week during the remaining months of the year.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning on the effective date of this order and lasting until December 31, 1989, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Flow	10.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	12.0 mg/l	18.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	8.0 mg/l	12.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus			Weekly	Composite	E
Mercury			Monthly	Composite	E
Cadmium			Daily	Composite	E
Chromium			Daily	Composite	E
Nickel			Daily	Composite	E
Lead			Daily	Composite	E
Cyanide			Monthly	Grab	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Toxicity	***		Quarterly	Composite	E
Pollutant Analysis	****		Annually		E
Oil & Grease			Monthly	Grab	E

C-47

* Sample locations: E - Effluent, I - Influent, U - Upstream see pages 41 and 42 of attachment A, D - Downstream see pages 41 and 42 of Attachment A.

** The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

*** See Attachment B, Pages 13 and 14 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April and July.

**** See Attachment C, Page 4 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on the effective date of this order and lasting until December 31, 1989, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
Flow	10.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	24.0 mg/l	36.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	16.0 mg/l	24.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus			Weekly	Composite	E
Mercury			Monthly	Composite	E
Cadmium			Daily	Composite	E
Chromium			Daily	Composite	E
Nickel			Daily	Composite	E
Lead			Daily	Composite	E
Cyanide			Monthly	Grab	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Toxicity	***		Quarterly	Composite	E
Pollutant Analysis	****		Annually		E
Oil & Grease			Monthly	Grab	E

* Sample locations: E - Effluent, I - Influent, U - Upstream see pages 41 and 42 of attachment A, D - Downstream see pages 41 and 42 of Attachment A.

** The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

*** See Attachment B, Pages 13 and 14 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April and July.

**** See Attachment C, Page 4 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning on January 1, 1990 and lasting until December 31, 1990, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Flow	10.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	12.0 mg/l	18.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	8.0 mg/l	12.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Mercury			Monthly	Composite	E
Cadmium			Daily	Composite	E
Chromium			Daily	Composite	E
Nickel			Daily	Composite	E
Lead			Daily	Composite	E
Cyanide			Monthly	Grab	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E

C-51

* Sample locations: E - Effluent, I - Influent, U - Upstream see pages 41 and 42 of attachment A, D - Downstream see pages 41 and 42 of Attachment A.

** The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

*** Quarterly average limitation.

**** See Attachment B, Pages 13 and 14 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April and July.

*****See Attachment C, Page 4 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on January 1, 1990 and lasting until December 31, 1990, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Flow	10.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	24.0 mg/l	36.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	16.0 mg/l	24.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Mercury			Monthly	Composite	E
Cadmium			Daily	Composite	E
Chromium			Daily	Composite	E
Nickel			Daily	Composite	E
Lead			Daily	Composite	E
Cyanide			Monthly	Grab	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Toxicity	****		Quarterly	Composite	E
Pollutant Analysis	*****		Annually		E
Oil & Grease			Monthly	Grab	E

C-53

* Sample locations: E - Effluent, I - Influent, U - Upstream see pages 41 and 42 of attachment A, D - Downstream see pages 41 and 42 of Attachment A.

** The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

*** Quarterly average limitation.

**** See Attachment B, Pages 13 and 14 of 16; Chronic Toxicity (Ceriodaphnia) Monitoring only at 99%, October, January, April and July.

*****See Attachment C, Page 4 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Summer: April 1 - October 31)

During the period beginning on January 1, 1991 and lasting until 3 months after construction completion, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Flow	10.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	12.0 mg/l	18.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	8.0 mg/l	12.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Mercury			Monthly	Composite	E
Cadmium	4.5 ug/l****	2.0 ug/l	Daily	Composite	E
Chromium	75.0 ug/l****	50.0 ug/l	Daily	Composite	E
Nickel	50.0 ug/l****	75.0 ug/l	Daily	Composite	E
Lead	34.5 ug/l****	25.0 ug/l	Daily	Composite	E
Cyanide			Monthly	Grab	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Toxicity	*****		Quarterly	Composite	E
Pollutant Analysis	******		Annually		E
Oil & Grease			Monthly	Grab	E

C-55

* Sample locations: E - Effluent, I - Influent, U - Upstream see pages 41 and 42 of attachment A, D - Downstream see pages 41 and 42 of Attachment A.

** The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15% of the respective influent values (85% removal).

*** Quarterly average limitation.

**** Daily maximum limitation.

***** See Attachment B, Pages 15 and 16 of 16; Chronic Toxicity (Ceriodaphnia) P/F at 99%, October, January, April and July.

**** See Attachment C, Page 4 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

ATTACHMENT A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Interim (Winter: November 1 - March 31)

During the period beginning on January 1, 1991 and lasting until 3 months after construction completion, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Flow	10.0 MGD		Continuous	Recording	I or E
BOD, 5Day, 20oC **	24.0 mg/l	36.0 mg/l	Daily	Composite	I,E
Total Suspended Residue **	30.0 mg/l	45.0 mg/l	Daily	Composite	I,E
NH3 as N	16.0 mg/l	24.0 mg/l	Daily	Composite	E
Dissolved Oxygen (minimum)	5.0 mg/l	5.0 mg/l	Daily	Grab	E,U,D
Fecal Coliform (geometric mean)	1000/100 ml	2000/100 ml	Daily	Grab	E,U,D
Residual Chlorine			Daily	Grab	E
Temperature			Daily	Grab	E,U,D
Total Nitrogen (NO2 + NO3 + TKN)			Monthly	Composite	E
Total Phosphorus	2.0 mg/l***		Weekly	Composite	E
Mercury			Monthly	Composite	E
Cadmium	4.5 ug/l****	2.0 ug/l	Daily	Composite	E
Chromium	75.0 ug/l****	50.0 ug/l	Daily	Composite	E
Nickel	75.0 ug/l****	50.0 ug/l	Daily	Composite	E
Lead	34.5 ug/l****	25.0 ug/l	Daily	Composite	E
Cyanide			Monthly	Grab	E
Copper			Monthly	Composite	E
Zinc			Monthly	Composite	E
Toxicity	*****		Quarterly	Composite	E
Pollutant Analysis	******		Annually		E
Oil & Grease			Monthly	Grab	E

C-57

* Sample locations: E - Effluent, I - Influent, U - Upstream see pages 41 and 42 of attachment A D - Downstream see pages 41 and 42 of Attachment A.

** The monthly average effluent BOD5 and Total Suspended Residue Concentration shall not exceed 15 of the respective influent values (85% removal).

*** Quarterly average limitation.

**** Daily maximum limitation.

***** See Attachment B, Pages 15 and 16 of 16; Chronic Toxicity (Ceriodaphnia) P/F at 99%, October, January, April and July.

****** See Attachment C, Page 4 of 4.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored daily at the effluent by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Upstream and downstream samples shall be grab samples.

ATTACHMENT A

INSTREAM MONITORING REQUIREMENTS - Final

During the period beginning on the effective date of this order and lasting until 3 months after construction completion, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)				
	Monthly Avg.	Weekly Avg.	Measurement Frequency	Sample Type	*Sample Location
BOD, 5Day, 20oC			three/week	Grab	U1,U2,U3
Dissolved Oxygen			three/week	Grab	U1,U2,U3
Fecal Coliform (geometric mean)			three/week	Grab	U1,U2,U3
Temperature			three/week	Grab	U1,U2,U3
Conductivity			three/week	Grab	U1,U2,U3

C-59

* Sample locations: U1 - East Club Boulevard, U2 - Glenn Road, U3 - Red Mill Road

There shall be no discharge of floating solids or visible foam in other than trace amounts.

INSTREAM MONITORING REQUIREMENTS - Final Summer (June 1 - September 30)

During the period beginning on the effective date of this order and lasting until 3 months after construction completion, the permittee is authorized to discharge from outfall serial number(s) - 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Other Units (Specify)		Measurement	Sample	*Sample
	Monthly Avg.	Weekly Avg.	Frequency	Type	Location
Dissolved Oxygen			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6
Temperature			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6
Conductivity			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6
Total Nitrogen			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6
Total Phosphorus			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6
NH3 as N			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6
TKN			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6
PO4			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6
pH			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6
Chlorophyll a			Weekly (am & pm)	Grab	U2, U3, U4, U5, U6

C-60

* Sample locations: U2 - Glenn Road, U3 - Red Mill Road, U4 - Old Railroad Trestle, U6 - I-85 or alternative site near mouth of Ellerbe Creek.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Chronic Toxicity Monitoring Requirement (Quarterly)

Pages 1 and 2 of Attachment B shall be effective from the effective date of this order until Decemeber 31, 1990.

The City of Durham shall conduct chronic toxicity tests using test procedures outlined in:

1. The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *February, 1987) or subsequent versions.

The effluent concentration defined as treatment two in the North Carolina procedure document is 99%. The City shall perform quarterly monitoring using this procedure to establish compliance with order condition. The first test will be performed within thirty days from the effective date of this Order. Subsequent tests will be performed in the months of October, January, April and July. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this Order will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention:
Technical Services Branch
North Carolina Division of Environmental Management
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if employed for disinfection of the waste stream.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this Order may be reopened and modified to include alternate monitoring requirements.

Note: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting(within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

Chronic Toxicity Testing Requirement (Quarterly)

Pages 3 and 4 of Attachment B shall be effective from January 1, 1991 until 3 months after construction completion.

The effluent discharge shall at no time exhibit chronic toxicity in any two consecutive toxicity tests, using test procedures outlined in:

1.) The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *February 1987) or subsequent versions.

The effluent concentration at which there may be no observable inhibition of reproduction or significant mortality is 99% (defined as treatment two in the North Carolina procedure document). The City shall perform quarterly monitoring using this procedure to establish compliance with the order condition. Tests performed on or after October 1, 1990 will be performed during the months of October, January, April and July. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM form AT-1 (original) is to be sent to the following address:

Attention: Technical Services Branch
North Carolina Division of
Environmental Management
P.O. Box 27687
Raleigh, N.C. 27611

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring test indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this order may be reopened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting(within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

In the event the City of Durham submits split/sample test results performed by two different certified labs and one result indicates a "pass" while the other result indicates a "fail", the AT-1 forms will be examined by Divisional Staff and if no protocol violations exist, the "pass" will be accepted.

Chronic Toxicity Monitoring Requirement (Quarterly)

Pages 5 and 6 of Attachment B shall be effective from the effective date of this order until December 31, 1990.

The City of Durham shall conduct chronic toxicity tests using test procedures outlined in:

1. The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *February, 1987) or subsequent versions.

The effluent concentration defined as treatment two in the North Carolina procedure document is 72%. The City shall perform quarterly monitoring using this procedure to establish compliance with order condition. The first test will be performed within thirty days from the effective date of this Order. Subsequent tests will be performed in the months of October, January, April and July. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this Order will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention:
Technical Services Branch
North Carolina Division of Environmental Management
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if employed for disinfection of the waste stream.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this Order may be reopened and modified to include alternate monitoring requirements.

Note: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting(within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

Chronic Toxicity Testing Requirement (Quarterly)

Pages 7 and 8 of Attachment B shall be effective from January 1, 1991 until 1 month after construction completion.

The effluent discharge shall at no time exhibit chronic toxicity in any two consecutive toxicity tests, using test procedures outlined in:

1.) The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *February 1987) or subsequent versions.

The effluent concentration at which there may be no observable inhibition of reproduction or significant mortality is 72% (defined as treatment two in the North Carolina procedure document). The City shall perform quarterly monitoring using this procedure to establish compliance with the order condition. Tests performed on or after October 1, 1990 will be performed during the months of October, January, April and July. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM form AT-1 (original) is to be sent to the following address:

Attention: Technical Services Branch
North Carolina Division of
Environmental Management
P.O. Box 27687
Raleigh, N.C. 27611

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring test indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing this monthly test requirement, will revert to quarterly in the months specified above.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this order may be reopened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting(within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

In the event the City of Durham submits split/sample test results performed by two different certified labs and one result indicates a "pass" while the other result indicates a "fail", the AT-1 forms will be examined by Divisional Staff and if no protocol violations exist, the "pass" will be accepted.

Chronic Toxicity Monitoring Requirement (Quarterly)

Pages 9 and 10 of Attachment B shall be effective from the effective date of this order until December 31, 1990.

The City of Durham shall conduct chronic toxicity tests using test procedures outlined in:

1. The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *February, 1987) or subsequent versions.

The effluent concentration defined as treatment two in the North Carolina procedure document is 99%. The City shall perform quarterly monitoring using this procedure to establish compliance with order condition. The first test will be performed within thirty days from the effective date of this Order. Subsequent tests will be performed in the months of October, January, April and July. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this Order will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention:
Technical Services Branch
North Carolina Division of Environmental Management
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if employed for disinfection of the waste stream.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this Order may be reopened and modified to include alternate monitoring requirements.

Note: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting(within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

Chronic Toxcity Testing Requirement (Quarterly)

Pages 11 and 12 of Attachment B shall be effective from January 1, 1991 until 1 month after construction completion.

The effluent discharge shall at no time exhibit chronic toxicity in any two consecutive toxicity tests, using test procedures outlined in:

1.) The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *February 1987) or subsequent versions.

The effluent concentration at which there may be no observable inhibition of reproduction or significant mortality is 99% (defined as treatment two in the North Carolina procedure document). The City shall perform quarterly monitoring using this procedure to establish compliance with the order condition. Tests performed on or after October 1, 1990 will be performed during the months of October, January, April and July. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM form AT-1 (original) is to be sent to the following address:

Attention: Technical Services Branch
North Carolina Division of
Environmental Management
P.O. Box 27687
Raleigh, N.C. 27611

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring test indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this order may be reopened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting(within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

In the event the City of Durham submits split/sample test results performed by two different certified labs and one result indicates a "pass" while the other result indicates a "fail", the AT-1 forms will be examined by Divisional Staff and if no protocol violations exist, the "pass" will be accepted.

Chronic Toxicity Monitoring Requirement (Quarterly)

Pages 13 and 14 of Attachment B shall be effective from the effective date of this order until December 31, 1990.

The City of Durham shall conduct chronic toxicity tests using test procedures outlined in:

1. The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *February, 1987) or subsequent versions.

The effluent concentration defined as treatment two in the North Carolina procedure document is 99%. The City shall perform quarterly monitoring using this procedure to establish compliance with order condition. The first test will be performed within thirty days from the effective date of this Order. Subsequent tests will be performed in the months of October, January, April and July. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this Order will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention:
Technical Services Branch
North Carolina Division of Environmental Management
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if employed for disinfection of the waste stream.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this Order may be reopened and modified to include alternate monitoring requirements.

Note: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting(within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

Chronic Toxicity Testing Requirement (Quarterly)

Pages 15 and 16 of Attachment B shall be effective from January 1, 1991 until 3 months after construction completion.

The effluent discharge shall at no time exhibit chronic toxicity in any two consecutive toxicity tests, using test procedures outlined in:

1.) The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *February 1987) or subsequent versions.

The effluent concentration at which there may be no observable inhibition of reproduction or significant mortality is 99% (defined as treatment two in the North Carolina procedure document). The City shall perform quarterly monitoring using this procedure to establish compliance with the order condition. Tests performed on or after October 1, 1990 will be performed during the months of October, January, April and July. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM form AT-1 (original) is to be sent to the following address:

Attention: Technical Services Branch
North Carolina Division of
Environmental Management
P.O. Box 27687
Raleigh, N.C. 27611

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring test indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this order may be reopened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting(within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

In the event the City of Durham submits split/sample test results performed by two different certified labs and one result indicates a "pass" while the other result indicates a "fail", the AT-1 forms will be examined by Divisional Staff and if no protocol violations exist, the "pass" will be accepted.