United States
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Region
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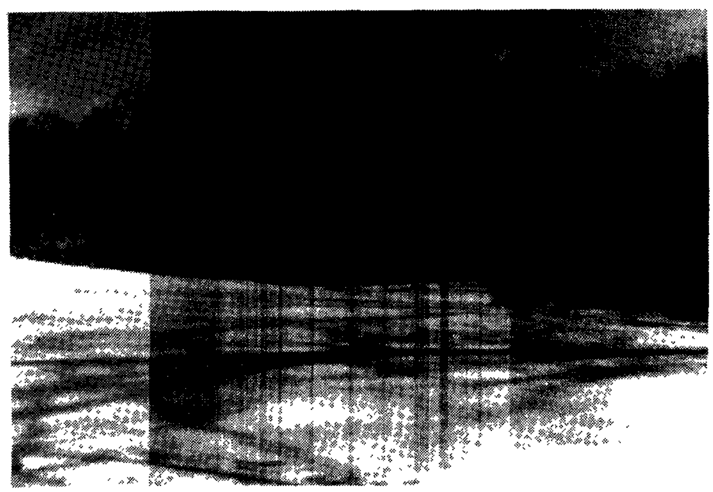
EPA

Environmental Impact Statement

Final

Cleveland Hilltop Planning Area, Ohio



FINAL ENVIRONMENTAL IMPACT STATEMENT

Cleveland, Ohio - Hilltop Facilities Planning Area

Prepared by the

United States Environmental Protection Agency

Region V

Chicago, Illinois

and

Science Applications International Corporation
McLean, Virginia

With

Triad Engineering Incorporated
Wauwatosa, Wisconsin

February 1988

Approved by:

for Frank M. Covington

Valdas V. Adamkus
Regional Administrator

EXECUTIVE SUMMARY

( ) Draft Environmental Impact Statement
(X) Final Environmental Impact Statement

US Environmental Protection Agency, Region V
230 South Dearborn Street
Chicago, Illinois 60604

1. NAME OF ACTION

Administrative (X)
Legislative ( )

2. LEGAL BASIS FOR ACTION

The National Environmental Policy Act of 1969 (NEPA) requires a Federal agency to prepare an EIS on "...major Federal actions significantly affecting the quality of the human environment...." In addition, the Council on Environmental Quality (CEQ) has established regulations (40 CFR Part 1500-1508) to guide Federal agencies in determinations of whether Federal funds or Federal approvals would involve a project that would significantly affect the environment. USEPA has developed its own regulations (40 CFR Part 6) for the implementation of the NEPA review. As noted above, USEPA Region V has determined that pursuant to these regulations, an EIS was required for the Hilltop project.

The Federal Water Pollution Control Act of 1972 (Public Law 92-500) established a uniform nationwide water pollution control program. Section 201 of the Act established grants for planning, design, and construction of water pollution control facilities. The Construction Grants program was an important impetus for planning improved wastewater collection and treatment facilities in Northeast Ohio.

3. PROJECT HISTORY

The Northeast Ohio Regional Sewer District (NEORSD), previously the Cleveland Regional Sewer District, was formed by court order in 1972 to conduct a program of pollution abatement in northeast Ohio. Subsequently, the NEORSD was designated by the U.S. Environmental Protection Agency (USEPA) as the lead agency to provide a program for wastewater management in Cleveland's Easterly Wastewater Treatment Plant service area. Subsequent NEORSD facilities planning divided the Cleveland metropolitan area into separate planning areas. Individual facilities plans were then prepared for each area.

Suburban communities to the east of Cleveland were included in the Easterly Separate Sewer Area (ESSA). NEORSD initiated facilities planning for the ESSA in 1977, with the goal of eliminating problems in the existing wastewater treatment and conveyance systems. Although the ESSA originally included the Creekside area, NEORSD concluded that a separate facilities planning approach for this area would be more cost-effective than a regional approach, and the Creekside area was dropped from the ESSA. The remaining area was termed the Heights/Hilltop Facilities Planning Area (see Figure 1). A chronologic listing of relevant facilities planning documents is provided in Table 1.

In 1981, a facilities plan was prepared for the Heights/Hilltop Facilities Planning Area (FPA), including all or portions of Cleveland, East Cleveland, Cleveland Heights, Gates Mills, Shaker Heights, University Heights, Mayfield Heights, South Euclid, Lyndhurst, Richmond Heights, Highland Heights, Mayfield, and Willoughby Hills. Additional facililities planning (including a Sewer System Evaluation Survey) for the Heights/Hilltop FPA was initiated in 1981, and submitted to Ohio EPA in 1983. During review, it was determined by Ohio EPA that a partitioned environmental assessment would be appropriate due to several unresolved issues concerning alternatives in the Hilltop portion of the project, as well as the extended project timeframe (calling for completion of the Hilltop interceptor in 1997). As a result, facilities planning activities were continued independently for the Heights Facility Planning Area (FPA) and for the Hilltop FPA.

The USEPA issued a Finding of No Significant Impact (FNSI) on the Heights FPA on August 29, 1984. The Heights interceptor will extend from the Easterly WWTP southward through Cleveland, East Cleveland, Cleveland Heights, Shaker Heights, and South Euclid. This FNSI approved a sewer segment along Green Road, between Euclid Avenue and Monticello Boulevard, called Contract G, but acknowledged that final sizing would depend on decisions made for the Hilltop FPA.

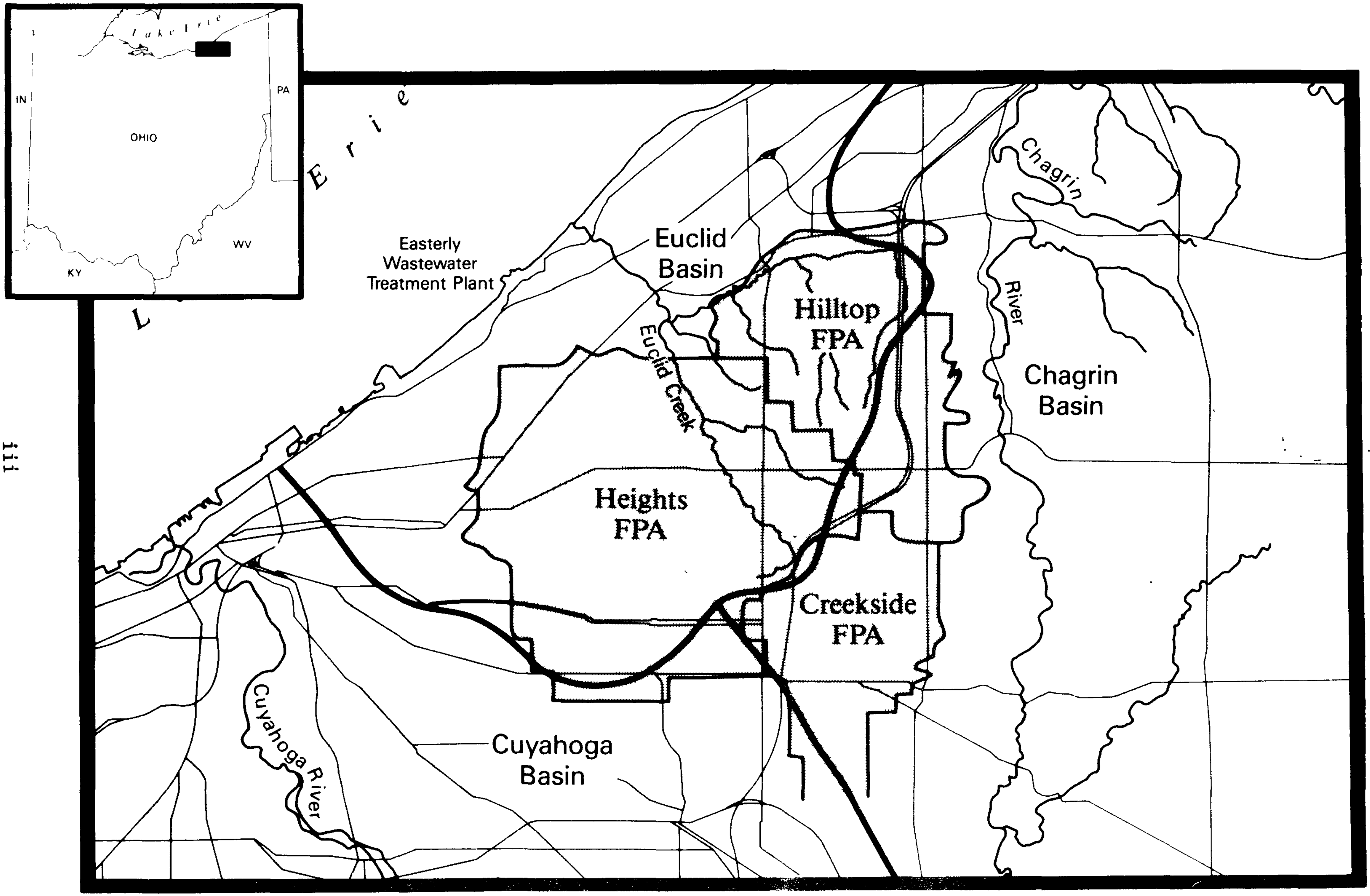


Figure 1. Hilltop, Heights, and Creekside
Facility Planning Areas and Associated Drainage Basins

Table 1. Facilities Planning Documents Relevant to the Hilltop Planning Area

TITLE	PREPARED BY	DATE
Easterly Separate Sewer Segment Wastewater Facilities Plan. Volume 1 - Environmental Inventory and Assessment	CH_2M-Hill	1978
Easterly Separate Sewer Segment Wastewater Facilities Plan. Volume 2 - Infiltration and Inflow Analysis	CH_2M-Hill	1978
Easterly Separate Sewer Segment Wastewater Facilities Plan. Volume 3 - Sewerage Study	CH_2M-Hill	1978
Easterly Separate Sewer Segment Wastewater Facilities Plan. Executive Summary	CH_2M-Hill	1981
Advanced Facility Planning Report. Easterly Separate Sewer Area, Supplemental Facilities Planning, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983
Advanced Facility Planning Report. Volume 1: Appendices A, B, C. Easterly Separate Sewer Area, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983
Advanced Facility Planning Report. Volume 2: Appendices D1, D2. Easterly Separate Sewer Area, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983
Supplemental Facilities Planning Report. Easterly Separate Sewer Area, Supplemental Facilities Planning, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983

Table 1. Facilities Planning Documents Relevant to the Hilltop Planning Area (Continued)

TITLE	PREPARED BY	DATE
Public Participation Programs Report. Easterly Separate Sewer Area, Supplemental Facilities Planning, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983
Water Quality Sampling Report. Easterly Separate Sewer Area, Sewer System Evaluation Survey, Advanced Facility Planning	Dalton, Dalton, and Newport	1984
Sewer System Evaluation Survey Report. Easterly Separate Sewer Area, Supplemental Facilities Planning, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1985

The Heights FNSI also acknowledged that planning for the Cleveland Easterly Wastewater Treatment Plant had not been completed, but that planning had demonstrated that flows from the Heights/Hilltop area should be transported for treatment at Easterly. Since 1984, USEPA has reviewed an environmental assessment for sludge handling facilities for Easterly, but the system improvements for control and treatment of wet weather overflows from Cleveland's combined sewer systems have not yet been evaluated. Based on its review, the USEPA issued a FNSI for solids handling at Easterly on April 17, 1985. Plans evaluated in this EIS, therefore, are not the final components of the Easterly system. Combined sewer overflow (CSO) issues are to be resolved during future planning segments.

Ohio EPA prepared an environmental assessment on the Hilltop Planning Area in August 1985. The USEPA carefully reviewed this information and, on April 2, 1986, issued a Notice of Intent to prepare this EIS on proposals to construct interceptor sewers to serve the wastewater treatment needs of the Hilltop Planning Area. This decision was based on concern for the environmental and cost impacts of the project proposed by the NEORSD.

4. PROJECT NEED

Four problems with wastewater treatment facilities in the Hilltop FPA were identified by the facilities planning process. These included:

- Wet weather sanitary sewer overflows from the Beech/Hill/Bonnieview/Wilson Mills BBW pumping complex;
- Infiltration and inflow to sanitary sewers in the area, many of which are deteriorating with age and are located in common trenches with storm sewers;
- Inadequate treatment of wastewater by a variety of small wastewater treatment plants discharging to Euclid Creek and tributaries of the Chagrin River;
- Onsite wastewater treatment facilities (largely septic leach fields) in the unsewered portions of the Hilltop Planning Area. The majority of these systems are overloaded and/or nearing the end of their design life. Many onsite systems have problems with high clay content soils, high water table, and shallow depth to bedrock. As a result, many of the onsite systems have discharges that reach existing storm sewers and drainage ditches. This contaminates tributaries of Euclid Creek, the Chagrin River, and small ponds in the area such as Mayfair Lake.

A major focus of the proccess of preparing this EIS was to define the actual wastewater treatment needs in the Hilltop area. Analysis of data provided by NEORSD indicated that control and capacity problems with the BBW pumping complex lead to wet weather sanitary overflows which discharge to local streams. Infiltration and inflow (I/I) to community sanitary sewers cause flow conveyance problems within the communities and within the BBW system. This I/I problem is primarily due to common trench sewer construction, where both storm and sanitary sewers were originally placed in the same trench. In addition, area package plants are not meeting permit limits for effluent discharged to local streams.

No documentation of problems from existing onsite systems in the areas primarily located north of Wilson Mills Road is available. While site conditions and the age of most systems indicate the possibility for problems, additional facilities planning by NEORSD to determine the extent of the problems will be necessary before any corrective action can occur.

The original facilities planning effort listed basement flooding as a problem within the Hilltop area. During the preparation of this EIS, it is determined that sewer maintenance on portions of the existing collector system would help relieve this problem. The SSES outlined several relief sewer and sewer rehabilitation projects which would increase the sewer capacity and reduce the incidence of basement flooding in the area. These projects are all local improvements and are not part of this EIS. With the exception of a few homes around the pumping stations, the BBW complex is not the cause of basement flooding in the area. Basement flooding around Beech Hill and Wilson Mills pumping stations is a result of basement floor elevations located below the overflow points of the pumping stations' wet wells. Most of these homes have had plumbing modifications to correct the problem.

5. EIS ISSUES

Environmental, planning, and fiscal issues addressed in this draft EIS were identified during USEPA review of the Heights/Hilltop Facility Plan and Ohio EPA's related environmental assessment. These issues were first outlined in USEPA's Notice of Intent (April 2, 1986) and further refined through public comments at two scoping meetings held on June 18, 1986. The resulting issues, which directly influenced the scope of the technical investigations in this EIS, include the following:

- Impacts to natural habitat
- Impacts to wetlands
- Impacts to Euclid Creek
- Project costs and fiscal impacts
- Induced secondary growth
- Project reliability.

6. WASTEWATER MANAGEMENT ALTERNATIVES

Evaluation of the Hilltop FPA is one component of an overall, regional facilities planning effort for the Cleveland metropolitan area. As such, the history of development and refinement of alternatives for the Hilltop FPA is interwoven with the development of alternatives for the overall Cleveland area. Based on earlier and parallel facilities planning activities for the overall Cleveland area, it was determined that flows from the Hilltop Facilities Planning Area would be routed to the Easterly WWTP, through the Heights/Hilltop interceptor. In keeping with this regional approach, flows from an area south and west of the Hilltop FPA, called Belvoir, were planned to be routed through the Hilltop system and then to the Heights interceptor. Approximately 202 million gallons per day (MGD) from the central Belvoir area were planned to be routed to the Heights interceptor at Green Road, and 59 MGD of flow from the eastern Belvoir area would be routed into the Hilltop system along Richmond Road. In addition, the EIS analysis of system alternatives for the Hilltop FPA used a worst-case scenario assuming that the most extensive system of local sewers would be needed to replace package plants, to serve unsewered areas, and to serve ultimate future growth. All alternatives also were assumed to have capacity to convey the Belvoir flows.

Connection of the unsewered areas and future growth were included in the analysis of each system alternative. The majority of growth will occur in the northern areas of the basin. The addition of future residential and commercial-industrial growth will add about 8.5 MGD (as projected by the NEORSD) to the system, as total peak flow. Most of this flow will enter the system near the Cuyahoga County Airport.

Four EIS system alternatives were evaluated for the Hilltop FPA. These alternatives were developed based on those provided in the facilities planning documents and the environmental assessment prepared by Ohio EPA. The four EIS system alternatives for the Hilltop FPA are as follows:

- EIS-1

EIS-1 will replace the Beech Hill/Bonnieview/Wilson Mills pumping complex with gravity interceptors. This was the alternative proposed by NEORSD during the facilities planning process. Wastewater flows will be transported to the Easterly WWTP via a newly constructed interceptor, as illustrated in Figure 2. Local sewers needed to serve the presently unsewered areas with this alternative are shown in Figure 3. The eastern leg of EIS-1 will be a 48" diameter sewer installed (open cut) primarily along SOM Center Road, and the western leg will be a 42" to 54" sewer installed (open cut) in Richmond Road with other spurs along Highland Road. The northern 48" leg of this alternative will be layed (open cut) along the Cuyahoga-Lake County Line. Tunnel construction will be used along the northern part of Richmond Road, Chardon Road, and Euclid Avenue. The crossing of Euclid Creek near the intersection of Chardon Road and Euclid Avenue will be constructed using a series of drop manholes and open cut construction across the stream bed.

New pump stations and force mains would be constructed at the Scottish Highlands (2) and Hickory Hills (3) Package Plant sites to remove these treatment facilities from service with direct pumping to the gravity system. Stark (c), Thornapple (L), Woods (M), and Suffolk Country Estates (N) Pumping Stations would all remain in service with EIS-1. Sufficient capacity will be available in the interceptor to remove Sleepy Hollow and Pleasant Hills Package Plants from service. Bonnieview Storage Tank would be removed under this plan. A variation of EIS-1 which included the Bonnieview Storage Tank was also studied during the preparation of the EIS.

- EIS-2

EIS-2 consists of upgraded facilities at Beech Hill (A) and Wilson Mills (B) pumping stations, and a new Richmond/White Pumping Station (D) as presented in Figure 4. The local sewers required with this option are included in Figure 5.

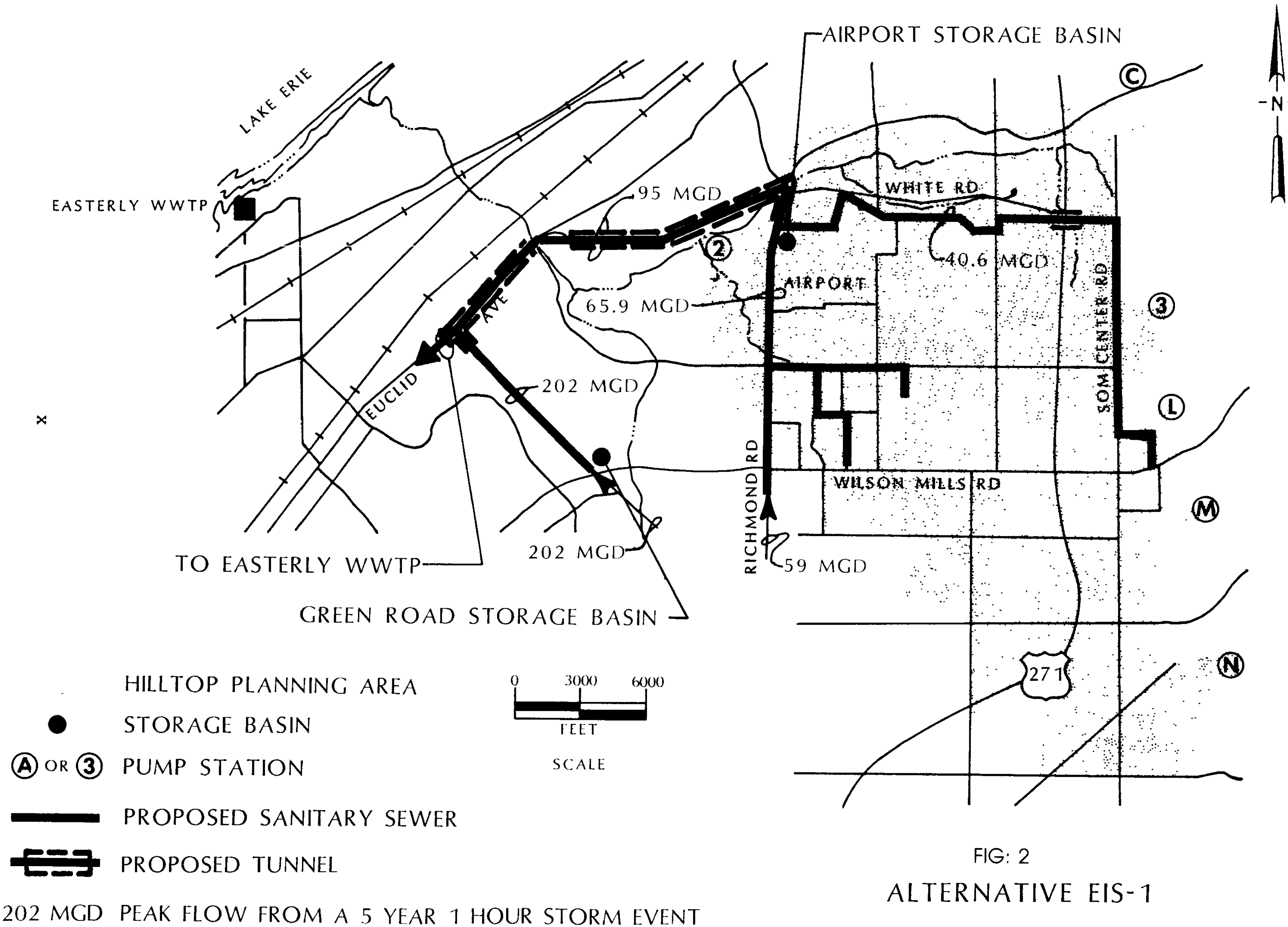


FIG: 2

ALTERNATIVE EIS-1

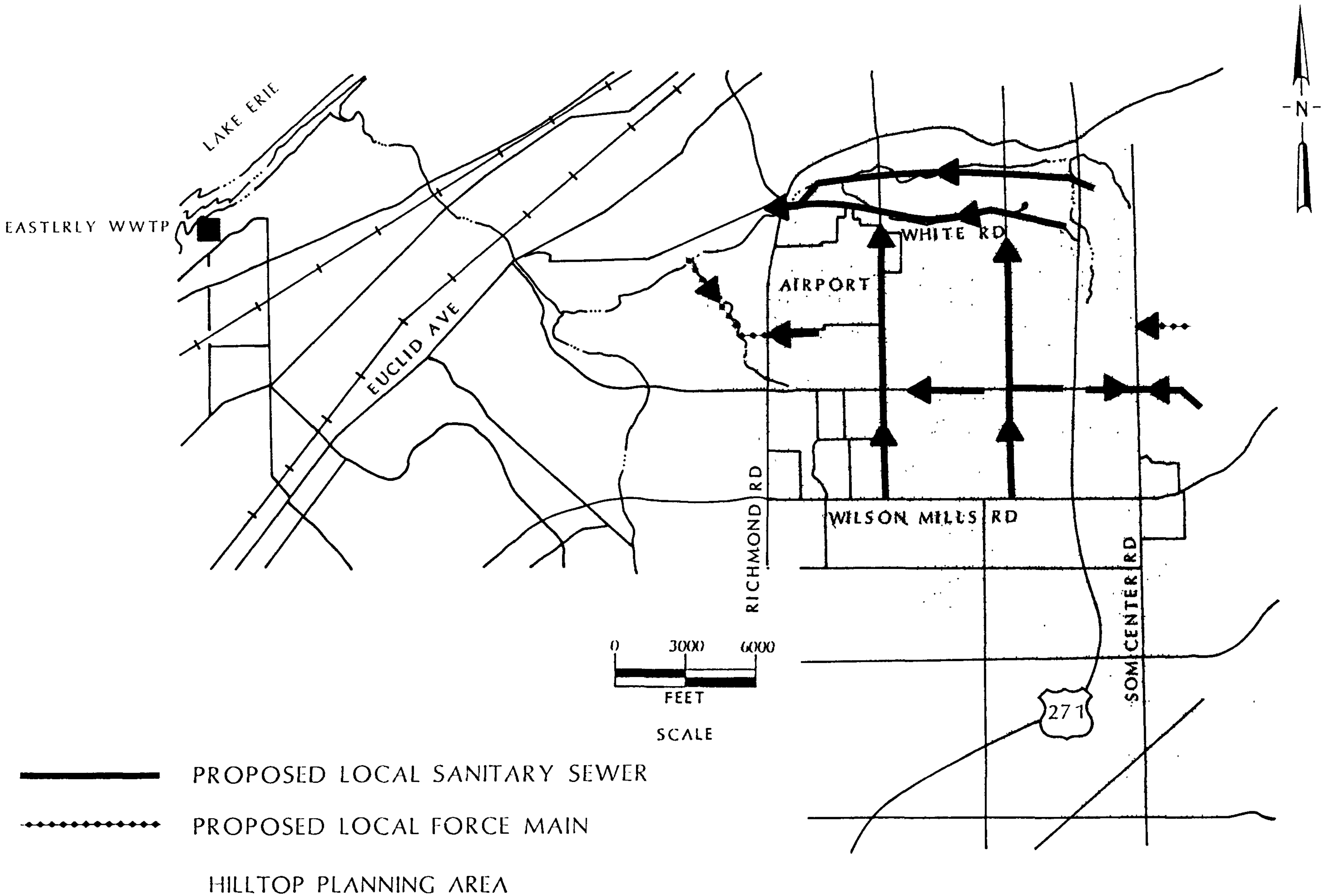


FIG: 3

EIS-1 LOCAL SEWERS

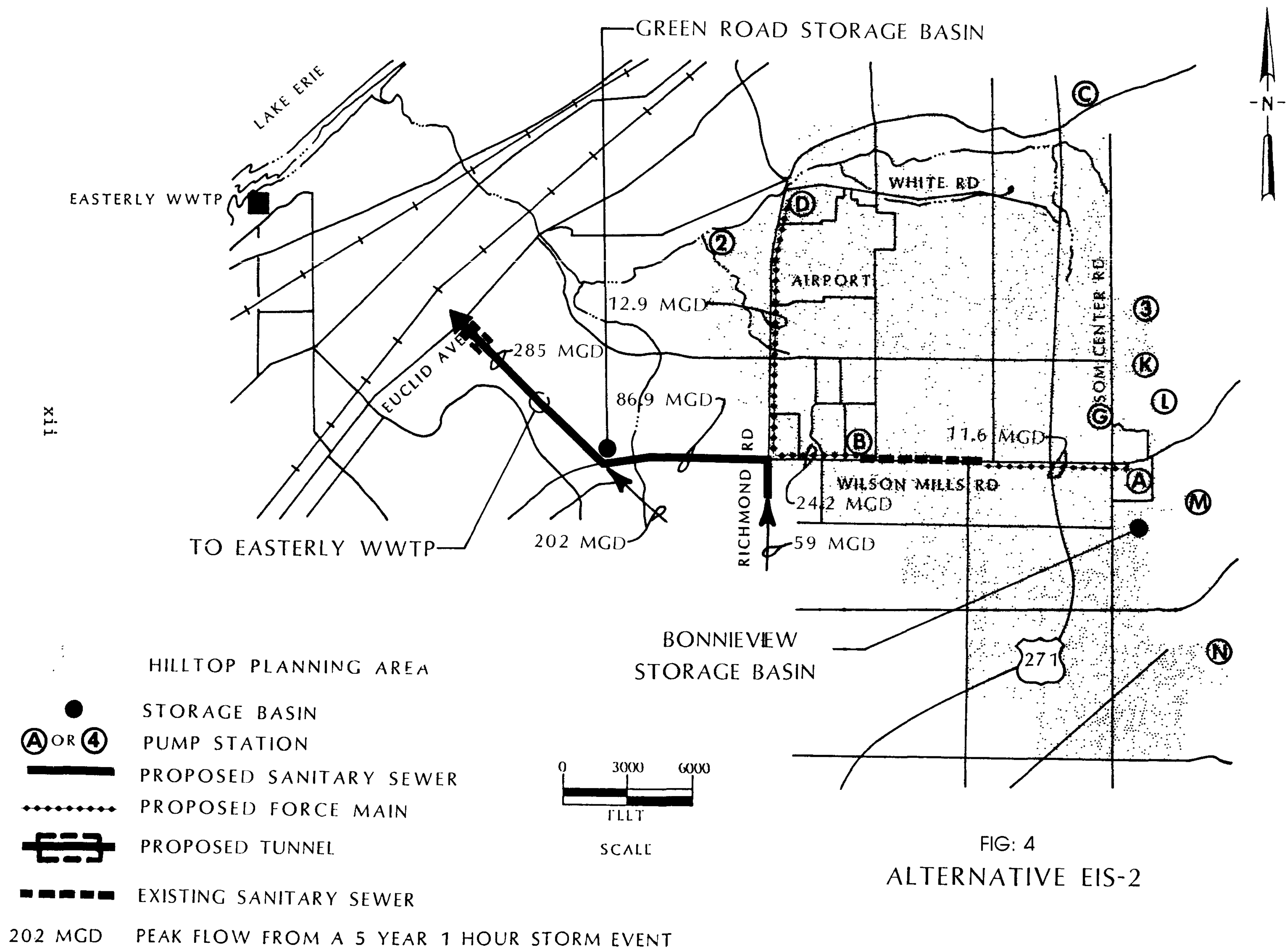


FIG: 4
ALTERNATIVE EIS-2

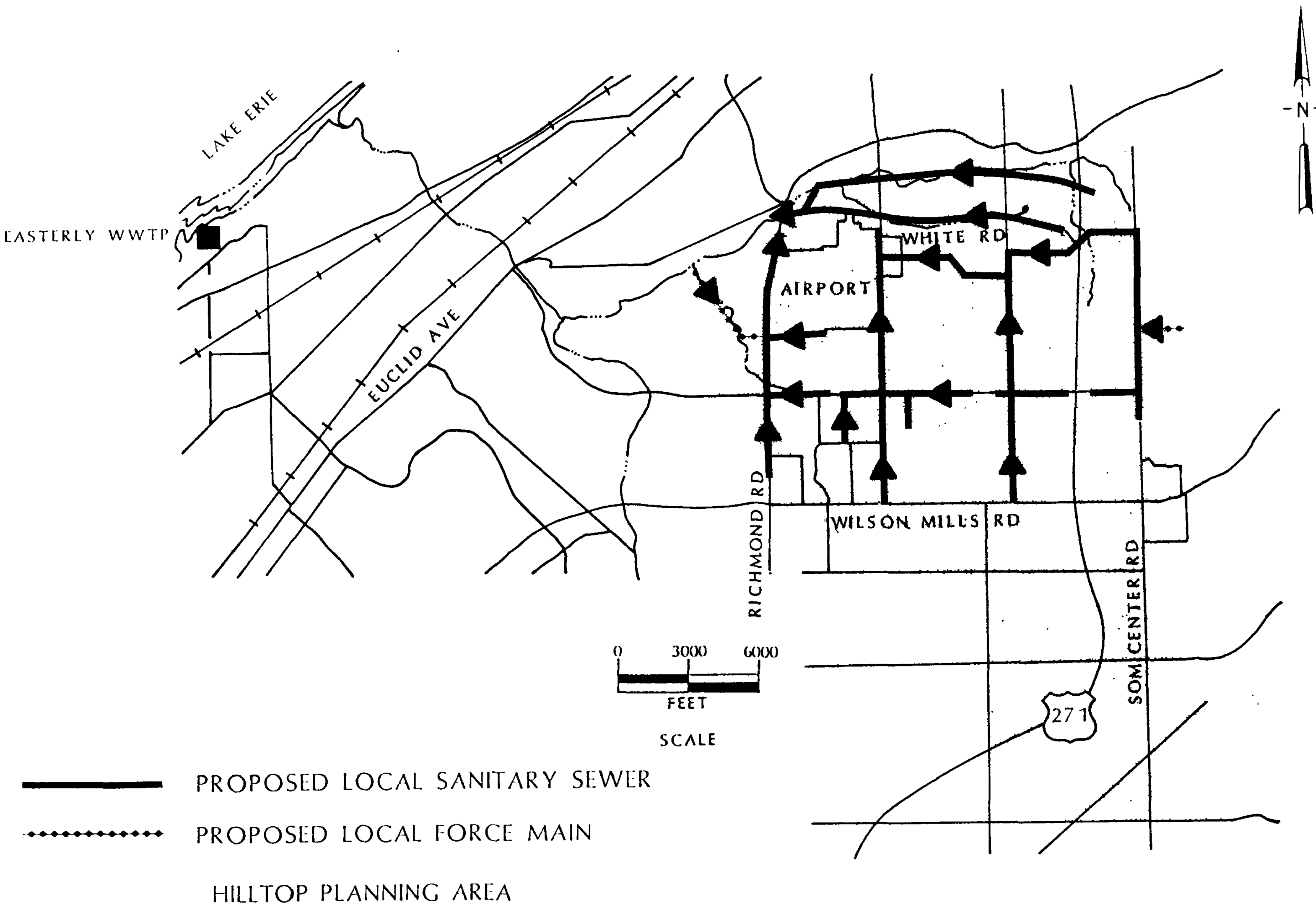


FIG: 5

EIS-2 LOCAL SEWERS

The facilities required for EIS-2 include new single force mains along Wilson Mills Road and Richmond Road. The Beech Hill force main will consist of approximately 8,900 feet of 30" pipe, and the Wilson Mills force main will consist of about 2,000 feet of 36" pipe. About 13,400 feet of 30" pipe will be required for the Richmond/White force main. The Beech Hill (A) and Wilson Mills (B) Pumping Stations will be sized to 11.6 mgd and 24.2 mgd respectively. The Richmond/White (D) Pumping Station was sized at 12.9 mgd. The pumping portion of this alternative was designed for reliable operation utilizing the latest in control technology. Each major pumping station (Beech Hill, Wilson Mills, and Richmond White) should be designed with sufficient capacity to handle the peak event with one pump out of service. Existing buildings at Beech Hill and Wilson Mills could be used, with a new or expanded structure required for Richmond/White.

Scottish Highlands (2) and Hickory Hills (3) Package Plants will be eliminated by new pumping stations; however, they will require construction of local gravity sewers before the flow can be collected. Several pumping stations will continue to be used with this alternative, as shown on Figure 4. Sufficient capacity would also be available to remove Sleepy Hollow and Pleasant Hill package plants from service. The crossing of Euclid Creek along Monticello Boulevard was assumed to be by a free standing pipe bridge supporting twin 54" sewers.

- <u>EIS-3</u>

Alternative EIS-3 consists of upgraded facilities at Beech Hill pumping station (A) and a new Richmond/White pumping station (D). EIS-3 is similar to EIS-2, except that the Wilson Mills Pump Station is replaced with a gravity tunnel. All other aspects are the same including pump station sizes, controls, and the Euclid Creek crossing. This alternative is shown on Figure 6. The local sewers are shown on Figure 7.

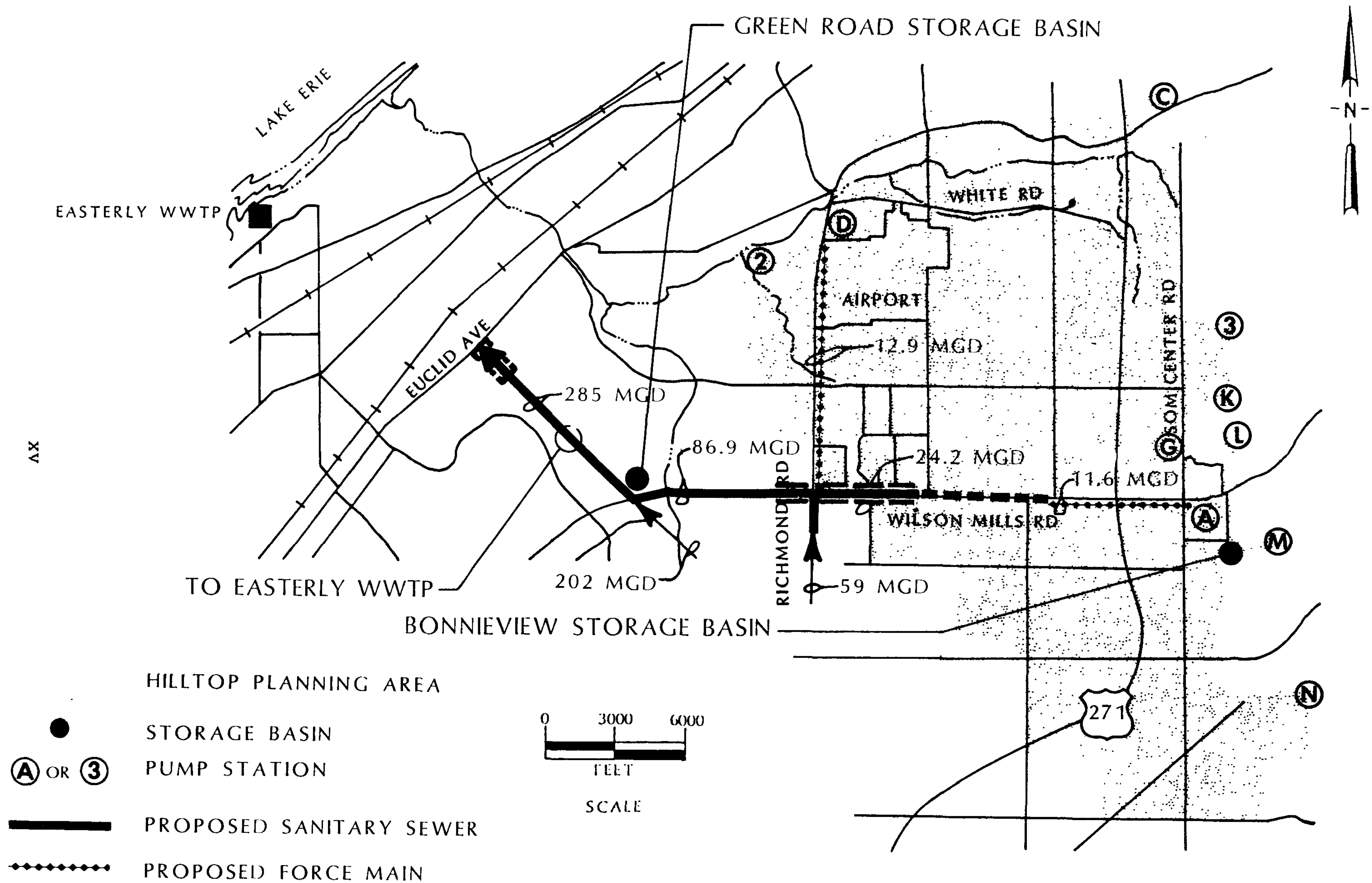


FIG: 6

ALTERNATIVE EIS-3

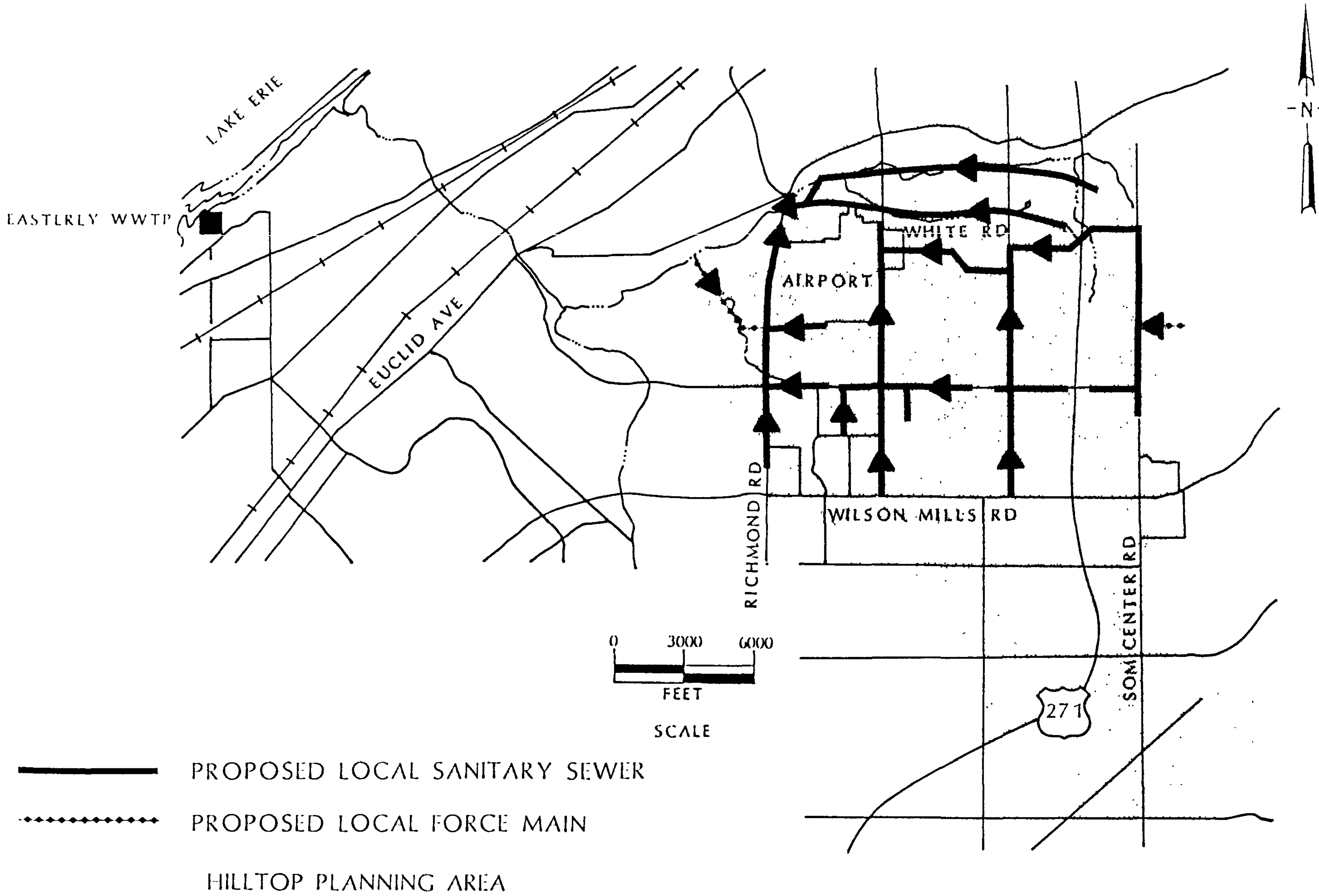


FIG: 7
EIS-3 LOCAL SEWERS

o EIS-4

This alternative consists of an upgraded Beech Hill pumping station (A) combined with a new interceptor as shown in Figure 8. The local sewers are included in Figure 9.

Beech Hill will be the only major pumping station included with this alternative. Wastes will be pumped west along Wilson Mills Road via a 30" force main, until it connects with a gravity sewer near Miner Road. From that point, flow will continue via gravity sewers past Wilson Mills Pumping Station, and then north to Highland Road. This 30" segment (open cut) will connect with a 42" gravity line along Richmond Road (open cut) which will continue north to Chardon Road. This 60" to 66" interceptor (tunnel) will follow Chardon Road and Euclid Road west to Green Road where another 60" spur will be added. The Chardon Road crossing of Euclid Creek will include several energy dissipating manholes and an open cut across the stream bed.

Scottish Highlands and Hickory Hills package plants will be replaced by pumping stations. Scottish Highlands force main will tie directly into the interceptor, while Hickory Hills will require construction of local sewers before it can be connected. Several existing pumping stations will still be used with this alternative.

7. EVALUATION AND COMPARISON OF SYSTEM ALTERNATIVES

Each of the four EIS alternatives were evaluated against the following five technical evaluation criteria:

- Cost - Total present worth of the alternative over a 20-year period. This includes capital costs for materials and installation as well as operation and maintenance costs.
- Implementability - The relative difficulty to construct each alternative.
- Reliability - The dependability of each alternative with respect to system failures.
- Energy Use - An analysis of the energy requirements for each alternative.
- Feasibility - The ability of each alternative to convey the Hilltop waste load.

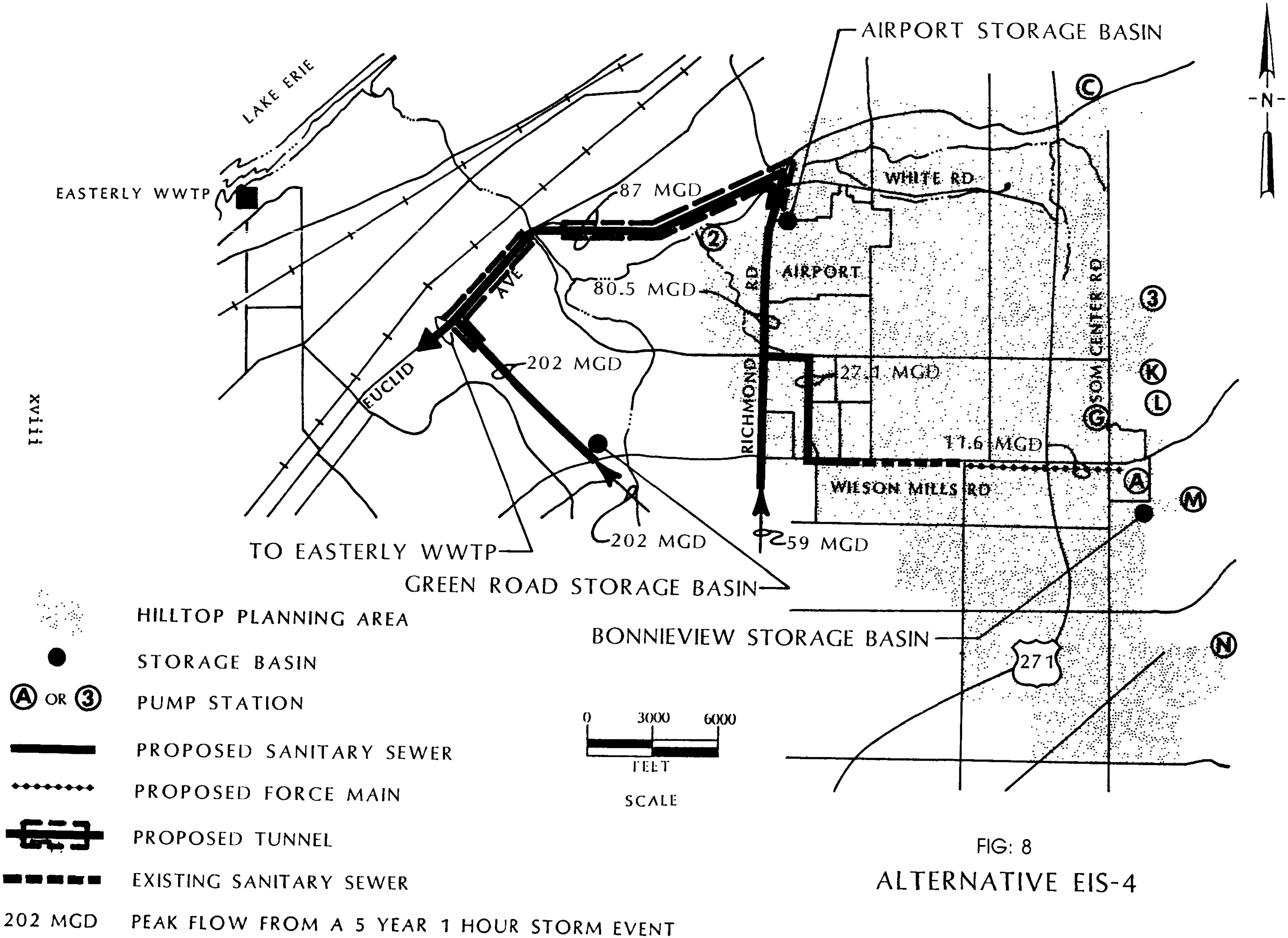


FIG: 8

ALTERNATIVE EIS-4

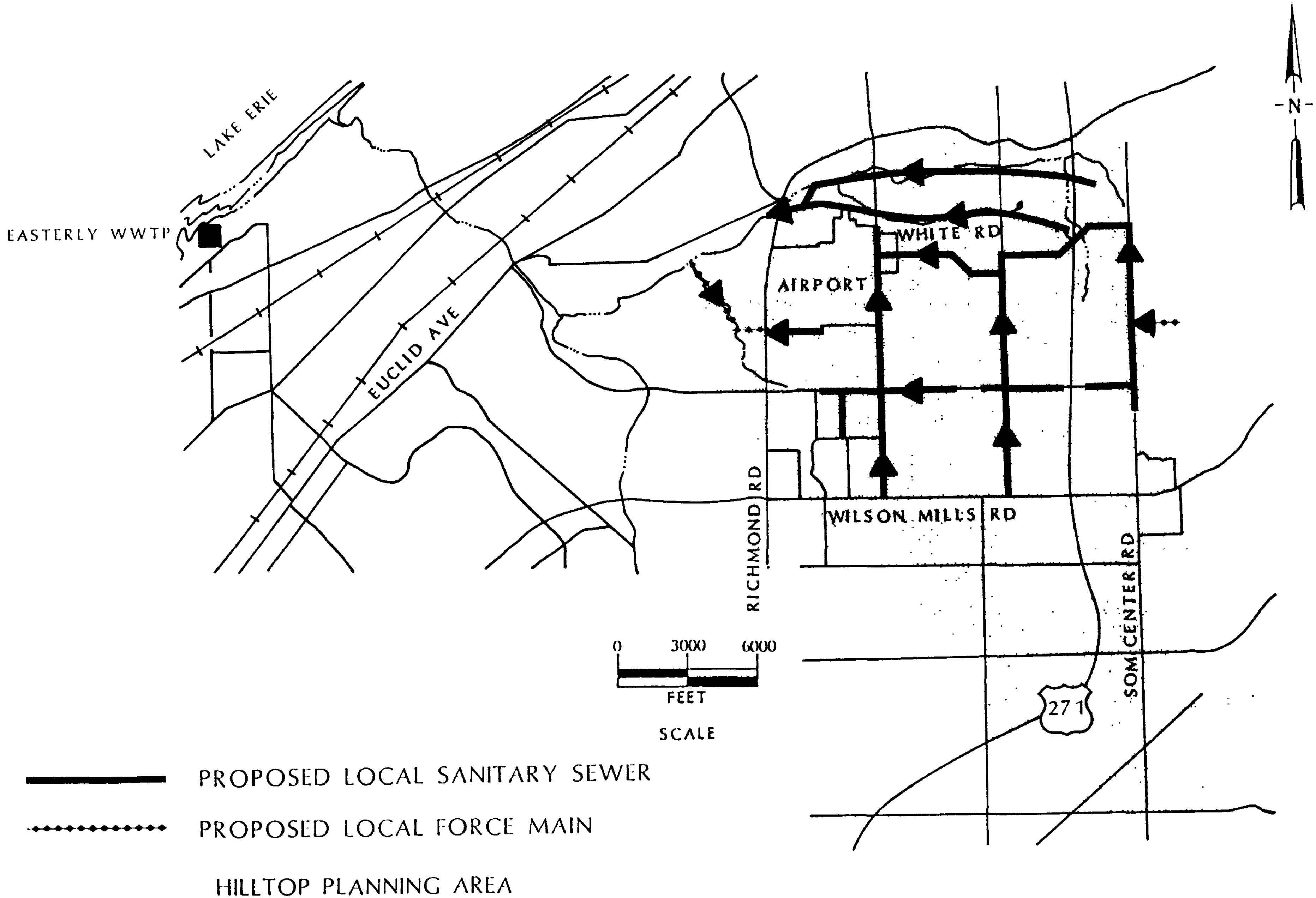


FIG: 9

EIS-4 LOCAL SEWERS

A comparison of the four EIS alternatives, according to the five evaluation criteria, is summarized in the following discussion.

- Cost

  See Table 2 for a comparison of EIS alternative costs.

- Implementability

  The alternatives which require open-cut construction across Euclid Creek (EIS-1 and EIS-4) present some very unique construction problems and would probably be more difficult to implement than EIS-2 and EIS-3. These same alternatives also have several segments which require deep (greater than 20 feet) open-cut construction which may also present implementation problems because of the sheeting and shoring required and also the excavation problems of the bedrock.

  Alternatives EIS-2 and EIS-3 present less implementation problems than EIS-1 and EIS-4; however, the Euclid Creek aerial crossing will be needed. With proper design of this crossing, few implementation problems should be encountered.

- Reliability

  Extensive pump station control systems would be designed into Alternatives EIS-2, EIS-3, and EIS-4 to provide good reliability for these options. This control system would be designed with the ability to monitor and control the system from one central location as well as onsite. Separate power grids and backup diesel generators will be provided to prevent shutdown from power failures. With these control features, the reliability of these alternatives is very high.

  Although Alternative EIS-1 provides main transport by a gravity system, it does utilize existing pump stations which would remain in service, and new stations which would be added at Scottish Highlands and Hickory Hills.

  With proper design considerations, the overall reliability of all the alternatives is relatively good.

- Energy Use

  Of the EIS alternatives, EIS-1 had the lowest energy costs at $49,600 per year. As would be expected, the alternatives which include the use of major pump stations would have higher energy costs. EIS-4 had an energy cost of $92,000 per year and was the second lowest. The two least cost alternatives from a construction and O&M perspective, EIS-2 and EIS-3, had the highest energy costs of $192,900 and $176,400 respectively per year.

Table 2. Cost Analysis

	EIS-1 (Without Bonnieview)	EIS-1 (With Bonnieview)	EIS-2	EIS-3	EIS-4
Capital Present Worth	$72,900,517	$70,150,591	$46,199,120	$49,411,976	$60,172,405
Operation and Maintenance Present Worth	1,266,327	1,266,327	7,346,513	5,788,345	2,891,143
Salvage Present Worth	9,787,929	9,282,267	5,727,256	6,216,627	$8,011,467
EIS Total Present Worth	$64,378,915	$62,141,116	$47,818,377	$48,983,694	$55,052,081

o Feasibility

Each system as designed has the feasibility to effectively transport wastewater to the Easterly Wastewater Treatment Plant. Since no significant advantages exist for any of the alternatives in this category, no comparisons can be made.

8. COST-EFFECTIVE SYSTEM ALTERNATIVE

Considering the current problems and conditions in the Hilltop area, this EIS evaluated several options that would serve the needs of the area. Several criteria were evaluated for each EIS alternative, including cost, implementability, reliability, energy use, feasibility, and environmental factors. Since sufficient facilities planning to document need for local sewers to serve the entire FPA has not been conducted, the EIS recommends an approach to solve the documented existing needs. Based on the EIS analysis, Alternative EIS-3 (shown in Figures 6 and 7) was selected as the best system alternative to serve the entire Hilltop FPA.

Although EIS-3 was not the lowest cost alternative (see Table 2), it was determined that removal of the Wilson Mills pumping station would be environmentally advantageous to the system. As previously discussed, the Wilson Mills pumping station has caused many of the probems for the existing system. Therefore, EIS-3 was selected over the least cost alternative based on this factor.

The analysis conducted in the EIS compared alternatives on the ability to provide service to the entire Hilltop FPA (for transport of flows to the Easterly WWTP) within the planning period. This was done to maintain the level of detail used thoughout the facilities planning process, and to compare all alternatives on equal terms. This analysis, however, was a worst case analysis since it assumed that ultimate growth would occur and that all septic systems, small pump stations, and package plants needed to be replaced by the central and local sewer systems. In reality, only portions of the local sewer system may need to be built to relieve these problems.

The EIS cost-effective system alternative would consist of upgraded facilities at the Beech Hill pumping station (A) and Bonnieview storage basin, and an expanded Richmond/White pumping station (D) to serve the northern areas. The Beech Hill pumping station would be sized at 11.6 MGD based on the flows projected in the SSES, and the Richmond/White pumping station would be sized at 12.9 MGD based on the connection of the unsewered areas, several package plants, and ultimate growth. Approximately 8,900 feet of new 30" pipe would be required for the Beech Hill force main, and about 13,400 feet of new 30" pipe would be required for the Richmond/White force main.

The Wilson Mills pumping station will be replaced by a new 60" gravity sewer. Historically, the Wilson Mills pumping station has created problems for the existing system. The majority of overflows from the existing system result from capacity problems at the Wilson Mills station, which signals the Beech Hill pumping station to shut down. By removing this problem source from the system, the overall reliability would be greatly increased.

A new control system for the pump stations would also improve the reliability of the entire system. Remote monitoring and control of each pumping station by a central control computer will provide a continuous report of all system functions. Central control will also respond to problems in the system with corrective actions. Automatic onsite controls at each pumping station would also contribute to the reliability of the system for EIS-3. Manual controls for onsite operators would also be available at each station.

The major pumping stations would also be designed with sufficient pumping capacity to handle the peak flow rate with one pump out of service. Coupled with separate power grids and onsite backup power generators, the major pumping stations for EIS-3 are designed for continuous reliable operation.

The Bonnieview facility would be upgraded with comminutors, grit removal, 6-inch water line, and odor control measures.

The EIS cost-effective system alternative includes provisions for eliminating several package plants and small pump stations and all onsite systems in the Hilltop area with local sewers (Figure 7). Under this worst case scenario, Scottish Highlands and Hickory Hills package plants would be eliminated by constructing pump stations and force mains to new local gravity sewers; Richmond Park, Sleepy Hollow, and Pleasant Hills package plants would be eliminated by gravity sewers tributary to local sewers. While Richmond Mall, Franklin, Williamsburg, and Picker X-ray pump stations would be eliminated, several pump stations would remain in use. Before any of these package plants, pump stations, or onsite systems can be eliminated, additional facilities planning by NEORSD is necessary to show that elimination is cost-effective.

The EIS analysis of EIS-3 includes a free standing pipe bridge supporting twin 54" sewers for the crossing of Euclid Creek along Monticello Boulevard. Actually, a single 66" pipe could be used with the existing 30" sewer which is in place under the bridge if the existing pipe is found to be in good condition. This option would be less expensive than using twin 54" sewers, however twin 54" sewers are used in cost-estimates as a worst-case assumption.

The projected costs for Alternative EIS-3 are provided in Table 3 and Appendix F.

9. RECOMMENDED PLAN

Although EIS-3 is the cost-effective system plan for serving the entire Hilltop area, a need to serve the entire area (specifically the unsewered areas) has not been sufficiently demonstrated. This section will describe an approach to serve the area's identified needs for the 20 year planning period.

The immediate needs for the Hilltop area are to relieve I/I problems in community relief sewers and overflows caused by the existing BBW complex. This will be done by implementing the recommendations for sewer construction and rehabilitation outlined in the SSES and constructing modifications to the existing BBW complex.

Table 3. EIS-3: Cost-Effective System Alternative Cost Summary[1,4]

Capital Costs		
Transport System		$25,825,572
Local Sewers		16,008,346
	Total	$41,833,918
Annual O&M Costs		
Sewer Maintenance		$ 49,600
Power		176,400
Labor		330,700
Miscellaneous		16,500
	Total	$ 573,200
Present Worth		
Capital		$41,016,293
O&M		5,788,345
Salvage		5,108,397
	Net	$41,696,241[2]

Table 4. EIS-Recommended Alternative (A Component of EIS-3) Cost Summary[1,4]

Capital Costs		
Transport System		$26,131,113[3]
Annual O&M Costs		
Sewer Maintenance		$ 49,600
Power		176,400
Labor		330,700
Miscellaneous		16,500
	Total	$ 573,200
Present Worth		
Capital		$25,973,070
O&M		5,788,345
Salvage		2,954,361
	Net	$28,788,964[2]

[1] Costs shown in Tables 3 and 4 for EIS-3 do not include those costs for Contract G already covered by the Heights FNSI ($8,395,683).

[2] See Appendix G for detailed costs.

[3] All sewers under this alternative are considered to be interceptor sewers.

[4] Costs were revised during additional evaluations performed in response to comments on the DEIS; these are described in Chapter 8. These evaluations did not shift the recommended alternative and therefore corrections were not made throughout this document to reflect the additional evaluations in Chapter 8.

As previously discussed, the NEORSD is currently working with the communities to coordinate several rehabilitation and relief sewer projects. These projects were outlined in the SSES and included as a grant condition for the Heights project. As they are implemented, they will help relieve the I/I and basement flooding problems. See Appendix I for several articles from NEORSD's "Pipeline" newsletter, which describe some ongoing programs for sewer rehabilitation.

Because of the problems created by the Wilson Mills pumping station, it should be replaced by a gravity sewer (approximate capital cost of $7 million, see Appendix G) as soon as possible. This would remove the main control problem of the existing BBW complex. Downstream capacity along Monticello Boulevard would also need to be increased to handle the full peak flow from a 5-year, 1-hour storm event in the Hilltop area. A 60" gravity sewer is recommended for this segment. The existing 30" sewer over Euclid Creek at Monticello Boulevard has sufficient capacity to handle this peak storm event.

Upgrading the Beech Hill pumping station (approximate capital cost of $494,500, see Appendix G) and installing the control system (approximate capital cost of $52,000, see Appendix G) could be done during the same time frame as the Wilson Mills elimination. Along with upgrading the Beech Hill pumping station, the force main should also be replaced (approximate capital cost of $2.3 million, see Appendix G) as soon as possible. This will allow the Beech Hill pumping station to operate at full design capacity without the concern of pipe failure. The proposed improvements to Bonnieview, as included in EIS-3, should also be implemented.

As shown in Figure 7, all of the proposed local sewers for the cost-effective system alternative are tributary to the Richmond/White pump station. Thus the system sizing of the pump station and force main in EIS-3 was such that all onsite system flows were included. As discussed previously, this need has yet to be established.

In order to solve the documented existing needs of the Hilltop area, the Richmond/White pump station should be upgraded to 1.8 MGD and a 12" force main to Wilson Mills Road constructed. With this configuration, Scottish Highlands and Richmond Park package plants could be eliminated (if demonstrated to be cost-effective by NEORSD) by a gravity sewer from Richmond Park to Richmond/White (to eliminate Richmond Park) and a force main from Scottish Highlands to the new gravity sewer, as shown in Figure 10. The Richmond/White pump station would then convey the flows from the eliminated plants and flows from areas now tributary to the pump station (see Section 2.4.2). Though facilities planning by NEORSD to show the cost-effectiveness of package plant elimination has yet to occur, the costs for this approach have been included (Appendix G).

Additional study of the onsite systems areas is needed before any local sewers could be determined to be cost-effective. Innovative options such as cluster systems, mound systems, and small diameter collection systems would need to be evaluated in order to identify a cost-effective solution. Decisions made for handling the unsewered areas, including areas currently undeveloped, may affect the need for additional capacity at Richmond/White pumping station. The recommended plan proposes sizing the pump station structure to accommodate pumping capacity for the future while only recommending pumping equipment capacity for existing needs until planning can be completed.

Since the extent of needed local sewer coverages is unknown at this time, an alternative solution (besides that proposed in system alternative EIS-3) for removing the Hickory Hills package plant from service was also developed. Flow from the Hickory Hills plant could be pumped to Beech Hill pump station via an 8" force main. As with the elimination of Scottish Highlands and Richmond Park, the costs were included for this option (Table 4 and Appendix G) even though facilities planning by NEORSD needs to be done to establish if this option is cost-effective. It should also be noted that these sewers which eliminate package plants would be considered interceptor sewers and not local sewers.

The Sleepy Hollow and Pleasant Hill package plants were not a focus of any of the previous facilities planning efforts. Modification may be needed on these plants, and they may eventually be removed from service by the centralized system; however, this will depend on the extent of the local sewer coverages and on future facilities planning to establish the cost-effectiveness of that option.

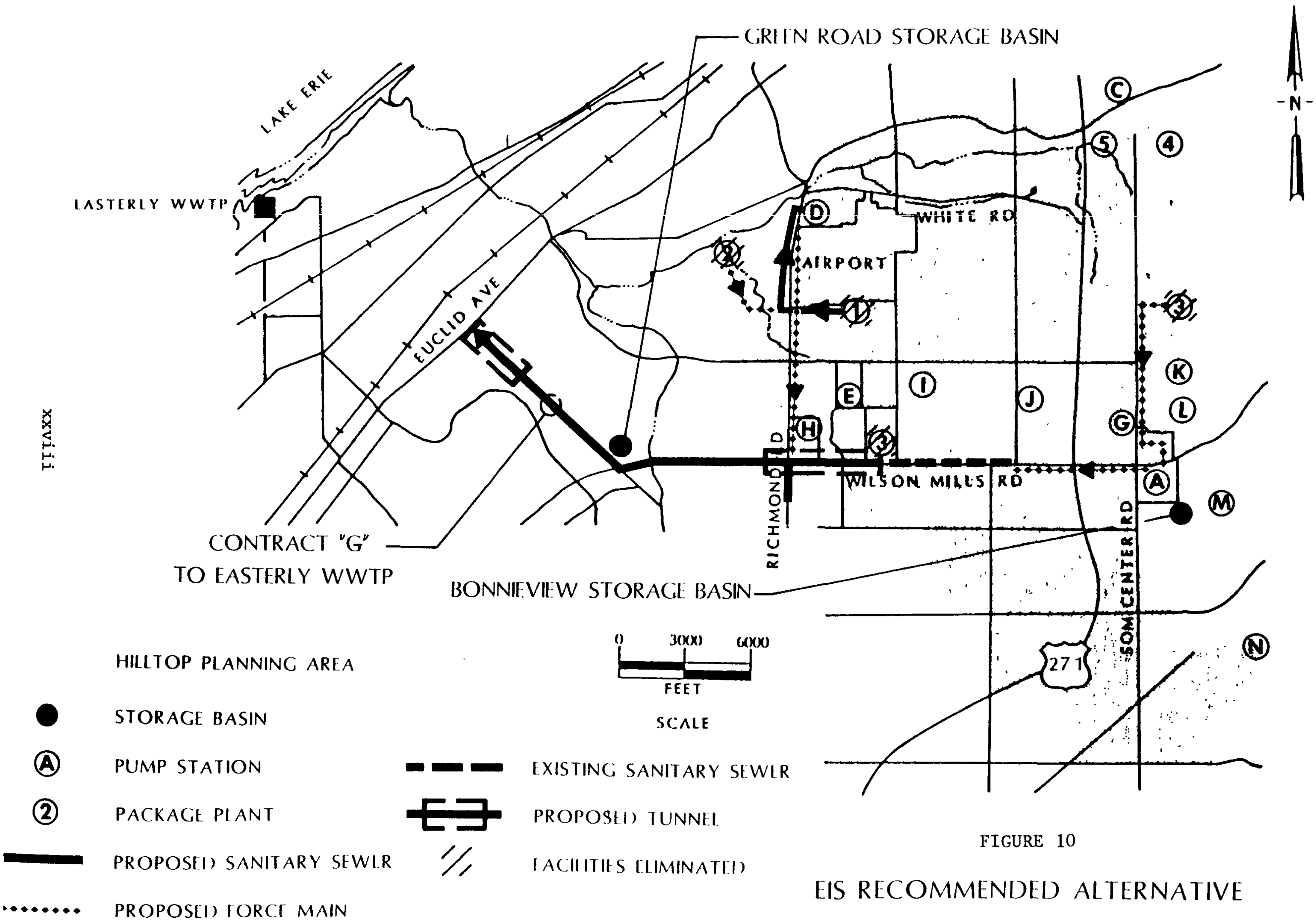


FIGURE 10

EIS RECOMMENDED ALTERNATIVE

As previously discussed in this section, the existing sewer under the Monticello Boulevard Bridge now has capacity to handle the existing flows from the area. Additional capacity for the aerial crossing will be needed when the Eastern Belvoir flows enter the Hilltop system. This is currently planned for 1994. The costs for the segment to convey the Eastern Belvoir flows ($897,803) and for the aerial crossing of Euclid Creek ($948,750) were included in Table 4 and Appendix G. These costs do not pertain directly to solving the needs of the Hilltop FPA, but are included since decisions to route the Belvoir flows through the Hilltop system were made prior to the EIS. Only the incremental costs for handling Hilltop flows were included in Table 4 (and Table 3) for Contract G.

The net present worth cost of the EIS-recommended alternative the Hilltop FPA is $28,788,964. The operation and maintenance (O&M) costs included in Table 3 are the same as those included in Table 2 for the EIS-3 alternative. Though the alternative to solve existing needs will obviously require somewhat less O&M, the draft EIS does not refine the O&M figures beyond the system level analyses.

10. ENVIRONMENTAL CONSEQUENCES OF SELECTED SYSTEM ALTERNATIVE

None of the four system alternatives considered in this EIS included highly significant, adverse environmental impacts. As a result, selection of the recommended action was not directly linked to any particular category of environmental impact. Further, because many commonalities exist between the four alternatives, the degree to which individual alternatives may be distinguished, with respect to differential impacts, is reduced. It was often found that one or two alternatives were preferable with respect to one category of environmental impact, but less desirable with respect to another. Overall, the cost-effective system alternative (EIS-3) was judged to be slightly less impact sensitive than the other alternatives but the differences were often subtle.

Construction of the cost-effective system alternative will result in some localized short-term dust and noise impacts due to construction activities and demolition of the Wilson Mills pump station. This alternative will relieve the nuisance of sewage overflows to creeks, which contribute to ambient odors. Construction of this alternative will also result in erosion and subsequent sedimentation in area drainageways and streams. At a minimum, the Ohio Department of Transportation requirements for erosion control will be observed.

The cost-effective system alternative should result in a net improvement of water quality in Euclid Creek and the Chagrin River due to the proposed removal of three existing waste discharges from the Euclid Creek drainage area (the Richmond Park, Scottish Highlands, and Pleasant Hills wastewater treatment plants) and the elimination of two discharges from the Chagrin River drainage area (the Hickory Hills and Sleepy Hollow plants). Adverse impacts to water quality and stream biota resulting from construction of the cost-effective system alternative should be temporary, associated with short-term runoff of sediment and attached pollutants from construction activities. The cost-effective alternative involves one major and five minor crossings of Euclid Creek. The potential adverse impacts resulting from this sewer construction include some nutrient and other pollutant inputs to the Euclid watershed. The one major Euclid crossing in the cost-effective system alternative is located at Monticello Boulevard east of Green Road. Adverse impacts to water quality could occur if the new structure requires construction in the waterway (e.g., abutments). These impacts can be minimized by following proper sediment and erosion control practices adjacent to the stream bed.

Floods with an expected 100-year return interval do not presently inundate existing wastewater treatment facilities within the FPA. None of the facilities proposed in the cost-effective system alternative is located in the 100-year floodplain.

Construction activities associated with the selected alternative could impact wildlife and vegetation. The placement of sewer lines, construction on and around pumping stations, and construction of new holding basins will disrupt existing biota. No adverse impact on Federal- and State-listed threatened and endangered species are anticipated to occur from the proposed work. Minimal impacts to riparian wetlands associated with Euclid Creek are expected to occur from proposed stream crossings.

No relocation of existing residences in the FPA is expected to occur due to construction and operation of the selected alternative. Most sewer construction of the selected alternative is proposed to occur within rights-of-way of existing roads and will not significantly affect adjacent land uses. Construction of sewers proposed under the selected alternative may temporarily disrupt access to some local businesses. Improved water quality should increase the potential for recreation in the Euclid Creek Reservation and the Chagrin River Reservation. Construction activity involved with the Euclid Creek crossing at Monticello Boulevard will temporarily limit the use of the Euclid Creek Reservation for picnicking, biking, and passive recreational uses. The existing Monticello Boulevard bridge, built in 1954, has an arched design which complements the natural surroundings of the Euclid Creek Reservation gorge. Construction of a free standing pipe bridge to carry the sewer line across Euclid River would disrupt the aesthetics of the area both during and after construction.

The selected alternative involves open-cut trenching and tunneling including staging areas to construct regional interceptors which may temporarily affect local traffic patterns. Any restriction of traffic flow along Euclid Avenue will have significant short-term impacts to traffic flow, especially during rush hours. Most other traffic impacts will be minor.

None of the construction for the selected alternative will directly affect known sites of historic or archaeologic significance.

Analysis shows a demand in the Hilltop FPA for increased single and multi-family units as well as commercial and industrial development. Projected growth impacts of the cost-effective system alternative will be to accommodate demand in areas with inadequate sewer service rather than inducing growth from surrounding areas. Growth levels with the cost-effective system alternative are not expected to contribute to any further long-term deterioration of air quality. Temporary inputs of sediment from construction of new developments will cause short-term water quality degradation. Increased nonpoint source pollution from urban runoff due to projected growth in the FPA is not expected to significantly affect surface water quality. Secondary development under any of the alternatives is not expected to affect the 100-year floodplain areas within the FPA since the terrain is very steep and is not conducive to development. A total of 36.7 acres of palustrine forested wetlands, 54 percent of the forested wetlands within the Hilltop FPA, could be destroyed by forecast levels of development. One acre of open water wetland would also be lost to development in the FPA.

Development resulting from the cost-effective system alternative might secondarily affect community facilities in the FPA by increasing demand for schools, waste disposal, energy, and other municipal services. Projected secondary impacts on most community facilities will not be significant. Increased need for police and fire services will represent the greatest demand on local jurisdictions for improved services. Additional households will also increase traffic pressure somewhat on local roadways such as Richmond and SOM Center Roads.

The estimated annual user costs for the EIS-recommended alternative (component of EIS-3 to solve existing needs) are $207 annually. These user costs should not be a significant burden on the users within the Hilltop FPA.

In the recommended plan to solve existing need (Figure 10) most of the proposed local sewer lines shown in Figure 5-6 and associated with Alternative EIS-3 are not retained because the need to serve much of the unsewered portion of the Hilltop FPA has not been demonstrated. The local sewer lines retained in the recommended plan (now termed interceptors) are principally for the purpose of eliminating package plants (subject to demonstration by NEORSD that eliminating them in lieu of plant upgrade is cost-effective). This recommended interceptor system does not significantly extend central sewer service beyond currently served areas and, as such, will not induce growth to the Hilltop FPA. Portions of the Hilltop FPA with the highest growth potential such as the airport vicinity are sufficiently close to existing regional sewers to enable developers in these areas to provide connections with private financing. Most of the larger, centrally located parcels of vacant land in the FPA (those in Highland Heights) are large enough that the cost of providing connections or adding reserve capacity to regional sewers could be absorbed in the cost of site development. Finally, most of the smaller infill parcels in the FPA are located in substantially sewered areas such as Mayfield Heights. Many of the sewers in these areas are currently being rehabilitated or replaced. For these reasons, the growth inducement potential of the recommended plan to solve existing needs is considered low.

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LIST OF PREPARERS

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CHAPTER 1. PURPOSE AND NEED FOR ACTION

1.1 PROJECT BACKGROUND

1.1.1 Introduction

This Environmental Impact Statement (EIS) addresses plans prepared by the Northeast Ohio Regional Sewer District (NEORSD) to meet wastewater treatment needs in the Hilltop Facility Planning Area (FPA) near the city of Cleveland. The Hilltop FPA is located northeast of Cleveland, in northeast Ohio, on the border of Lake and Cuyahoga Counties. The Hilltop Facilities Planning Area includes all or parts of Richmond Heights, Highland Heights, Mayfield Heights, Mayfield, Willoughby Hills, and Gates Mills (Figure 1-1). The area encompasses 20.4 square miles of which 46.6 percent (9.5 mi^2) is drained by the Euclid Creek system and 53.4 percent (10.9 mi^2) is drained by the Chagrin River. After crossing the western boundary of the planning area, Euclid Creek flows west for approximately 3.0 miles to Lake Erie. The Chagrin River never actually enters the planning area but flows approximately 7.4 miles beyond the northern border to Lake Erie. The Euclid Creek drainage basin, covering roughly 23 square miles, is considerably smaller than the Chagrin drainage basin which measures 264 square miles. Approximately 42.2 percent of the Euclid Creek drainage basin lies within the facility planning area while only 4.1 percent of the Chagrin drainage basin is included in this area (CRSD 1979a). The geographic relationship of the planning area to these watersheds is depicted in Figure 1-2.

1.1.2 Areawide Planning and Project History

The NEORSD, previously the Cleveland Regional Sewer District, was formed by court order in 1972 to conduct a program of pollution abatement in northeast Ohio. Subsequently, the NEORSD was designated by the U.S. Environmental Protection Agency (USEPA) as the lead agency to provide a program for wastewater management in Cleveland's Easterly Wastewater Treatment Plant service area. One segment of the resulting plan addressed the portions of the Easterly service area with separate sewers. This plan was termed the Easterly Separate Sewer Segment and generally encompassed suburban communities to the east of Cleveland (Figure 1-2). Facilities planning was begun in 1977, with

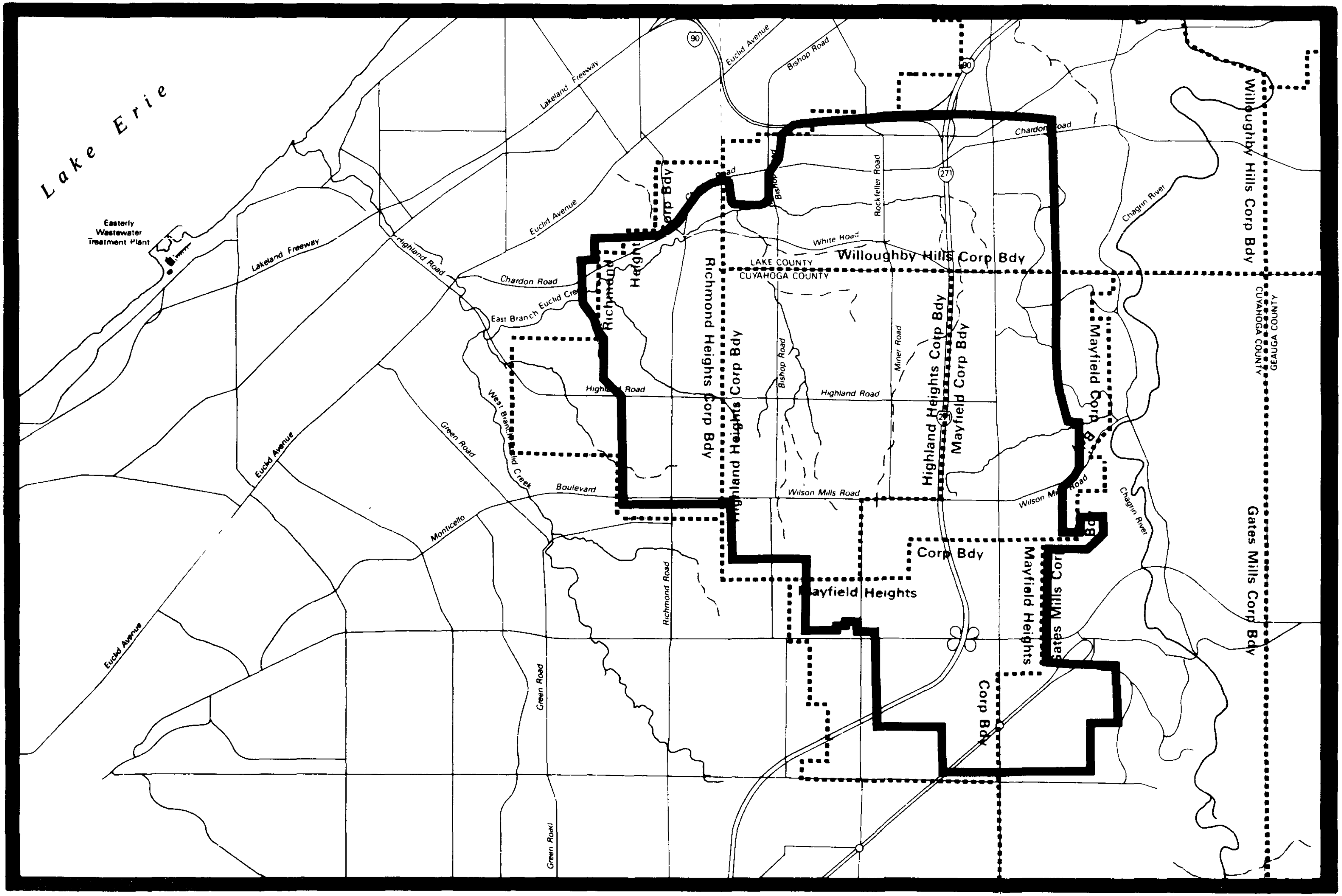


Figure 1-1. Hilltop Facility Planning Area Jurisdictions

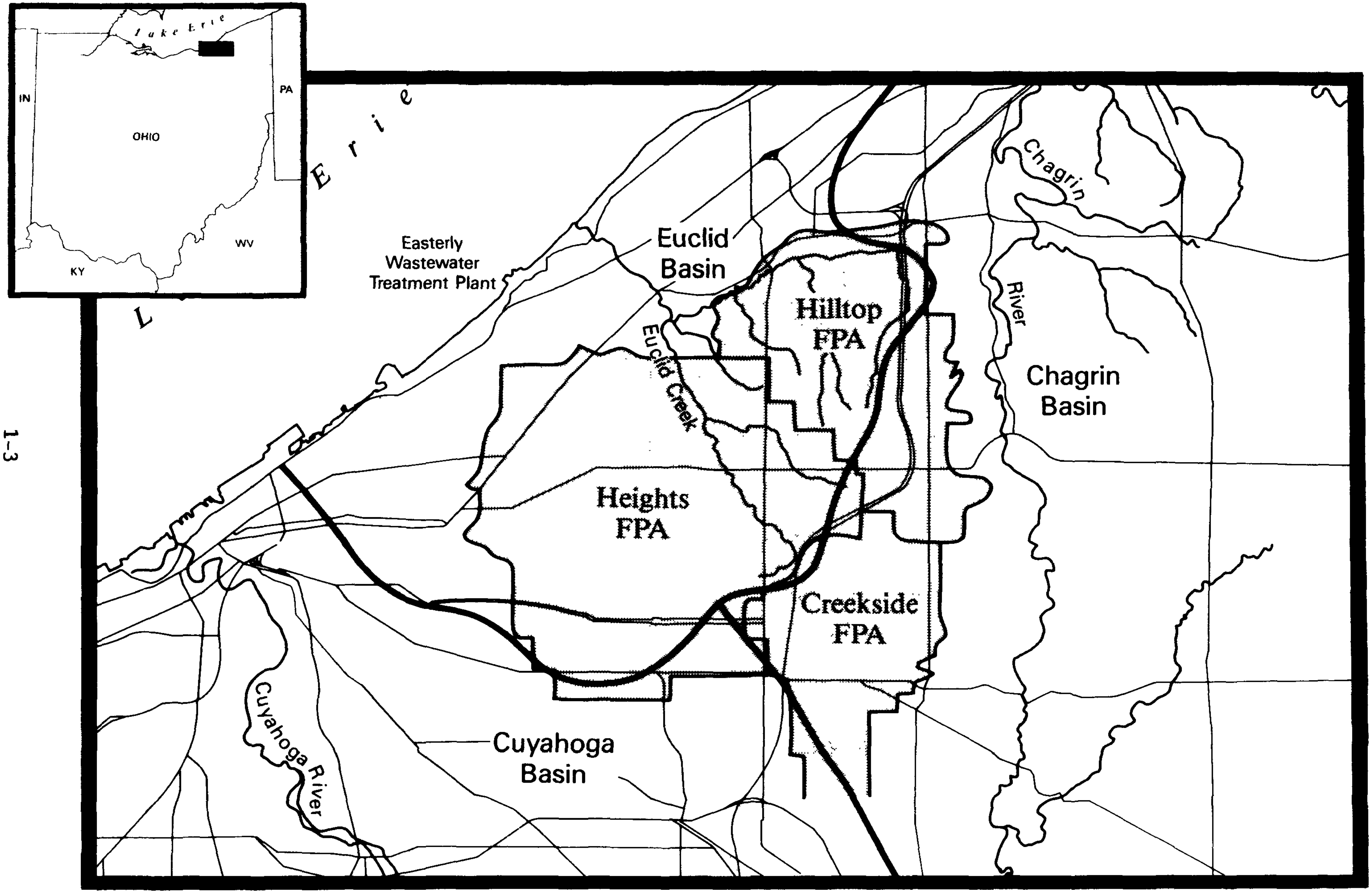


Figure 1-2. Hilltop, Heights, and Creekside Facility Planning Areas and Associated Drainage Basins

the goal of eliminating problems with existing wastewater treatment and conveyance systems in the Easterly Separate Sewer Area (ESSA). Originally, ESSA facility planning included the Creekside area (also shown in Figure 1-2). However, early in facilities planning, the NEORSD concluded that a regional solution including the Creekside area would not be cost-effective and a separate Creekside facility planning process was initiated. The remaining area was termed the Heights/Hilltop Facilities Planning Area. A chronologic listing of relevant facilities planning documents is provided in Table 1-1.

In 1981, a facilities plan was prepared by CH_2M-Hill for the Heights/Hilltop Facility Planning Area (NEORSD 1981). This planning area (Figure 1-2) included all or portions of Cleveland, East Cleveland, Cleveland Heights, Shaker Heights, University Heights, Mayfield Heights, South Euclid, Lyndhurst, Richmond Heights, Highland Heights, Mayfield, and Willoughby Hills. Infiltration and inflow analyses in the facilities plan indicated need for a Sewer System Evaluation Survey (SSES) to assess the extent of necessary sewer rehabilitation. These studies and additional facilities planning for the Heights/Hilltop FPA were initiated in 1981, and submitted to Ohio EPA in 1983. During review of the 1983 submittal, it was determined by Ohio EPA that a partitioned environmental assessment would be appropriate due to several unresolved issues concerning alternatives in the Hilltop portion of the project, as well as the extended project timeframe calling for completion of the Hilltop interceptor in 1997 (NEORSD 1983d). As a result, facilities planning activities were continued independently for the Heights and Hilltop FPAs.

The USEPA issued a Finding of No Significant Impact (FNSI) on the Heights Facility Planning Area on August 29, 1984 (USEPA 1984d). The Heights interceptor covered by the FNSI will extend from the Easterly WWTP southward through Cleveland, East Cleveland, Cleveland Heights, Shaker Heights, and South Euclid. This FNSI approved a sewer segment along Green Road, between Euclid Avenue and Monticello Boulevard, called Contract G, but acknowledged that final sizing would depend on decisions made for the Hilltop FPA.

Table 1-1. Facilities Planning Documents Relevant to the Hilltop Planning Area

TITLE	PREPARED BY	DATE
Easterly Separate Sewer Segment Wastewater Facilities Plan. Volume 1 - Environmental Inventory and Assessment	CH_2M-Hill	1978
Easterly Separate Sewer Segment Wastewater Facilities Plan. Volume 2 - Infiltration and Inflow Analysis	CH_2M-Hill	1978
Easterly Separate Sewer Segment Wastewater Facilities Plan. Volume 3 - Sewerage Study	CH_2M-Hill	1978
Easterly Separate Sewer Segment Wastewater Facilities Plan. Executive Summary	CH_2M-Hill	1981
Advanced Facility Planning Report. Easterly Separate Sewer Area, Supplemental Facilities Planning, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983
Advanced Facility Planning Report. Volume 1: Appendices A, B, C. Easterly Separate Sewer Area, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983
Advanced Facility Planning Report. Volume 2: Appendices D1, D2. Easterly Separate Sewer Area, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983
Supplemental Facilities Planning Report. Easterly Separate Sewer Area, Supplemental Facilities Planning, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983

Table 1-1. Facilities Planning Documents Relevant to the Hilltop Planning Area (Continued)

TITLE	PREPARED BY	DATE
Public Participation Programs Report. Easterly Separate Sewer Area, Supplemental Facilities Planning, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1983
Water Quality Sampling Report. Easterly Separate Sewer Area, Sewer System Evaluation Survey, Advanced Facility Planning	Dalton, Dalton, and Newport	1984
Sewer System Evaluation Survey Report. Easterly Separate Sewer Area, Supplemental Facilities Planning, Sewer System Evaluation Survey, Advanced Facility Planning	Havens and Emerson, Inc. and Dalton, Dalton, and Newport	1985

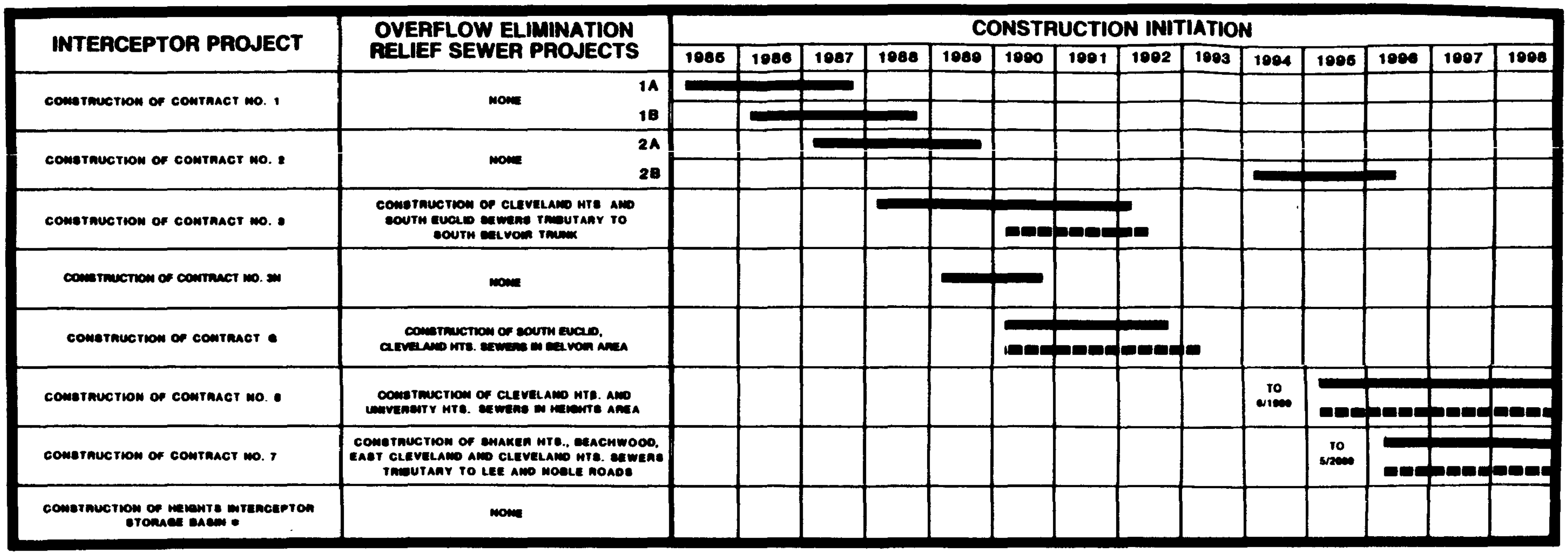
The total estimated construction cost of the Heights interceptor sewer is $93.1 million (1983 value). The total estimated costs of relief sewer and sewer rehabilitation for all communities in the Heights/Hilltop planning area amount to $97.8 million (USEPA 1984d). A condition of the grant for the Heights project required that NEORSD work with the communities in the Heights/Hilltop planning area to develop and implement programs for relief sewer construction and rehabilitation. This grant condition covered all communities in the Heights FPA and Mayfield Heights, Richmond Heights, Mayfield Village, Gates Mills, and Highland Heights in the Hilltop FPA. The construction schedule for the Heights project is presented in Figure 1-3 and the various contracts in the project are illustrated in Figure 1-4.

The Heights FNSI acknowledged that planning for the Cleveland Easterly Wastewater Treatment Plant had not been completed, but that planning had demonstrated that flows from the Heights/Hilltop area should be transported for treatment at Easterly. Since 1984, USEPA has reviewed an environmental assessment for sludge handling facilities for Easterly, but the system improvements for control and treatment of wet weather overflows from Cleveland's combined sewer systems have not yet been evaluated. Based on its review, the USEPA issued a FNSI for solids handling at Easterly on April 17, 1985 (USEPA 1985). Plans evaluated in this EIS, therefore, are not the final components of the Easterly system. Combined sewer overflow (CSO) issues are to be resolved during future planning segments.

Ohio EPA prepared an environmental assessment on the Hilltop Facility Planning Area in August 1985 (OEPA 1985a). The USEPA carefully reviewed this information and, on April 2, 1986, issued a Notice of Intent to prepare this EIS on proposals to construct interceptor sewers to serve the wastewater treatment needs of the Hilltop Facility Planning Area (USEPA 1986b). This decision was based on concern for the environmental and cost impacts of the project proposed by the NEORSD.

1.2 PROJECT NEED

The purpose of the proposed improvements to the Hilltop wastewater collection and conveyance system is to solve the current problems in the



* CONSTRUCTION SCHEDULE BASED UPON NEED

NOTE SCHEDULE EFFECTIVE 5/85

LEGEND

▬ PROPOSED INTERCEPTOR PROJECTS

■■■ PROPOSED RELIEF SEWER PROJECTS

Figure 1-3. Heights/Hilltop Interceptors Project Construction Schedule

Source: NEORSD 1985a

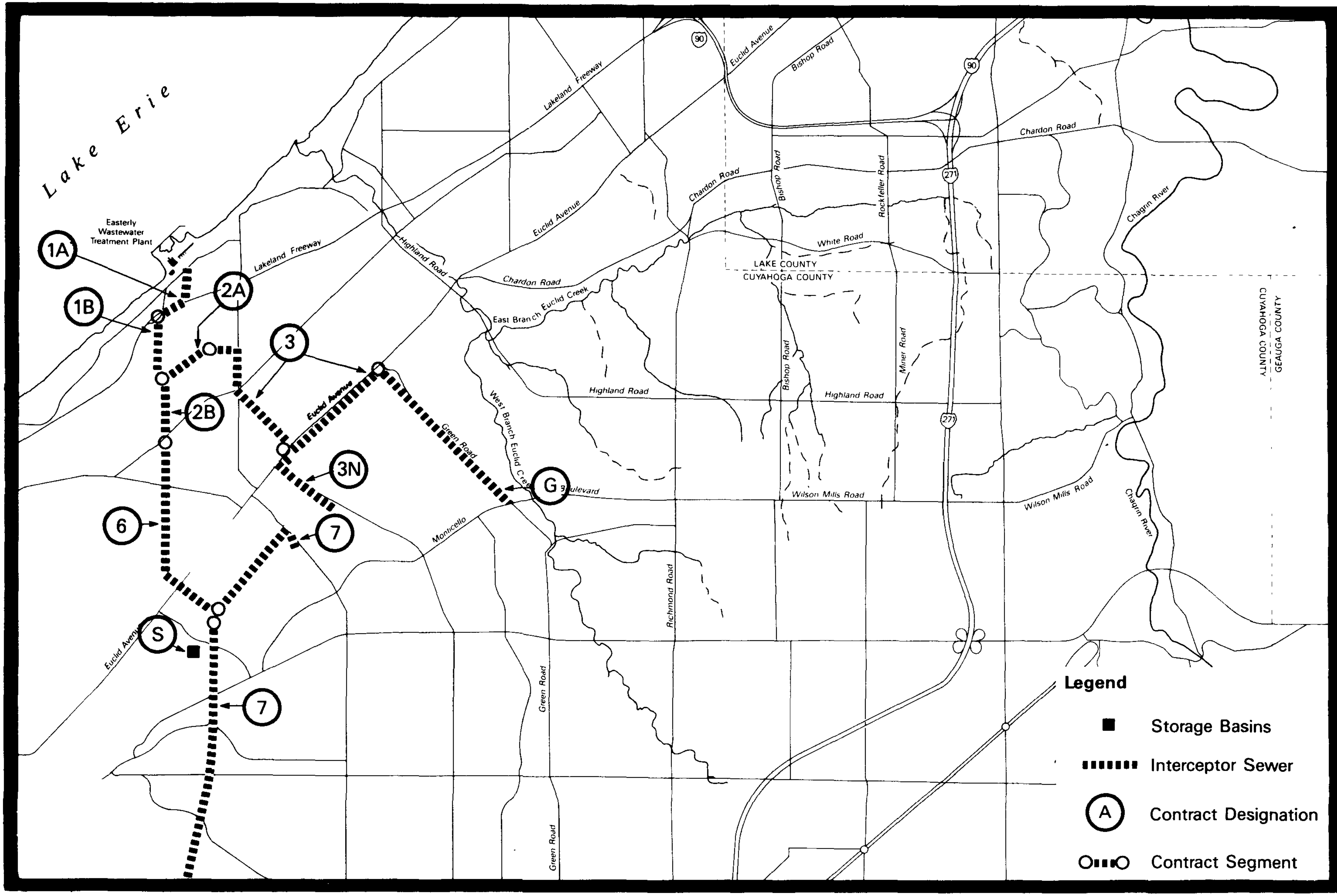


Figure 1-4. Heights/Hilltop Interceptors Schematic

Source: Stumpe 1986a

Hilltop area. These include pump station control problems, excessive I/I, poorly operating package plants, and septic system failures. In addition, decisions made during facilities planning for the Easterly Separate Sewer Area (ESSA) must also be considered.

The most serious problem with the existing sewage transport system is the operation of the Beech Hill/Bonnieview/Wilson Mills complex (BBW). During periods of extremely wet weather, the Wilson Mills pumping station becomes overloaded and signals the Beech Hill pumping station to shut down. Beech Hill in turn signals a sluice gate to divert flow to the Bonnieview storage basin. Although a majority of the flow is diverted to the storage basin, some flow continues to the Beech Hill pumping station. This flow overflows from the wet well and is discharged to a small tributary of the Chagrin River. If pumping is not resumed at Beech Hill, the Bonnieview facility then becomes full and eventually overflows.

These excessive flow volumes that occur during wet weather are a result of I/I problems in the local collector systems. Many of these problems are the result of common trench sewer construction (see Section 2.3). The Sewer System Evaluation Survey (SSES) outlined several sewer rehabilitation and relief sewer projects for the local communities which will help relieve a portion of the I/I problem. The NEORSD is currently working with the communities to coordinate these rehabilitation and relief projects.

Several package plants exist within the Hilltop Facility Planning Area (FPA) and operate with varying degrees of efficiency as discussed in Section 2.2. These plants discharge poor quality effluent to area waterways and thus have problems meeting the NPDES permit limitations.

The original facilities planning efforts listed basement flooding as a problem within the Hilltop area. During the preparation of this EIS, it was determined that sewer maintenance on portions of the existing collector system would help relieve this problem. As previously discussed, the SSES outlined several relief sewer and sewer rehabilitation projects that would increase the sewer capacity and reduce the incidence of basement flooding in the area.

These projects are all local improvements and are not part of the scope of this EIS. With the exception of a few homes around the pumping stations, the BBW complex is not the cause of basement flooding in the area. Basement flooding around Beech Hill and Wilson Mills pumping stations is a result of basement floor elevations lower than the overflow of the pumping stations' wet wells. Most of these homes have had plumbing modifications to correct the problem.

Failing septic systems within the Hilltop FPA were noted as another problem throughout the facilities planning process. Since a complete study of these problems has never been conducted, the actual extent of failing systems in the area is relatively unknown. Although a complete study of existing onsite systems has not been conducted for the Hilltop FPA, facilities planning identified poor soils in the area, the relative age of the onsite systems, and the fact that construction projects have been rejected because of no sewer access as indicators that the existing onsite systems should be eliminated.

1.3 LEGAL BASIS FOR ACTION

The National Environmental Policy Act of 1969 (NEPA) requires a Federal agency to prepare an EIS on "...major Federal actions significantly affecting the quality of the human environment...." In addition, the Council on Environmental Quality (CEQ) has established regulations (40 CFR Part 1500-1508) to guide Federal agencies in determinations of whether Federal funds or Federal approvals would involve a project that would significantly affect the environment. USEPA has developed its own regulations (40 CFR Part 6) for the implementation of the NEPA review. As noted above, USEPA Region V has determined that pursuant to these regulations, an EIS was required for the Hilltop project.

The Federal Water Pollution Control Act of 1972 (FWPCA, Public Law 92-500), as amended in 1977 by the Clean Water Act (CWA, Public Law 95-217), established a uniform, nationwide water pollution control program according to which all State water quality programs operate. OEPA has been delegated the responsibility and authority to administer this program in Ohio, subject to the approval of USEPA. However, the authority for determining whether proposed actions are subject to NEPA is retained by USEPA.

Federal funding for wastewater treatment projects is provided under Section 201 of the FWPCA. The USEPA will fund 75 percent of the grant-eligible costs for conventional collection and treatment facilities for subsequent grant awards made to treatment works that received partial funding prior to October 1, 1984. For grants awarded after October 1, 1984, Federal participation will be for 55 percent of all grant-eligible costs (current capacity at the time of the Step 3 award) and conventional gravity collection sewers become ineligible for grant awards. For alternative collection systems and treatment systems in small communities (e.g. pressure sewers, septic tank effluent sewers, septic tanks, and soil absorption systems), the funding level is 85 percent of the eligible costs for grant awards made prior to October 1, 1984, and decreases to 75 percent of all eligible costs for grants made after October 1, 1984. The conventional sewer costs for which USEPA will not provide funding assistance are land and easement costs; sewers for which less than two-thirds of the planned flow originated before October 28, 1972; sewer laterals located in the street or in easements required to connect house laterals with the sewer main; and house laterals for connection to an onsite pumping or treatment system. Grant eligibility of the onsite portions of alternative systems varies depending on their ownership and management. Privately owned systems constructed after December 27, 1977, alternative service for homes built after this date, and new conventional systems are not eligible for Federal grants.

The dispersal of Federal funds to local applicants is made via the Municipal Wastewater Treatment Works Construction Grants Program administered by USEPA. The Municipal Wastewater Treatment Construction Grants Amendments of 1981 became law (Public Law 97-217) on December 29, 1981, and significantly changed the procedural and administrative aspects of the municipal construction grants program. The changes reflected in these amendments have been incorporated into the USEPA manual, Construction Grants 1985 (CG-85) Municipal Wastewater Treatment. Under the 1981 Amendments, separate Federal grants are no longer provided for facilities planning and design of projects. The designation of these activities as Step 1, facilities planning, and Step 2, design, are retained in CG-85. The Step 3 grant refers to the project for which grant assistance will be awarded and will include an allowance for planning (Step 1) and design (Step 2) activities.

The CG-85 states that projects which received Step 1 or Step 2 grants prior to the enactment of the 1981 amendments may be completed in accordance with terms and conditions of their grant agreement except where statutory changes require revisions or the grantee elects to meet new requirements. Step 3 grant assistance includes a design allowance for those projects which received a Step 1 grant prior to December 29, 1981. A municipality may be eligible, however, to receive an advance of the allowance for planning or design if the population of the community is under 25,000 and the State reviewing agency (OEPA) determines that the municipality would be unable to complete the facilities planning and design to qualify for grant assistance (Step 3).

Communities also may choose to construct wastewater treatment facilities without financial support from the State or Federal governments. In such cases, the only State and Federal requirements that apply are that the design be technically sound and that OEPA be satisfied that the facility will meet NPDES permit standards and public health requirements. Any applicable local ordinances would also have to be met.

If a community chooses to construct a wastewater collection and treatment system with USEPA grant assistance, the project must meet all applicable requirements of the Grants Program. The CWA stresses that the most cost-effective alternative is the one that will result in a minimum total resource costs over the life of the project, as well as meet Federal, State, and local requirements. Nonmonetary costs also must be considered, including social and environmental factors. The most cost-effective alternative is not necessarily the lowest cost alternative. The analysis for choosing the most cost-effective alternative is based on both capital costs and operation and maintenance costs for a 20-year period, although capital costs are funded. Selection of the most cost-effective alternative must also consider social and environmental implications of the alternative. An alternative with higher monetary costs but lesser social and environmental impacts may be selected over an alternative that has low monetary costs but significant environmental impacts.

1.4 EIS PROCESS AND PUBLIC PARTICIPATION

On June 18, 1986, the USEPA held two meetings in Highland Heights where the decision to prepare an EIS for the Hilltop portion of the Heights/Hilltop interceptor project was announced. The scoping meetings, which were advertised to the general public and public officials, were held to gather public input in developing the scope of issues to be addressed in the EIS. The NEORSD has assembled the Hilltop Area Public Advisory Committee (HAPAC) to provide review and input during the EIS process. A list of the HAPAC members is presented in Appendix A. A draft version of this Final EIS was circulated for public comment (the distribution list for the Draft EIS is contained in Appendix B). Public hearings were held in Highland Heights on August 12, 1987 at 1:00 and 7:00 pm for USEPA to receive comments in person on the Draft EIS. Following the close of the 45-day comment period on August 27, 1987, this Final EIS was prepared incorporating the results of public input on the Draft EIS. Chapter 8 provides responses to comments raised during the public comment period on the Draft EIS and at the public hearings held on August 12, 1987. After a comment period following release of this Final EIS, USEPA will issue a Record of Decision (ROD) identifying the cost-effective, environmentally sound alternative for the Hilltop FPA. This ROD will then form the basis of a funding decision by the Municipal Wastewater Treatment Construction Grants Program.

1.5 ISSUES

Environmental, planning, and fiscal issues addressed in this EIS are summarized below. These issues were first identified during USEPA review of the Heights/Hilltop Facility Plan and Ohio EPA's related environmental assessment. Resulting issues were first outlined in USEPA's Notice of Intent (April 2, 1986) and further refined through public comments at the two scoping meetings held on June 18, 1986. These issues are discussed in detail in Chapter 6, Environmental Consequences of Alternatives. Chapter 7, Conclusions and Selected Alternative, identifies the most cost-effective and environmentally sound alternative and recommends measures to mitigate negative impacts of this selected plan. Chapter 8 provides responses to comments raised during the public comment period on the Draft EIS and at the public hearing held on August 12, 1987.

Induced Secondary Growth

The potential for each of the alternatives to affect the magnitude and distribution of growth is evaluated. Past trends in development, suburban land-use conversion, and the supply of vacant developable land in the Hilltop Facility Planning Area and competing suburban areas near Cleveland are evaluated. Current constraints to growth in the unsewered portions of the Planning Area due to inadequate soils have limited growth to date and may do so in the future. Impacts of forecast changes in the magnitude and distribution of area growth and on the ability of the affected jurisdictions to provide basic public services and infrastructure are evaluated.

Project Costs and Fiscal Impacts

The impacts of each of the project alternatives on total project cost, user costs, and the ability of the NEORSD to provide the local share of project costs is evaluated. The ability of the Hilltop Facility Planning Area's population to pay the projected project user costs is evaluated.

Impacts to Euclid Creek

The selected alternative may include a free standing pipe bridge across Euclid Creek in the Euclid Creek Reservation. Impacts evaluated include aesthetics, habitat modification, sedimentation, and erosion, as well as the effects of these factors on water quality and downstream biota.

Impacts to Natural Habitat

Direct impacts of habitat loss and destruction along the proposed open-cut sewer construction corridors and new facility locations for each alternative have been estimated based on field visits and pre-existing surveys. Potential mitigation for these impacts is identified for the selected alternative.

Impacts to Wetlands

Existing Federal and State inventories of wetland areas were combined with field inspections to identify potential impacts of proposed open-cut sewer construction corridors for each alternative. The selected alternative involves no direct impacts to wetlands. Future growth may, however, affect wetlands in the Hilltop FPA.

CHAPTER 2. EXISTING WASTEWATER TREATMENT FACILITIES

This chapter describes the wastewater facilities currently located in the Hilltop Facility Planning Area (FPA) as well as the main centralized facilities outside of the planning area. Both large (centralized) and small (package plants) wastewater treatment plants are discussed as well as the existing pump stations, sewer system, and unsewered areas. Figure 2-1 shows the location of the facilities discussed in this chapter.

The major wastewater facilities associated with the planning area are the Easterly and Euclid Wastewater Treatment Plants. The Easterly treatment plant is one of three major wastewater treatment plants that serve the city of Cleveland and it's suburbs. The Hilltop FPA is within the Easterly service area. The Euclid plant is also important because transfer of waste to that facility from the Hilltop planning area was proposed as an alternative for the part of the Easterly Separate Sewer Segment Wastewater Facilities Plan addressing the Hilltop area. The Euclid plant is owned and operated by the city of Euclid.

Several small treatment facilities, known as package plants, are present within the Hilltop FPA. These facilities include Richmond Park, Scottish Highlands, and Hickory Hills, which are operated by Cuyahoga County, and Sleepy Hollow and Pleasant Hill, which are operated by Lake County. Existing pumping stations include the Beech Hill/Bonnieview/Wilson Mills (BBW) complex and several others. These pumping stations serve certain portions of the sewer area by lifting wastewater from low lying areas to gravity sewers in higher areas.

The sewer system in the Hilltop FPA collects wastes from individual sources and transports it to the Easterly Wastewater Treatment Plant (shown on Figure 2-1). Several areas exist within the planning area which are not served by the Easterly sewer system. Wastes from those areas are either transported to package treatment facilities, or are treated with onsite systems such as septic tanks and leach beds.

The following sections of this chapter provide information on the equipment, performance, and condition of the existing facilities in the Easterly service area, with a focus on the features directly related to the proposed Hilltop interceptor. Figure 2-1 shows the location of the facilities discussed in this chapter.

2.1 EXISTING CENTRALIZED FACILITIES

2.1.1 Easterly Wastewater Treatment Plant

The Easterly treatment plant was proposed in the 1920s to serve a portion of the city of Cleveland. The combined sewer system existing before 1925 determined to a great extent the location of the three major wastewater treatment plants. As in many older areas, a combined system existed with both sanitary and storm water flows in one pipe. Two additional factors were considered in the final placement of the Easterly Regional Wastewater Treatment Plant at the intersection of East 140th Street and Lake Shore Boulevard. First, a safe distance had to be allowed between the plant discharge to Lake Erie and the drinking water intake for the city of Cleveland. Second, the plant had to be located near the existing alignment and outlet of the Easterly interceptor, as constructed in 1905 (NEORSD 1978c). The location of the Easterly Wastewater Treatment Plant is shown on Figure 2-1.

The original Easterly plant was designed to treat an average sewage flow of 123 million gallons per day (MGD). Maximum hydraulic capacity for primary treatment was 307 MGD, and for secondary treatment, it was 184 MGD (NEORSD 1978c). Primary treatment involves the removal of wastes which will settle out or float, while secondary treatment is generally a biological breakdown of soluble organic materials. The Easterly plant was expanded and renovated in 1968 and again in 1973.

The Cleveland Regional Sewerage District, now known as the Northeast Ohio Regional Sewerage District (NEORSD), completed the Easterly Wastewater Facilities Plan for Phase I improvements to the Easterly Wastewater Treatment Plant in 1974. The improvements proposed included:

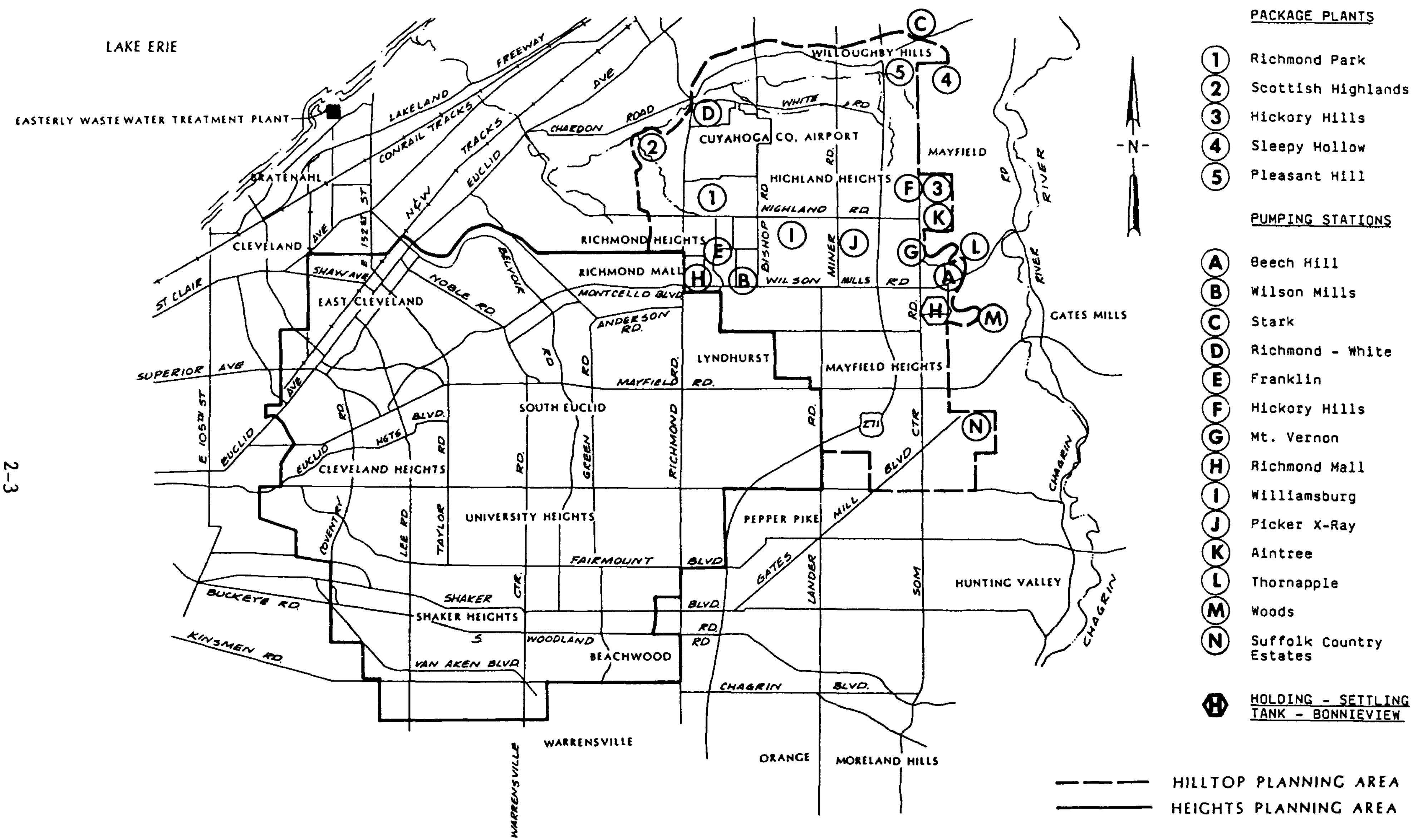


FIG: 2-1

EXISTING FACILITIES

- Electric power and air supply system
- Disinfection and discharge
- Effluent pumping station
- Return sludge system
- Service facility and site.

Expansion and upgrading to improve the plant's efficiency began in 1978 and is essentially complete. These improvements have increased Easterly's dry weather flow capacity to 155 MGD with a wet weather or peak flow capacity of 330 MGD.

Service Area

The Easterly Regional Wastewater Treatment Plant serves approximately 540,000 residents, with a total service area of over 41,000 acres. This service area includes 17,000 acres of combined sewers in the city of Cleveland and 24,500 acres of separate sewers in the suburbs (NEORSD 1978c). The six major interceptors that convey flow in the Easterly sewer district include:

- Easterly
- Doan Valley
- Dugway (East and West)
- Lake Shore Boulevard
- East 140th
- East 152nd.

The communities served by this treatment facility include Mayfield, Lyndhurst, Beechwood, Pepper Pike, Orange Village, Woodmere, Richmond Heights, Highland Heights, Mayfield Heights, Shaker Heights, South Euclid, University Heights, Cleveland Heights, East Cleveland, Gates Mills, Warrensville Heights, Warrensville Township, and the city of Cleveland (NEORSD 1978c).

Existing Flows

The Easterly Regional Wastewater Plant serves the largest portion of the separate sewer area within the city of Cleveland. The Easterly portion of the separate sewer system contains approximately 2,800,000 linear feet of sanitary sewer and serves nearly 24,500 acres. The communities within the Easterly separate sewer area have a combined population of about 232,000 people; however, not all are connected with the Easterly WWTP (NEORSD 1978c).

Within the Hilltop Facility Planning Area, approximately 10 million gallons a day (MGD) of separate wastewater sewage is generated and transported to the Easterly plant (NEORSD 1978c). As previously stated, the peak flow capacity at the Easterly plant is 330 MGD for secondary treatment. Dry weather design capacity for this plant is 155 MGD.

An extensive flow monitoring program conducted as part of the Sewer System Evaluation Survey established a peak wet weather flow rate to the Easterly WWTP of 713 MGD (NEORSD 1985a). This study concluded that the existing separate sewer system has insufficient capacity to transport this peak flow and the result is frequent sewer overflows, bypasses, and basement flooding. These problems occur throughout the ESSA including the Hilltop area. More detail on these problems will be provided later in this chapter with the discussion of the existing sewer system.

Treatment System

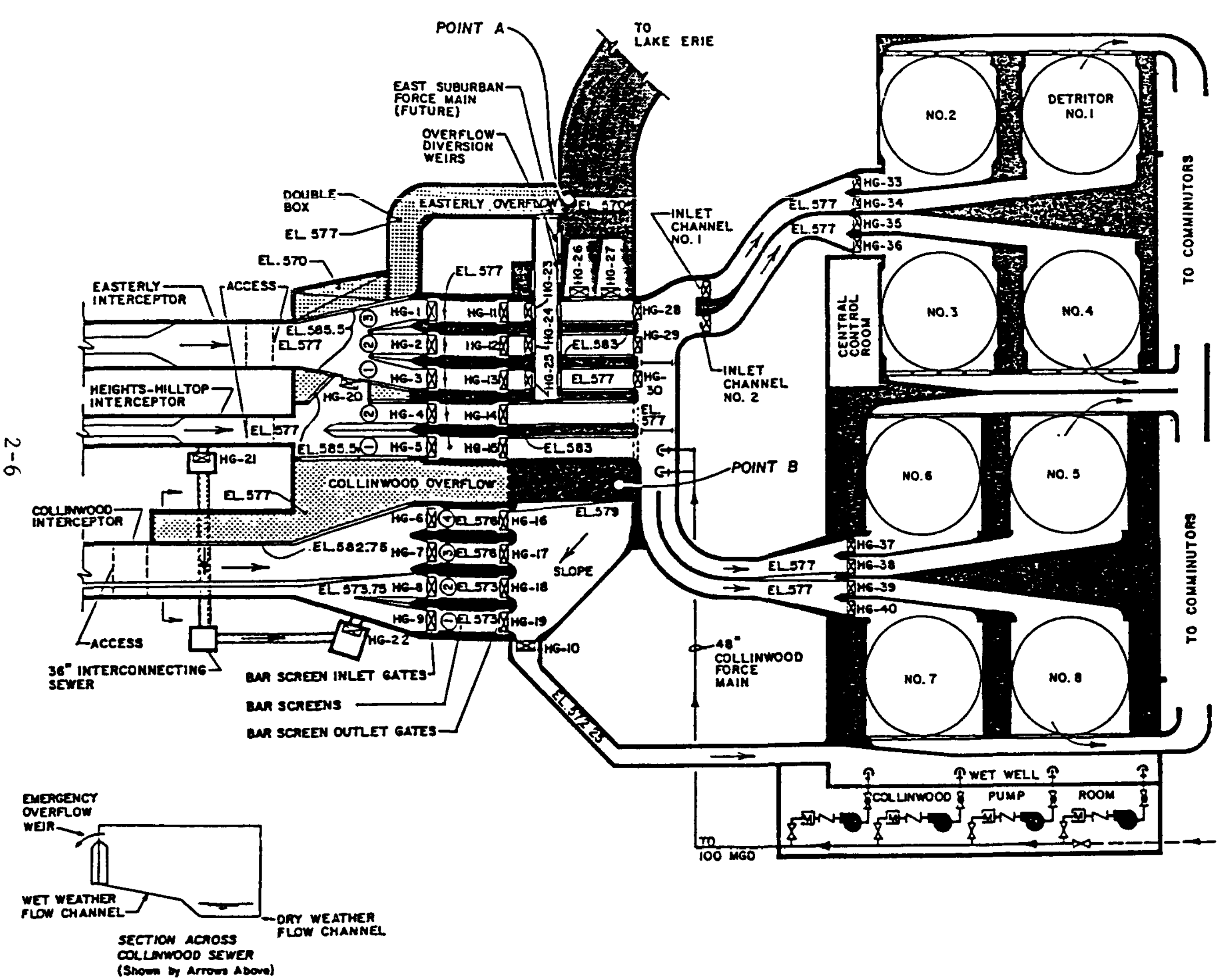
The existing Easterly plant layout is shown in Figures 2-2, 2-3, 2-4, and 2-5. The Easterly Wastewater Treatment Plant was initially built to remove only grit and screenings. It was upgraded to an activated sludge plant (the first on Lake Erie) in 1938. The plant was further upgraded and expanded from 1974-1976. The solids generated at this facility are pumped to the Southerly WWTP for treatment (via a 13-mile force main).

The Heights and Hilltop projects are not the final components for the Easterly system. Future planning for improvements for CSO control and treatment will continue after this plan is completed.

The treatment steps currently used at Easterly are described in this section and correspond to Figures 2-2, 2-3, 2-4, and 2-5.

1) Screening and Grit Removal - In a typical treatment system, the initial step involves removal of large suspended or floating materials which may be potentially hazardous to the treatment system. This is accomplished by using coarse screens or racks to remove solids such as sticks, rags, and paper; and by allowing grit to settle out.

2) Comminutors - These devices are used to chop sewage solids into smaller pieces so they do not clog pumps or interfere with other treatment processes.



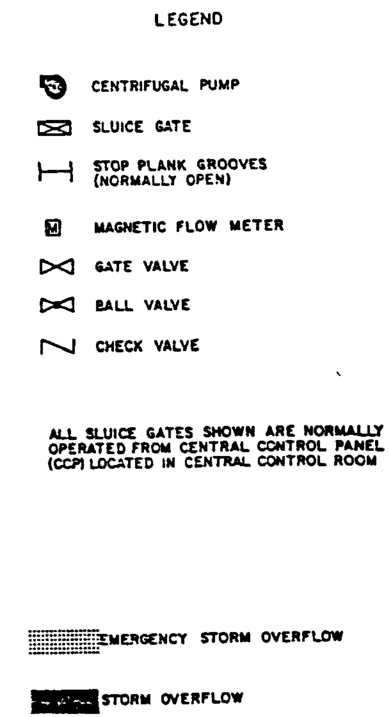


FIGURE 2-2
EASTERLY WASTEWATER TREATMENT PLANT HEADWORKS FACILITIES

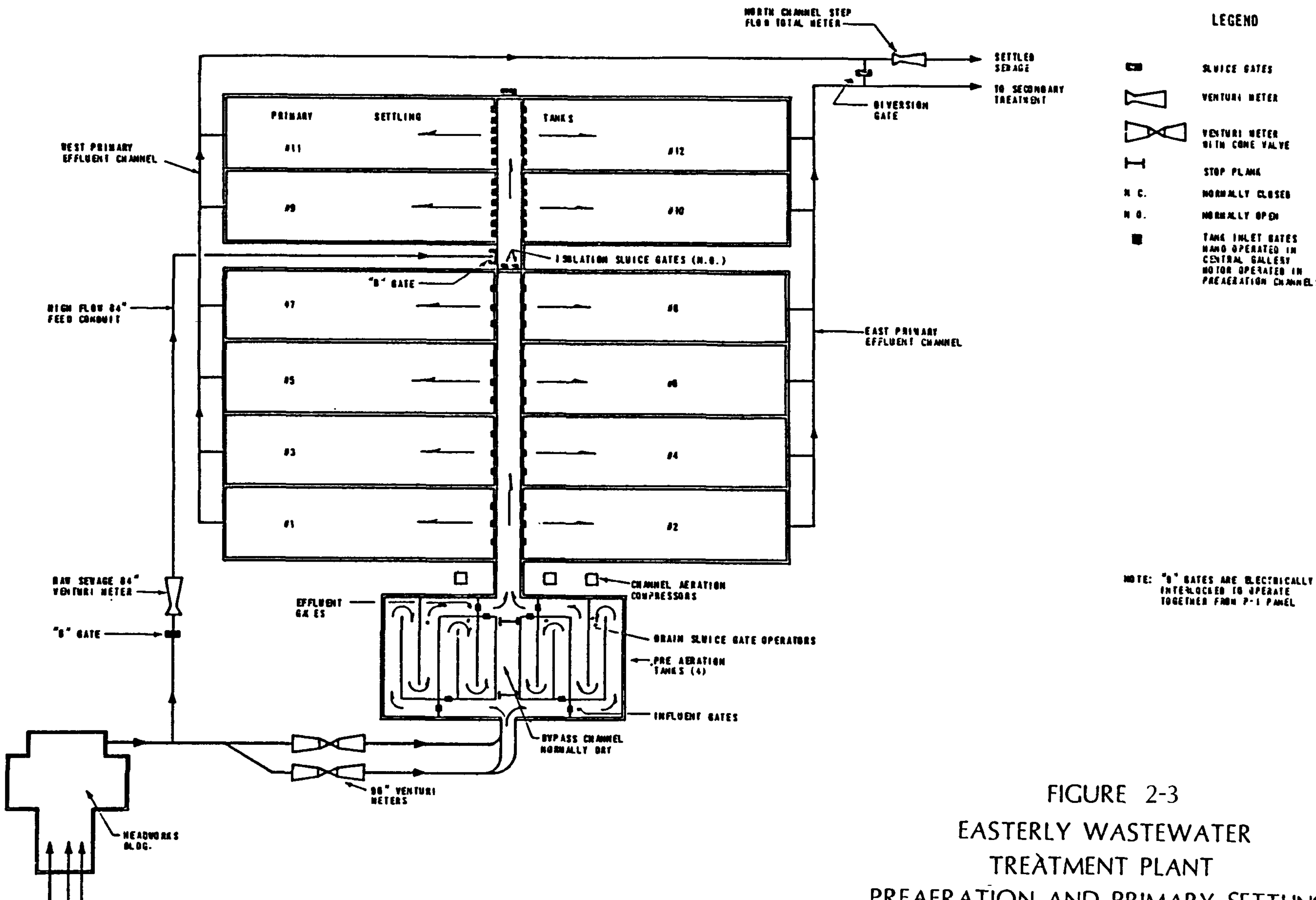


FIGURE 2-3
EASTERLY WASTEWATER
TREATMENT PLANT
PREAERATION AND PRIMARY SETTLING

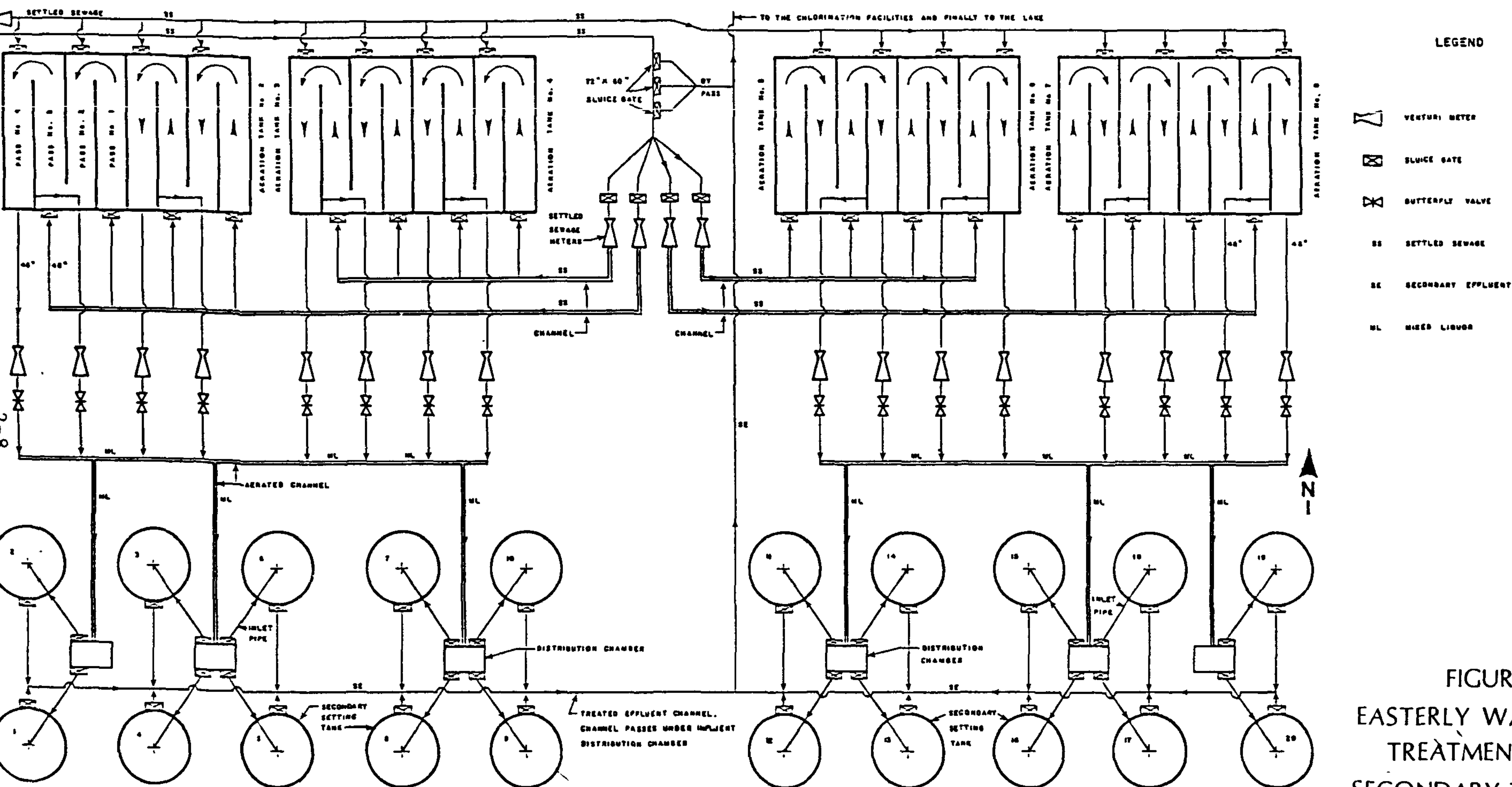
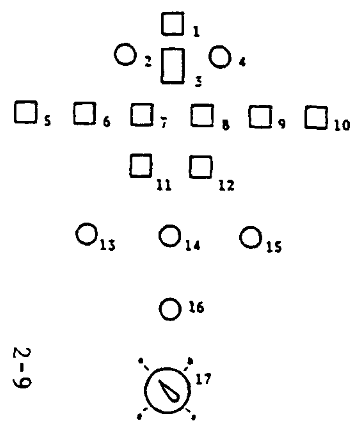


FIGURE 2-4
EASTERLY WASTEWATER
TREATMENT PLANT
SECONDARY TREATMENT



TYPICAL SCREW PUMP CONTROL MODULE

1. LUBRICATOR MOTOR LIGHT, ON WHEN MOTOR RUNNING
2. LUBRICATOR MOTOR START BUTTON
3. MANUALLY OPERATED MOTOR STARTER, NORMALLY ON
4. LUBRICATOR MOTOR STOP BUTTON
   LABELS (5) thru (10) ARE LAMPS FOR THE FOLLOWING SCREW PUMP FUNCTIONS:
5. MOTOR COOLING OFF
6. BREAKER CONTROL SWITCH
7. BREAKER PUSH BUTTON
8. MAIN CONTROL PANEL PUSH BUTTON
9. AUTOMATIC BUBBLER
10. MOTOR TRIPPED
   LABELS (11) thru (17) PERTAIN TO THE SCREW PUMPS
11. RUNNING LIGHT
12. OFF LIGHT
13. MANUAL RESET, EMER. CONTROL SWITCH
14. START BUTTON
15. ALARM RESET BUTTON
16. STOP BUTTON
17. CONTROL SWITCH - 4 SETTINGS
    a. BREAKER PUSH BUTTON
    b. PUSH BOTTON MAIN CONTROL PANEL
    c. AUTOMATIC BUBBLER
    d. BREAKER CONTROL SWITCH

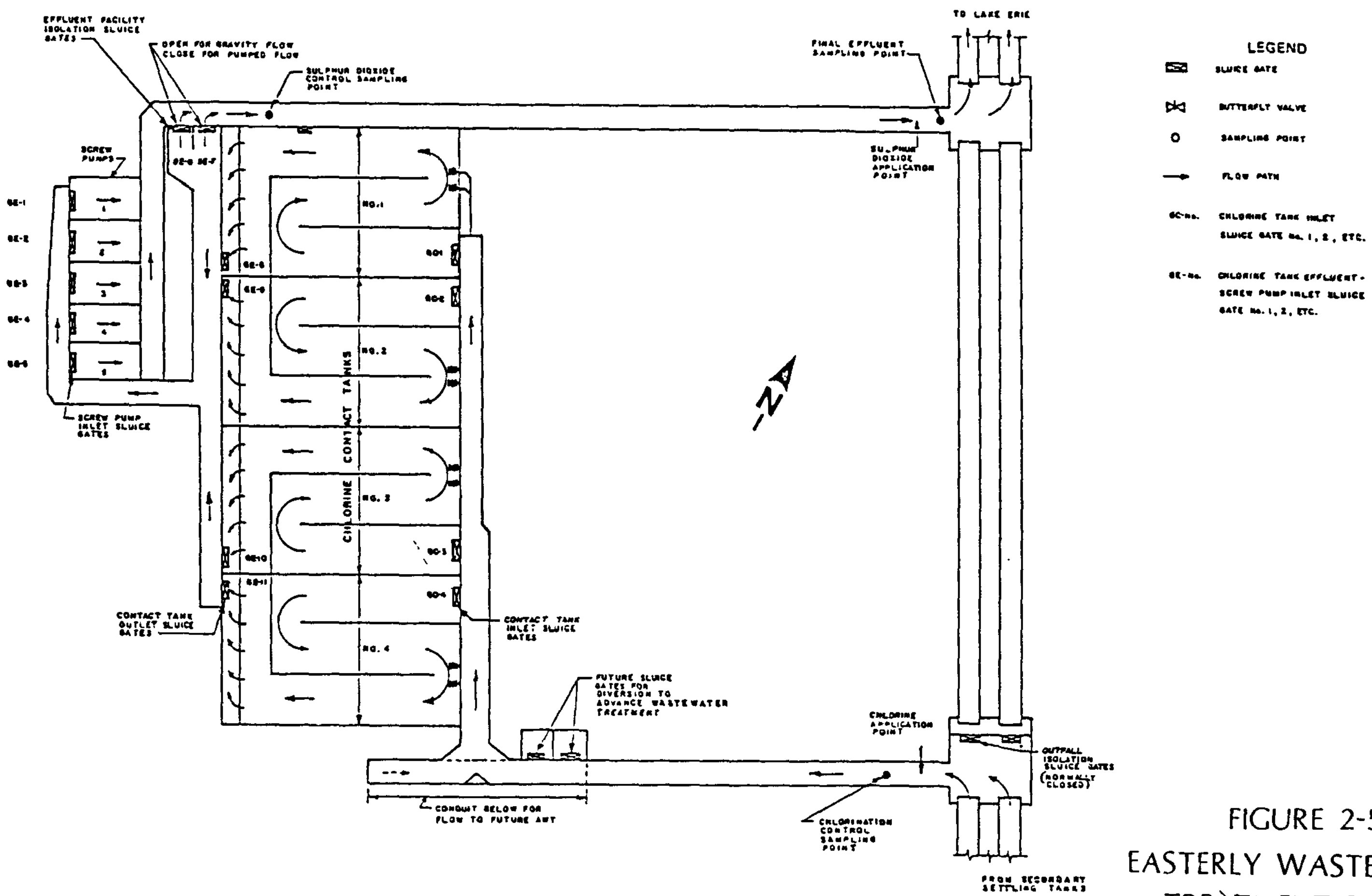


FIGURE 2-5
EASTERLY WASTEWATER
TREATMENT PLANT
EFFLUENT FACILITIES

3) Primary Settling - In this treatment process, flow velocity is decreased in 12 primary settling tanks. As the sewage flows through the tanks, settleable solids are removed from the liquid fraction.

4) Aeration - The flow from the primary settling tanks is then introduced to one of eight four-pass aeration tanks. Here the wastewater is mixed with returned sludge and aerated under turbulent conditions. This process is designed to encourage growth of microorganisms which will convert the biodegradable organics into carbon dioxide, water, and more microorganisms. As the microorganisms grow, they form a mass which is removed during the final settling process. A portion of these biological solids are returned to the aeration tank as needed to perpetuate growth.

5) Final Settling - The waste fraction of the sewage along with the flocculated microorganisms from the aeration tanks are allowed to settle out in this step, with a portion being returned to the aeration tanks.

6) Disinfection - The final step in a treatment process is disinfection to prevent the spread of disease caused by pathogenic bacteria and viruses. The addition of chlorine (as a gas, or as a solid or liquid hypochlorite compound) is the process most commonly used for wastewater disinfection in the United States.

7) Discharge - The final treated wastewater from this facility is ultimately discharged to Lake Erie.

Effluent Quality

Performance data for the Easterly Wastewater Treatment Plant as documented by the Ohio EPA are summarized in Table 2-1 (OEPA 1986a).

As shown, the Easterly WWTP generally operates within the NPDES permit limits. Although the BOD limit is exceeded during the summer months, overall the plant appears to operate efficiently.

2.1.2 Euclid Wastewater Treatment Plant

The Euclid Wastewater Treatment Plant is owned and operated by the city of Euclid and serves the city and several small developments in the Hilltop FPA. The average daily design flow of this facility is about 18 MGD. The city of Euclid reports that the sanitary sewers have a history of problems associated with wet weather flow (as stated in the Easterly Separate Sewer Segment Wastewater Facilities Plan) which are probably similar to the severe infiltration and inflow problems which occur within the Easterly Wastewater Treatment Plant service area (NEORSD 1978c). These problems result in excessive flow volumes at the treatment plant during wet weather. The final effluent from the Euclid plant is discharged to Lake Erie.

Table 2-1. Easterly Wastewater Treatment Plant Effluent Data

	Month	Flow (MGD)	BOD_5 (mg/l)	S.S. (mg/l)	Fecal* Coliform (#/100 ml)	Total Phosphorus (mg/l)
1985	November	137.5	15.8	5.9	--	0.28
	December	116.4	16.7	7.2	--	0.33
1986	January	118.0	16.0	7.5	--	0.34
	February	136.1	10.1	8.2	--	0.26
	March	116.5	13.3	6.7	--	0.26
	April	114.4	11.4	8.0	--	0.26
	May	120.0	17.5	9.8	36.8	0.31
	June	116.8	24.7	4.9	35.4	0.18
	July	123.0	20.8	5.1	19.6	0.23
	August	109.7	21.4	4.9	29.4	0.29
	September	118.9	22.9	5.3	23.8	0.21
	October	127.4	20.1	6.1	53.3	0.28
	AVERAGE	121.2	17.6	6.6	33.1	0.27
	NPDES Limit (30 day average)	--	20	20	1,000	1.0

Source: *OEPA 1986a*

*Note: Fecal Coliform was only monitored from May to October.

Effluent data for this facility (OEPA 1986b) are included in Table 2-2. As shown, this plant has a problem meeting the NPDES limits for BOD, SS, and total phosphorus.

2.2 EXISTING PACKAGE PLANTS

These plants were originally built by developers and are now owned and operated by the counties. Five large package treatment plants are present within the planning area. The Richmond Park Terrace and Scottish Highlands plants both have an average capacity of over 0.1 MGD. The Hickory Hills, Sleepy Hollow, and Pleasant Hill plants are considerably smaller with average capacities of less than 0.05 MGD for each plant. A summary of the available information on each facility is contained in this section, as well as information on the small package treatment facilities in the area.

2.2.1 Richmond Park Terrace Treatment Plant

The Richmond Park Terrace treatment plant is located on the grounds of the Cuyahoga County Airport. The facility is owned and operated by Cuyahoga County and serves about 950 residents of an apartment complex in Richmond Heights. The total service area of this plant is approximately 3.7 acres (NEORSD 1978c). The location of this facility is shown in Figure 2-6.

This plant has a design capacity of 0.198 MGD but currently operates at an average flow of about 0.133 MGD. Treatment at this facility is by extended aeration (NEORSD 1978c). An extended aeration process generally consists of an aeration tank followed by a settling tank. In the aeration tank, wastewater is mixed with sludge returned from the settling tank and aerated under turbulent conditions.

This process encourages growth of microorganisms which transform the organic fraction of the wastewater into carbon dioxide, water, and microorganisms. Extended aeration typically allows a long retention time in both the aeration tank and the settling tank to improve the treatment efficiency. All sludge generated in the settling tank is generally returned to the aeration tank, and the liquid fraction is discharged as effluent.

Table 2-2. Euclid Wastewater Treatment Plant Effluent Data

	Month	Flow (MGD)	BOD_5 (mg/l)	S.S. (mg/l)	Fecal* Coliform (#/100 ml)	Total Phosphorus (mg/l)
1985	November	20.6	8.8	18.9	--	0.68
	December	19.4	17.2	32.3	--	1.31
1986	January	18.1	23.4	40.3	--	1.29
	February	19.6	35.9	67.3	--	1.67
	March	19.4	32.4	54.2	--	2.03
	April	19.3	24.0	36.9	--	1.81
	May	20.1	20.7	32.3	12.1	1.47
	June	18.9	19.0	36.2	26.9	1.33
	July	17.9	14.1	15.3	13.2	0.87
	August	17.7	18.4	8.2	15.9	0.45
	September	18.4	9.9	14.7	--	0.55
	October	19.0	10.1	13.3	--	0.47
	AVERAGE	19.0	19.5	30.8	17.0	1.16
	NPDES Limit (30 day average)	--	12	12	200	1.0

Source: OEPA 1986a

*NOTE: Fecal Coliform was only monitored from May to August.

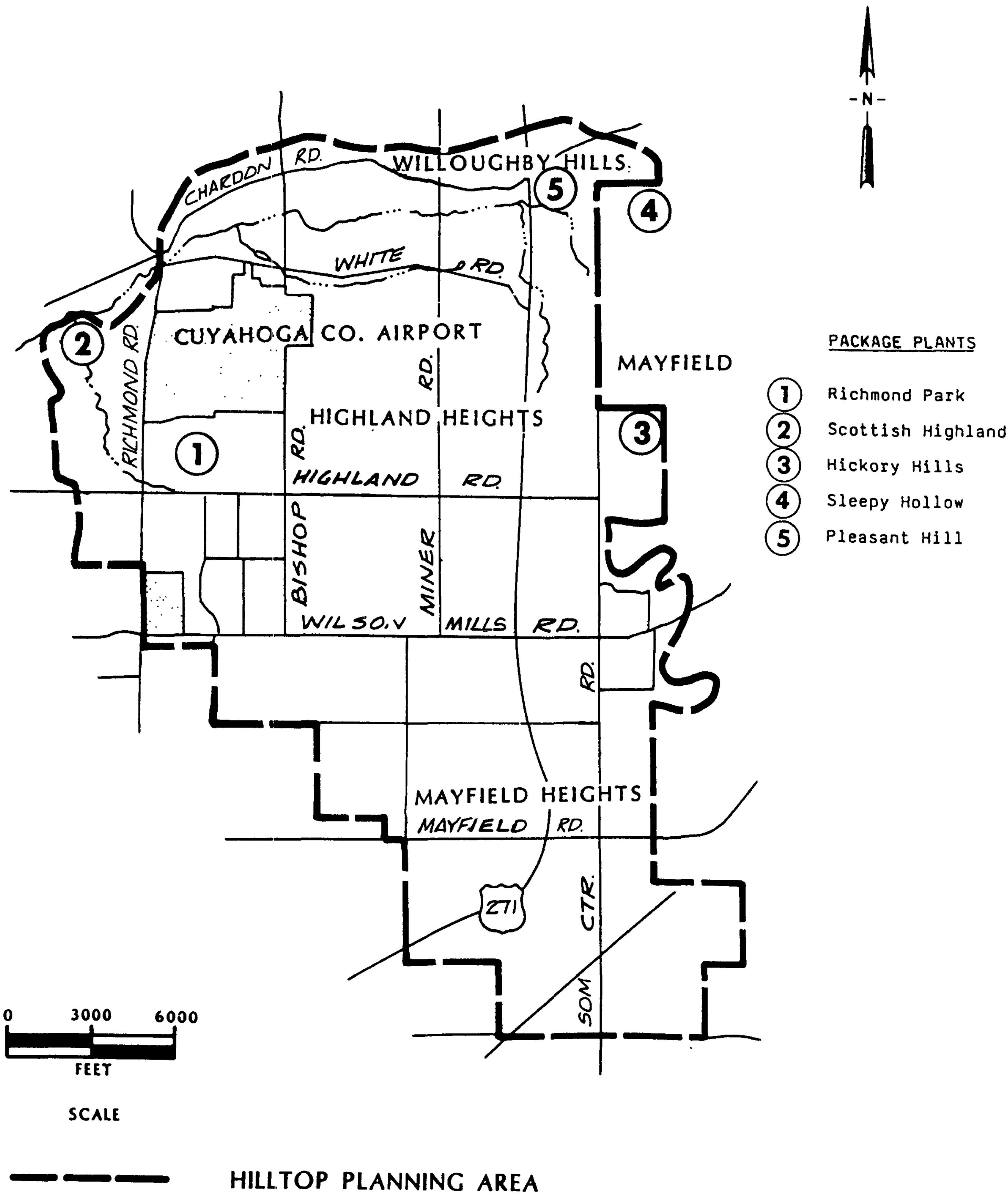


Figure 2-6
EXISTING PACKAGE PLANTS

Effluent from this plant is discharged to Euclid Creek. Data available from November 1985 through October 1986 is summarized in Table 2-3. A monthly summary of the plant data is contained in Appendix C. Available information on the NPDES permit for this plant is also shown in Table 2-3. Compliance is generally shown for all values except fecal coliform bacteria.

During site vists, the EIS project team noted that the facility appeared to be in generally good condition. No severe odor problems were detected.

2.2.2 Scottish Highlands Treatment Plant

The Scottish Highlands treatment plant is located on Dundee Road in Richmond Heights and is owned and operated by Cuyahoga County. This facility serves a residential area of about 950 residents within Richmond Heights with separate sewers. The location of this facility is shown in Figure 2-6.

The design capacity of this plant is about 0.122 MGD, and recent records indicate that the plant normally treats about 0.118 MGD. Secondary treatment at this facility is also by extended aeration.

Summarized effluent data (November 1985 through October 1986) for the Scottish Highlands treatment plant and the NPDES permit values are included in Table 2-3. A monthly summary of the plant data is contained in Appendix C. This plant shows noncompliance for suspended solids and fecal coliform. Discharge from this facility is to Euclid Creek.

The EIS project team also noted that this facility was in generally good condition. The plant is situated near the edge of the steep Euclid Creek ravine, which could limit the extent of expansion of this facility. No severe odor problems were detected during the site visits.

Table 2-3. Treatment Facilities Data Large Package Facilities

Facility	Average Flow (MGD)	Capacity (MGD)	Effluent Quality*				NPDES Limitations**			
			BOD_5 (mg/l)	Sus. Solids (mg/l)	D.O. (mg/l)	Fecal Coliform (per 100 ml)	BOD_5 (mg/l)	Sus. Solids (mg/l)	D.O. (mg/l)	Fecal Coliform (per 100 ml)
Richmond Park	0.133	0.198	7.3	10.8	5.8	942	10	12	5	200
Scottish Highlands	0.118	0.122	9.4	15.0	5.4	304	10	12	5	200
Hickory Hills	0.031	0.024	13.5	22.2	5.8	1245	10	12	5	200
Sleepy Hollow	0.011	0.010	16.2	15.9	—	—	10	12	6	1000
Pleasant Hill	0.046	0.040	35.0	21.1	—	—	—	—	—	—

* Data is for November 1985 thru October 1986. Monthly summary data for each plant is included in Appendix C.
** 30 day average limits.

SOURCE: OEPA 1986a

2.2.3 Hickory Hills Treatment Plant

The Hickory Hills treatment plant is also owned and operated by Cuyahoga County. It is located along the eastern edge of the study area on Hickory Hills Road in Mayfield (see Figure 2-6). This plant serves about 287 residents of Mayfield Village.

The most recent available data (November 1985 through October 1986) indicates that this plant has an average flow of 0.031 MGD. The design capacity of this plant is 0.024 MGD.

Effluent data (November 1985 through October 1986) for this facility are included in Table 2-3 along with the NPDES limits. A complete summary of the plant data is contained in Appendix C. With the exception of dissolved oxygen, the effluent is generally not in compliance with the permit. Effluent from this plant flows to a storm sewer that discharges to the Chagrin River.

This facility is entirely enclosed in a building; however, during site visits, the EIS project team did not detect any severe odor problems. The facility was in generally fair condition.

2.2.4 Sleepy Hollow Treatment Plant

The Sleepy Hollow treatment plant is located in the northeast corner of the study area along Martin Drive in Willoughby Hills as shown in Figure 2-6. This facility is owned and operated by Lake County and serves approximately 118 people.

The design capacity of this extended aeration facility is about 0.010 MGD; however, recent records show that the plant treats an average of about 0.011 MGD. Effluent characteristics (November 1985 through October 1986) for the Sleepy Hollow treatment plant are summarized in Table 2-3. Monthly summary data for this facility are also contained in Appendix C. As shown, the plant generally does not comply with the BOD or suspended solids NPDES permit limits. Discharge from this facility is to a tributary of the Chagrin River.

The EIS project team noted that this facility appeared to be in somewhat poor condition. No physical constraints were present that would limit expansion of this facility. During the site visit, no odor problems were detected.

2.2.5 Pleasant Hill Treatment Plant

The Pleasant Hill treatment plant is also located in the northeast corner of the study area in Willoughby Hills, and is also owned and operated by Lake County. This facility is located on Pleasant Hill Road (see Figure 2-6). The service area of this facility consists of about 83 homes and small commercial properties in Willoughby Hills (NEORSD 1978c).

As with the plants previously mentioned, this facility also has extended aeration treatment. The reported design capacity of this plant is 0.040 MGD; however, it currently treats about 0.046 MGD.

The effect of the excessive flow volumes at this facility can be seen in the effluent quality. The high flow volumes reduce the retention time in the plant, and thus reduce treatment efficiency. Table 2-3 contains a summary of the operating data for November 1985 through October 1986. Monthly data is also contained in Appendix C. At present, this facility is not covered by an NPDES permit. As shown, this plant discharges relatively high concentrations of BOD and suspended solids. Effluent from this facility is discharged to a tributary of Euclid Creek.

The overall appearance of this facility was generally good as noted by the EIS project team. During the site visit, the plant was being operated with only half of the aeration tanks to treat the waste load. No significant odor problems were detected.

2.2.6 Other Treatment Plants

In addition to the five package plants described above, there are several small package plants and onsite treatment systems located within the Hilltop area (NEORSD 1985a). Table 2-4 provides information on these plants.

Table 2-4. Existing Small Package Treatment Facilities

Facility	Community	Location	Capacity (MGD)	System
Bishop & Highland Marathon	Highland Heights	558 Bishop Rd.	0.0015	Aeration
Dick's Auto Sales	Highland Heights	5591 Highland Rd.	0.0008	Aeration
Highland Bishop Tavern	Highland Heights	5596 Highland Rd.	0.0008	Aeration
Bud Ley & Sons, Inc.	Highland Heights	5599 Highland Rd.	0.0008	Filter
Highland Deli	Highland Heights	5600 Highland Rd.	0.0010	Evapotrans
George Baker	Highland Heights	6119 Highland Rd.	0.0060	Aeration
Church of Latter Day Saints	Mayfield Heights	32895 Cedar Rd.	0.0020	Aeration
Acacia Cemetary	Mayfield Heights	1880 SOM Center Rd.	0.0010	Filter
B&B Sunoco	Mayfield Heights	1890 SOM Center Rd.		
Highland Road Baptist Church	Mayfield Village	6500 Highland Rd.	0.0020	M-Filter
Parkview Golf Course	Mayfield Village	320 SOM Center Rd.	0.0015	Aeration
St. Bartholomew Church	Mayfield Village	435 SOM Center Rd.	0.0020	Aeration
Don Ray Products	Mayfield Village	500 SOM Center Rd.	0.0020	Aeration
White Haven Memorial Park	Mayfield Village	615 SOM Center Rd.	0.0008	Filter
Ken's Auto Service	Mayfield Village	744 SOM Center Rd.	0.0012	Aeration
Christian Assembly Church	Richmond Heights	25595 Chardon Rd.	0.0050	Aeration
Four Seasons Equipment	Richmond Heights	25850 Chardon Rd.	0.0015	Aeration
Calabrese Comm. Bldg.	Richmond Heights	25861 Chardon Rd.	0.0045	Aeration
State Farm Insurance	Richmond Heights	25875 Chardon Rd.	0.0015	Aeration
The Colonial Homestead	Richmond Heights	26000 Chardon Rd.	0.0005	Filter
B&B Marathon	Richmond Heights	26005 Chardon Rd.	0.0010	Filter
Ron's Auto Service	Richmond Heights	26102 Chardon Rd.	0.0010	Filter
Convenient Food Mart	Richmond Heights	26159 Chardon Rd.	0.0015	Aeration
Richmond Beverage	Richmond Heights	26180 Chardon Rd.	0.0015	Aeration
Chardon Plaza	Richmond Heights	26177 Chardon Rd.	0.0050	Aeration
Kingdom Hall	Richmond Heights	26450 Chardon Rd.	0.0015	Filter
City Service Garage	Richmond Heights	26260 Chardon Rd.	0.0008	Aeration
Mayfair Swim Club	Richmond Heights	25959 Highland Rd.	0.0040	Filter
Hillcrest Ambulance	Richmond Heights	26700 Highland Rd.	0.0020	M-Filter
Hillcrest Animal Hospital	Richmond Heights	26800 Highland Rd.	0.0015	Aeration
City Pool & Park	Richmond Heights	27285 Highland Rd.	0.0050	M-Filter

Table 2-4. Existing Small Package Treatment Facilities (Continued)

Facility	Community	Location	Capacity (MGD)	System
Suburban Christian Church	Richmond Heights	27499 Highland Rd.	0.0010	
Fatica Hardware	Richmond Heights	213 Richmond Rd.	0.0008	Aeration
Marconi T.V.	Richmond Heights	216 Richmond Rd.	0.0010	M-Filter
Gastown Station #346	Richmond Heights	230 Richmond Rd.	0.0015	Aeration
Puglio's	Richmond Heights	239 Richmond Rd.	0.0050	Aeration
Cuyahoga Tractor Sales	Richmond Heights	243 Richmond Rd.		
U.S. Post Office	Richmond Heights	454 Richmond Rd.	0.0015	Aeration
Marathon Gas Station	Richmond Heights	456 Richmond Rd.	0.0015	Aeration
Amoco Service Station	Richmond Heights	453 Richmond Rd.		Filter
Cabinet Shoppe	Richmond Heights	468 Richmond Rd.	0.0015	Aeration
Faith United Church of Christ	Richmond Heights	575 Richmond Rd.	0.0015	
St. Gregory Church	Richmond Heights	678 Richmond Rd.	0.0025	Aeration
Revco Discount Drug #32	Richmond Heights	754 Richmond Rd.	0.0015	Aeration
Longstreet Auto Body	Richmond Heights	755 Richmond Rd.	0.0005	Filter
Dry Clean USA	Richmond Heights	760 Richmond Rd.	0.0010	Filter

Source: Somrak 1987c

Note: M-Filter - Dosing pump after a septic tank or trash trap to flood a filter.
Filter - Any other filter type system.

In general, each of these facilities is a small treatment system which serves one business (e.g., Bishop & Highland Marathon).

2.3 SEWER SYSTEM

The provision of sewer service in the Easterly Separate Sewer Area (ESSA) was conducted under the jurisdiction of Cuyahoga County during most of the system expansion. The communities directly adjacent to the city of Cleveland were allowed direct connection to the city sewer system. Communities further east and southeast (including the Hilltop area) that desired access had to connect to a county sewer or negotiate with the communities that already had access to the city system (NEORSD 1978c). The problems involved with coordinating the communities, the county, and the city of Cleveland, as well as the increasing pressure to improve wastewater collection and treatment facilities, led to the formation of the Cleveland Regional Sewer District in 1972, now known as the Northeast Ohio Regional Sewer District (NEORSD).

Within the Easterly Wastewater Treatment Plant service area the majority of sewers are separate sewers consisting of individual conduits for wastewater and stormwater.

Generally, separate sewers in the ESSA are constructed in different trenches as they currently are in Cleveland. However, prior to 1960, the stormwater and sanitary pipes were constructed in the same trench; these are called dual sewers (NEORSD 1978c). Finally, some of the sewers in the Easterly Wastewater Treatment Plant service area are combined sewers which combine stormwater and wastewater flow within a single pipe. These facilities and existing problems are described below.

The Easterly Separate Sewer Area (ESSA) serves nearly 24,500 acres and connects to the combined system at over 12 locations. Length of sewers per community and inch-diameter-miles of separate sewer in the Hilltop Facility Planning Area (as listed in the Sewer System Evaluation Survey) are shown in Table 2-5.

Table 2-5. Community Separate Sewer Information

Community	Length (ft)	Inch-Diameter-Mile
Mayfield Village	53,000	N/A
Richmond Heights	45,085	N/A
Highland Heights	103,550	N/A
Mayfield Heights	165,400	184
Willoughby Hills	24,765	288
Gates Mills	9,200	N/A
TOTAL	401,000	

Source: NEORSD 1983a

The major portion of sewage collected in the ESSA is transported to the Easterly interceptor and the Easterly Wastewater Treatment Plant by the Doan Valley, Dugway, East 152nd-Ivanhoe, and East 140th-Hayden Avenue interceptors.

Infiltration and Inflow

The majority (95%) of the sanitary sewers in the ESSA have a diameter of 8 to 24 inches. These smaller sewer lines are generally vitrified clay, while the larger diameter sewers in the area are reinforced concrete pipe. Some segmented clay block and brick sewers are still in service. Most of the separate sewers were built prior to 1950, and the oldest portions were constructed around 1915. Since 1950, nearly all of the separate sewer construction in the Easterly district has occurred in the eastern portion of the ESSA (NEORSD 1978b).

Wet weather overflows due to infiltration and inflow (I/I) are recognized as a pollution problem in the Easterly Separate Sewer Area (ESSA) (NEORSD 1978b). Infiltration occurs when water in backfill material leaks into the sanitary sewer through breaks and cracks in the pipe. Inflow, on the other hand, occurs when stormwater reaches the sanitary sewer by direct connection without first entering the backfill material (such as a directly connected downspout). One major task of the facilities planning effort was to determine the amount of I/I entering the sewer system. A flow monitoring study and a sewer system evaluation survey were conducted to define the extent of the problem.

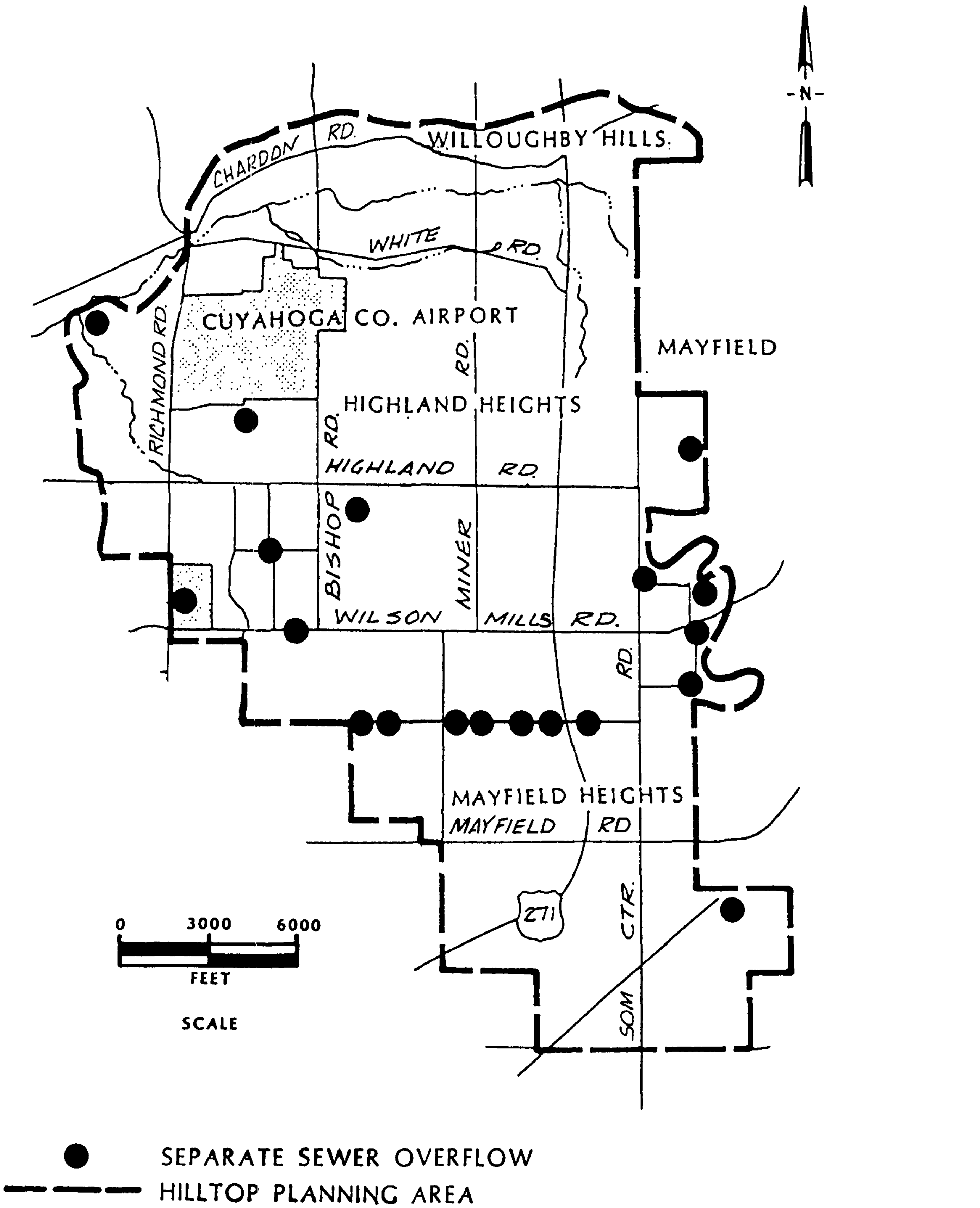
During the preparation of the facility plan, wastewater flow meters were used to monitor 101 points within the ESSA over a 30-day period. Depth of flow was recorded, and for the first time, flow conditions throughout the system were observed simultaneously. The effects of inflow were evident even during the lightest of the observed rainfalls. Inflow resulting from the maximum rainfall event (approximately 1 inch per hour) during the monitoring period caused sewage to back up in 64 of the 101 monitoring locations. A fairly uniform light rainstorm with an average intensity of one-quarter inch per hour caused sewage backup in 28 monitoring locations. These results indicate that the inflow problems are severe.

Although infiltration was observed throughout the sewer system, inflow entering the sanitary sewer system appeared to be by far the most severe problem in most areas. Therefore, a Sewer System Evaluation Survey (SSES) was judged to be necessary (NEORSD 1985a).

The SSES included extensive field investigations and mapping to identify sources of extraneous flow within the separate sewer system. Approximately 700 short-term flow monitors were placed in individual manholes throughout the study area. Long-term flow monitors were also installed at strategic locations within the system.

The major problem found during the SSES was rapid infiltration (and not inflow as originally believed), which is caused by storm sewers leaking water into the sanitary sewers. Rapid infiltration occurs when stormwater leaks from joints and/or cracks in the storm sewer, travels through backfill material, and enters the sanitary sewer. This is particularly important in dual sewer systems because of the close proximity of the storm and sanitary sewers. Other sources include flow from roof drains and other direct connections.

In the course of this study 162 overflows were identified in the separate sewer system. Of these, 19 are in the Hilltop study area (see Figure 2-7).



SOURCE: NEORSD 1985a

Figure 2-7
OVERFLOW LOCATIONS

Overflows are designed to provide relief for sewers with insufficient capacity to handle the flow volume. During a period of excessively high flow, sewage can escape from the system through one of these overflows.

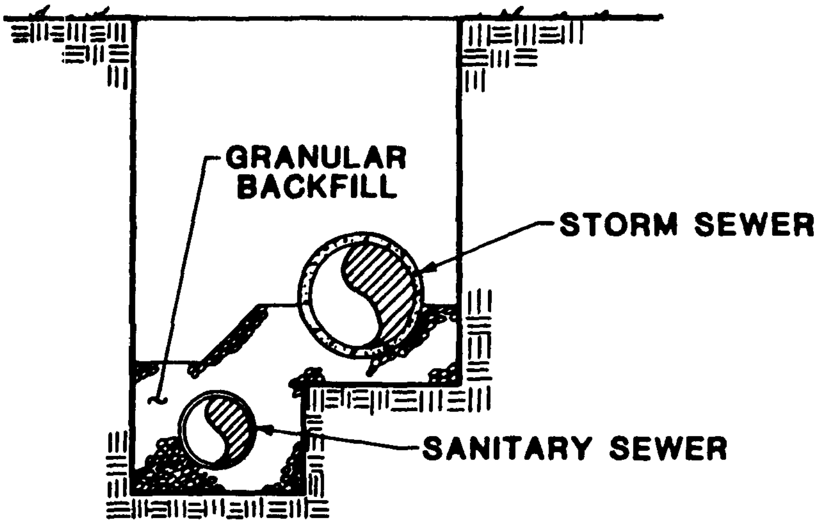
Dual Sewers

The problem of infiltration is intensified by the fact that approximately 74 percent of the sanitary and storm sewers in the Hilltop area were constructed in the same trench (dual system), while only 26 percent were constructed in separate trenches. In the separate trench construction, the center lines of the storm and sanitary sewer are laid about 8 feet apart, with the storm sewer invert at least 2 feet higher than the sanitary sewer crown (NEORSD 1978c).

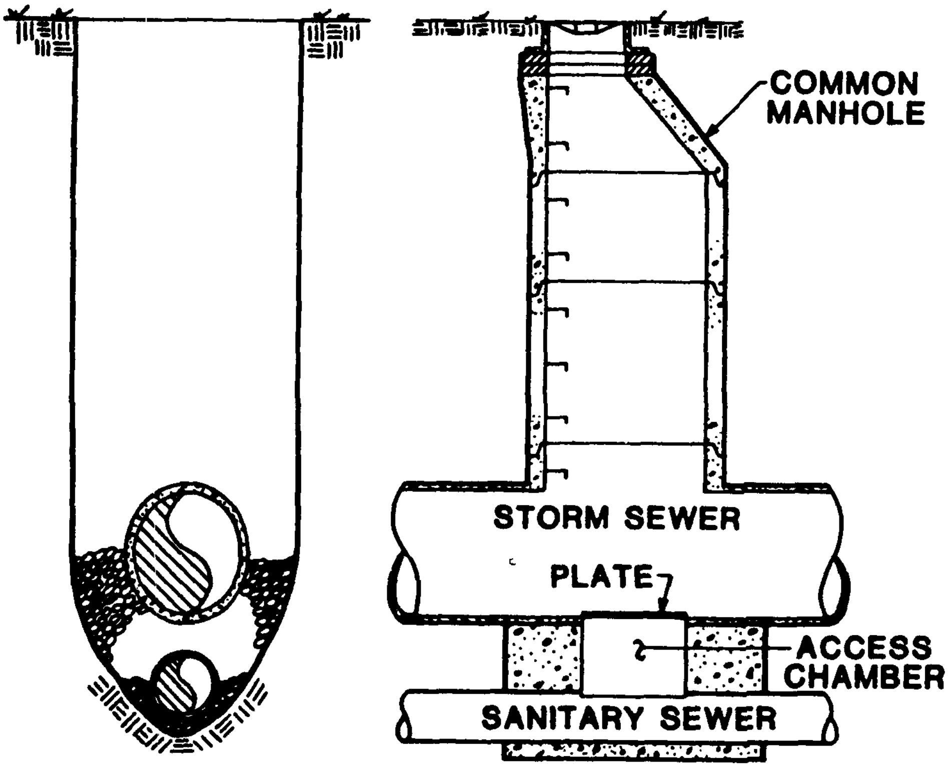
Dual sewers are constructed in either a bench or over-and-under design as shown in Figure 2-8. In the study area, 70 percent of these sewers are bench type and 30 percent are over-and-under design. The construction of dual sewers was stopped in about 1960 in favor of separate trench construction. The main problem with dual sewers is they have an enhanced potential for the infiltration of stormwater into the sanitary sewers because both pipes are contained in the same trench (NEORSD 1978b).

As the name suggests, the bench design of dual sewers is characterized by an excavation which allows placement of the storm sewer above and to the side of the sanitary sewer. Access to the benched sewers is provided by individual manholes located side by side--one for the sanitary sewer, and one for the storm sewer.

In the over-and-under design of dual sewers, the storm sewer is positioned directly over the sanitary sewer in the same trench. Common manholes are used in this design. A removable steel or cast iron plate in the lower half of the storm sewer provides access to the sanitary sewer below. The opening size varies with the size of the storm sewer but is generally 24 by 30 inches (NEORSD 1978c).



BENCH TYPE CONSTRUCTION



OVER–AND–UNDER CONSTRUCTION

SOURCE: NEORSD 1985a

Figure 2-8

DUAL SEWER CONFIGURATION

In both designs, the storm sewer invert is located approximately 1 to 2 feet higher than the sanitary sewer crown. Typical configurations for each of these dual sewers is shown in Figure 2-8.

Basement Flooding

The Easterly Separate Sewer Segment Wastewater Facilities Plan (ESSSWFP) noted basement flooding as a problem in the Hilltop area (NEORSD 1978c). A study was conducted by Havens and Emerson in January 1987 for the Hilltop area (Pohler 1987). Table 2-6, below, shows the results of this study.

Table 2-6. Hilltop Area Basement Flooding

Community	Basements Flooded Each Year
Mayfield Village	15-20
Mayfield Heights	100
Highland Heights	No Record
Richmond Heights	No Significant Problem

Based upon discussions with NEORSD personnel, it was learned that the majority of basement flooding problems in the Hilltop FPA are a result of poorly maintained house laterals and collector sewers. Generally, these poorly maintained sewers cause basement floods because of tree roots or other obstructions which decrease the pipe capacity. Increased sewer maintenance and repairs are currently underway to remedy the problem (Kennedy 1987c).

A few homes around Beech Hill and Wilson Mills pumping stations experience basement floods because of design problems with the homes. These homes were built with the basement drains below the level of the pump station wet wells, and consequently have flooding problems when the level in the wet wells rises.

Overall, basement flooding in the Hilltop area does not appear to be a result of the main transport system. Proper maintenance of house laterals and collector sewers should greatly reduce the problem.

As discussed in Section 1.1.2, a grant condition to the Heights FNSI required NEORSD to work with the area communities to develop programs for relief sewer rehabilitation and construction. The NEORSD is currently working with communities to develop the necessary programs to mitigate the problems of infiltration and inflow and basement flooding.

2.4 EXISTING PUMP STATIONS

Areas adjacent to but at a lower elevation than the sewage system to which they are tributary have sewage collected and pumped into the higher elevation sewage system. Several pumping stations exist within the study area. Major interbasin transfer of sewage is accomplished by the Beech Hill/ Bonnieview/Wilson Mills pumping complex. Other smaller stations collect and pump sewage from lower areas for transport to a treatment facility (NEORSD 1978c).

2.4.1 Beech Hill/Bonnieview/Wilson Mills

The Beech Hill/Bonnieview/Wilson Mills (BBW) complex is a three-element pumping facility which consists of the Beech Hill pumping station, the Bonnieview Storage Tank, and the Wilson Mills pumping station. The BBW transfers flow from about 4000 acres of the Hilltop basin to the Easterly basin (NEORSD 1978c). The system is operated by the NEORSD under a lease arrangement with Cuyahoga County. The location of each element of the BBW complex is shown in Figure 2-9.

Existing Equipment

The Beech Hill pumping station is located at 6830 Wilson Mills Road and is housed in a ranch home-type structure. The pumping station is equipped with four pumps. Two of the pumps are 10-inch-diameter and are rated at 2,700 gpm (3.9 MGD) against a total dynamic head of 126 feet. The other two pumps are 12-inch-diameter and are rated at 6,200 gpm (8.9 MGD) against a total dynamic head of 160 feet. The smaller pumps have 150 horsepower motors, while the larger pumps are equipped with 350 horsepower motors (NEORSD 1978c).

Beech Hill may operate a maximum of two small pumps for a total of 5400 gpm (7.8 MGD), or one large pump for a maximum station output of 6200 gpm (8.9

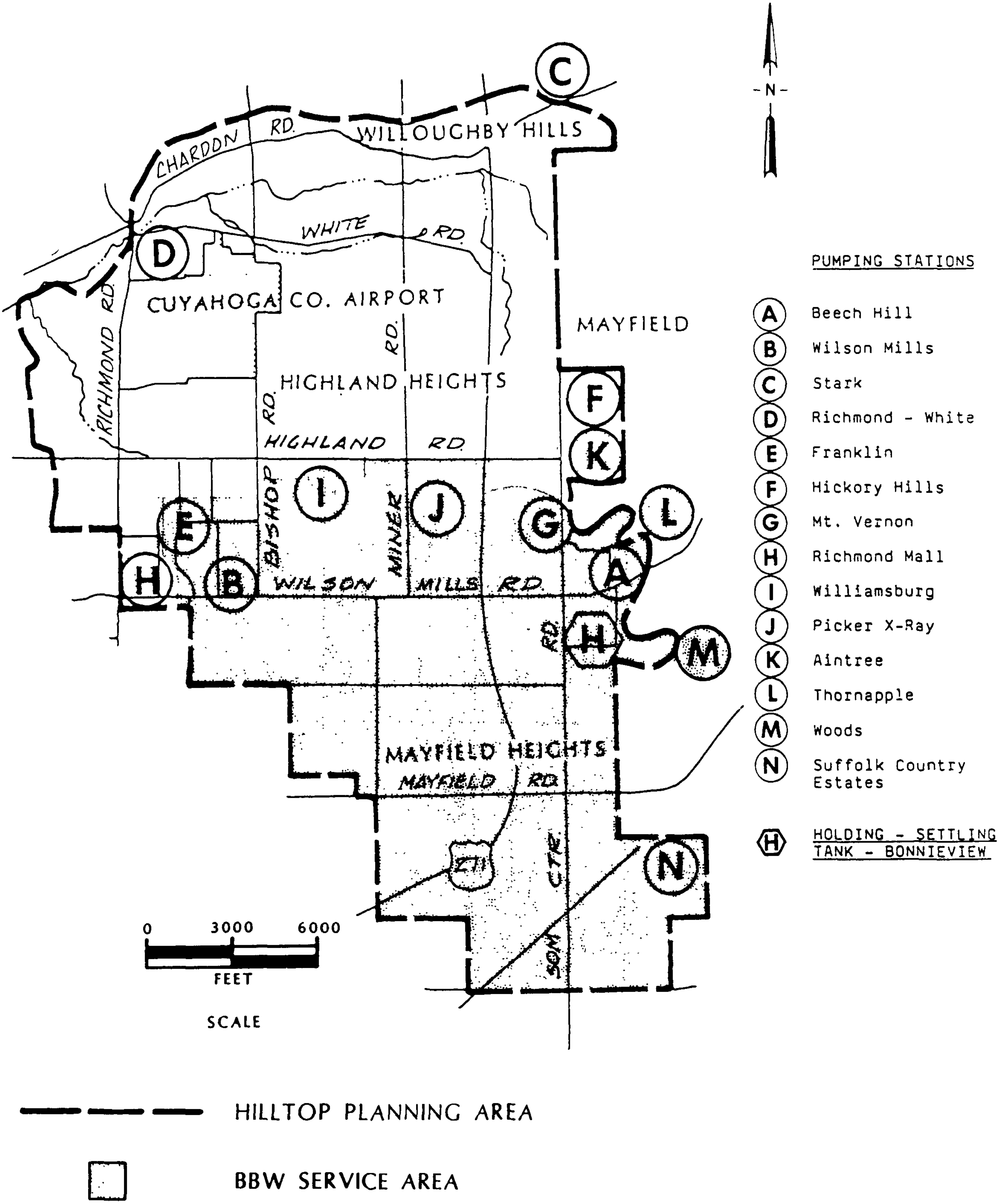


Figure 2-9
BBW SERVICE AREA

MGD). One of the larger pumps is maintained as a standby unit. a diesel-driven generator provides emergency power to operate one small pump. Waste to the Wilson Mills pumping station is transported through 8,880 feet of 24-inch-diameter cast iron pressure main.

The Beech Hill pumping station is coupled with the headworks of the Bonnieview storage-settling tank which has a capacity slightly less than 1 million gallons. The storage tank is a circular, reinforced concrete structure with an aluminum dome to control odor. The headworks contain a grit chamber, comminutors, grit transfer pumps and classifier, and diversion facilities to the storage tank (NEORSD 1978c).

The Wilson Mills pumping station is located at 5457 Wilson Mills Road and is also housed in a ranch home-type structure. This pumping station is the third segment of the BBW complex. It is equipped with four pumps; however, the control system only allows three to operate at one time. Two 8-inch pumps rated at 2,750 gpm (4.0 MGD) (against an operating head of 52 feet), one 10-inch pump rated at 4,800 gpm (6.9 MGD) (at a head of 73 feet), and one 12-inch pump rated at 5,000 gpm (7.2 MGD) (at a head of 75 feet) serve this facility. The 10-inch pump rated at 4,800 gpm is operated by a diesel engine under emergency conditions. Sewage is pumped through 2000 feet of 24-inch cast iron force main which discharges to a 24-inch concrete sanitary sewer. The line then connects with a 42-inch sanitary sewer which joins the combined system (NEORSD 1978c). A schematic diagram of the BBW complex is shown on Figure 2-8. Sewage is eventually treated at the Easterly Wastewater Treatment Plant.

Currently, backup power at the Beech Hill and Wilson Mills pump stations is provided by backup generators at each facility. Both of these generators are outdated and could be upgraded with a newer system.

Process

The BBW operation is complex and is controlled by a 14-year-old Autocon control system. Sewage from a commercial and residential area of about 2,500 acres flows to the grit removal and comminutor building at Bonnieview headworks. During dry weather the sewage bypasses the storage tank and flows through a 30-inch sewer to the Beech Hill pumping station, where it joins flow from a 400-acre area which is transported through a 15-inch line. The sewage is pumped to Wilson Mills pumping station where flow from an additional 1000-acre service area (some from smaller pumping stations) enters the system (see Figure 2-10) (NEORSD 1978c).

During wet weather, when the capacity of the Wilson Mills pumping station is about to be exceeded, flow from the 30-inch line at Bonnieview is diverted to the storage basin through a 30-inch overflow controlled by a fixed set-point sluice gate. After the wet weather, the storage basin is emptied back into the headworks and on to Beech Hill (see Figure 2-10) (NEORSD 1978c).

Problems

The majority of problems within the BBW complex result from excessive flow volumes at Wilson Mills pump station during wet weather. When Wilson Mills capacity is about to be exceeded it signals flow from the 30-inch sewer line to be diverted to the Bonnieview storage tank. Although this storage facility removes a major portion of the flow to Beech Hill, the 15-inch gravity line to Beech Hill continues to fill the Beech Hill wet well, eventually overflowing to a small tributary of the Chagrin River. The overflow sends raw sewage through a residential area, and is a concern to local residents (NEORSD 1978c).

If pumping does not resume at Beech Hill, the Bonnieview facility will also become full and overflow. Although the facility was designed to handle up to a 1-year storm, it was reported to overflow about six times a year. Overflow from the Bonnieview basin is partially treated. The storage tank also acts as a settling tank to remove settleable solids, and the overflow is equipped with scum baffles and weirs to trap floating solids. Additionally, all the flow from this facility is chlorinated to kill harmful organisms (NEORSD 1978c).

The sewers upstream of the Wilson Mills pumping station receive a severe, short-duration surcharge during wet weather. This flow appears to be caused by excess flows in the gravity sewers tributary to the Wilson Mills pump

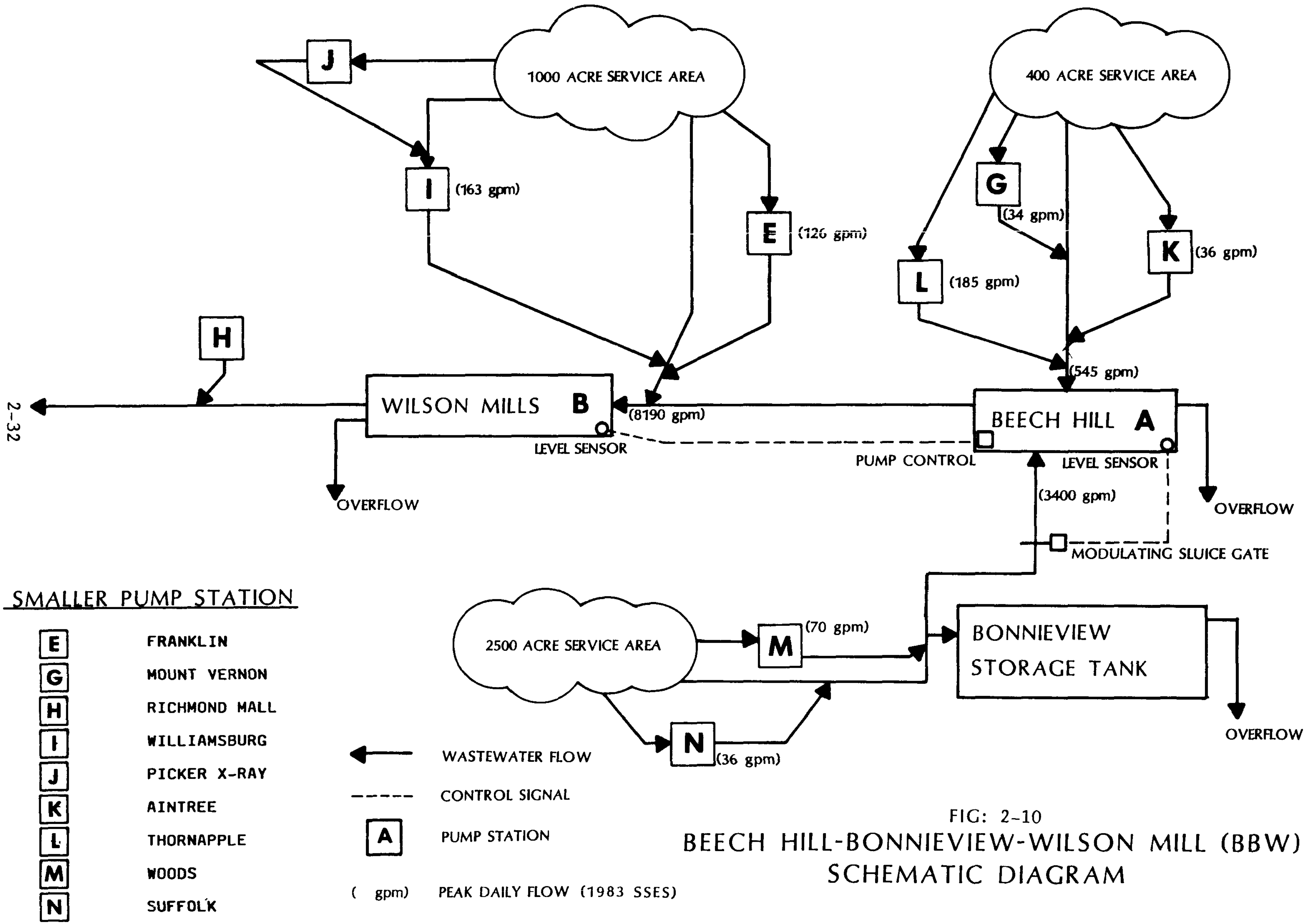


FIG: 2-10
BEECH HILL-BONNIEVIEW-WILSON MILL (BBW)
SCHEMATIC DIAGRAM

station, compounded by the residual flow from the Beech Hill pump station after shutdown. During the infiltration/inflow analysis, a light rain caused the manhole upstream of Wilson Mills pumping station to surcharge over 3 feet above the top of the sewer pipe. The largest rainfall event during the monitoring period caused the cover of the manhole to be dislodged by sewage backup (NEORSD 1978c).

Another major problem with the BBW complex is occasional ruptures in the pressure mains. It was reported in the Easterly Separate Sewer Segment Wastewater Facilities Plan, that the Beech Hill pumping station force main had ruptured several times over the previous 5 years. During the repair period (which may take as long as 2 to 3 days), raw sewage is bypassed to local streams (NEORSD 1978c). Again, this creates a potential health problem which is of concern to the local residents.

Part of the problem with the force mains is a result of mechanical joints bearing directly on rock. Corrosion and encrustation have been reported along the pressure main, and the general condition is rated as poor.

2.4.2 Smaller Pump Stations

Several smaller pumping stations are located throughout the study area. These are generally constant-speed or package-type stations (NEORSD 1978c). The majority of stations are owned and operated by Cuyahoga County. A summary of the existing pumping stations is included in Table 2-7. The locations of these facilities are shown in Figure 2-9.

Several of these small pumping stations join the previously discussed BBW pumping complex. Williamsburg, Franklin, and Picker X-Ray feed into the Wilson Mills pumping station. Aintree, Thornapple, and Mount Vernon account for part of the flow that goes directly to the Beech Hill pumping station via the 15-inch pipe (NEORSD 1978c).

The Richmond/White pump station does not connect with the BBW complex. This station, located near the corner of Richmond and White Roads, is owned and operated by Cuyahoga County and is equipped with two 250 gallons per

Table 2-7. Small Pump Stations

Name	Location	Rated Capacity (gpm)	Number of Pumps	Service Area (acres)	Pressure Main Size (inches)	Overflow
Woods	West Hill Drive	448	2	44	6	Creek to Chagrin River
Williamsburg	Williamsburg at Pinehurst	420	2	123	8	Euclid Creek Tributary
Pleasant Hill	Pleasant Hill T.P.	413	2	50	N/A	Euclid Creek Tributary
Richmond Park	Richmond Park T.P.	344	2	4	N/A	Euclid Creek Tributary
Franklin	Franklin at Strumbly	310	2	138	8	Euclid Creek Tributary
Richmond Mall	Richmond Mall	274	2	N/A	8	Euclid Creek Tributary
Thornapple	Ravine Drive	251	2	57	6	Creek to Chagrin River
Hickory Hills	Hickory Hill T.P.	150	2	151	N/A	Creek to Chagrin River
Richmond-White	Richmond at White	500	2	500	N/A	None
Suffolk Co. Est.	Gates Mills Boulevard	138	2	161	6	Creek to Chagrin River
Aintree	Timberline Trail	123	2	46	6	None
Mount Vernon	Beta Drive	90	2	156	6	Beecher's Brook
Picker X-Ray	Picker Corporation	80	2	N/A	4	None
Stark	Stark Drive	60	2	50	N/A	Creek to Chagrin River

N/A - Data not available

Source: NEORSD 1978c

minute pumps that currently pump between 105,000 gallons per day (gpd) and 135,000 gpd from a light industrial area just east of Cuyahoga County Airport to the Euclid wastewater treatment plant. A diesel generator is available for standby power. During an inspection of the station, Cuyahoga County personnel provided a summary sheet of recommended minor improvements for the pump station. These recommendations included repairing the one time lapse meter and the magnetic flow meter; acquiring two new cycle counters and pump delays; and replacing the comminutor.

2.5 EXISTING UNSEWERED AREAS

2.5.1 Systems Used

A significant portion of the study area is not connected to the Easterly sewer system. The previously discussed package plants and small onsite treatment systems serve parts of this area. The remaining population is served by septic systems. Typically, a septic system is comprised of a septic tank and a drainage field. The septic tank acts to remove solids from the wastewater, while the drainage field is designed to distribute the liquid portion. Properly designed septic systems will effectively decompose wastes which are present in the liquid portion before any environmental contamination can occur.

According to a study conducted by Havens and Emerson in 1985, 75 percent of the Lake County portion and over 80 percent of the Cuyahoga County portion of the Hilltop area have substandard septic tanks. Most of the septic tanks were constructed when standards differed from those required today. The Cuyahoga County Board of Health reports that the average age of the systems in Cuyahoga County is about 32 years old (NEORSD 1987).

The Havens and Emerson report also indicated that within the Hilltop area, approximately 1380 homes have septic tanks of only 500-gallon capacity. The remaining systems in the area consist of about 950 homes with 750- to 1750-gallon tanks, and 360 homes with 1500- to 2000-gallon tanks (Hudson 1985a).

The Cuyahoga County Health Department and previous planning reports and soil surveys for the Hilltop area state that the soils have a slow permeability which results in somewhat poor drainage, soil wetness, seasonally high groundwater tables, and ponding water, especially in the winter and spring. This results in a severe limitation in the disposal of effluent from a septic tank. Cuyahoga County conducts a soil permeability test for each new septic tank permit applicant. All the tests within the Hilltop area have classified the soils as either severely or very severely limited for the disposal of effluent from septic tanks. The Lake County Board of Health does not conduct their own onsite soil testing. They use the guidelines set for Lake County by the United States Department of Agriculture, which state that the entire Hilltop area is severely limited for septic tank effluent disposal (NEORSD 1987).

According to the Havens and Emerson report, poor soils in the area have caused local health departments to institute strict regulations for new septic tanks. The Lake County Health Department, for example, has required (since 1973) that all new homes must have two 1000-gallon septic tanks with a 1000-foot drainage field in a 24-inch trench or a 600-square foot subsurface filter plus a 500-foot evaporation bed. The overflows from the leach field must be connected to a storm sewer or a year round flowing stream. Cuyahoga County outlawed all drainage fields in 1973, and now requires at a minimum a 500-gallon dosing tank connected to a 1000-gallon septic tank (size will increase with number of bedrooms in the house). The subsurface filter must have a minimum of 1000 feet in a deep trench. All overflows must be connected to a continuous flowing stream or storm sewer.

As a result of these restrictions, new home septic tank construction in the Hilltop area has been severely limited. The Havens and Emerson study found that since 1980 only 15 new permits had been issued in the Lake County area, with only three new permits issued in the Cuyahoga County area. The lack of storm sewers or a continuously flowing stream in the Cuyahoga County area severely limited the available sites for new septic tank construction (Hudson 1985a).

Table 2-8 provides a list of construction projects which have been denied permits within the last 10 years in Lake County (from the 1985 Havens and Emerson report) and exemplifies the construction limitations in the overall Hilltop area. Numerous proposals for subdivisions and commercial areas have also been rejected in the same time period within Cuyahoga County (see Table 2-8) due to poor soils, no flowing stream, or no sanitary sewers according to the Cuyahoga County Health Department as reported by Havens and Emerson. Proposals for package wastewater treatment plants have also been rejected by the OEPA as not complying with the regional Heights/Hilltop plan (Hudson 1985a).

The Twinsburg office of the OEPA specifically rejected a proposed 28,000 gpd package wastewater treatment plant for the Sayle Farm subdivision in Lake County. It was noted that the area was covered under the Facility Planning Area in the Northeast Ohio Regional Sewer District's Easterly Separate Sewer Facilities Plan. The facilities plan called for the elimination of package plants in the area with eventual flow routing to the Easterly Wastewater Treatment Plant (Hudson 1985a).

The Havens and Emerson report also stated that as a result of these actions, construction has been severely restricted in the Hilltop area. Files for rejected projects were difficult to locate for Cuyahoga County, but a partial list of major stalled projects is also included in Table 2-8 (Hudson 1985a).

No data is available on the actual effluent quality of the septic systems in the Hilltop area. Typical effluent quality for septic systems is shown in Table 2-9. Estimates of average pollutant concentrations from septic systems in the study area were made by Havens and Emerson, Inc., in 1985 and are included in Table 2-9.

2.5.2 Location

The unsewered portions of the study area are generally large parcels of land mostly in older developments. Much of the area is subdivided into very deep narrow lots with short road frontage. Although the unsewered portion of

Table 2-8. Building Restrictions

Type of Facility	Date	Reason for Rejection
Lake County*		
Church	1984	Poor soils, no flowing stream, no sanitary sewers. Does not comply with the Regional Plan.**
Church	1984	Poor soils, no flowing stream, no sanitary sewers. Does not comply with the Regional Plan.
Retail/Office	1983	Poor soils, no flowing stream, no sanitary sewers. Does not comply with the Regional Plan.
Commerical	1980	Poor soils, no flowing stream, no sanitary sewers. Does not comply with the Regional Plan.
Subdivision	1980	Does not comply with the Regional Plan.
Community Hall	1980	Does not comply with the Regional Plan.
Commerical	1979	Does not comply with the Regional Plan.
Retail	1978	Does not comply with the Regional Plan.
Subdivision	1978	Does not comply with the Regional Plan.
Office	1976	Does not comply with the Regional Plan.
Subdivision	1974	Does not comply with the Regional Plan.
Commerical	1974	Does not comply with the Regional Plan.
Commerical	1973	Does not comply with the Regional Plan.

Table 2-8. Building Restrictions (Continued)

Type of Facility	Date	Reason for Rejection
Office	1972	Does not comply with the Regional Plan.
Subdivision	1972	Package plant not large enough.
Subdivision	1967	Poor soils, no stream.
Cuyahoga County - Incomplete List***		
Housing complex in Mayfield Village - 45 acre parcel	1980	Poor soils and no flowing stream
Housing complex for aged in Mayfield Village - 42 acre parcel	1976	Limited sewer capacity
Subdivision in Mayfield Village - 40 acre parcel	1978	Poor soils and no flowing stream
Commercial Development in Mayfield Village - Don Ray Products	1981	Poor soils and no flowing stream
Commerical-Industrial Park - Richmond Heights	1981	Limited sewer capacity

* Compiled from the planning files at the Lake County General Health District (Sheldon Munnings, R.S., Supervisor, 105 Main St., Painesville, Ohio).

** Regional Plan refers to the Heights/Hilltop Facilities Plan.

*** List compiled from information supplied by:

- Mr. Gus Amendola, Building Director, Mayfield Village
- Mr. Bernie Samac, Building Director, Highland Heights
- Mr. Felix DeSantis, Building Inspector, Richmond Heights

Source: Hudson 1985a

Table 2-9. Septic System Effluent Quality[1]

Parameter	Units	Septic Tank Effluent[2]	Filter Bed Effluent[3]	Estimated Hilltop System Effluent
BOD (5-day)	mg/l	130	9	50
Suspended Solids	mg/l	54	7	30
Total Nitrogen	mg/l-N	51	-	40
Inorganic Nitrogen	mg/l-N	36	21	30
Total Phosphorus	mg/l-P	14	-	12
Ortho Phosphate	mg/l-P	11	7	9
Fecal Coliform	#/100ml	650,000	700	10,000

[1]Hudson 1985a
[2]Otis and Boyle 1976
[3]Boyle and Otis n.d.

the Hilltop area is recognized as the only area within the Easterly Separate Sewer Area with the potential for development, the narrow lots serve as a deterrent to future growth (NEORSD 1978c).

Most of the residences north of Wilson Mills Road in Richmond Heights and Highland Heights do not have sanitary sewers (see Figure 2-11). Other scattered unsewered developments are located in Mayfield Heights and Willoughby Hills (NEORSD 1978c).

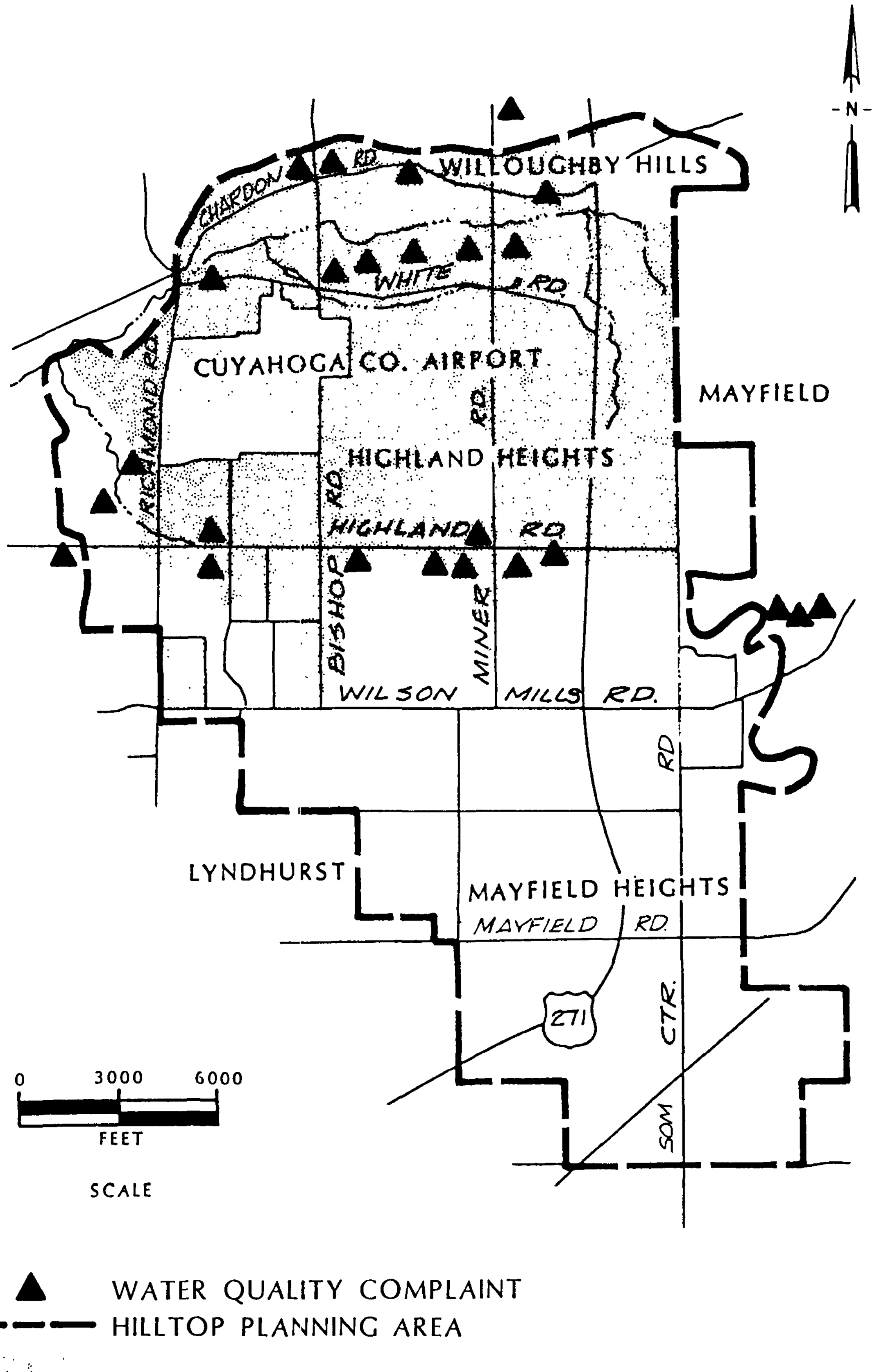
2.5.3 Problems

Many onsite systems have problems with high clay content soils, high water tables, and shallow depth to bedrock according to the Environmental Assessment. As a result, most of the onsite systems have discharges that reach existing storm sewers which serve as collectors for these wastes. Consequently, poor quality effluent is discharged to tributaries of Euclid Creek and the Chagrin River, as well as to small ponds in the area (OEPA 1985a).

The 1985 Havens and Emerson report also stated that over 75 percent of the systems in the area have substandard septic tanks. Also, the age of the systems (reported to be an average age of 32 years) may create some treatment problems.

The files of the Cuyahoga County Health Department indicate that there were nine water quality complaints filed in 1984 within the Hilltop service area. In 1983, there were five complaints filed. The complaints were all in regard to improperly treated wastewater being discharged to roadside ditches and creeks. Likewise, similar complaints were filed with the Lake County Health Department, four in 1984 and seven in 1983 (Hudson 1985a). The area for which these water quality complaints were filed are shown in Figure 2-11.

A benthic survey performed by Environmental Resource Associates in 1984 for the Heights/Hilltop area streams describes several instances of water quality degradation as a result of improperly treated waste inputs (ERAI 1984). Most sections of the stream within the unsewered area north of Wilson



WATER QUALITY COMPLAINT

HILLTOP PLANNING AREA

AREAS WITH SEPTIC SYSTEMS

FIG: 2-11
AREAS WITH REPORTED WATER QUALITY COMPLAINTS

SOURCE: HUDSON 1985a

Mills Road showed some signs of domestic sewage wastes. One portion of a Euclid Creek tributary showed severe degradation changes in a 50-foot span. "Septic conditions mixing with waters from Station 1 (50 feet upstream) create an intolerable habitat for many clean-water forms and marginal habitat for others. The conductivity increased by nearly 40 percent and dissolved oxygen was reduced by nearly 20 percent."

In November 1982, the Cuyahoga County Sanitary Engineering Department conducted an evaluation of Mayfair Lake in Richmond Heights (CCSED 1982). Findings of the study indicated that 224 on-lot treatment systems within the lake watershed contributed about 0.040 MGD of effluent to the lake. Many of the systems are relatively old and predate current septic tank standards according to the report.

CHAPTER 3. HISTORY OF ALTERNATIVE DEVELOPMENT

This chapter describes the historical development of alternatives for providing sewer service to the Hilltop Facility Planning Area (FPA), from the 1978 Easterly Separate Sewer Segment Wastewater Facilities Plan (ESSSWFP) prepared by CH_2M Hill to the Environmental Assessment prepared by OEPA in 1985. The organization of this chapter includes a review of the alternatives presented in each document, the analysis of alternatives, and the selected alternative of each study. Because the alternatives are referenced differently in the two documents, the transition is confusing even though some of the sewer routes are the same. In an effort to clarify this situation, a brief overview is presented in this introduction prior to a complete discussion of the alternatives in the remainder of this chapter (see Table 3-1).

The facilities plan (ESSSWFP) developed several transport and treatment systems for the Hilltop area. These alternatives were: H-1 and H-1A (subregional wastewater treatment plant); H-2 and H-2B (transport to Easterly WWTP); and E-1A (upgrade of the BBW pumping complex). Of these alternatives, the ESSSWFP recommended alternative H-2B (transport to Easterly WWTP) as the best choice for service to the Hilltop area. The reasons for this choice included:

- Low monetary costs
- Low energy requirements
- High reliability
- Relative ease of operation.

After the ESSSWFP was completed, several other reports were developed that addressed the final design of this system (H-2B). These documents included the Sewer System Evaluation Survey (SSES), the Advanced Facilities Plan (AFP), and the Supplemental Facilities Plan (SFP). Several alignment changes were made in the final design of alternative H-2B based on the conclusions in the AFP, SFP, and SSES. These changes included:

- An extension south along Richmond Road to collect flows from the Eastern Belvoir drainage area

Table 3-1. Alternative Designations

Description	ESSSWFP	Environmental Assessment
In-Basin Treatment Plant	H-1	--
Transport to	H-2A	--
Easterly WWTP	H-2B	Alternative 1
Pumping to Euclid WWTP	H-3	--
BBW Upgrade -	E-1A	--
Transport to Easterly WWTP Pumping Station	E-1A + Another	Alternative 2
Transport to Easterly	--	Alternative 3
WWTP (2 pumping stations)		
Transport to Easterly WWTP (1 pumping station)	--	Alternative 4
No Action	--	--

- An extension along Green Road to collect flows from the Central Belvoir drainage area
- Inclusion of several storage basins to reduce peak flows to the Easterly WWTP.

During a review of the facilities planning process (ESSSWFP, SSES, AFP, and SFP), the OEPA prepared an Environmental Assessment for the Hilltop area. The Environmental Assessment (prepared in 1985) evaluated four alternatives for sewer service to the Hilltop area. Alternative 1 (transport to Easterly WWTP) was the same as the final alignment of alternative H-2B, the recommended plan of the facilities planning process. Alternative 2 (upgrade of BBW complex) was the same as alternative E-1A from the ESSSWFP including a pumping station to serve the unsewered areas. Alternatives 3 and 4 were developed by NEORSD's consultant specifically for the Environmental Assessment and represent combinations of alternatives 1 and 2. The Environmental Assessment comparison of alternatives also selected transport to Easterly WWTP (alternative 1) to serve the Hilltop area.

3.1 FACILITIES PLAN ALTERNATIVES/RECOMMENDED ALTERNATIVE

Several alternatives for sewer service were developed and analyzed by CH_2M Hill in the 1978 Easterly Separate Sewer Segment Wastewater Facilities Plan (ESSSWFP) (NEORSD 1978a, 1978b, 1978c). Recommendations for service within the Creekside service area and parts of the Easterly service area were included in the alternatives but are not within the scope of this report. Of the alternatives, only the following were specific to the Hilltop Facilities Planning Area.

H-1 - A subregional wastewater treatment plant located north of the Cuyahoga County Airport, including flow from the Beech Hill/Bonnieview/Wilson Mills (BBW) pumping complex.

H-1A - A subregional wastewater treatment plant located north of the Cuyahoga County Airport, excluding the BBW pumping complex.

H-2 - The Hilltop branch of the Heights interceptor to transport flow to the Easterly Wastewater Treatment Plant.

H-3 - A regional sewage pumping station located north of the Cuyahoga County Airport to transport flow to the Euclid Wastewater Treatment Plant.

E-1A - The Hilltop branch of the Heights interceptor to transport flow to the Easterly Wastewater Treatment Plant, including an upgraded BBW pumping complex.

3.1.1 Proposed Alternatives

The following sections provide a more detailed description of each alternative proposed in the ESSSWFP for the Hilltop FPA.

Alternative H-1 - In-Basin Treatment

Treatment within the Hilltop FPA was proposed in alternative H-1. This alternative would include capacity to serve the entire Hilltop area, including flow currently transported by the BBW complex.

A 12.75 MGD wastewater treatment plant was proposed for alternative H-1, as shown in Figure 3-1. A large amount of existing infiltration and inflow, as well as flow from the more densely populated area of the BBW, would be treated (NEORSD 1978c).

Several treatment methods were evaluated in conjunction with this alternative. The ESSSWFP recommended a process that involved activated sludge followed by two-stage nitrification, filtration, disinfection, and post aeration, as shown in Figure 3-2, as the preferred treatment alternative. Although a single-stage nitrification system would be less expensive, the two-stage system was recommended because:

- It is questionable whether or not a single-stage nitrification system would function adequately during the cold weather to meet the ammonia limits.
- There is more control, flexibility, and reliability in operating a two-stage system.
- Two-stage nitrification systems have been found to operate well in cold climates.

Alternative H-1A - In-Basin Treatment

Alternative H-1A is similar to alternative H-1; however, only flows from areas not currently served by the BBW complex would be treated at the in-basin

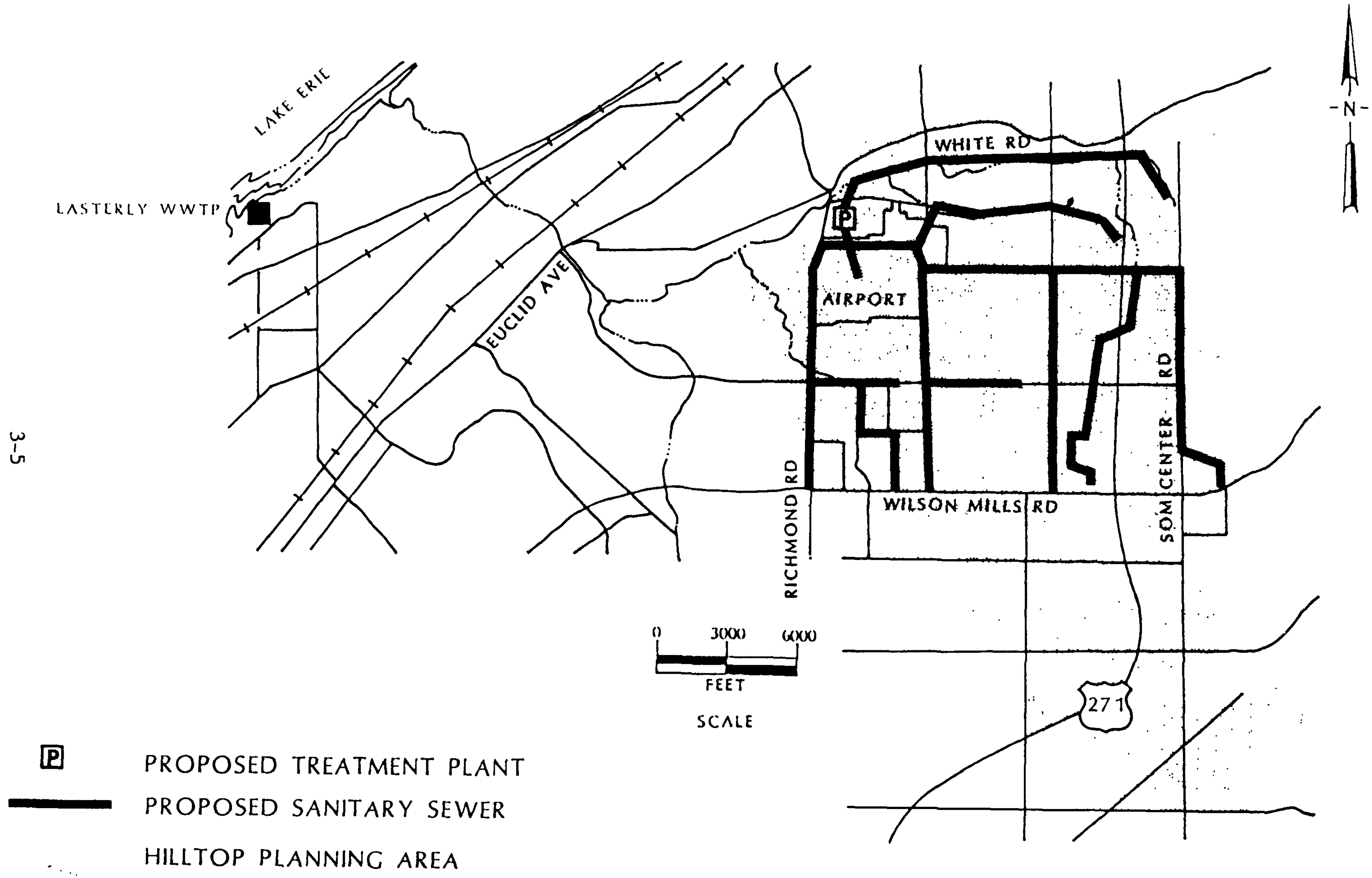
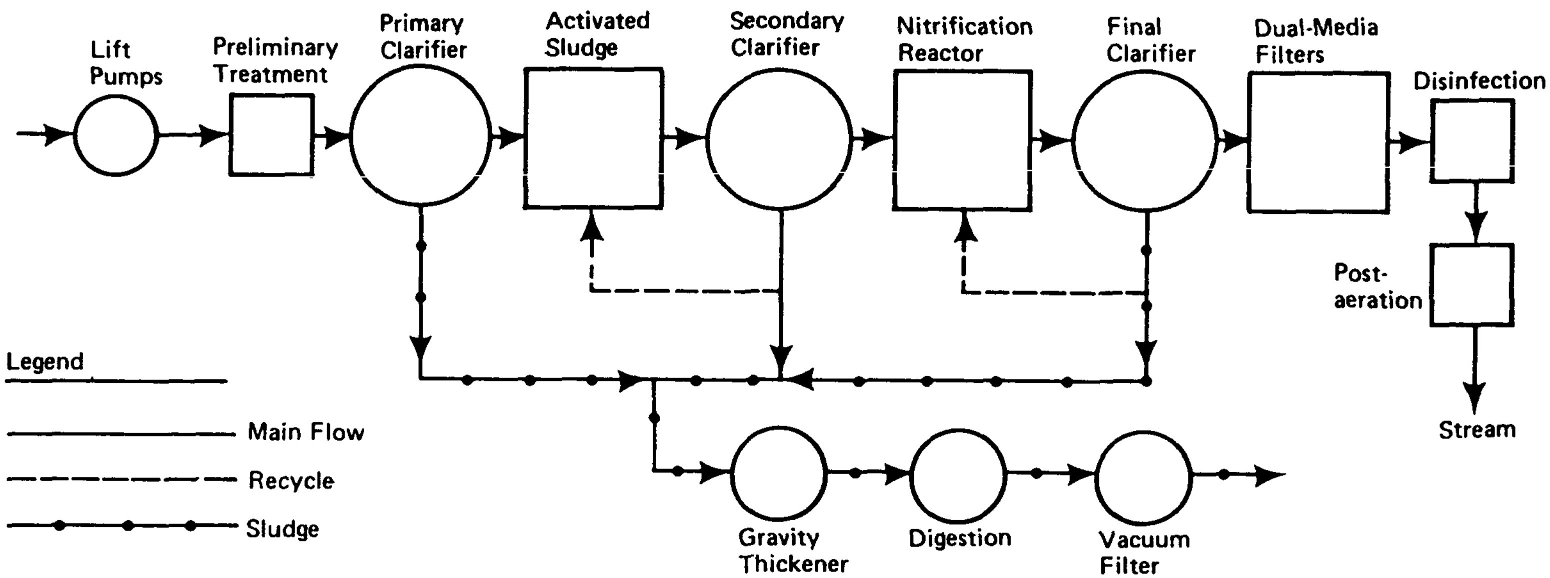


FIG: 3-1
ALTERNATIVE H-1



Wastewater Characteristics	Influent	Effluent
BOD_5, mg/l	185	<10
TSS, mg/l	230	<10
NH_3-N, mg/l	20	1
DO, mg/l	1	≥ 5

SOURCE: NEORSD 1978c

FIG: 3-2

ACTIVATED SLUDGE/NITRIFICATION

plant. Consequently, only a 2.75 MGD plant was planned for this alternative, as shown in Figure 3-3 (NEORSD 1978c). This alternative was only developed for service to the northern areas for use with alternative E-1A.

The treatment process for this alternative was the same as for H-1, as shown in Figure 3-2.

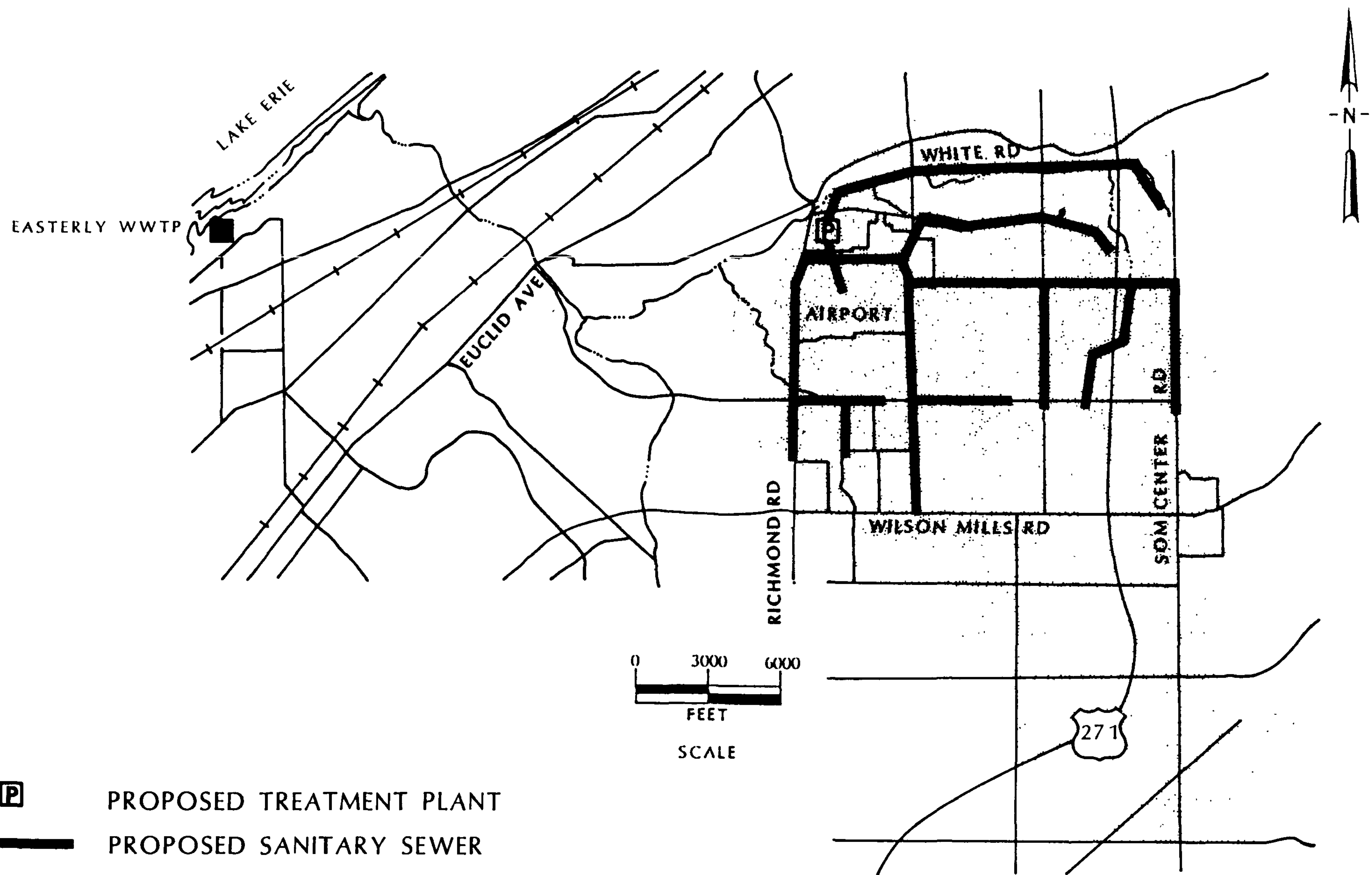
Alternative H-2 - Transport to Easterly

Transportation of flow from the Hilltop service area to the Easterly Wastewater Treatment Plant was proposed in this alternative. Two modifications (H-2A and H-2B) were proposed to transfer flow from the Hilltop basin as shown on Figure 3-4. Flow from the entire Hilltop area would be transported by a primarily gravity system (although several pump stations would still remain). The BBW complex would be eliminated with either alternative (H-2A or H-2B).

Alternative H-2B included the same alignment as alternative H-2A, with the exception of the tunnel proposed in alternative H-2B at Chardon Road. The proposed tunnel would begin south of Euclid Avenue at Euclid Creek and follow Chardon Road to Richmond Road for connection to the Hilltop sewer system north of the county airport (NEORSD 1978c).

Alternative H-2A presented a downstream modification of the original Northeast Suburban Interceptor proposal. This modification was recommended to obtain a better gradient eastward to Euclid Avenue at Euclid Creek. From the Euclid Creek bridge on Euclid Avenue, the sewer would continue northeast along the east branch of Euclid Creek as originally proposed, but would terminate north of the Cuyahoga County Airport.

Alternative H-2A would be located along the east branch of Euclid Creek between Euclid Avenue and Richmond Road which contains a gorge that is nearly 200 feet deep at some locations (NEORSD 1978c). The steep gorge walls along this reach are natural and undeveloped and provide an irreplaceable, unique and natural habitat. Access for construction equipment along the steep walls is extremely limited; and consequently, construction of this alternative would be very difficult (NEORSD 1978c). The problems involved with constructing



PROPOSED TREATMENT PLANT

PROPOSED SANITARY SEWER

HILLTOP PLANNING AREA

FIG: 3-3
ALTERNATIVE H-1A

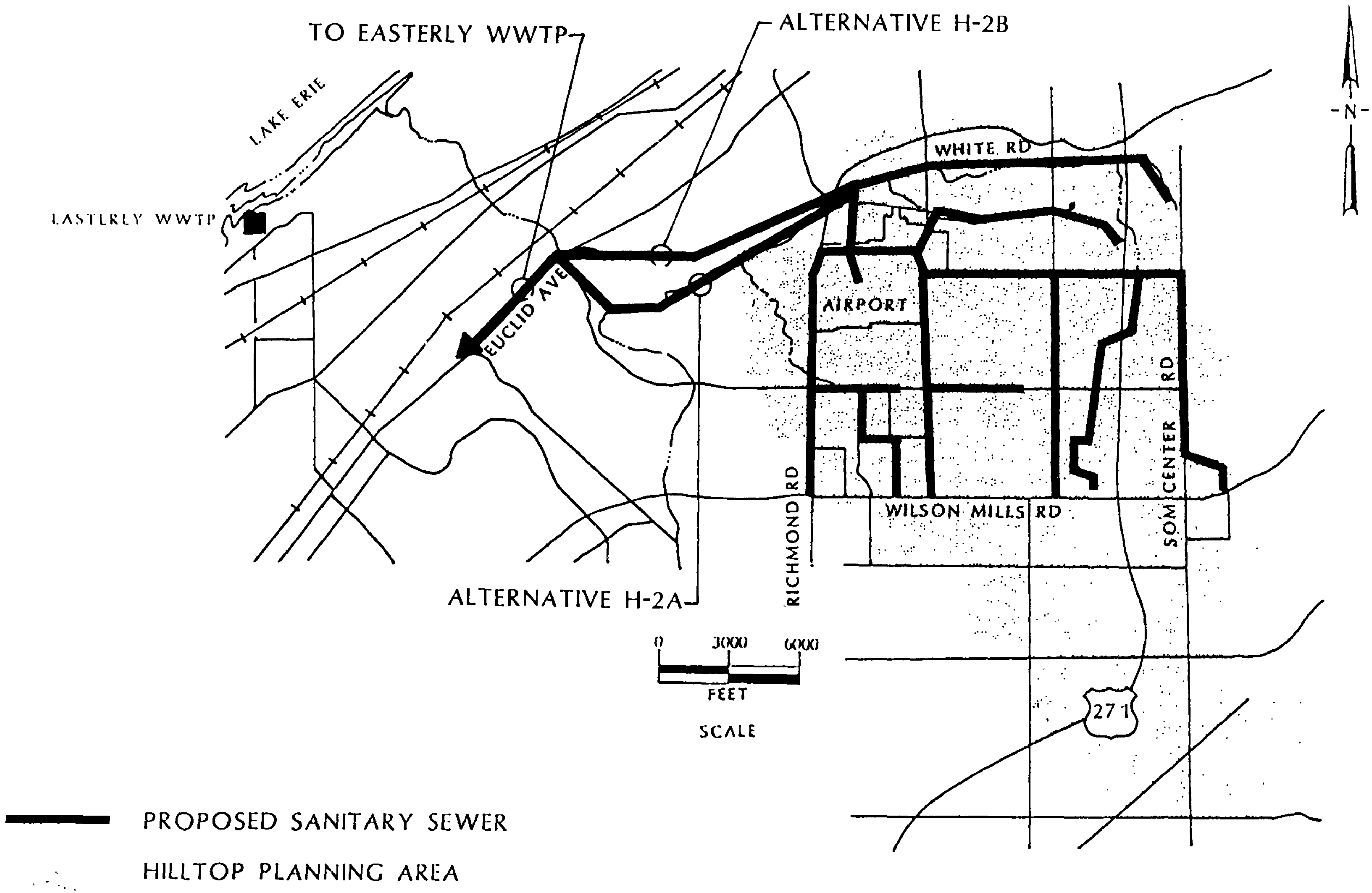


FIG: 3-4
ALTERNATIVE H-2A AND H-2B

alternative H-2A led to the development of alternative H-2B, a tunnel in Chardon Road between Richmond Road and Euclid Avenue.

Alternative H-3 - Pumping to Euclid

This alternative proposed transfer of wastewater flow from the Hilltop service area to the Euclid Wastewater Treatment Plant. The transportation system would include a sewage pump station located north of the Cuyahoga County Airport, about 4,000 feet of force main, replacement of 18,000 feet of sanitary sewer, and future expansion of the Euclid Wastewater Treatment Plant. Alternative H-3 is shown in Figure 3-5.

According to the ESSSWFP, limited area is available for expansion of the Euclid Wastewater Treatment Plant. Also, the city of Euclid's sanitary sewers have a history of problems associated with wet weather flow, which could preclude implementation of this alternative (NEORSD 1978c).

Alternative E-1A - BBW Upgrade

In alternative E-1A flow from the BBW sewage pumping complex would be transported to the Easterly Wastewater Treatment Plant through the Easterly service area by existing separate and combined sewers, as shown in Figure 3-6. This would provide for the continued transport of flow from the BBW to the Easterly plant. Improvements to both the pumping and transport systems were suggested to increase the reliability of this option (NEORSD 1978c).

Improvements proposed for continued transfer of flow by the BBW are as follows:

- Remove 30 percent of the infiltration and inflow (I/I) from the BBW service area.
- Increase capacity of Beech Hill pumping station to 14 million gallons per day (MGD) and Wilson Mills pumping station to 23 MGD.
- Build parallel pressure mains for both Beech Hill and Wilson Mills pumping stations.
- Build standby power generators for both pumping stations.
- Replace sewer from Bishop Road to Wilson Mills pumping station.

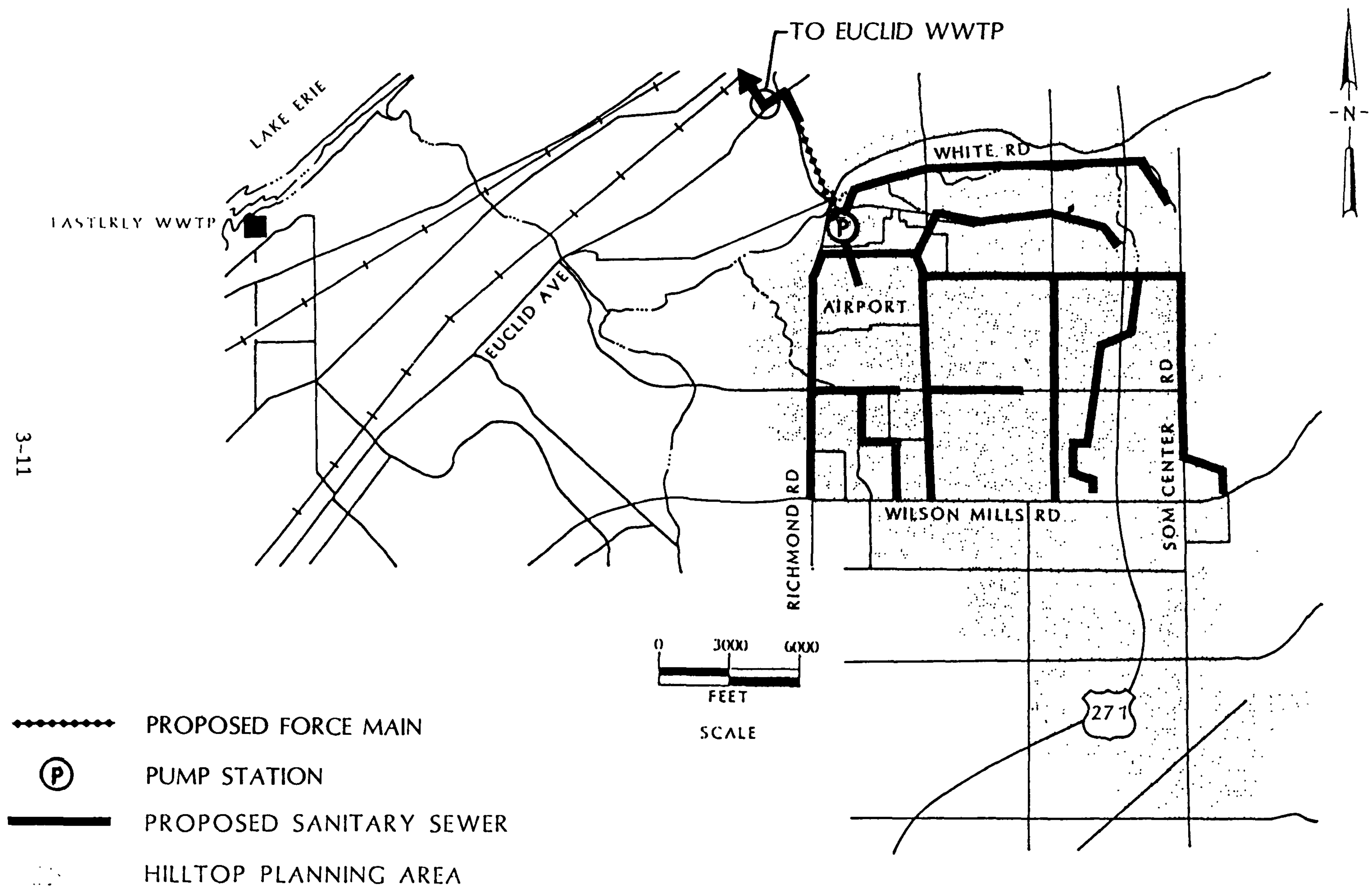


FIG: 3-5
ALTERNATIVE H-3

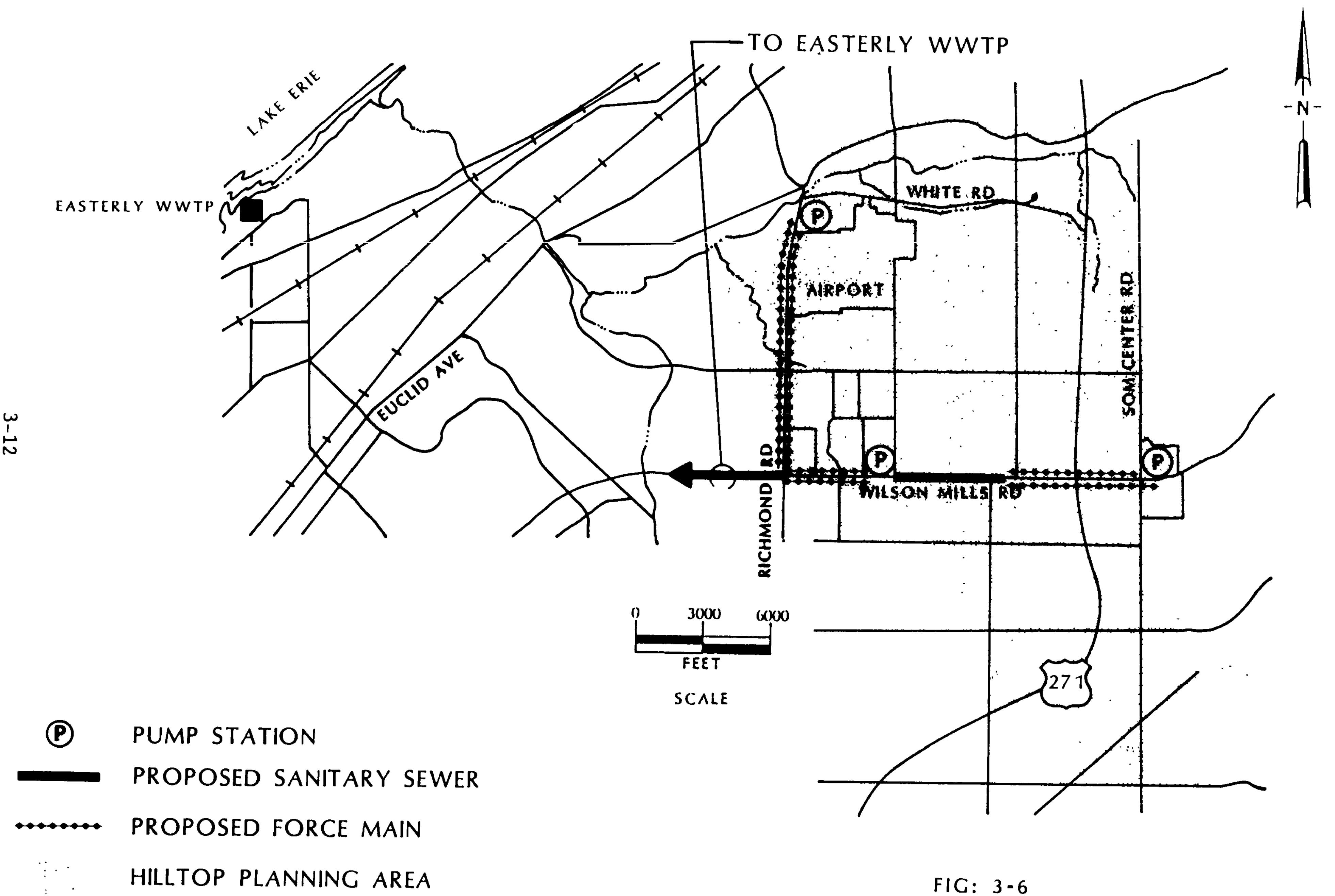


FIG: 3-6
ALTERNATIVE E-1A AND E-1A HILLTOP PUMP STATION

- Build transport conduit from Green Road to Wilson Mills force mains.
- Increase capacity of Belvoir interceptor and Heights interceptor.

3.1.2 Evaluation of ESSSWFP Alternatives

This section provides an explanation of the methods used in the ESSSWFP to evaluate the alternatives and recommend the most cost-effective plan.

The ranking of the alternatives on cost-effectiveness included not only monetary costs but also environmental and resource impacts and technical benefits. The evaluation was based on ranking each alternative with respect to a uniform set of criteria.

3.1.2.1 Facilities Plan Criteria

To compare the various alternative plans, the following criteria were used.

Economic

Monetary Cost - Dollar or monetary cost of an alternative (in this case total present worth), which included both capital cost expenditures and operation and maintenance cost over a 20-year period.

Net Energy Consumption - The use of natural resources of each alternative based on consumption of energy.

Environmental

Overall Water Quality - Local and regional water quality effects (including Lake Erie) involved with each alternative.

Bypassing and Overflow - The ability of alternative plans to provide downstream capacity for wet weather flows and to reduce the quantity of sewage overflow.

Disturbance of Flora and Fauna - Disturbance of the natural environment by the construction and operation of the various alternatives.

Conflict with Cultural Resources - A measure of the impact of each alternative on historic and archaeologic resources.

Technical

Utilization of Existing Facilities - The use of existing structures and equipment, both within and outside the service area.

Adaptability to Higher Effluent Standards - A judgment of the ability, through future modification of each alternative, to meet a higher quality effluent with minimum amount of disruption, additional facilities, and cost.

Reliability - Reliability of the alternatives with respect to equipment failures.

Ease of Operation - The relative ease of operation for each alternative based on the mechanics of operation and required increase in operational staff.

Implementation - The difficulties of implementing each alternative such as acquiring right-of-way and land, disruption of traffic flow, and general public acceptance.

Jurisdiction - Requirements for intergovernmental agreements or contracts and the complexities of financing the local portion of each alternative.

Flexibility

Flexibility - The physical ease and monetary cost of meeting changes in future growth, and the sensitivity of the cost-effectiveness ranking to various population ranges.

3.1.2.2 Comparison of ESSSWFP Alternatives

For the final analysis in the Easterly Separate Sewer Segment Wastewater Facilities Plan (ESSSWFP), each of the previously discussed criteria was weighted according to its importance. The values ranged from 1 to 4, with 4 ranking as the most important. The weighted values for the Hilltop service area are shown in Table 3-2.

The alternatives were then rated based on their overall effect on each criteria. Letter grades were assigned in each category. Each grade corresponded to a numeric value as shown in Table 3-3 ("A" having a score of 4.0, "A-" having a score of 3.7, etc.). The higher the score, the more beneficial the alternative is within the category (NEORSD 1978c). The ESSSWFP's assignment of grades was subjective in that no clear guidelines were ever developed for assigning them.

Table 3-2. Weight of Ranking Criteria (ESSSWFP)

Criterion	Weight Used for Evaluation[a] Hilltop
Monetary Cost	4
Energy Consumption	3
Water Quality	3
Bypassing & Overflow	3
Flora and Fauna	3
Cultural Resources	2
Existing Facilities	2
Adaptability to Higher Effluent Standards	3
Reliability	4
Ease of Operation	3
Implementation	2
Jurisdiction	3
Flexibility	4

[a]From 1 to 4 as relative importance increases.

Source: NEORSD 1978c

Table 3-3. ESSSWFP Alternative Ranking

		Entire Hilltop Flow								Hilltop Less BBW Flow					
		H-1		E-1A		H-2A		H-2B**		H-3		H-1A		E-1A (Hilltop P S)*	
Factor	Wt.	Letter	Score	Letter	Score	Letter	Score	Letter	Score	Letter	Score	Letter	Score	Letter	Score
Monetary Cost	4	C	8.0	A–	14.8	A	16.0	A	16.0	B	12.0	C	8.0	A	16.0
Energy Consumption	3	C	6.0	C	6.0	A	12.0	A	12.0	B	9.0	B+	9.9	C	6.0
Water Quality	3	B	9.0	A–	11.1	A	12.0	A	12.0	C	6.0	B–	8.1	C	6.0
Bypassing & Overflow	3	B+	9.9	B	9.0	A	12.0	A	12.0	B	9.0	B+	9.9	B–	8.1
Flora and Fauna	3	B	9.0	A	12.0	D	3.0	B	9.0	B	9.0	C	6.0	B	9.0
Cultural Resources	2	B	6.0	A	8.0	C	4.0	A	8.0	B	6.0	A	8.0	B	6.0
Existing Facilities	2	C	4.0	B	6.0	C+	4.6	C+	4.6	B+	6.6	C	4.0	B+	6.6
Adaptability to Higher Effluent Standards	3	C	6.0	A	12.0	A	12.0	A	12.0	B	9.0	C	6.0	B	9.0
Reliability	4	B+	13.2	C	8.0	A	16.0	A	16.0	B	12.0	B+	13.2	B	12.0
Ease of Operation	3	C	6.0	B	9.0	B	9.0	A	12.0	B	9.0	C	6.0	B	9.0
Implementation	2	C	4.0	A	8.0	D	2.0	A	8.0	D	2.0	B	6.0	B+	6.6
Jurisdiction	3	C	6.0	A	12.0	A	12.0	A	12.0	D	3.0	B	9.0	B	9.0
Flexibility	4	B	12.0	B	12.0	B	12.0	B	12.0	C+	9.2	B	12.0	B–	10.8
TOTAL			99.1		127.9		126.6		145.6		101.8		106.1		114.1
COMPOSITE RANK			(4)		(2)		(3)		(1)		(3)		(2)		(1)

*Used to develop Alternative E-1A.
**ESSSWFP Recommended Alternative

NOTE:

Letter Score	Numeric Score
A	4.0
A–	3.7
B+	3.3
B	3.0
B–	2.7
C+	2.3
C	2.0
C–	1.7
D+	1.3
D	1.0

Final Score = weight x numeric value of letter score

SOURCE: NEORSD 1978c

Each letter grade value was multiplied by the weight value for the category to develop the final analysis. By summing all the products, a final numeric value was generated which could serve as a final comparison for the alternatives. The grades and values are shown in Table 3-3.

A discussion of the factors involved with assigning grades in each criteria in the ESSSWFP is contained in the following sections.

Economic Evaluation

In order to determine the most cost-effective alternative plan for serving the entire Hilltop service area, two flow conditions were investigated. The area south of Wilson Mills Road is currently served by the BBW complex, while the area north of Wilson Mills Road is now served by small treatment plants, pumping stations, and onsite systems (NEORSD 1978c). Alternative H-1 (in-basin treatment) would provide service to the entire Hilltop area, while alternative E-1A (BBW upgrade) would only serve the area south of Wilson Mills Road. Therefore, in order to compare alternatives on the basis of serving the entire Hilltop area, various alternatives for serving the area north of Wilson Mills Road were analyzed and the most cost-effective plan was used in conjunction with alternative E-1A.

The three alternatives developed for the north portion of the basin were alternative H-1A (in-basin treatment excluding BBW), alternative H-3 (pumping to Euclid), and an additional Hilltop pumping station (located near Richmond and White Roads). The additional Hilltop pumping station was selected by the ESSSWFP as the best choice for service to the northern part of the Hilltop area. The additional pumping station was used in conjunction with alternative E-1A (BBW upgrade) to provide service for the entire Hilltop service area. Since alternatives H-1, H-2A, and H-2B already provided service for the entire area, the combination of E-1A and the Hilltop pumping station was required so all alternatives were compared on a similar service area (NEORSD 1978c).

Alternative H-1 (in-basin treatment) was found to have the highest capital cost and present worth of the major Hilltop alternatives. The BBW upgrade (E-1A), including the Hilltop pumping station, was found to have a slightly higher present worth value than transport to Easterly (alternative H-2B). However, the cost of energy required for alternative E-1A pumps was not escalated. The ESSSWFP concluded that the increase in the cost for energy will probably exceed cost increases for other facilities planning items, and consequently the present worth of alternative E-1A would actually exceed the present worth of alternative H-2B by an even greater amount (NEORSD 1978c). Alternative H-2B is a capital intensive plan and would be affected only indirectly and to a lesser extent by rising energy cost.

Alternative H-2B (transport to Easterly) would require additional local interceptor capacity above that required for alternative E-1A (BBW upgrade) (NEORSD 1978c). This incremental cost was considered in the cost-effective analysis of the two alternative plans.

The total cost for alternative H-2A (interceptor in Euclid Creek) was not developed because of the extreme difficulty of constructing this alternative due to the steep gorge walls.

The estimated capital cost and present worth value for the Hilltop alternatives are shown in Table 3-4.

Table 3-4. ESSSWFP Alternative Costs (Million $)

Item	Alternative		
	H-1	H-2B	E-1A
Capital	$35.2	35.2	32.4
Present Worth O&M	$14.3	3.1	4.8
Total	$49.5	38.3	37.2
Present Worth Salvage Value	$(2.5)	(4.6)	(2.2)
TOTAL PRESENT WORTH	$47.0	33.7	35.0

Source: NEORSD 1978c

Environmental Evaluation

Overall Water Quality. Alternatives in which Hilltop flow would be transferred to other service areas for treatment would provide the greatest improvement in the water quality of the Hilltop service area streams. However, proposed interbasin transfers can be detrimental to the overall water quality of the study area if the facilities in the receiving basin are not adequately sized for the transfer of wet weather flow. The ESSSWFP stated that the addition of wet weather flow from the transport alternatives (H-2A and H-2B) and the BBW upgrade (E-1A) would exceed the 200 MGD capacity of the headworks at the Easterly Wastewater Treatment Plant (the 200 MGD maximum capacity is now 330 MGD as a result of expansion) (NEORSD 1978c).

The projected design flow would not be realized until the local systems were improved to allow transport of the design flow to the interceptor system. According to the ESSSWFP, the frequency of bypassing at the headworks would increase over the years as local system improvements were implemented. The development and expansion of detention/treatment facilities at the Easterly plant over this same time period would help alleviate the impact of increased bypassing (NEORSD 1978c).

Because of the potential wet weather overflow at the Easterly plant associated with alternatives H-2A, H-2B, and E-1A flows, these alternatives without detention/treatment would result in less overall water quality improvement than alternative H-1 (in-basin treatment). With adequate detention/treatment at the Easterly plant, these alternatives would be favored over in-basin treatment. In ranking the Hilltop alternatives, it was assumed by the ESSSWFP that the detention/treatment facility would be built at the Easterly plant (NEORSD 1978c).

Bypassing and Overflow. According to the ESSSWFP, bypassing and sewage overflows are limited to the BBW portion of the Hilltop service area. Bypassing is not extensive throughout the service area, but local flooding and overflow adjacent to the regional pumping station can be extreme. The overflow associated with the BBW would be alleviated by implementing any of the proposed plans according to the ESSSWFP (NEORSD 1978c).

Overflow in the Easterly area would be aggravated by additional flows from the Hilltop service area particularly during intense storm events. Alternative H-2B (transport to Easterly) would divert Hilltop flow from existing Easterly sewers, therefore limiting the effect of increased flow to the Easterly plant.

Disturbance of Flora and Fauna. The facilities plan concluded that alternative E-1A (BBW upgrade) would cause the least disturbance of flora and fauna because the proposed improvements would involve mostly renovation of existing facilities and construction of new facilities in existing street right-of-ways (NEORSD 1978c).

Alternative H-1 (in-basin treatment) would involve extensive construction on an undisturbed natural area north of the Cuyahoga County Airport, and would therefore cause more disturbance to the flora and fauna of the basin than alternative E-1A. Alternative H-2B (tunnel in Chardon Road) would require open-cut installation of the sewer in the area north of the county airport, which would result in a disturbance similar to that caused by alternative H-1. Alternative H-2A, an open-cut sewer installation in Euclid Creek, would cause severe disturbance to the flora and fauna existing along the stream and was not recommended for further consideration by the ESSSWFP (NEORSD 1978c).

The H-1A flow alternative (in-basin treatment excluding BBW flow) would require construction of new facilities north of the county airport. Alternative E-1A plus the Hilltop pumping station would require over 12,000 feet of force main in addition to the pumping station construction. E-1A plus the Hilltop pumping station force main would be contained almost entirely within existing streets. However, more disturbance to vegetation would result from E-1A and the Hilltop pumping station and force main construction than from the onsite construction of alternative H-1A according to the ESSSWFP. Alternative H-3 (pumping to Euclid) would require the same site work as E-1A plus the Hilltop pumping station. The H-3 force main, although shorter than E-1A and the Hilltop pumping station force main, would require crossing Euclid Creek. Alternative H-3, therefore, has a higher potential for disturbance of flora and fauna than the E-1A alternative (NEORSD 1978c).

Conflict with Cultural Resources. The ESSSWFP concluded that none of the major Hilltop alternatives present potential conflicts with archaeological and historical resources.

Technical Evaluation

Utilization of Existing Facilities. Alternatives E-1A (BBW upgrade), E-1A plus the Hilltop pumping station, and H-3 (pumping to Euclid) would make the best use of existing facilities according to the facilities plan.

Alternative H-2B (transport to Easterly) would transport flow to the Easterly Wastewater Treatment Plant, but would require substantial new construction. Several existing pumping stations would remain in service with this alternative.

Alternatives H-1 and H-1A (in-basin treatment) would require all new facilities. The collection system proposed by the facilities plan for the Hilltop service area would eliminate several existing wastewater facilities. The existing sewers would be used where possible (NEORSD 1978c).

Adaptability to Higher Effluent Standards. The interbasin transfer alternatives E-1A, H-2B, H-3, and E-1A plus the Hilltop pumping station would be more adaptable to higher effluent standards because they provide treatment at regional plants, according to the ESSSWFP (NEORSD 1978c). The cost allocation to the Hilltop service area for improvements to the Easterly or Euclid plants would be less than the improvements required for the in-basin treatment facilities.

Reliability. Alternative H-2B would provide the least potential for mechanical failures according to the facilities plan. However, several existing pumping stations would remain with this option and present some potential for equipment failure.

The in-basin treatment facilities alternatives H-1 and H-1A would continue to provide some degree of treatment under most equipment failure conditions.

Alternatives E-1A, H-3, and E-1A plus the Hilltop pumping station would be more severely affected by equipment failure (NEORSD 1978c).

Ease of Operation. The in-basin treatment alternatives, H-1 and H-1A, would require more operator time and a larger increase in operation and maintenance staff than the other alternatives.

The BBW upgrade alternative (E-1A) would require some increased operator time over that required with the existing BBW complex because of the additional Hilltop pumping station.

Alternative H-2B (gravity flow to Easterly) would require an increase in maintenance staff and maintenance time but presents the greatest ease of operation compared to the other alternatives according to the ESSSWFP (NEORSD 1978c).

Implementation and Jurisdiction. Alternatives E-1A (BBW upgrade), H-2B (transport to Easterly), and E-1A plus the Hilltop pumping station are proposed as regional facilities. Portions of the area to be served by these alternatives are not within the Northeast Ohio Regional Sewerage District (NEORSD) service area.

Financing through the NEORSD would be easier than through special assessment districts (which would be required for the nonregional facilities). The local interceptor sewers proposed in alternative H-2B were included as regional facilities. Alternatives H-1 (in-basin treatment), H-1A (in-basin treatment excluding BBW flow), and H-3 (pumping to Euclid) were proposed as local facilities. The local alternatives would serve more than one community and would therefore require the formation of a special assessment district for their implementation (NEORSD 1978c).

The ESSSWFP concluded that the regional facilities presented slightly less difficulty in implementation and jurisdiction than the local alternatives.

The ESSSWFP also stated that the BBW upgrade, alternative E-1A, would cause considerable inconvenience to the public through traffic congestion, dust, noise, and other sewer construction-related problems, but to a lesser extent than the lower segment of the gravity alternative, H-2B (NEORSD 1978c).

Flexibility Considerations

According to the facility plan, alternatives H-1 (in-basin treatment) and E-1A (BBW upgrade) presented greater flexibility in serving a larger population than projected. It was also stated that the capacity of alternative H-1A (in-basin treatment excluding BBW flow) would be much more difficult and expensive to increase than the capacity of either alternative E-1A or H-1 (NEORSD 1978c).

The cost-effectiveness of alternative H-2B (transport to Easterly) is not dependent on projected population. Because a large quantity of flow is currently transferred by the BBW, the Hilltop alternatives are less sensitive to changes that may result from alterations in projected population. The ESSSWFP felt that the high cost of rock excavation required for sewer installation in the Hilltop basin also decreased the sensitivity of the Hilltop alternatives to population. That is, within limits, a change in sewer diameter in the Hilltop service area would have very little effect on the total cost of transport facilities (NEORSD 1978c).

3.1.3 Facilities Plan Recommended Alternative

Based on the information presented in the previous section and the summary in Table 3-3, the Easterly Separate Sewer Segment Wastewater Facilities Plan (ESSSWFP) recommended alternative H-2B (transport to Easterly) for service to the Hilltop area. From the analysis, the reliability, low energy costs, ease of operation, and removal of bypasses and overflows were major factors in recommending this alternative (NEORSD 1978c). The cost comparison on present worth was previously presented in Table 3-4.

3.1.3.1 Further Analysis and Final Alignment of the Recommended Alternative

This section contains a summary of the additional studies which were completed on the recommended alternative. These studies included a Sewer

System Evaluation Survey (SSES, published in 1985) (NEORSD 1985a), an Advanced Facilities Plan (AFP, published in 1983) (NEORSD 1983a, 1983b, 1983c), and a Supplemental Facilities Plan (SFP, published in 1983) (NEORSD 1983d).

Once the ESSSWFP recommended alternative H-2B for service to the Hilltop basin, an AFP was prepared to expedite design and implementation of the interceptor system (NEORSD 1983a). This work was done concurrently with a SSES which further analyzed system problems (NEORSD 1985a).

Preliminary results from the SSES program showed that inflow and infiltration (I/I) were considerably greater throughout the Easterly Separate Sewer Area (ESSA) than had been anticipated in the ESSSWFP. Large portions of the existing sewer system are constructed in the dual system (as discussed in Chapter 2) with the storm drains and sanitary sewers in the same trench. This type of construction is prone to excessive leakage from the storm drain into the sanitary sewer and is one of the primary sources of I/I.

The ESSSWFP had estimated a peak rate of 393 MGD to be delivered to the Easterly WWTP if peak wet weather flows from the entire ESSA were summed (NEORSD 1978c). A preliminary summation of the flow data collected by the SSES suggested the peak flow could be as high as 926 MGD.

The EPA Stormwater Management Model (SWMM) was used in the AFP to determine the route of peak wet weather flows through the Heights/Hilltop interceptor system and to obtain an estimate of the attenuated peak flow rate that would be delivered to the Easterly WWTP (NEORSD 1983a).

The attenuated peak flow rate experienced at Easterly (from the AFP SWMM analysis) was 713 MGD. This value for peak flow was considerably less than the 926 MGD suggested in the SSES, but was large enough to cause concern about the design of the interceptors. This created numerous additional easement and clearance problems, and a considerable increase in expected costs for the project (NEORSD 1983a).

Alignment changes were made in portions of the Heights/Hilltop interceptors as a result of the AFP, along with recommendations to reroute peak flows from the ESSA through the interceptors in such a way as to further reduce the peak flow rate experienced at Easterly (NEORSD 1983a). Altering flow routes changes travel time and causes peak flows to arrive at critical junctions in the interceptor system at different times. Contracts G and H were added during this rerouting to transport flows from the Belvoir area (which is south of the Hilltop Facility Planning Area), as shown in Figure 3-6A.

After the alignment changes (both inside and outside the Hilltop area) were incorporated into the SWMM analysis, the attenuated peak flow rate delivered to the Easterly WWTP was decreased to approximately 599 MGD. All of the peak flow rates resulted in conveyance problems in designing the down stream segments of the Heights/Hilltop interceptor system and created the need for massive changes to the Easterly WWTP headworks and outfall.

A preliminary AFP analysis of costs associated with modifications of Easterly to handle peak wet weather flows from the ESSA showed a significant increase in cost for flows in excess of 400 MGD. Therefore, a means of regulating the ESSA peak flows to a maximum value of 400 MGD was determined to be desirable in the development of a feasible project (NEORSD 1983a).

The problems associated with modifying the headworks and outfall capacity generated a storage concept, which was significantly different than the originally selected alternative. The storage concept regulated the peak flow rate reaching Easterly by diverting flows above a set rate to storage, with return to the interceptor system after the peak subsided. Several preliminary proposals were made as part of the AFP efforts concerning the location and volume of off-line storage basins. Storage in one large basin at Easterly was not feasible due to land constraints onsite and nearsite, and because a basin near the WWTP would not reduce the size of interceptors (NEORSD 1983a). Storage at each of the approximately 20 input points to the interceptor system also was not feasible because of operation and maintenance problems associated with the number of basins and due to land acquisition problems in the highly urbanized corridor followed by the interceptors.

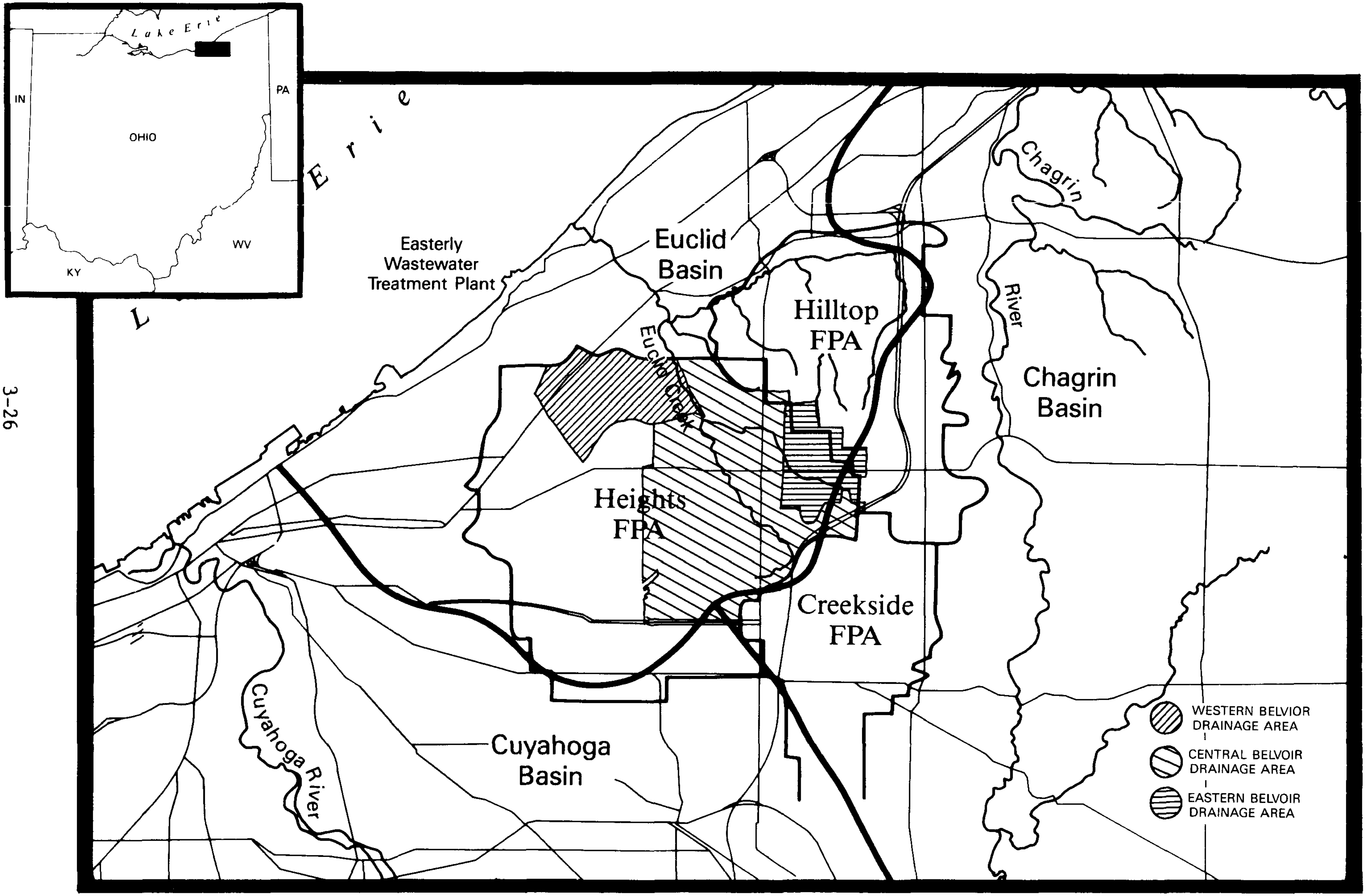


Figure 3-6A. Belvior Drainage Area

Four preliminary areas were found for locating off-line storage basins upstream in the Heights/Hilltop interceptor system. These areas were near the intersections of Richmond Road and Swetland Boulevard, Green Road and Monticello Boulevard, Belvoir Boulevard and Euclid Avenue, and Coventry and Superior Roads. Upstream mini-system flows from the SSES analysis were coded into the SWMM, and flows generated by the model at key locations were used to size interceptors upstream of the basins. Storage basin volumes were proportioned according to the ratio of summed upstream mini-system flows to the 926 MGD total. Basin volumes were then revised in subsequent SWMM runs until the peak flow delivered to Easterly was 400 MGD. Interceptors downstream of the basins were sized to convey the SWMM generated peak flows limited by the basins.

The preliminary storage alternative analysis indicated that some type of storage would be cost-effective. As a result, additional detailed planning was conducted for off-system storage of flows in excess of 400 MGD. This additional planning effort culminated in the creation of a Supplemental Facilities Plan (SFP) (NEORSD 1983d). The SFP provided hydraulic and physical orientation of the proposed storage basins, the environmental and archaeological ramifications of each basin site, and the revised interceptor alignments resulting from the rerouting of flows and incorporation of the storage basins into the Heights/Hilltop interceptor system.

The recommended plan for the Heights/Hilltop FPA included storage basins at the Cuyahoga County Airport, in Lake View Cemetery near the southwest corner of Coventry and Superior Roads, and along Green Road north of Monticello Boulevard. The size of the basins is related to the success of the rehabilitation program outlined in the SSES. Sizes and costs which were presented in the recommended plan are based on the effects of this rehabilitation effort. If rehabilitation does not result in the projected reduction of flows, the basins could be enlarged. Since the basins are the last item to be built in the system, the effectiveness of the rehabilitation program will be known.

The construction contracts from the Advanced Facility Plan (AFP) for the final recommended alignment for service to the Hilltop area are shown in

Figure 3-6. Contract G and Contract 4 are also shown because they are important in later Environmental Assessment analyses. The Lake View Cemetery storage basin is not shown because it is dedicated to Heights interceptor flows and is not part of the Hilltop plan. The design flow capacity of each component shown in Figure 3-7 is included in Table 3-5.

Table 3-5. Sizes for the Recommended Plan

Contract	Component	Size	Pipe Diameters
4	Conveyance	236/66 MGD[1]	102/66 in.
5	Conveyance	66 MGD	60 in.
F (Eastern Leg)	Conveyance	45 MGD	48 in.
(Western Leg)	Conveyance	70 MGD	54 in.
G	Conveyance	202 MGD	60 in.
H	Conveyance	59 MGD	42 in.
Airport Basin	Storage	1.5 MGD	

[1]236 MGD downstream of Green Road and 66 MGD upstream.

Source: NEORSD 1983d

3.2 ENVIRONMENTAL ASSESSMENT ALTERNATIVES/RECOMMENDED ALTERNATIVE

The Ohio EPA review of the facility plan was documented in an Environmental Assessment (OEPA 1985a). Four alternatives to serve this basin were reviewed in the Environmental Assessment based upon the original facilities plan alternatives. Alternative 1 is the same as the final alignment of alternative H-2B (transport to Easterly) from the facilities planning process, and alternative 2 is very similar to alternative E-1A (BBW upgrade) from the ESSSWFP. Alternatives 3 and 4 are combinations of these

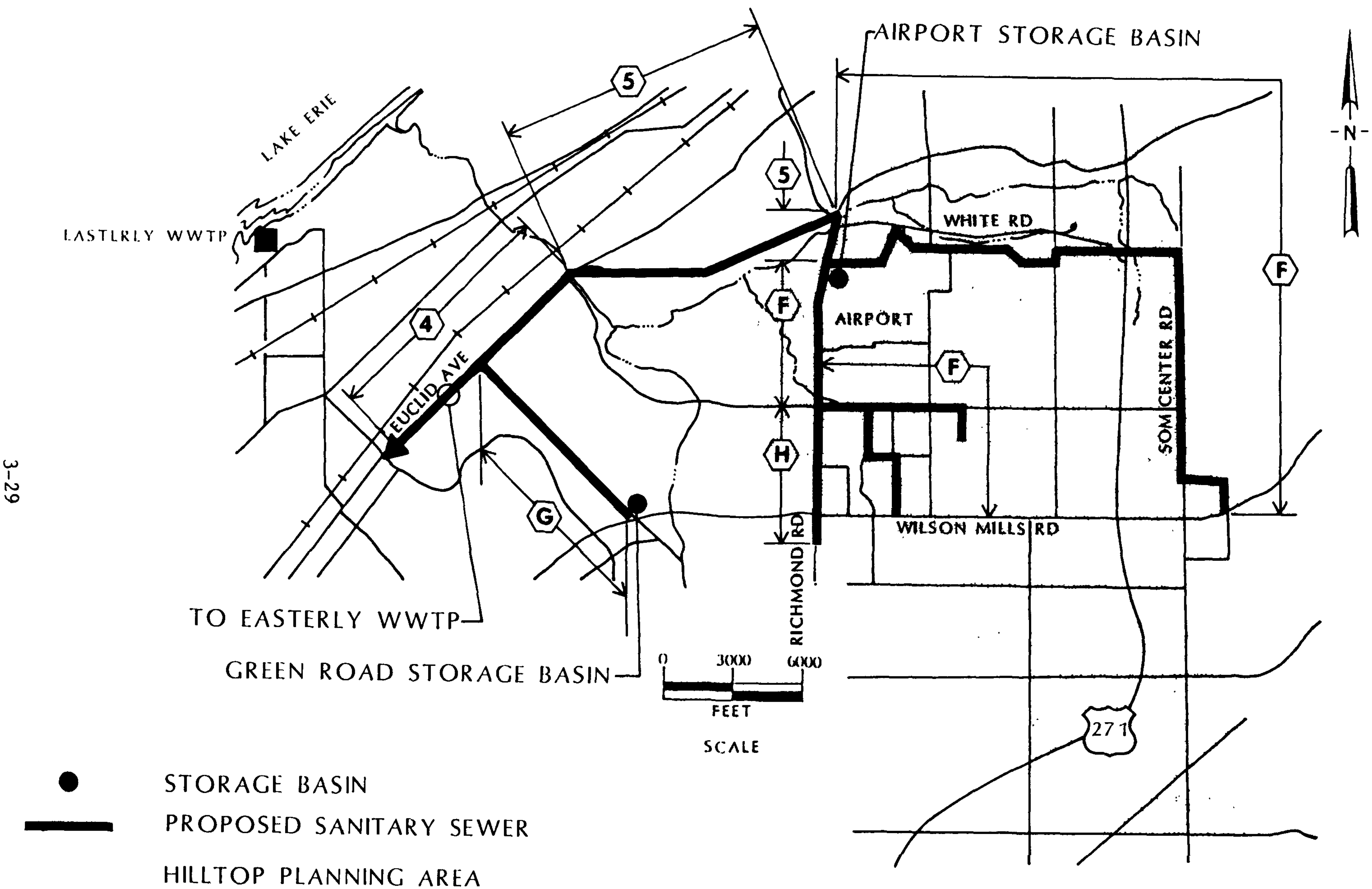


FIG: 3-7
FACILITIES PLAN RECOMMENDED ALTERNATIVE

other alternatives developed by NEORSD and requested by OEPA. The revised alternatives include:

Alternative 1 - Gravity Interceptor Sewer with Small Pump Stations

Alternative 2 - Combination Gravity Interceptor Sewer and Pump Stations/Force Mains (3 Major Pumping Stations)

Alternative 3 - Combination Gravity Interceptor Sewer and Pump Stations/Force Mains (2 Major Pumping Stations)

Alternative 4 - Combination Gravity Interceptor Sewer and Pump Station/Force Main (1 Major Pumping Station).

A separate assessment (i.e., Finding of No Significant Impact) was completed for the Heights interceptor prior to the start of the Hilltop Environmental Assessment (USEPA 1984d). In the Heights Environmental Assessment, the leg of the interceptor that will be routed down Green Road from Euclid Avenue to Monticello Boulevard, Contract G, was included with the understanding that the sewer diameter and construction cost would be dependent on which alternative was ultimately selected for the Hilltop area. Therefore, Contract G was also included in the cost analysis of the Hilltop alternatives even though it was previously discussed and conceptually approved.

3.2.1 Alternatives Description

Alternative 1 - Gravity Interceptor Sewer with Small Pump Stations

This alternative is shown on Figure 3-8, and the costs are included in Appendix D. This alternative is the same as the final alignment of alternative H-2B from the facilities planning process (NEORSD 1978c).

Alternative 1 would consist of a 48" diameter gravity sewer from the Beech Hill/Bonnieview pumping station north via small side streets and SOM Center Road to the Cuyahoga County/Lake County line. The sewer would follow the county line west from SOM Center Road to Bishop Road. The sewer would then be routed from Bishop Road to Richmond Road through the Cuyahoga County Airport (OEPA 1985a).

Another leg of this alternative would consist of branches from the Wilson Mills and Williamsburg pump stations. These sewers would converge in a 30"

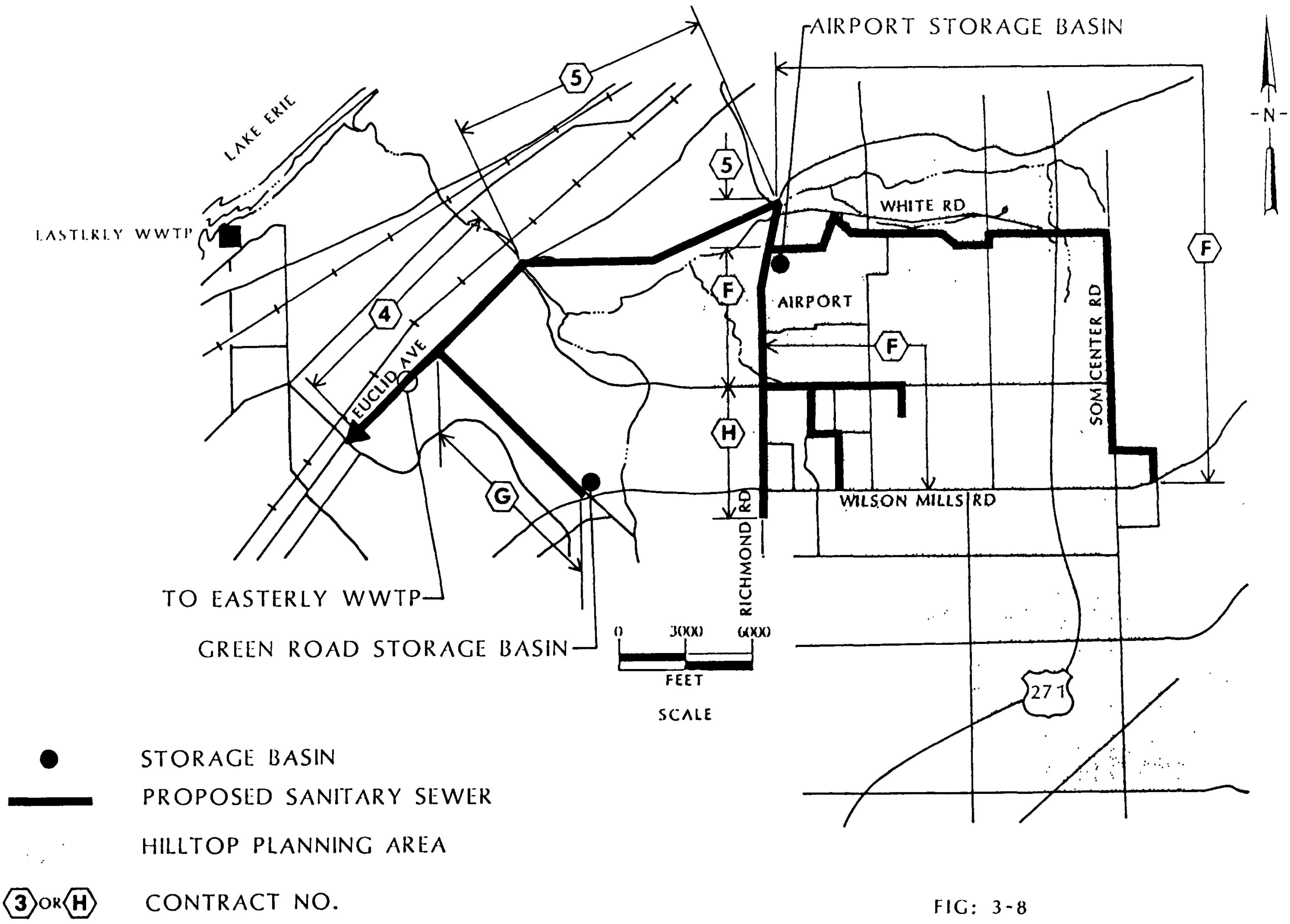


FIG: 3-8
ALTERNATIVE 1

sewer in Highland Road where the flow would be transported west to Richmond Road. The Richmond Road sewer would be a 42" to 58" diameter gravity sewer from Anderson Road north to Swetland Boulevard.

A 60" diameter gravity sewer would be routed north along Richmond Road to Chardon Road, and southwest along Chardon Road to Euclid Creek. A 48" diameter sewer would cross Euclid Creek and a 66" sewer would follow Euclid Road southwest to Green Road. A 102" diameter sewer would continue along Euclid Road from Green Road to Ivanhoe Road (OEPA 1985a).

A 60" to 66" diameter gravity sewer would be required for Contract G. Also included with this alternative would be a leg to connect the Richmond Park package plant with pump stations and force mains at Scottish Highlands and Hickory Hills package plants to eliminate these point source discharges (OEPA 1985a). Thornapple, Woods, and Suffolk Country Estates pump stations would all remain in service under this alternative.

A 0.75 million gallon storage basin would be constructed on the Cuyahoga County Airport property.

While not proposed for Federal funding as a part of the Heights/Hilltop interceptor project, local collector sewers were included in the Environmental Assessment cost analysis (OEPA 1985a). These sewers would be necessary to serve existing unsewered areas and future development, and would enable the elimination of several small pump stations.

Alternative 2 - Combination Gravity Interceptor and Pump Stations/Force Mains (3 Major Pumping Stations)

This alternative is shown in Figure 3-9, and the costs are included in Appendix D.

A 24.2 million gallons per day (MGD) pump station would be constructed at the existing Wilson Mills pump station site, and twin 24" diameter force main sewers would be constructed along Wilson Mills Road to discharge to the gravity sewer along Monticello Boulevard (OEPA 1985a).

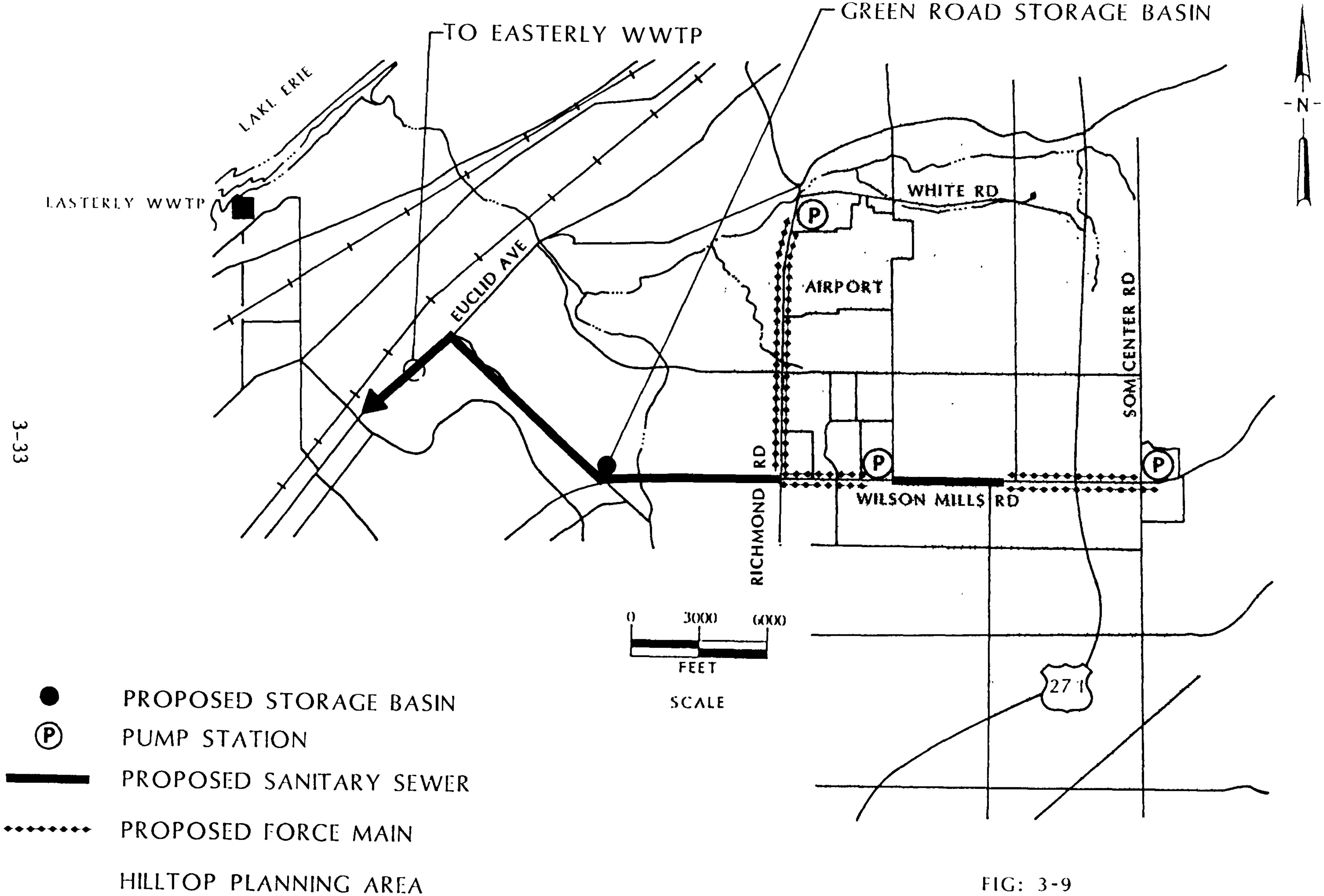


FIG: 3-9
ALTERNATIVE 2

An 11.6 MGD pump station would be constructed at the Beech Hill pump station site, and twin 18" diameter force main sewers would be constructed along Wilson Mills Road to discharge to the new Wilson Mills pump station. The Bonnieview storage basin would be rehabilitated.

A new 12.9 MGD pump station would be constructed near Richmond Road and White Road, and twin 18" diameter force main sewers would be constructed along Richmond Road to discharge to the gravity sewer along Monticello Boulevard.

This alternative also involves a gravity aerial crossing of Euclid Creek along Monticello Boulevard. The Environmental Assessment analysis assumed a worst-case condition which would require a new free standing pipe bridge to support twin 54" sewers.

This alternative would also include a 66" to 78" diameter gravity sewer along Green Road (Contract G) from Monticello Boulevard to Euclid Avenue. Additional gravity sewers would be constructed along portions of Monticello Boulevard and Wilson Mills Road (OEPA 1985a).

With this alternative, the proposed Green Road storage basin and associated facilities would need to be larger than what is required for alternative 1 because of the elimination of the Airport storage basin.

Also included in the Environmental Assessment cost analysis for this alternative were local collector sewers to serve existing unsewered areas and future development, and enable the elimination of several small pump stations and the Richmond Park package plant (OEPA 1985a). The Scottish Highlands and Hickory Hills package plants would be eliminated by constructing pump stations and force mains to discharge to the new local collector sewers. Several pump stations (Aintree, Thornapple, Mt. Vernon, and Woods) would need to be renovated with this alternative.

<u>Alternative 3 - Combination Gravity Interceptor and Pump Stations/Force Mains (2 Major Pumping Stations)</u>

This alternative is shown in Figure 3-10, and the costs are included in Appendix D.

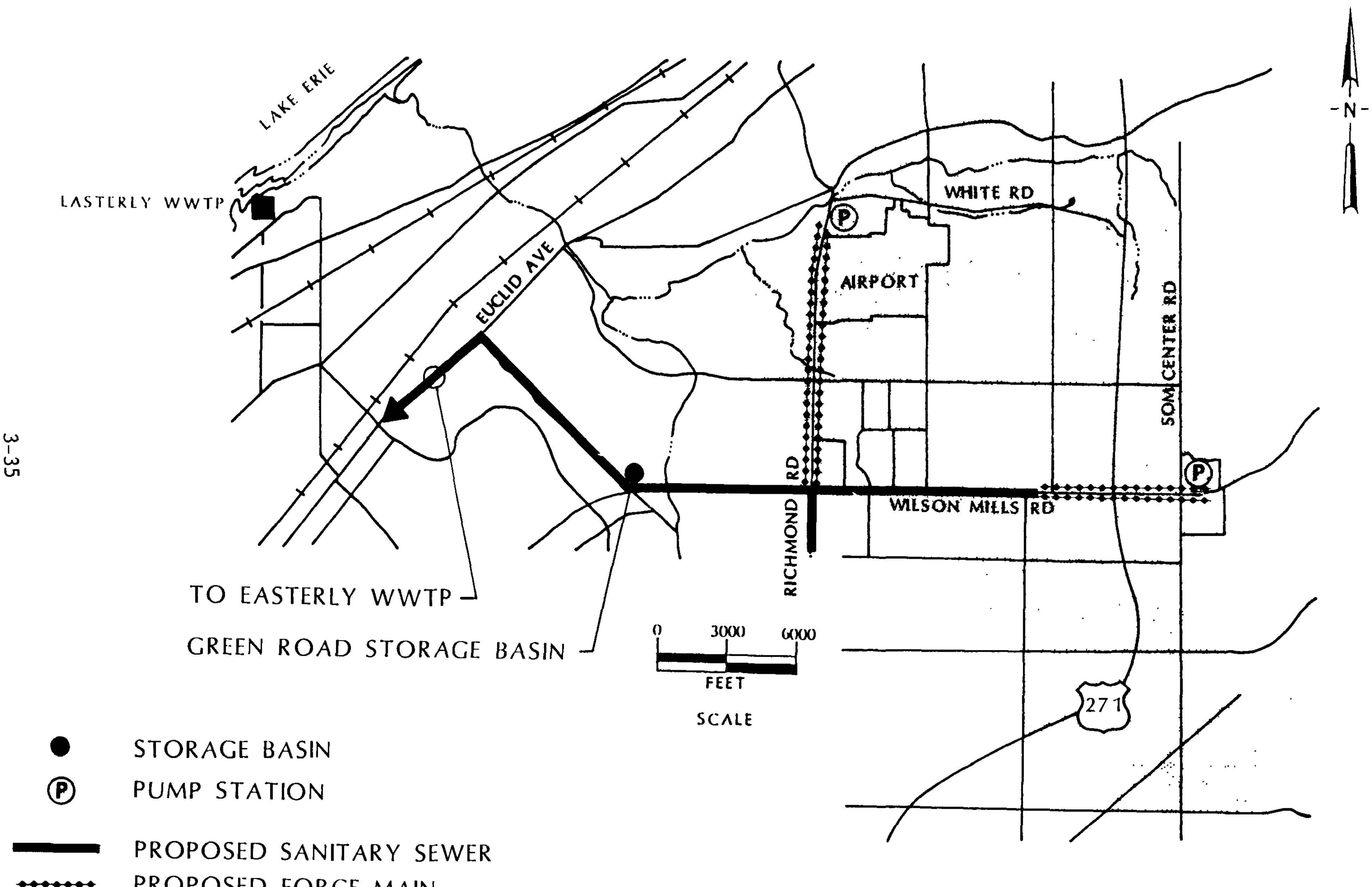


FIG: 3-10
ALTERNATIVE 3

This alternative is similar to alternative 2, except that the Wilson Mills pump station would be eliminated and replaced by an additional section of gravity sewer.

Contract G would remain the same as in alternative 2. Gravity sewer supplementation would be constructed along Monticello Boulevard and Wilson Mills Road. A 60" diameter sewer would be tunneled below Monticello Boulevard and Wilson Mills Road to eliminate the Wilson Mills pump station. Two 54" gravity sewers would also be required for the aerial crossing of Euclid Creek along Monticello Boulevard.

The Green Road storage basin would need to be slightly larger than what would be necessary for alternative 2. All other features would be the same as alternative 2.

Alternative 4 - Combination Gravity Interceptor and Pump Station/Force Main (1 Major Pumping Station)

This alternative is shown in Figure 3-11, and the costs are included in Appendix D.

This alternative combined features of a gravity interceptor system along with rebuilding the Beech Hill pumping complex.

The Beech Hill/Bonnieview pumping complex would be rebuilt, and twin 18" diameter force main sewers would be constructed along Wilson Mills Road to discharge to a gravity sewer along Richmond Road.

A 30" diameter gravity sewer would be routed west from the Williamsburg pump station along Highland Road to Richmond Road. A connecting leg would also run north from the Wilson Mills pump station along Franklin Boulevard and Meadowlane Drive to Highland Road. A 42" to 58" diameter gravity sewer would follow Richmond Road from Anderson Road to Swetland Boulevard.

A 60" diameter gravity sewer would be routed north along Richmond Road to Chardon Road and southwest along Chardon Road to Euclid Creek. A 48" diameter sewer would cross Euclid Creek, and a 66" sewer would follow Euclid Road

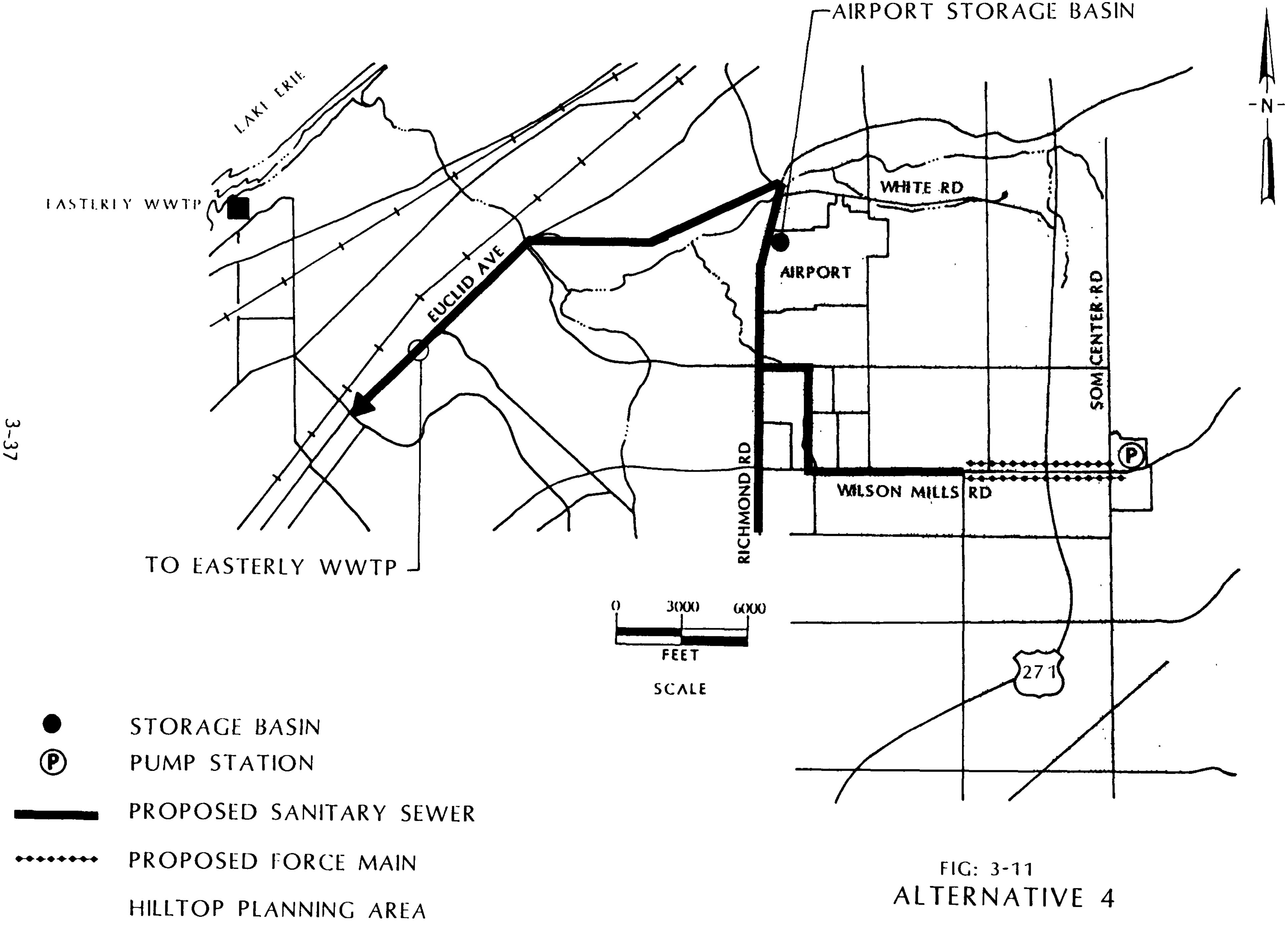


FIG: 3-11
ALTERNATIVE 4

southwest to Green Road. A 102" diameter sewer would continue along Euclid Road from Green Road to Ivanhoe Road (OEPA 1985a).

A spur from the Richmond Road sewer would connect to the Richmond Park package plant. The Scottish Highlands package plant would require a pump station and force main to connect to the Richmond Road sewer.

Local collector sewers to serve existing unsewered areas and future development, and to enable the elimination of several pump stations, are included in the cost analysis. The Hickory Hills package plant would be eliminated by constructing a pump station at the plant site and a force main sewer to connect to a local collector sewer along SOM Center Road (OEPA 1985a).

The Aintree, Thornapple, Mt. Vernon, and Woods pump stations would require renovation with this alternative.

A 0.30 million gallon storage basin would be constructed north of the Cuyahoga County Airport.

Contract G would include a 60" to 66" diameter gravity sewer that would be routed from the intersection of Monticello Boulevard and Green Road up Green Road to Euclid Avenue (OEPA 1985a).

3.2.2 EA Evaluation of Alternatives

Table 3-6 presents a summary of the present worth costs for the four Hilltop Environmental Assessment alternatives.

Table 3-6. Environmental Assessment Present Worth Summary (1982 dollars)

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Capital Present Worth	$83,901,300	$65,046,855	$67,930,455	$76,424,345
Operation and Maintenance Present Worth	$ 1,257,300	$ 6,941,565	$ 5,884,400	$ 2,638,700
Salvage Present Worth	$ 9,283,990	$ 5,961,900	$ 6,764,880	$ 7,995,595
Total Present Worth	$75,874,610	$66,026,520	$67,049,975	$70,427,565

Source: OEPA 1985a

Along with cost considerations, the Environmental Assessment cost-effectiveness analysis also considered the environmental and implementation factors associated with each alternative. These factors are discussed below.

Alternative 1

According to the Environmental Assessment, one of the beneficial environmental factors associated with this alternative would be the elimination of several point source discharges. The Scottish Highlands, Richmond Park, and Hickory Hills package plants would be eliminated (Scottish Highlands and Hickory Hills would be replaced with pump stations), reducing the pollution load to local streams. The Wilson Mills/Beech Hill/Bonnieview pumping complex would be removed from service, eliminating pollution loads to local streams from overflows of these facilities during storm events. Sanitary sewer overflows during storm events, along with the back up of sewage into some residences, would be minimized as a result of this alternative in conjunction with recommended sewer rehabilitation and relief sewer construction (OEPA 1985a).

This alternative would have the lowest power demand, as full advantage would be taken of gravity flow rather than pumping. Also due to maximizing gravity flow, this alternative may be less subject to interruptions in service due to power failure or mechanical breakdown. It would also provide for a conveyance system with a longer useful life.

The Environmental Assessment also stated that alternative 1 was the most acceptable to the public in the Hilltop area. The problems associated with the existing pump stations, and the public expectation that eventually the pump stations would be abandoned, has resulted in local preference for a gravity interceptor, rather than a solution that would utilize new pump stations and force mains. It should be noted, however, that even with this alternative not all pump stations will be removed.

Adverse environmental factors would include traffic disturbance along Richmond Road, SOM Center Road, Highland Road, and Wilson Mills Road during sewer construction. The sewer along Euclid Avenue and Chardon Road would consist of tunnel construction, and the only areas of disturbance would be at several access shaft locations (OEPA 1985a).

Extensive disturbance would occur where the alignment is routed outside road rights-of-way, particularly along the Cuyahoga County/Lake County line. This route, between Bishop Road and SOM Center Road, would traverse various stages of wooded growth. Most of this route would traverse abandoned agricultural fields which have been taken over by brush forest vegetation, generally between 15 to 20 years old. The construction easement would be 40 feet wide (OEPA 1985a).

Alternative 1 would provide an easily accessible sewer through undeveloped land. This would result in lower cost local sewers than for the other alternatives and would enable development to occur most readily.

Alternative 2

As stated by the Environmental Assessment, the beneficial environmental factors associated with this alternative would include the elimination of several point source discharges. The Scottish Highlands, Richmond Park, and Hickory Hills package plants would be eliminated (Scottish Highlands and Hickory Hills would be replaced with pump stations), reducing the pollution load to local streams. The Wilson Mills/Beech Hill/Bonnieview pumping complex would be replaced with expanded, more reliable facilities, eliminating wet weather pollution loads which result from pump station overflow. A new pump station would be constructed near Richmond and White Roads to enable existing and future flows from the lowest portion of the Hilltop area to be routed to the new gravity sewer along Monticello Boulevard. Sanitary sewer overflows during storm events, along with the back up of sewage into some residences, would be minimized as a result of this alternative in conjunction with recommended sewer rehabilitation and relief sewer construction (OEPA 1985a).

This alternative would have the highest power demand, as three major pump stations would be utilized. Also, pump stations rely on the proper operation and maintenance of mechanical components and do not have as long a useful life as gravity sewers.

The Environmental Assessment noted that this alternative was the least acceptable to the public in the Hilltop area, because of the problems associated with the existing pumping stations (OEPA 1985a).

Traffic disturbances during the construction of this alternative would not be as extensive as with alternative 1, because most street construction would involve force mains, which are typically smaller in diameter and shallower than gravity sewers, and take less time to construct.

This alternative does not involve interceptor sewer construction outside road rights-of-way, and would result in less disturbance to natural areas. Pump station construction and operation would result in a minor disturbance to residential areas.

Alternative 2 would provide capacity for future development. Local sewer costs would be greater than for alternative 1 since the interceptor/force main construction would be less extensive.

The sewer along Monticello Boulevard would require an aerial crossing of Euclid Creek and would result in an aesthetic impact to the Euclid Creek Reservation (OEPA 1985a).

Alternative 3

With alternative 3, the Wilson Mills pump station would be eliminated. This would eliminate the largest of the pump stations, and as such reduce energy demand, increase reliability, and increase public acceptability. Aside from this change, the environmental considerations are the same as for alternative 2 according to the Environmental Assessment (OEPA 1985a).

Alternative 4

This alternative would eliminate the Wilson Mills pump station and the need for a new pump station near Richmond and White Roads. Alternative 4 had the lowest energy demand of all alternatives except alternative 1. Equipment in the Beech Hill/Bonnieview pumping complex would be replaced, and this would be the only major pump station in the Hilltop area. Due to the reduced number of pump stations, this alternative would be considered the most reliable of all but alternative 1, and would possibly be more publicly acceptable than alternatives 2 and 3 according to the Environmental Assessment (OEPA 1985a).

Traffic disruption along Richmond Road, Euclid Avenue, and Chardon Road would be the same as alternative 1. Traffic disturbance along Wilson Mills Road from force main sewer construction would be similar to alternatives 2 and 3. Disturbance to natural areas would not be a direct impact of this alternative, as all construction would be along roadways and at the Beech Hill/Bonnieview sites (OEPA 1985a).

The Monticello Boulevard sewer, and associated aerial crossing of Euclid Creek, would not be necessary with alternative 4.

This alternative would provide for capacity to serve future development, but would not provide for a sewer through undeveloped land.

3.2.3 EA Recommended Alternative

Of the four alternatives analyzed in the Hilltop Environmental Assessment, alternative 1 was recommended for the Hilltop Facility Planning Area. Although this alternative had a present worth approximately $9.8 million more than the least cost alternative (alternative 2), the Environmental Assessment made the recommendation based on:

- A longer useful life of the gravity system
- Public sentiment against major pumping stations
- Minimal energy, operation, and maintenance requirements for the gravity option.

The proposed alternative is discussed by individual construction contract in the following paragraphs. The segments discussed also correspond to the various segments shown on Figure 3-8 with one exception. After the Hilltop Environmental Assessment cost analysis was completed, the portion of Contract 4 from Ivanhoe Road along Euclid Avenue to Green Road was redesignated as part of Contract 3 and is no longer included as part of this alternative (OEPA 1985a).

Contract 4

This contract involves construction of a 66" diameter pipe and is designed for a peak flow of 66 million gallons ger day (MGD). The downstream end of Contract 4 begins at the intersection of Euclid Avenue and Green Road. The interceptor will be tunneled below Euclid Avenue from the intersection of Euclid Avenue and Green Road to Euclid Creek. The Environmental Assessment estimated capital cost of this contract at $7.5 million (OEPA 1985a).

Contract 5

This contract involves construction of a 48" to 60" diameter sewer and is designed for a peak flow of 66 MGD. The downstream end of Contract 5 begins on the west side of Euclid Creek, near Chardon Road, and involves open-cut construction of a 48" diameter sewer across the stream. East of Euclid Creek, a 60" sewer will be tunneled below Chardon Road. This sewer will be oversized at 60" because it is impractical to construct an extensive tunnel of smaller diameter. The sewer will continue below Chardon Road and will turn south along Richmond Road to Swetland Boulevard. The Environmental Assessment estimated capital cost for this contract at $16.16 million (OEPA 1985a).

Contract F

This contract involves construction of several sewers ranging from 54" to 30" in diameter and designed for a peak flow of 70 MGD for the western leg and 45 MGD for the eastern leg. Also included are smaller spurs to pick up package plants and pump stations. All sewer construction in Contract F will be by open-cut construction methods (OEPA 1985a).

The western leg of Contract F begins at Richmond Road and Swetland Boulevard. This section involves construction of a 54" to 42" diameter sewer along Richmond Road from Swetland Boulevard to Highland Road. A 30" diameter sewer will be placed along Highland Road from Richmond Road to Meadowlane Drive. A 30" diameter sewer will be placed south along Meadowlane Drive to Radford Drive and Kenbridge Drive to the Wilson Mills pump station. From Meadowlane Drive, a 21" to 18" diameter sewer will be placed east along Highland Road and south along Pinehurst Road to the Williamsburg pump station. Both the Wilson Mills and Williamsburg pump stations will be eliminated (OEPA 1985a).

The eastern leg of Contract F begins at Richmond Road, approximately 2,000 feet south of Highland Road. This section involves construction of a 48" diameter sewer eastward through the Cuyahoga County Airport to Bishop Road. From Bishop Road to White Road and SOM Center Road, the 48" diameter sewer will generally follow the Cuyahoga County/Lake County line. A 400' section will be tunneled below Interstate 271. From White Road, a 48" diameter sewer will be routed south along SOM Center Road to Thornapple Drive. The sewer will then turn east along Thornapple Drive to Oakwood Drive, south along Oakwood Drive, across Wilson Mills Road, to the Beech Hill pump station (OEPA 1985a).

Included with this contract will be a 12" sewer to pick up the Richmond Park package plant, east of Richmond Road. The Scottish Highlands package plant will be eliminated with a pump station and force main discharging to the

Richmond Road interceptor. The Hickory Hills package plant will be eliminated with a pump station and force main discharging to the SOM Center Road interceptor.

The estimated capital cost of Contract F from the Environmental Assessment was $26.4 million (OEPA 1985a).

Contract H

This contract involves open-cut construction of a 42" diameter sewer from Richmond Road and Highland Road south along Richmond Road to Anderson Road. This sewer will be designed to transport a peak flow of 59 MGD from the East Belvoir area (not part of the Hilltop area).

The Environmental Assessment estimated capital cost of this sewer at $3.54 million (OEPA 1985a).

Contract G

This contract was initially included in the Heights Environmental Assessment (OEPA 1985a). However, due to the Hilltop area selected alternative not being finalized at the time, sizes were presented as a range. With alternative 1 selected, the sizes could then be developed.

Contract G will begin at the intersection of Green Road and Euclid Avenue. A 66" diameter sewer will be tunneled below Green Road south for 1,600 feet. From this point along Green Road the sewer will be a 60" diameter sewer constructed using open-cut methods. The sewer will terminate at Green Road and Monticello Boulevard.

The estimated capital cost of this sewer was $7.38 million (OEPA 1985a).

Storage Basins

The storage basins will be the last components of the proposed facilities to be constructed. Their need and size will be dependent on the eventual flows entering the interceptors upon completion of the sewer rehabilitation and relief sewer construction (OEPA 1985a).

The selected alternative for the Hilltop area included construction of a 0.75 million gallon storage basin on the Cuyahoga County Airport property. Both the western and eastern legs of Contract F will be able to feed into the basin during peak flow conditions. The basin will require about 0.6 acres of the airport property, and will be placed below ground level. When flows subside in the interceptor sewer, the stored water will be pumped into the interceptor for treatment at the Easterly WWTP.

The estimated capital cost of the storage basin in the Environmental Assessment was $2.54 million (OEPA 1985a).

3.3 OTHER ALTERNATIVES

Because of the broad coverage of alternatives developed throughout the facilities planning process, no new interceptor routes were developed during the EIS process. Several variations of the alternatives already discussed in this chapter were examined in the planning process before the final alignments were determined. The following section describes these alternative routes.

The Supplemental Facilities Planning Report (SFP) studied four variations of the recommended alternative before deciding on the final alignment shown on Figure 3-6 (NEORSD 1983d). Presented below is a brief description of the four variations:

- Bishop Road Alignment without Anderson Road Diversion - Consisted of Contract F, but the western leg of Contract F was routed down Bishop Road from the county line to Wilson Mills Road.
- Richmond Road Alignment without Anderson Road Diversion - Consisted of Contract F but did not include Contract H. The western leg of Contract F was routed down Richmond Road and across on Highland Road.
- Bishop Road Alignment with Anderson Road Diversion - Consisted of the same arrangement as Bishop without Anderson, but also included a branch west on Wilson Mills Road to Richmond Road and then south to Anderson Road.
- Richmond Road Alignment with Anderson Road Diversion - Consisted of the same arrangement as Richmond without Anderson, but also included Contract H.

The SWMM model was run for each of these alternatives with the following results (NEORSD 1983d).

Table 3-7. SWMM Model Run Results

	Flow at Easterly WWTP	Construction Cost ($1,000,000)
Bishop w/o Anderson	713 MGD	$19.4
Richmond w/o Anderson	625 MGD	19.5
Bishop w/Anderson	599 MGD	27.4
Richmond w/Anderson	599 MGD	23.2

The alternatives which included the Anderson Road Diversion were favored over the other alternatives because of the reduction in peak attenuated wet weather flow to the Easterly plant. Since the Richmond with Anderson alternative was estimated to be $4.2 million less expensive than the Bishop with Anderson alternative, the Richmond alignment was chosen. This final alignment, shown on Figure 3-7, is the previously defined recommended alternative. The other alternatives were dropped from further consideration. The Anderson Road diversion collects flow from the East Belvoir area (NEORSD 1983d).

An alternative developed by the NEORSD, in response to OEPA comments, was the routing of the northern part of Contract F along White Road instead of across open areas as proposed in the recommended alternative (NEORSD 1984b). The final conclusion of the NEORSD was that the White Road route would be about $2.0 million more expensive than the county line route. This conclusion was drawn based on the fact that the White Road route would require construction in pavement, while the county line route would not. The White Road route, however, does remain as a viable alternative to the cross-country section.

Another modification of the recommended plan that was examined by the NEORSD was the routing of the eastern leg of Contract F (across Highland Road from SOM Center to Richmond Road) in place of the county line route. Since segments of Highland Road will already be disturbed by the western leg of

Contract F (Richmond to Williamsburg pump station), the additional cost to increase the pipe size may be minor. However, the depth of the interceptor may require tunneling which will increase the costs (Stumpe 1986b).

A possibility which was developed during the EIS process involves the use of the Bonnieview storage facility with the recommended alternative. In the previous documents (ESSSWFP and Environmental Assessment), Bonnieview would be eliminated, and a new storage facility would be built near the county airport for this alternative (NEORSD 1978c, OEPA 1985a). Since Bonnieview is already a gravity-fed tank, it could remain in service. From the SSES results, the peak flow rate within the eastern leg of Contract F would be reduced from 40.6 MGD to 11.6 MGD by including this basin (NEORSD 1985a). By reducing the peak flow rates, the interceptors could be down sized, and a preliminary summation of peak flow volumes indicates that the Airport storage basin could also be eliminated. These modifications would decrease the overall cost of the recommended alternative.

As previously discussed, modifications of the alternatives were developed in the Environmental Assessment. Since these alternatives show potential as viable cost-effective options, they will also be addressed in the EIS analysis.

CHAPTER 4. AFFECTED ENVIRONMENT

4.1 ATMOSPHERE

4.1.1 Climate and Precipitation

The climate of the Cleveland/Hilltop area is characterized as continental; however, the climate is strongly influenced by Cleveland's location along the shores of Lake Erie. The area receives abundant precipitation, about 34 inches annually, distributed rather evenly throughout the year. Winds, for the most part, are from the south and southwest and average 11 mph. Damaging winds sometimes occur during summer thundershowers. According to the National Oceanic and Atmospheric Administration (NOAA), relative humidity remains about 60 to 80 percent throughout the year (NOAA 1976).

Winters are generally marked by cold, Canadian polar air masses traveling south and east. Passage over Lake Erie modifies the air mass temperature somewhat and supplies abundant moisture, resulting in frequent snowfalls. The average seasonal snowfall amounts to 51.5 inches, with 10 to 11 inches recorded monthly during December through January, and 5 to 6 inches during November. Maximum snowfall rates of 17.4 inches in 24 hours and 30.5-inch monthly totals have been recorded. Seasonal snowfall totals have ranged from 30 to 75 inches. Average winter temperatures range from about 22 degrees at night to 35 degrees during the daytime (NOAA 1976).

The summer season has the greatest amount of precipitation, and local flooding may occur. Maximum precipitation rates occur with summer thunderstorms. Record falls include 1.2 inches during a 10-minute period, 2.21 inches in 1 hour, 3.02 inches in 2 hours, and 4.97 inches in 24 hours. An average of 16 thunderstorms occur annually, primarily from April to September (NOAA 1976). The USEPA (1984a) states that for southwest Cleveland, "of the mean annual precipitation, about one-third runs off to streams. Thus evaporation, transpiration, and infiltration account for about two-thirds of the precipitation value." Values for the Hilltop Facility Planning Area (FPA) would be comparable due to the similarity of climate in southwest Cleveland to that of the FPA.

Spring and fall represent transitional periods. The last day of freezing temperatures typically occurs in late April, and the first frost occurs in early November.

More detailed climatological data is provided in Table 4-1.

4.1.2 Air Quality

The Cleveland/Hilltop region lies within the Metropolitan Cleveland Intrastate Air Quality Control Region (AQCR) as designated by USEPA. The region is subject to National Ambient Air Quality Standards (NAAQS) and those imposed by the Ohio Environmental Protection Agency (OEPA). Ohio EPA has designated standards identical to the NAAQS. These standards are listed in Table 4-2.

Areas wherein the NAAQS have not been attained are designated as non-attainment areas. In such areas, the State is required to develop permit requirements that will serve to bring the area into compliance with NAAQS. Specifically, permit requirements for major stationary sources (i.e., new or modified sources with the potential to emit more than 100 tons per year of a regulated pollutant) that will contribute to the non-attainment problem must demonstrate a high degree of emission control and obtain emission reductions, offsets, or tradeoffs for problem pollutants (Federal Register 40 CFR Part 51, July 1, 1984).

Currently, Cuyahoga County is designated as non-attainment for three gaseous pollutants: ozone, carbon monoxide (CO), and sulfur dioxide (SO_2) (Kovatch 1986). However, the county is in compliance with NAAQS for SO_2; the standard has not been exceeded for a number of years. A request to redesignate the county to attainment for SO_2 has been submitted to USEPA. With regard to ozone and CO, the most recent violation of the standard occurred in 1983, which was an unusually hot and dry year (Kovatch 1986).

In addition, portions of Cleveland and industrial Cuyahoga County are designated as non-attainment for total suspended particulates (TSP). The TSP non-attainment region is bounded by 65th Street, Denison Road, and Broadview

Table 4-1. Selected Climatological Data for Cleveland, Ohio

Month (Yrs. in record)	Precipitation in inches									
	Water equivalent				Snow, Ice pellets			Wind		# of days
	Normal (106)	Maximum monthly (34)	Minimum monthly (34)	Maximum in 24 hrs. (34)	Normal (35)	Maximum monthly (34)	Maximum in 24 hrs. (34)	Mean wind speed m.p.h. (34)	Prevailing direction (14)	Thunder-storms (34)
J	2.56	7.01	0.36	2.33	10.2	18.7	9.3	12.5	SW	<0.5
F	2.18	4.64	0.73	2.33	11.2	20.7	10.6	12.3	S	1
M	3.05	6.07	0.78	2.76	10.3	26.3	14.9	12.5	W	2
A	3.49	6.61	1.18	2.24	2.2	14.5	7.6	11.9	S	4
M	3.49	6.04	1.00	3.73	0.1	2.1	2.1	10.4	S	5
J	3.28	9.06	1.17	4.00	0.0	0.0	0.0	9.5	S	7
J	3.45	6.47	1.23	2.87	0.0	0.0	0.0	8.7	S	6
A	3.00	8.96	0.53	3.07	0.0	0.0	0.0	8.4	S	5
S	2.80	6.37	0.74	2.26	<0.1	<0.1	<0.1	9.1	S	3
O	2.57	9.50	0.61	3.44	0.8	8.0	6.7	10.0	S	2
N	2.76	6.44	0.92	2.23	5.6	22.3	15.0	12.1	S	1
D	2.36	5.60	0.71	2.06	11.1	30.3	12.2	12.3	S	<0.5
YR	34.99	9.50	0.36	4.00	51.5	30.3	15.0	10.8	S	36

FOOTNOTES

Annual extremes have been exceeded at other sites in the locality as follows: Maximum monthly precipitation 9.77 in June 1902; minimum monthly precipitation 0.17 in August 1881; maximum monthly snowfall 30.5 in February 1908; maximum snowfall in 24 hours 17.4 in November 1913. Information extracted from data compiled by the National Climatic Center.

Source: NOAA 1976

Table 4-2. USEPA and Ohio EPA Ambient Air Quality Standards

POLLUTANT	DURATION	RESTRICTION	MAXIMUM ALLOWABLE CONCENTRATIONS**	
			PRIMARY	SECONDARY
Total Suspended Particulates	Annual geometric mean	Not to be exceeded	75 ug/m^3	60 ug/m^3 ***
	24-hour concentration	Not to be exceeded more than once per year	260 ug/m^3	150 ug/m^3
Sulfur Dioxide	Annual arithmetic mean	Not to be exceeded	80 $ug.m^3$ (0.03 ppm)	
	24-hour arithmetic mean concentration	Not to be exceeded more than once per year	365 ug/m^3 (0.14 ppm)	
	3-hour arithmetic mean concentration	Not to be exceeded more than once per year		1300 ug/m^3 (0.5 ppm)
Carbon Monoxide	8-hour arithmetic mean concentration	Not to be exceeded more than once per year	10 mg/m^3 (9.0 ppm)	
	1-hour mean concentration	Not to be exceeded more than once per year	40 mg/m^3 (35.0 ppm)	
Ozone	1-hour mean concentration	Not to be exceeded on more than one day per year, average over three years	0.12 ppm (244 ug/m^3)	
Nitrogen Dioxide	Annual arithmetic mean	Not to be exceeded	0.53 ppm (100 ug/m^3)	
Lead	3-month arithmetic mean concentration	Not to be exceeded	1.5 ug/m^3	

NOTES:

Primary standards are established for the protection of public health
Secondary standards are established for the protection of public welfare

ug/m^3 = micrograms per cubic meter
ppm = parts per million
mg/m^3 = milligrams per cubic meter

Source: OEPA 1986b

* U.S EPA & Ohio EPA Air Quality Standards Are Identical
** 400CFR 50.4 - 50.12
*** Air Quality Guidelines

Road to the west; the Penn Central Railroad tracks on the south; East 71st and 79th Streets to the east; and Lake Erie to the north (Kovatch 1986). Both the 24-hour and annual average TSP standards were exceeded in Cuyahoga County.

The Ohio EPA has established numerous air quality monitoring stations throughout the State. Within the Cleveland AQCR, the following pollutants are monitored: TSP at 55 sites, PM-10 (particulate matter of less than 10 micron diameter) at five sites, lead at four sites, sulfate at six sites, SO_2 at 15 sites, oxides of nitrogen (NOX) at three sites, CO at six sites, and ozone at 12 sites.

Air quality data for sites in and near the Hilltop Facility Planning Area are summarized in Table 4-3. There is a significant difference in air quality between those sites in the industrial sections of Cleveland--especially those areas designated as non-attainment for TSP as described above--and sites within the FPA or adjacent areas to the south and east. Roughly stated, pollutant values within the facilities planning region are about one-half the maximum values recorded in industrial sections of Cleveland.

With regard to TSP, there were no violations of the annual standard or the 24-hour primary standard outside of Cleveland from 1983 to 1985. There were, however, several violations of the 24-hour secondary standard for TSP at sites within and near the FPA including Beachwood, Eastlake, Willoughby Hills, Mentor, and sites in Geauga and Lake Counties. Sulfur dioxide values outside of Cleveland are also significantly less than those of the industrial regions with the exception of one elevated 3-hour SO_2 reading at Eastlake. All measured values are below the applicable standards. One-hour maximum CO values are significantly higher at Cleveland than at the Lake County monitoring site, but 8-hour maximum values are similar, and violations of this standard have been recorded at both sites. The 1-hour ozone standard has also been violated at both the Lake County and Cleveland sites. In the case of this pollutant, the Lake County site has recorded maximum values slightly greater than those recorded in Cleveland. This may be attributed to the transport and photochemical oxidation of ozone precursors (NO_x and reactive hydrocarbons) generated within the major metropolitan areas. Comparative values for NO_x and lead are not available, but it would be expected that values in the Hilltop FPA would be less than those measured within Cleveland.

Table 4-3. Air Quality Data for the Hilltop Facility Planning Area and Surrounding Localities

Pollutant (Units) Avg. Time	Year				
		Cleveland	Willoughby Hills	Cuyahoga Co.	Geauga Co.
TSP	1985	101.1	34.7	-	48.0
(ug/m^3)	1984	116.1	-	53.2	52.3
Annual	1983	122.6	-	56.0	57.4
		Eastlake	Euclid	Lake Co.	Mentor
	1985	41.5	-	50.5	34.4
	1984	40.2	49.1	-	-
	1983	45.8	47.8	-	-
		Beachwood	Mayfield	Solon	
	1985	49.1	-	-	
	1984	50.0	36.8	37.4	
	1983	46.6	36.6	36.7	
		Cleveland	Willoughby Hills	Cuyahoga Co.	Geauga Co.
TSP	1985	354	188	-	221
(ug/m^3)	1984	357	-	122	183
24-hr	1983	564	-	150	339
		Eastlake	Euclid	Lake Co.	Mentor
	1985	198	-	234	173
	1984	103	121	-	-
	1983	114	132	-	-
		Beachwood	Mayfield	Solon	
	1985	236	-	-	
	1984	152	84	87	
	1983	121	96	82	
		Cleveland	Cuyahoga Co.	Eastlake	
SO_2	1985	62.9	24.1	32.8	
(ug/m^3)	1984	60.6	-	33.9	
Annual	1983	63.3	-	33.1	

Table 4-3. Air Quality Data for the Hilltop Facility Planning Area and Surrounding Localities (Continued)

Pollutant (Units) Avg. Time	Year			
		Cleveland	Cuyahoga Co.	Eastlake
SO_2	1985	292	8	125
(ug/m^3)	1984	348	-	296
24-hr	1983	252	-	166
		Cleveland	Cuyahoga Co.	Eastlake
SO_2	1985	1045	230	256
(ug/m^3)	1984	712	-	1158
3-hr	1983	548	-	265
		Cleveland	Lake Co.	
CO	1985	24.7	12.3	
(mg/m^3)	1984	24.3	15.7	
1-hr	1983	20.6	19.7	
		Cleveland	Lake Co.	
CO	1985	10.0	7.7	
(mg/m^3)	1984	10.8	10.2	
8-hr	1983	14.2	12.3	
		Cleveland	Lake Co.	
Ozone	1985	212	249	
(ug/m^3)	1984	231	284	
1-hr	1983	300	310	
		Cleveland		
NO_x	1985	55.9		
(ug/m^3)	1984	53.5		
Annual	1983	52.6		
		Cleveland		
Lead	1985	0.34		
(ug/m^3)	1984	0.38		
3-mo	1983	0.42		

For downtown areas, the maximum value of several downtown sites is reported.

Source: OEPA 1984, 1985b, and 1986b.

A 1984 study of aerosol pollutant transport and dry deposition in the Lake Erie basin (USEPA 1984b) indicates that the general area may be affected by atmospheric deposition of several pollutants. These include iron, lead, zinc, cadmium, copper, chromium, nickel, sulfate, and phosphorus. It is not clear what amount of these atmospheric pollutants have man-made sources in the Cleveland area.

4.1.3 Noise

No specific data on ambient noise levels are available for the Hilltop Facility Planning Area.

4.1.4 Odors

No specific data on ambient odors are available for the Hilltop Facility Planning Area; however, ambient odors become a nuisance with wet weather sanitary sewer overflows and backups to basements. Complaints are at times noted, especially in conjunction with overflows to Euclid Creek (Bell 1986).

4.2 GEOGRAPHY AND SOILS

4.2.1 Topography and Physiography

Cuyahoga County occupies parts of two different physiographic provinces, the glaciated Appalachian Plateaus Province on the south and east, referred to as the Allegheny Plateau, and the Central Lowland Province on the north and west, referred to as the Lake Plain (Winslow et al. 1953). The Lake Plain is composed of the Eastern Lake and Till Plains sections and occupies a belt approximately 3 miles wide, parallel to the Lake Erie shore. The Hilltop Facility Planning Area (FPA) lies within the Allegheny Plateau, which borders the Lake Plain on the south and rises above it in a prominent escarpment (White 1980). The escarpment is not a single or steep cliff but a composite feature as much as 3 miles wide against which a series of end moraines were deposited (White 1982). The escarpment crosses the county in a northeast-southwest diagonal.

Topography northwest of the escarpment is relatively flat and rises gradually to the southeast from an elevation of about 620 feet above mean sea level (MSL) to little more than 700 feet above MSL at the base of the escarpment. The top of the escarpment is approximately 900 feet above MSL, and the Allegheny Plateau rises from the top of the escarpment to between 1,050 and 1,200 feet in elevation in the vicinity of the Hilltop study area (NEORSD 1978a).

Surface water drainage within the Hilltop study area occurs principally by the Chagrin River and Euclid Creek, which eventually drain into Lake Erie. The Chagrin River has deeply dissected the northwestern edge of the Allegheny Plateau and provides the area's greatest topographic relief. The Chagrin River Valley lies as much as 200 feet below the present land surface (NEORSD 1978a). Euclid Creek is located west of the Chagrin River. It follows a course through a steep-sided ravine that is roughly parallel to Chardon Road.

4.2.2 Bedrock and Surficial Geology

Bedrock of the Allegheny Plateau in northeastern Ohio consists of Mississipian and Devonian systems (Table 4-4). The formations composing these systems will be discussed in descending order from land surface. The individual units in the following groups have similar water-bearing characteristics: (1) the Cuyahoga group of Mississippian age, (2) the Berea sandstone of Mississippian age, and (3) the shales and interbedded sandstones of the Bedford shale of Mississippian age and the Ohio and Chagrin shales of Devonian age (Winslow et al. 1953).

The Cuyahoga group is approximately 425 feet in thickness and lithologically consists of shale with interbedded sandstone. Wells generally yield sufficient water for domestic purposes; as much as 10 gpm may be developed. The thickness of the Berea sandstone averages 60 feet in Cuyahoga County. This formation consists of coarse- to medium-grained porous sandstone and serves as one of the best aquifers in the county. Yields of up to 100 gpm may be developed. The Bedford, Ohio, and Chagrin shales immediately underlie the Berea sandstone. Lithologically, these layers are greater than 700 feet thick and consist of shale with thin calcareous sandstone layers throughout.

Table 4-4. Stratigraphic Units and Their Water-Bearing Characteristics in the Vicinity of the Hilltop Facility Planning Area

System	Formation	Lithology	Water-Bearing Characteristics
Mississippian	Meadville shale	Medium to dark gray sandy shale alternating with thinly bedded blue-gray sandstone layers and zones of iron carbonate concretions.	Wells of sufficient yield for farm and domestic purposes generally can be developed in this aquifer. Yields of as much as 10 gpm may be developed.
	Sharpsville sandstone	Fine-grained blue-gray sandstone layers interbedded with blue-gray fissle shale.	
	Orangeville shale	Blue-gray to tan-gray fissle shale. Includes basal sandstone and shale members.	
	Berea sandstone	Light gray to light tan-red medium- to coarse-grained porous sandstone.	An aquifer of large areal extent and wells yield sufficient water for small industrial and municipal use. Yields of 100 gpm may be developed.
	Bedford shale	Blue-gray shale and thin calcareous sandstone lenses that thicken to form a basal sandstone member.	
Devonian	Ohio shale	Black bituminous shale containing pyrite concretions.	In certain areas, these formations are completely unproductive for groundwater. Generally, however, supplies of 3 to 4 gpm may be developed.
	Chagrin shale	Blue-gray to dark gray silty shale and scattered light blue-gray iron carbonate concretions and thin, hard light gray calcareous sandstone layers.	

Source: Winslow et al. 1953

In certain areas, these formations are unproductive; however, domestic supplies of 3 to 4 gpm may be developed (USDA 1980).

Surficial material overlying bedrock in Cuyahoga County consists of glacial deposits resulting from several ice advances during the Pleistocene Epoch. Evidence exists that the ice of the third glacial stage, the Illinoian, advanced at least once over Cuyahoga County. However, the majority of the glacial deposits in the county are from the Wisconsin stage. The Hiram Till mantles bedrock and earlier drift to a depth not greater than 10 feet in most places (Winslow et al. 1953). It is the most clayey till in northeastern Ohio, and pebbles are sparse and cobbles rare. The Hiram Till is the parent material from which the silty loam soils common to northeastern Ohio originate.

4.2.3 Soils in the Hilltop Facility Planning Area

Information about the soils within the planning area was obtained from Cuyahoga and Lake Counties, Ohio Soil Surveys (1979 and 1980). The following is a general discussion of the soil association within the planning area. For further details on the soil characteristics the previously listed publications should be consulted.

Soils within the Hilltop FPA consist of the following six soil associations: Urban Land-Mahoning, Urban Land-Mitiwanga, and Wadsworth-Rittman, in Cuyahoga County and Tioga-Euclid-Orville, and Darien-Mahoning and Mahoning-Ellsworth in Lake County. Table 4-5 describes soil characteristics and land use limitations for these associations; Figure 4-1 illustrates these associations in the Hilltop FPA.

Urban land is an area where more than 80 percent of the surface is covered by streets, parking lots, buildings, and other structures. As a result, the soils are obscured such that identification is not possible (USDA 1980).

Mahoning soils are somewhat poorly drained and have slow or very slow permeability. These soils formed in glacial till or tillplains. They have slopes that range from 0 to 6 percent. A perched seasonal high water table is at a depth of 12 to 30 inches and depth to bedrock is greater than 60 inches.

Table 4-5. Hilltop Facility Planning Area Soil Associations: Characteristics and Limitations

Characteristics	Soil Associates					
	Urban Land Mahoning	Urban Land Mitiwanga	Darien-Mahoning	Wadsworth-Rittman	Mahoning-Ellsworth	Tioga-Euclid-Orville
Depth to Seasonal High Water Table (inches)	12-30 perched	12-30 perched	6-18 perched	12-42 perched	18 perched	6-72 perched
Depth to Bedrock (inches)	>60	20-40	40-60	>60	.5-1.5	>60
Drainage	somewhat poorly	somewhat poorly	somewhat poorly	somewhat poorly to moderately well	somewhat poorly	somewhat to moderately well
Permeability (inches/hour)	slow to very slow	moderate	slow to very slow	slow to moderate*	slow to very slow	moderate to moderately slow
Rating for Septic Leach fields	severe: percs. slowly wetness	severe: depth to rock, wetness	severe: wetness, too clayey, slow percolation	severe: wetness, slow percolation	severe: wetness, depth to rock, slow percolation	severe: wetness, slow percolation
Rating for Shallow Excavations	severe: wetness	severe: depth to rock, wetness	severe: wetness, too clayey	severe: wetness, slope, texture, slippage	severe: wetness	severe: wetness, floods, cutbanks cave
Risk of Corrosion						
o uncoated steel	high	high	high	high	mod. to high	low to high
o concrete	high	moderate	low to high	high	low to high	low to high

*Wadsworth-Rittman - Permeability is moderate above the fragipan and slow within the fragipan.
Source: USDA 1979, 1980

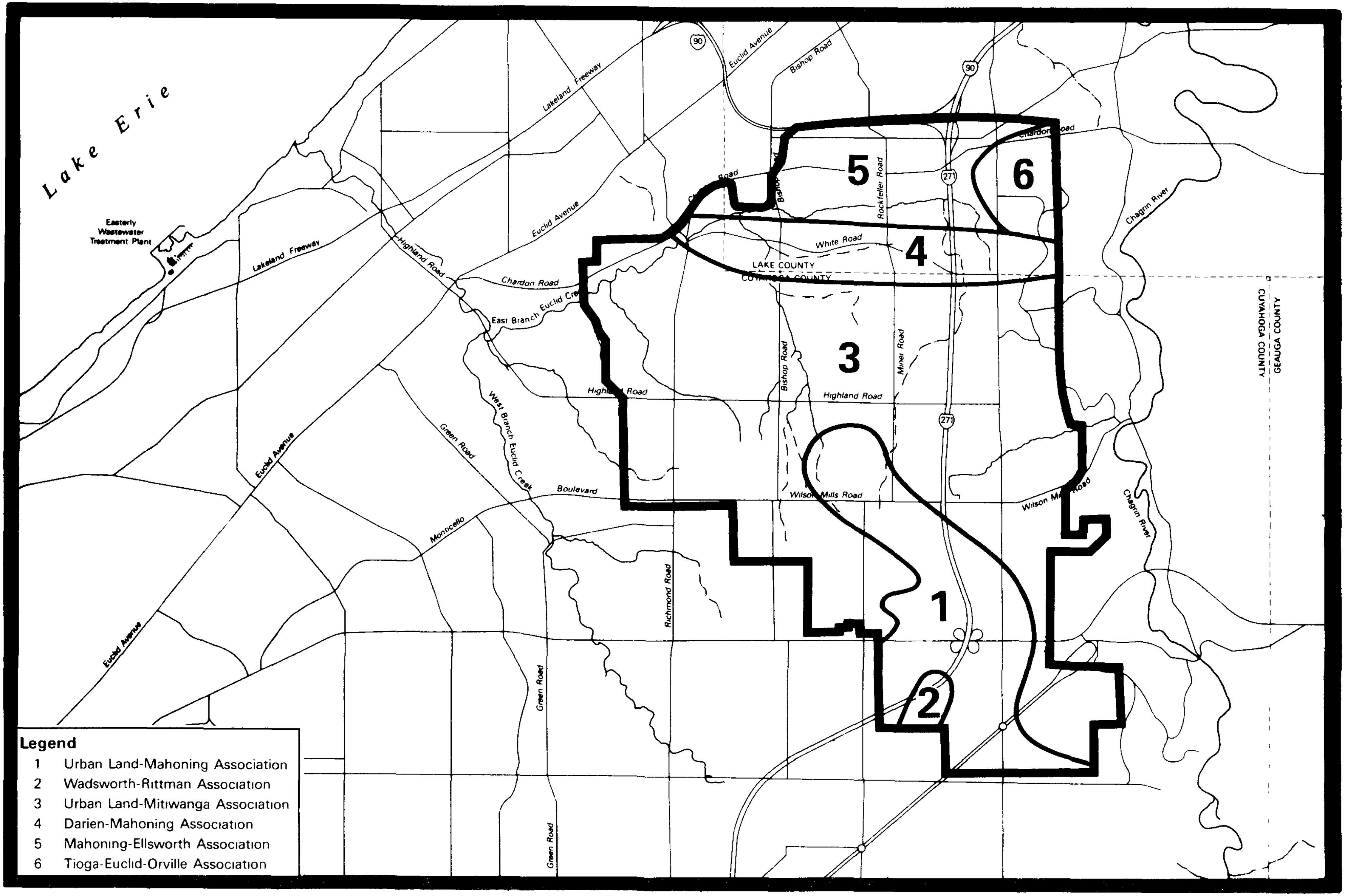


Figure 4-1. Soil Associations in the Hilltop Facility Planning Area

Source: USDOA 1979, 1980

These soils are severely limited as sites for septic tank absorption fields and sewage lagoons by the seasonal high water table and slow or very slow permeability. The risk of corrosion in these soils is high for both uncoated steel and concrete (USDA 1980).

Mitiwanga soils are somewhat poorly drained and exhibit moderate permeability. These soils, formed in glacial till and residual bedrock, have slopes that range from 0 to 6 percent. A perched seasonal water table is at depths of 12 to 30 inches, and bedrock is at depths of 20 to 40 inches. These soils are severely limited as sites for septic tank adsorption fields and sewage lagoons by the seasonal high water table and shallow depth to bedrock. The risk of corrosion in these soils is high for uncoated steel and moderate for concrete (USDA 1980).

The Darien-Mahoning soil association in Lake County consists of somewhat poorly drained soils having slow to very slow permeability. These soils formed in glacial till, and slope ranges from 0 to 12 percent. A perched seasonal high water table and bedrock at depths of 40 to 60 inches severely limits septic tank adsorption fields and sewage lagoons (USDA 1979). The risk for corrosion in these soils varies greatly, but can be high for both uncoated steel and concrete.

Wadsworth-Rittman association soils are nearly level to sloping and range from somewhat poorly drained to moderately well drained. The Wadsworth soils are deep, somewhat poorly drained, and range in slope from level to 6 percent. The Rittman soils are also deep, but are moderately well drained and exist on slopes that range from 2 to 12 percent. Both soils in this association have very shallow perched water tables and are limited for septic leach fields and shallow excavations because of wetness. The risk of corrosion is high in these soils for both uncoated steel and concrete.

The Mahoning-Ellsworth association consists of soils formed in glacial till, and range in slope from level to 70 percent. These soils have low to very low permeabilities and are limited because of slope and wetness for most uses. Corrosion risk is moderate to high for both uncoated steel and concrete.

Tioga-Euclid-Orville association soils are deep, range from somewhat poorly to moderately well drained, and exist on nearly level land. Use limitations for shallow excavations and septic leach fields is severe primarily because of wetness. These soils are also limited for these uses because of the potential for flooding, cutbank caving and slope slippage. The severity of any of these limitations is relative to the soil's topographic location and position on the flood plains. The risk of corrosion to uncoated steel and concrete ranges from low to high depending on the soil type and topographic location.

4.3 WATER RESOURCES

There are three major water resources in the study area: Lake Erie, the Chagrin River, and Euclid Creek. One small lake, Mayfair Lake, is also located in the FPA. The physical characteristics of these resources are discussed below.

4.3.1 Surface Water Hydrology

The proposed interceptor system is designed to carry wastewater to the Easterly WWTP, which discharges treated effluent into the Central Basin of Lake Erie. The Central Basin extends along the northeast Ohio shore and is the largest of three basins in Lake Erie, covering approximately 6,300 square miles. Its average water depth is about 60 feet, with a maximum depth of 84 feet (NEORSD 1978b).

The average lake level normally varies from just below 572 feet during winter to 573 feet in late spring and early summer. The average level is 572.3 feet above mean sea level. The lowest average monthly recorded level was 567.5 feet in February 1936. Northeast Ohio contributes only 1.3 percent of the total inflow, whereas approximately 83 percent of the total inflow comes from the Detroit River (NEORSD 1978b).

The Hilltop Facility Planning Area (FPA) lies entirely within the drainage basins of two stream systems: the Chagrin River and Euclid Creek (see Figures 1-2 and 4-2). The Chagrin River is the principal river system in the area, extending for approximately 48 miles and draining 267 square miles (OEPA 1986d). The river itself lies outside the Hilltop FPA, but 10.9 square miles or 53.4 percent of the planning area drains into small Chagrin River tributaries. A large portion of the Mayfield and Gates Mills communities lie within the Chagrin River basin.

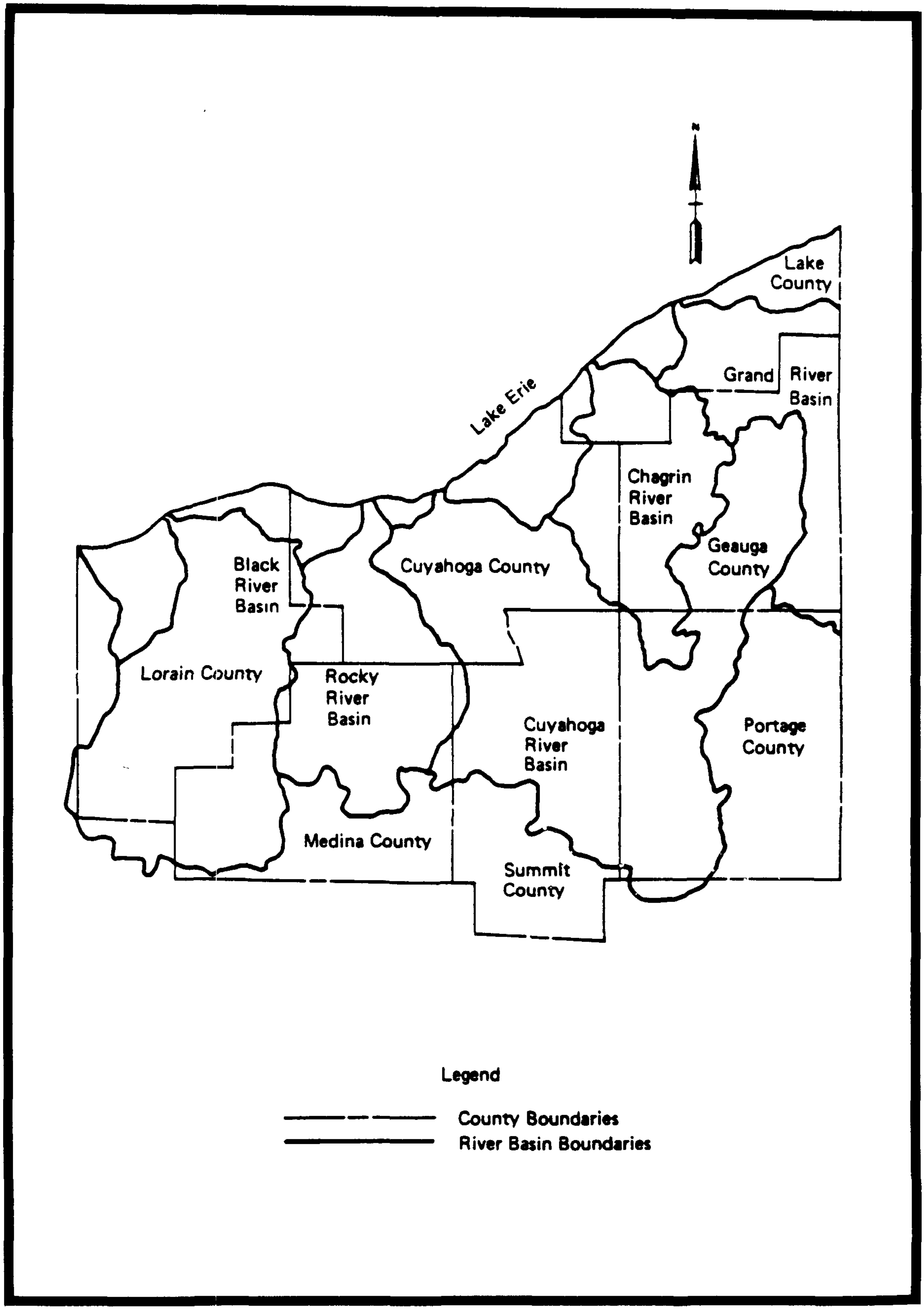


Figure 4-2. Cleveland Area Drainage Basins

Source: NEORSD 1978a

Euclid Creek is a much smaller system, extending for only 9.5 miles and draining an area of approximately 22.6 square miles (OEPA 1986d). Approximately 46.6 percent of the Hilltop FPA lies within the Euclid Creek drainage area. This includes most of the communities of Richmond Heights, Highland Heights, and Willoughby Hills. Euclid Creek is formed by the confluence of two branches (east and west) about 3 miles from its mouth at Lake Erie. The west branch drains South Euclid (outside the FPA), then flows northwesterly through Cleveland Metropark's Euclid Creek Reservation, forming the western boundary of the Richmond Heights area. The east branch drains most of the Euclid Creek portion of the Hilltop FPA. Small streams tributary to the east branch flow northwesterly from Wilson Mills Road, joining the east branch just north of Cuyahoga Airport. The stream then flows southwesterly to its confluence with the west branch about 0.8 miles upstream of Euclid Avenue (USDI 1979a, 1984).

Euclid Creek is gaged near its mouth (USGS Gage 04208690). Two periods of record exist for this gage: one extends from May 1977 to September 1980 and the other from October 1983 to the present. Flows at this gage have ranged from a daily minimum extreme of 2.0 cubic feet per second (cfs) on October 2, 1983, to a maximum of 7,440 cfs on August 31, 1975 (USGS 1986). For the 1984 calendar year, the mean discharge was 56.2 cfs; the maximum discharge was 1,160 cfs; and the minimum discharge was 4.9 cfs. Low flow periods generally occur in August and September.

The Hilltop FPA's one lake, Mayfair Lake, is located on a tributary to the east branch of Euclid Creek. According to the Cuyahoga County Sanitary Engineering Department (CCSED), this 4-acre impoundment drains approximately 610 acres (CCSED 1982), including much of Highland Heights and portions of Richmond Heights. The tributary area is used primarily for residential development with limited commercial and public land uses.

The Mayfair Lake dam was originally built by the former Brotherhood Country Club in about 1942. The lake was constructed for recreational purposes, but development in the watershed has accelerated the lake's eutrophication, limiting uses in recent years. The lake is now primarily used for boating, fishing, and ice skating. Sediment deposition in the southern end of the lake has formed a delta, limiting boating in this area (CCSED 1982).

4.3.2 Floodplains

Information on floodplains in the FPA was obtained from the Federal Emergency Management Agency (FEMA) National Flood Insurance Program. This agency distributes maps delineating flood boundaries for 100- and 500-year floods. Figure 4-3 shows these boundaries within the FPA. Differences between the 100- and 500-year boundaries are small and, due to the scale of the map, the boundaries are not delineated separately. The flood boundaries closely follow streambeds (Zone A). There is little development in these areas. The majority of the FPA is characterized as an area of minimal flooding (Zone C) (FEMA 1978a, 1978b, 1979, 1981, 1985).

4.3.3 Water Use and Quality

4.3.3.1 Surface Water

Ohio water quality standards that apply to all waters of the State and the State antidegradation policy are shown in Appendix E. In addition to these criteria, all rivers and lakes in the State have use classifications. These use classifications are protected by a set of numerical and narrative standards (OEPA 1986c).

Lake Erie

Lake Erie is the major surface water body in the area and is used for domestic water supply, industrial cooling water, and recreation. Four public water supplies obtain water from Lake Erie in areas several miles north of Cleveland Harbor (Cleveland Crown, 106 MGD; Cleveland Division, 110 MGD; Cleveland Baldwin, 100 MGD; Cleveland Nottingham, 98 MGD). In addition, several industries and utilities obtain cooling water from Lake Erie in the Cleveland Harbor area (SAIC 1986). Public water supplies in the Hilltop FPA are discussed in Section 4.3.3.3.

Angling in the Lake Erie portions of Cleveland is undergoing a revival. Activity is concentrated around the marinas and breakwater walls, particularly near Cleveland Harbor (SAIC 1986). Creel census data indicate that the most commonly caught fish in the outer harbor are carp, goldfish, and shad. However, anglers fishing from shore in this area also commonly catch yellow

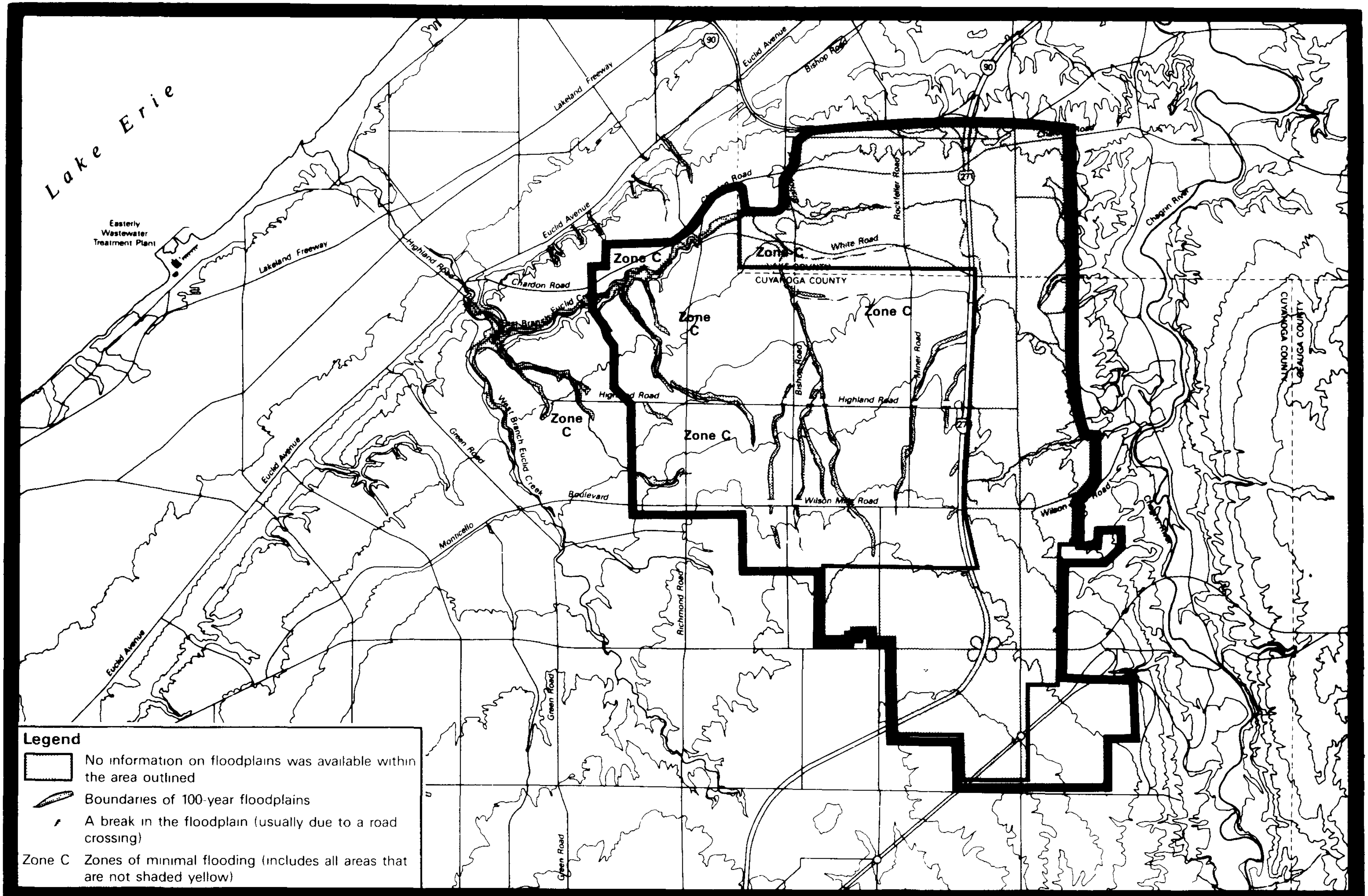


Figure 4-3. Flood Boundaries in the Hilltop Facility Planning Area

Source: FEMA 1978a, 1978b, 1979, 1981, 1985 perch, drum, white bass, walleye, white perch, and channel catfish (SAIC 1986). There is currently no fish consumption advisory for this area.

Public access to the lakefront near the Cleveland Harbor is limited, but swimming is popular at beaches immediately east and west of Cleveland Harbor. The most popular area is Edgewater Park, which received two million visits in 1984, including 750,000 visits by swimmers (SAIC 1986). Euclid Beach was recently opened (summer 1985) despite local concerns about pollution from CSOs. As stated in NOACA (1986), "Swimmers interviewed were unanimous in the opinion that water quality was not a concern along the lakefront east of East 140th Street. The common perception is that if the water were unsafe, the public health department would post warnings or otherwise warn the public not to swim in the lake."

Nearshore Lake Erie waters immediately adjacent to Euclid Creek and to the Chagrin River are classified by Ohio EPA as limited estuary habitats (LEH). According to the 1986 305b Report (OEPA 1986d), the Euclid Creek nearshore area is in "poor condition" and is not attaining its designated uses. Elevated levels of ammonia, total phosphorus, copper, iron, manganese, nickel, and zinc concentrations exceeding the standards assigned to the LEH classification contribute to the area's non-attainment status. Elevated numbers of fecal coliform bacteria have also been measured near Euclid Creek. The Chagrin River nearshore area partially meets its designated uses, and water quality is rated "good" by the Ohio EPA (OEPA 1986d). Data collected in 1978 and 1979 showed regular violations of the copper, zinc, and mercury LEH standards and occasional violations for lead, nickel, and iron. The area is considered eutrophic, but is one of the least eutrophic areas on Lake Erie's south shore (OEPA 1986d).

Chagrin River

The Chagrin River, one of the most scenic rivers in northeast Ohio, is the major river resource near the FPA. Overall water quality in the Chagrin River is exceptional (OEPA 1986d). However, development pressures are being felt in parts of the basin and an estimated 4.1 stream miles are known to have major physical/chemical water quality problems.

The mainstem of the Chagrin River flows just east of the Hilltop FPA (USDI 1979a, 1984). This section of the river is designated for the following uses by Ohio EPA: exceptional warmwater habitat, agricultural water supply, industrial water supply, and primary contact recreation. The section is also designated a "scenic river" by Ohio EPA and represents a State Resource Water (OEPA 1986c). According to Ohio Rule 3745-1-05, known as the Antidegradation Policy, the present ambient water quality in State Resource Waters is not to be degraded by toxic substances or substances that interfere with any of the water's designated uses (OEPA 1986c). According to Ohio EPA (Bell 1987), this classification effectively restricts new wastewater discharges into the Chagrin River; very few have been approved in recent years.

Two small package sewage treatment plants discharge to Chagrin River tributaries in the Hilltop FPA: Hickory Hills (.04 MGD) and Sleepy Hollow (.01 MGD). Tributaries to the Chagrin River also receive pollutant loadings from overflows from the Beech Hill pumping station and the Bonnieview holding tank (NEORSD 1978c, USEPA 1984d). Additional details on pollutant inputs from wastewater facilities are included in Chapter 2. The Beech Hill/Bonnieview/ Wilson Mills pumping complex, owned by the Northeast Ohio Regional Sewer District (NEORSD), provides interbasin transfer of waste flow from the Hilltop FPA to the Heights area leading to the Easterly WWTP. During dry weather, the Beech Hill pumping station in Mayfield Village pumps sewage to a gravity sewer on Wilson Mills Road, which in turn feeds the Wilson Mills pump station in Highland Heights (NEORSD 1978c). The 1 MGD Bonnieview holding tank is connected to a 30-inch gravity sewer tributary to the Beech Hill pump station. During wet weather when the Wilson Mills pumping station capacity is exceeded, the Beech Hill station shuts down and flow is diverted to the Bonnieview tank. During long-duration storms, uncontrolled flow builds up in the Beech Hill wet well until it ultimately overflows to a small Chagrin River tributary (NEORSD 1978c). This tributary is located about 200 feet south of the Beech Hill station and flows northeast through a residential area. The overflows are of concern to local residents. The Bonnieview tank discharges into another Chagrin River tributary. Although overflows from the tank are not monitored, NEORSD (Kennedy 1987b) estimates that the tank overflows several times a year. These overflows introduce poorly treated wastes to small Chagrin River tributaries, producing localized water quality impacts.

Euclid Creek

All segments of Euclid Creek are designated for use as warmwater habitat, industrial and agricultural water supply, and primary contact recreation. In addition, the segment from Route 20 to Anderson Road on the west branch of Euclid Creek is designated as a State Resource Water (OEPA 1986d).

Ohio EPA (1986d) concluded that the condition of Euclid Creek from its west tributary to its mouth at Lake Erie is poor and that its designated uses are not being attained. They identify fecal coliform bacteria, phenolics, total lead, and total iron as the chemical water quality parameters of concern. Discharges from the Scottish Highlands WWTP, septic tank dischargers, and combined sewer overflows are listed as probable causes of the bacterial problems. The phenolics and metals were attributed to seepage from a covered waste disposal site at Cleveland Metal Cleaning. However, no supporting data are available. Additional data on pollutant inputs from public wastewater facilities are included in Chapter 2.

Recent water quality sampling of Euclid Creek in the Hilltop FPA has been very limited. Single dissolved oxygen and conductivity measurements were taken at 14 sites on Euclid Creek and its tributaries as part of a 1984 benthic survey of the stream (ERAI 1984). Stations were selected immediately downstream of point sources, and the benthic community was stressed at all sites. Water chemistry did not show evidence of pollution-induced stress, with all dissolved oxygen measurements above 6 mg/l. However, the limited sampling could be misleading. The biological community structure provides a better indication of long-term stress in an aquatic system and is reviewed in Section 4.5.2.

A limited water quality sampling effort was conducted in 1982 (NEORSD 1984c) to assess wet weather pollution below the Scottish Highlands WWTP and the Richmond Park Apartments WWTP. Data collected in this effort are shown in Table 4-6. The station locations are shown in Figure 4-4. These data show high concentrations of BOD_5 and TSS discharged from Scottish Highlands during the storm events. However, fecal coliform numbers and TSS and BOD_5 concentrations in the stream appear to be more impacted by runoff than the

Table 4-6. Hilltop Facility Planning Area Water Quality Sampling Data

Sample Location	Pre-Storm Sampling (9/8/82)		Wet-Weather Sampling (9/15-16/82)			Post-Storm Sampling (9/17/82)
	Suspended Solids (mg/l)	BOD_5 (mg/l)	Suspended Solids (mg/l)	BOD_5 (mg/l)	Fecal Coliform (#/100 ml)	Fecal Coliform (#/100 ml)
Scottish Highlands WWTP						
H-1 - Upstream	2.0	2.4	4.0	3.6	4,200	180
H-2 - Effluent	NA	NA	363.3	94.1	NA	NA
H-3 - Downstream	19.0	3.0	16.0	6.6	4,900	3,200
Richmond Park Apartments WWTP						
H-4 - Upstream	4.0	2.7	4.0	3.3	280	<20
H-5 - Effluent	NA	NA	34.7	41.6	NA	NA
H-6 - Downstream	24.0	4.2	20.0	8.4	80	<20
H-10 - Wilson Hills Pump Station	NA	NA	221.5	74.5	NA	NA

NA - Not available

Source: NEORSD 1984c

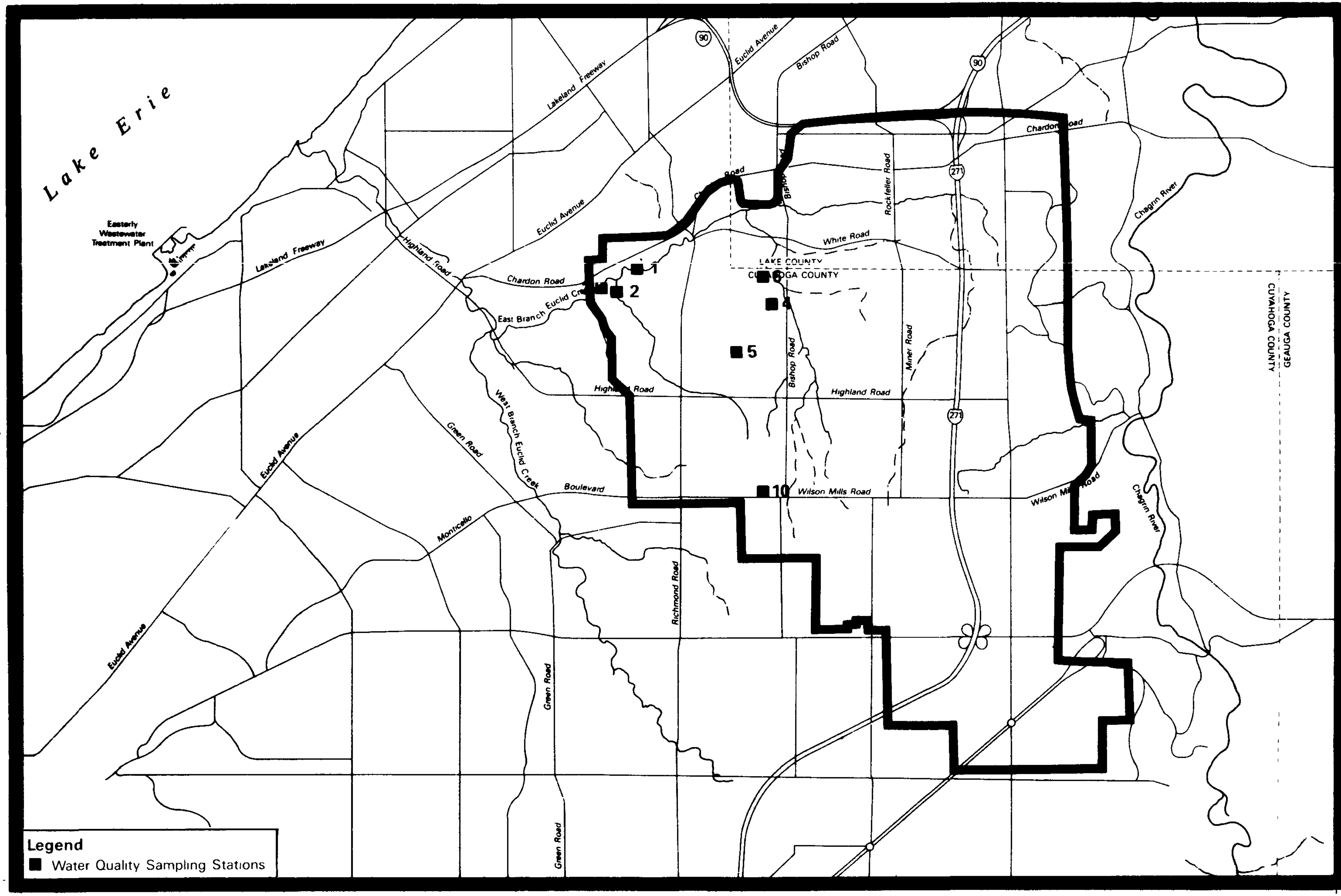


Figure 4-4. Locations of Water Quality Sampling Stations in the Hilltop Facility Planning Area

discharge during wet weather conditions. The plant does not appear to increase stream TSS and fecal coliform concentrations during dry weather although the lack of effluent data make this difficult to verify. The Richmond Park Apartments WWTP discharge appears to increase stream TSS concentrations slightly. The plant discharges a higher quality effluent than Scottish Highlands, achieving close to secondary treatment event during wet weather.

Overall, these data do not show gross pollution of Euclid Creek. However, the sampling is very limited and may not be fully indicative of stream conditions.

Mayfair Lake

Mayfair Lake, the only lake in the Hilltop FPA, is a privately owned impoundment on a tributary to the east branch of Euclid Creek. The lake drains 610 acres of primary commercial and residential land. Reported loadings of fertilizers, sewage, and sediment have accelerated natural eutrophication of the impoundment.

The Cuyahoga County Sanitary Engineering Department coordinated a study of Mayfair Lake in 1982 (CCSED 1982). They concluded that water quality in the lake was impacted by numerous sources, but that the lake met secondary contact recreation standards. Accelerated sedimentation from upstream erosion and leaf litter was cited as the primary water quality problem.

4.3.3.2 Groundwater

Groundwater availability in the FPA is shown in Figure 4-5; as this figure indicates, the potential for useful groundwater sources is poor in Richmond Heights, Highland Heights, Mayfield, and Willoughby Hills, and ranges from fair to good in the remainder of the FPA. At most locations, wells penetrating 200 to 700 feet into the underlying sandstone and shale are required to reach usable aquifers (NEORSD 1978a).

Groundwater sources are not used for public water supplies within the FPA, so groundwater quality data are limited to private groundwater drinking wells. The majority of data has been provided by the Cuyahoga County Health

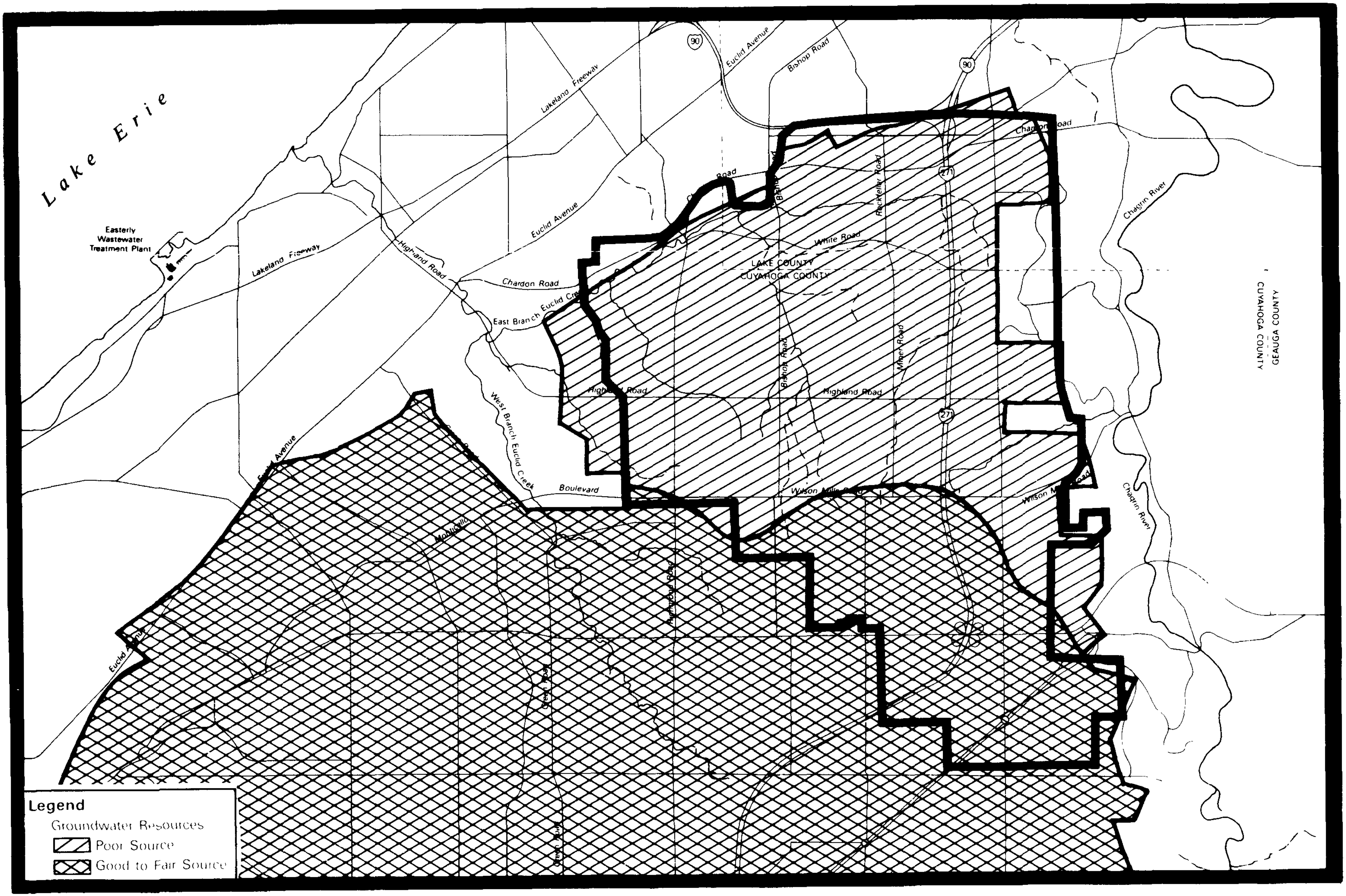


Figure 4-5. Groundwater Resources in the Hilltop Facility Planning Area

Source: NEORSD 1978a

Department since southwest Lake County primarily uses Cleveland public water supplies (Somrak 1987a).

Cuyahoga County tests groundwater samples for bacteria. If a well contains measurable quantities of Escherichia coli, it is deemed unsafe for drinking water use. From 1985 to the beginning of 1987, 10 of 22 wells sampled were found to contain significant bacterial concentrations. Of these 10 wells, however, some contained bacteria other than E. coli and will be tested again specifically for E. coli (Somrak 1987a). The Cuyahoga County Health Department says the ratio of safe to unsafe wells in the study area is the same for the entire county.

4.3.3.3 Public Water Supply

Municipalities located in Cuyahoga County are served by the Cleveland Public Utilities Company. In 1983, Willoughby Hills began receiving service from the Lake County Department of Utilities. Both counties draw water from Lake Erie (see Section 4.3.2.1) for treatment and distribution.

4.4 TERRESTRIAL BIOTA

4.4.1 Terrestrial Vegetation and Landscape

Information on terrestrial plant and wildlife species in the Facility Planning Area (FPA) was collected by NEORSD (1978a) and Havens and Emerson (1986). The study by NEORSD describes vegetation in the western branch of Euclid Creek; the report by Havens and Emerson describes vegetation along the Lake/Cuyahoga County line.

The valley of the west branch of Euclid Creek was examined from the Chardon Road and Euclid Avenue intersection south of and roughly paralleling Chardon Road to a point just east of the I-271 freeway. The western end of the valley is steep and up to 150 feet deep, while the eastern end ranges from 15 to 20 feet (NEORSD 1978a). The western one-third of the valley passes through a relatively undisturbed combination of climax (i.e., beech, sugar maple) and subclimax (i.e., red maple, tulip, red oak, black cherry) forest, with trees from 50 to 70 feet in height. The stretch of the ravine east and northeast from Highland Road to Richmond Road is considered highly sensitive because the land form and vegetation have not been disturbed by development (NEORSD 1978a). Given the size of the trees, the late successional stage, and the documented lack of abundance of mature forest in Cuyahoga County (Havens and Emerson 1984), this community should be considered sensitive and irreplaceable if damaged. This portion of the ravine has a shale-base that is very susceptible to erosion damage. Soil at the ravine bottom is shallow and anchored by the vegetation in the floodplain. Disruption of the vegetation coupled with subsequent erosion could bring about irreplaceable loss of certain vegetation to the valley bottom (i.e., yellow birch, beech, and sugar maple) (NEORSD 1978a). Vegetation in this area includes riparian woodland typical of river banks with sycamore, river birch, red maple, and brambles of greenbrier, blackberry, and grape where the floodplain widens. The beech-maple or mixed hardwood forest, which occupies extensive upper slope areas, extends down to the stream in sections where it is narrow. Hemlock is found on the shadier sites. Oak and tuliptree are relatively abundant in the mixed forest. Herbaceous ground cover in the forested areas include wild leek, woodfern, violets, great-flowered trillium, Dutchman's breeches, cutleaf toothwort, iris, and jewelweed (NEORSD 1978a).

In the more shallow east end of the valley, tree species consist primarily of red maple, red oak, and birch, with willows prevalent in wet border areas. As the valley becomes shallower near I-271, wild fox grape, willow, and hawthorn become more prevalent. The valley upstream from Richmond Road lacks the high shale walls, although there is much low relief and meandering. Parts of this segment pass through disturbed residential areas that contain patches of riparian growth and various stages of secondary succession. Other parts of the segment traverse mixed lowland hardwoods. There are groves of locust and some hawthorn. Lowland areas contain much iris and the species of fern known as the sensitive fern. Recently disturbed areas have old field successional stages (NEORSD 1978a). An old field typically develops in abandoned pastures and farmland and is dominated by grasses and wildflowers interspersed with shrubs. Old field species common in northeastern Ohio include sedges, pasture juniper, wild rose, foxtail, goldenrod, Queen Anne's lace, meadow fescue, milkweed, and thistle.

Part of the FPA along the Lake/Cuyahoga County border is traversed by a proposed interceptor route (see Chapters 3 and 5). In general, this area has poorly developed drainage. Patches of swampy ground are present due to underlying clay (OEPA 1985a). The soil of this area is composed of shale or sandstone material of glacial origin which forms a heavy clay loam. Terrestrial habitat along the cross country segment, as described in the study by Havens and Emerson (1984), is composed of four major plant communities: old field, brushland, brush forest, and forest. Brushland and brush forest communities cover most of the area in this potential interceptor construction easement. An environmental assessment prepared by Ohio EPA (1985a) indicates that forest community is scattered throughout the easement area and estimates that approximately 1000 feet of the sewer alignment between Miner and Bishop Roads will traverse this type of community.

Old field community occupies no more than 10 acres of the easement area, along the edges of Miner Road. Many introduced grasses are present, indicating the area was once a pasture. These grasses include timothy, foxtail, meadow fescue, and red top. Other common plant species include goldenrod, Queen Anne's lace, thistle, ironweed, mullein, and common milkweed (Havens and Emerson 1984).

Areas of brushland community represent transitional stages between old fields and brush forest communities. The brushland community is characterized by dense thickets of woody vines entangled with shrubs. Dominant plants include raspberry bramble, greenbrier, Japanese honeysuckle, rose bushes, smooth sumac, and deciduous tree saplings (Havens and Emerson 1984).

The brush forest community covers the largest percentage of the proposed sewer easement area along the Lake/Cuyahoga County border. This community is characterized by small trees and a dense understory of tangled vines and shrubs. Tree species are in competition for space which was once open brushland. Most of the brush forest community is a monoculture of red maple saplings no larger than 4 inches in diameter at breast height. A portion of this community within the easement is classified as wetland by the U.S. Fish and Wildlife Service (Havens and Emerson 1984). This area is discussed in more detail in Section 4.4.2.

Forest community near the proposed easement is dominated by moderate to large hardwoods (Havens and Emerson 1984). All of the area's forests were cut in the past, but scattered trees left uncut have become quite large. Understory growth is sparse to moderately common. Beech is the dominant tree and is found in close association with red maple, tulip, white ash, magnolia, and tupelo. Common understory plants are hophornbean, dogwood, shadebush, spicebush, maple-leaved viburnum, and red-berried elder. In the more swampy areas, red maple, black ash, basswood, and butternut hickory are common trees. American hornbeam, spicebush, and poison ivy are common understory plants of this association.

The Chagrin River basin is a State-designated scenic river by the Ohio Department of Natural Resources (Jones 1986). Scenic segments include the Aurora branch from the State Route (SR) 82 bridge downstream to the confluence with the Chagrin River; the Chagrin River from its confluence with the Aurora branch downstream to the State Route (SR) 6 bridge; and the east branch from the Health Road Bridge downstream to the confluence with the Chagrin (ODNR 1985a).

4.4.2 Wetlands

Wetlands in the FPA have been mapped by the U.S. Fish and Wildlife Service (USFWS) for the National Wetland Inventory. Definitions of wetlands vary due to their extreme diversity and depending on needs for developing demarcations and characterizations. The USFWS definition is based on the need "to impose boundaries on natural ecosystems for the purposes of inventory, evaluation, and management" (USDI 1979b). Wetlands are defined as:

> Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year (USDI 1979b).

Wetlands within the FPA include both riverine and palustrine open water, forested, scrub-shrub, and emergent habitat. The palustrine system includes all non-tidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens (USDI 1979b). Figure 4-6 illustrates the locations of wetland areas mapped by the U.S. Fish and Wildlife Service (USDI 1977a,b). Only one of these areas, a forested wetland (PF01: Palustrine, forested, broad leaved deciduous) located northeast of Cuyahoga Airport, may be affected by the proposed interceptor construction. A field survey of the proposed interceptor alignments confirmed that this undeveloped section of Highland Heights contains forested wetlands. The fragipan layer in the soils retains surface waters; thus, plant species tolerant of these wet conditions are found. The dominant tree species for this entire undeveloped area is the red maple, a facultative species found in both upland and wetland areas. The patches of wetlands are generally distinguished vegetatively from the upland area by sphagnum moss, cinnamon fern, rice cut grass, carex sedge, and water horehound. Other tree species observed throughout the general vicinity of the proposed interceptor alignment in Highland Heights include the tulip tree, pin oak, red ash, American beech, and shagbark hickory.

4.4.3 Wildlife

Approximately 180 species of birds have been identified from surveys (1969 through 1978) as possibly occurring in the Cleveland area; less than 40 of these are permanent resident species. A total of 27 of these species are legally hunted game species in Ohio (NEORSD 1978a).

Each spring and fall, millions of bird migrants of several hundred species pass through Ohio to and from their breeding grounds. A diversity of bird fauna has been observed near the FPA; however, no data have been collected from the Euclid Creek Reservation (Hinkle 1987). Resident species reported for the neighboring North Chagrin Reservation incude the red-tailed and red-shouldered hawks; ruffed grouse; barred owl; the pilleated, red-bellied, hairy, and downy woodpeckers; blue jay; American crow; black-capped chickadee; tufted titmouse; white-breasted nuthatch; northern cardinal; and song sparrow (Thomson 1983).

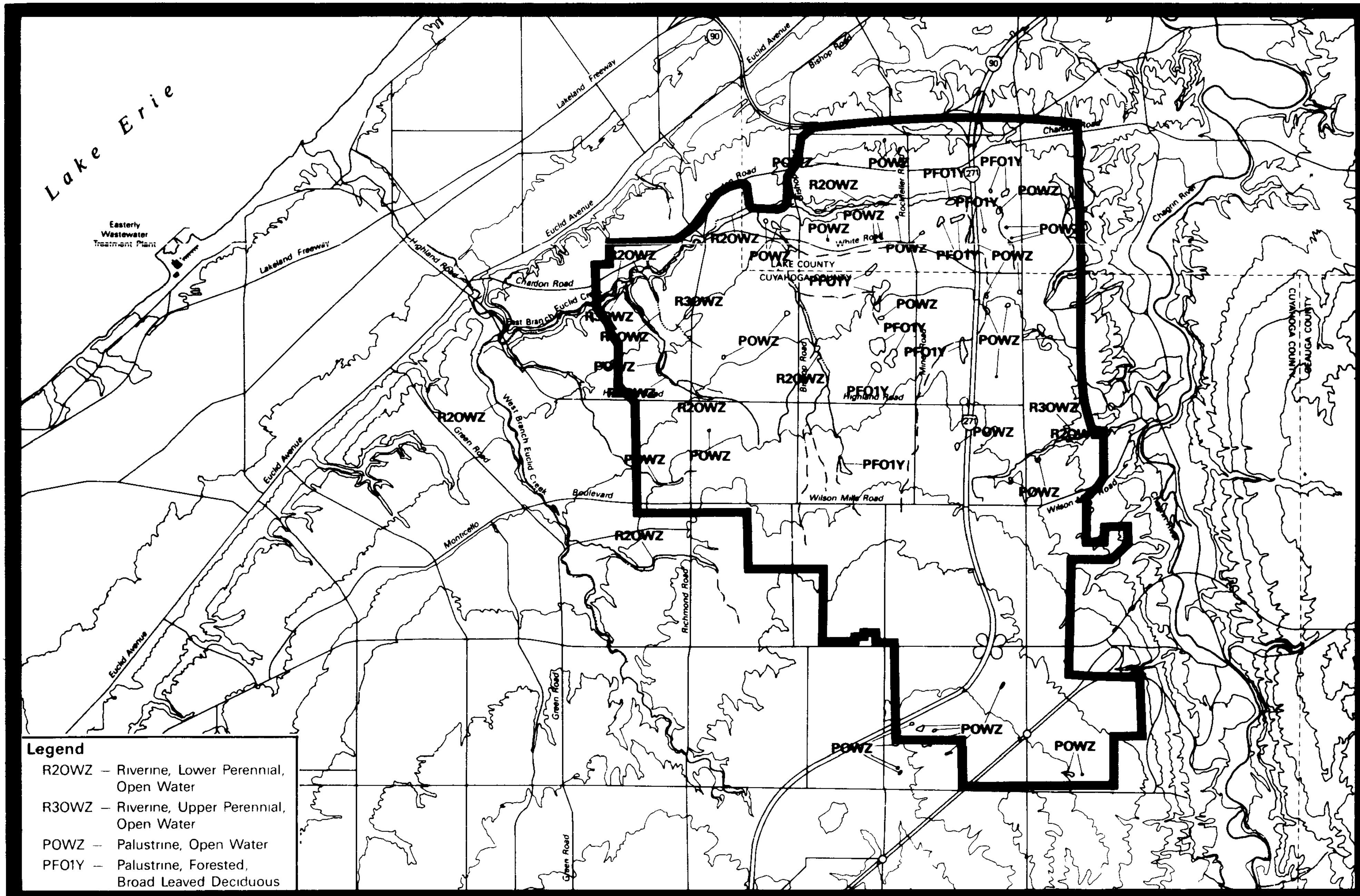


Figure 4-6. Wetlands in the Hilltop Facility Planning Area

Source: USDI 1977a, 1977b

Forty-five species of mammals are found in Cleveland and the surrounding area (composed of Lake, Cuyahoga, and Geauga Counties) (Gottschang 1981). These species are listed in Table 4-7. A list of 12 salamander, 11 frog and toad, and 13 reptile species of probable occurrence within the study area was compiled during the 1978 survey (NEORSD 1978a). Animals associated with terrestrial habitats along the cross-country segment of the proposed interceptor route were described in Havens and Emerson (1986) and are reviewed below.

In the old field habitat, birds regularly observed were flickers, robins, field sparrows, song sparrows, and juncos. During the late spring, black racer snakes will enter similar old fields to sun, and box turtles use these fields to nest. Woodchucks also feed in these types of fields, and voles will favor those areas where vegetation is matted (Havens and Emerson 1984).

The tangled understory of the brushland communities impedes the movement of large animals, creating a competitive advantage for small- and medium-sized animals. Cottontail rabbits were observed, and opossums and woodchucks were assumed to be present based on numerous burrow sightings and their known habitat preferences. The presence of foxes was ascertained by observation of tracks. Birds observed in brushland habitat include towhees, cardinals, dark-eyed juncos, and sparrows. Warblers may use the habitat for breeding in the summer. Other summer residents include at lease one species of lizard, several species of harmless snakes, and the box turtle (Havens and Emerson 1984).

The forested areas provide the greatest diversity of habitat for animals. Fallen limbs and trunks provide cover for several species of salamanders. Box turtles hibernate in ravines. Holes in tree trunks are used as nesting sites for owls, squirrels, and raccoons. Woodpeckers utilize the trunks for nesting and feeding. Songbirds present in the forest habitat include titmice, fly catchers, creepers, nuthatches, and thrushes (Havens and Emerson 1984).

Table 4-7. Mammals with Known Ranges in the Vicinity of Cleveland, Ohio

	Didelphis virginiana	Virginia Opossum
	Sorex cinereus	Masked Shrew
	Sorex fumeus	Smoky Shrew
(a)	*Blarina brevicauda*	Short-tailed Shrew
	Cryptotis parva	Feast Shrew
	Parascalops breweri	Hairy-tailed Mole
	Scalopus aquaticus	Eastern Mole
	Condylura cristata	Star-nosed Mole
(a)	*Myotis lucifugus*	Little Brown Bat
	Myotis keenii	Keen's Bat
	Myotis sodalis	Indiana Bat
	Lasionycteris noctivagans	Silver-haired Bat
	Pipistrellus subflavus	Georgian Bat
(a)	*Eptesicus fucus*	Big Brown Bat
	Lasiurus borealis	Red Bat
	Lasiurus cinereus	Hoary Bat
	Sylvilagus floridanus	Eastern Cottontail
	Jamias striatus	Eastern Chipmunk
	Marmota monax	Woodchuck
	Sciurus carolinensis	Gray Squirrel
	Sciurus nigli	Fox Squirrel
	Tamiasciurus hudsonicus	Red Squirrel
	Glaucomys volans	Southern Flying Squirrel
	Castor Canadensis	Beaver
(a)	*Peromyscus maniculatus*	Deer Mouse
(a)	*Peromyscus leucopus*	White-footed Mouse
(a)	*Microtus pennsylvanicus*	Meadow Vole
	Microtus pinetorum	Woodland Vole
	Ondatra zibethicus	Muskrat
	Synaptomys cooperi	Southern Bog Lemming
	Rattus norvegicus	Norway Rat
	Mus Musculus	House Mouse
	Zapus hudsonius	Meadow Jumping Mouse
(b)	*Napaeozapus insignis*	Woodland Jumping Mouse
	Canis latrans	Coyote
(a)	*Vulpes vulpes*	Red Fox
(a)	*Urocyon cenereoargenteus*	Gray Fox
(a)	*Procyon lotor*	Raccoon
(b)	*Mustela erminea*	Ermine
(a)	*Mustela nivalis*	Least Weasel
(a)	*Mustela frenata*	Long-tailed Weasel
(a)	*Mustela vison*	Mink
(b)	*Taxidea taxus*	Badger
(a)	*Mephitis mephitis*	Striped Skunk
	Odocoileus virginianus	White-tailed Deer

(a) indicates mammal is very common in the area
(b) indicates the mammal is at the edge of its range in the area

Source: Developed from Gottschang 1981

4.5 AQUATIC BIOTA

4.5.1 Fisheries

Benthos and fisheries data were collected on the east branch of Euclid Creek upstream of Highland Road Bridge, 1/2 mile south of Euclid Avenue and also 200 yards south of Euclid Avenue; results of this study were reported in 1964. Aside from macroinvertebrate data collected by Environmental Resource Associates Incorporated (ERAI) in June-July 1984 (ERAI 1984), 1964 data are the most recent collected. Benthic organisms found at the sampling locations included seven midge species, crane flies, snipe flies, black flies, mayflies, leeches, flatworms, and crayfish. The fish species collected were predominantly creek chubs, blacknose dace, stoneroller minnows, common shiners, and emerald shiners, with some whitesuckers, hogsuckers, green sunfish, and a few other minnow species. According to the 1974 Cleveland Department of Public Utilities report of this study, the east branch "supports a greater diversity of fish than any other stream in the area, although the fish diversity is not as great as that in either the east branch of Big Creek or the Chagrin River" (Popowski 1978). During the spring and fall, anadromous fish species such as salmon and steelhead trout ascend the creek, but there is no documented evidence of successful spawnings (Popowski 1979). This creek is presently not considered a good trout spawning stream by the U.S. Fish and Wildlife Service fishery biologists or by the Ohio Department of Natural Resources biologists.

The lower Chagrin River supports a healthy and prolific fish community. It is a popular fishing site for game and pan fish. The river supports the most popular salmonid fishery in Ohio (OEPA 1986d). Fishermen report taking brown trout, rainbow trout (steelhead), coho salmon, and chinook salmon at Daniels Park near State Route 84 (RM 5.0) (OEPA 1986d). Biological community degradation due to nonpoint source loading and siltation is lower in this segment than anywhere else in the basin, largely due to upstream dams that collect silt in dam pools (NOACA 1980). These pools have not been dredged in the recent past and may never have been dredged (Wysenski 1987).

In June and July of 1984, a benthic survey of macroinvertebrates in Euclid Creek and its smaller tributaries was conducted by ERAI to assess conditions of aquatic habitat in the Hilltop FPA. Seventeen sampling stations were selected from areas exposed to known pollution sources that would be eliminated by construction of the interceptor sewer (Havens and Emerson 1986). The stations were selected to represent segments known to be polluted, not to represent the system as a whole. Figure 4-7 shows station locations. Stations 1 through 4 and 6 through 12 are in the Hilltop FPA.

The raw data, index calculations, and descriptions of the physical characteristics of each site can be found in ERAI (1984). The results were further analyzed in Havens and Emerson (1986). The following discussion is a summary of their combined reports.

Benthic samples collected at each station were sorted and identified and the data then used to calculate diversity and biotic indices. Diversity was calculated using the Shannon-Weiner method, and biotic index calculations were based on Hilsenhoff (1977). The results of the calculations are shown in Table 4-8.

The Shannon-Weiner Index, which is very widely used, is scaled from 0 to 3. For purposes of this study, a value of 3 indicates unpolluted water and a value less than 1 indicates pollution. A moderately polluted stream, impacted only by nonpoint urban or suburban runoff, would have a diversity index of 2.5 (Havens and Emerson 1986).

To calculate the biotic index, each species was assigned a value from 0 to 5 based on pollution tolerance. Species that are highly intolerant of pollution were given a 0 and species capable of inhabiting extremely polluted waters were given a 5. These ratings were based on collections in streams of known water quality. Biotic index values were calculated from each sampling station by multiplying the assigned value for each species by the number of individuals of that species, summing the products and dividing by the total number of individuals (Havens and Emerson 1986). Water quality determinations were based on the following scale: less than 1.8 was considered unpolluted; 1.8 to 2.5, moderately enriched; 2.5 to 3.1, significantly enriched; greater than 3.8 was considered grossly enriched (Havens and Emerson 1986).

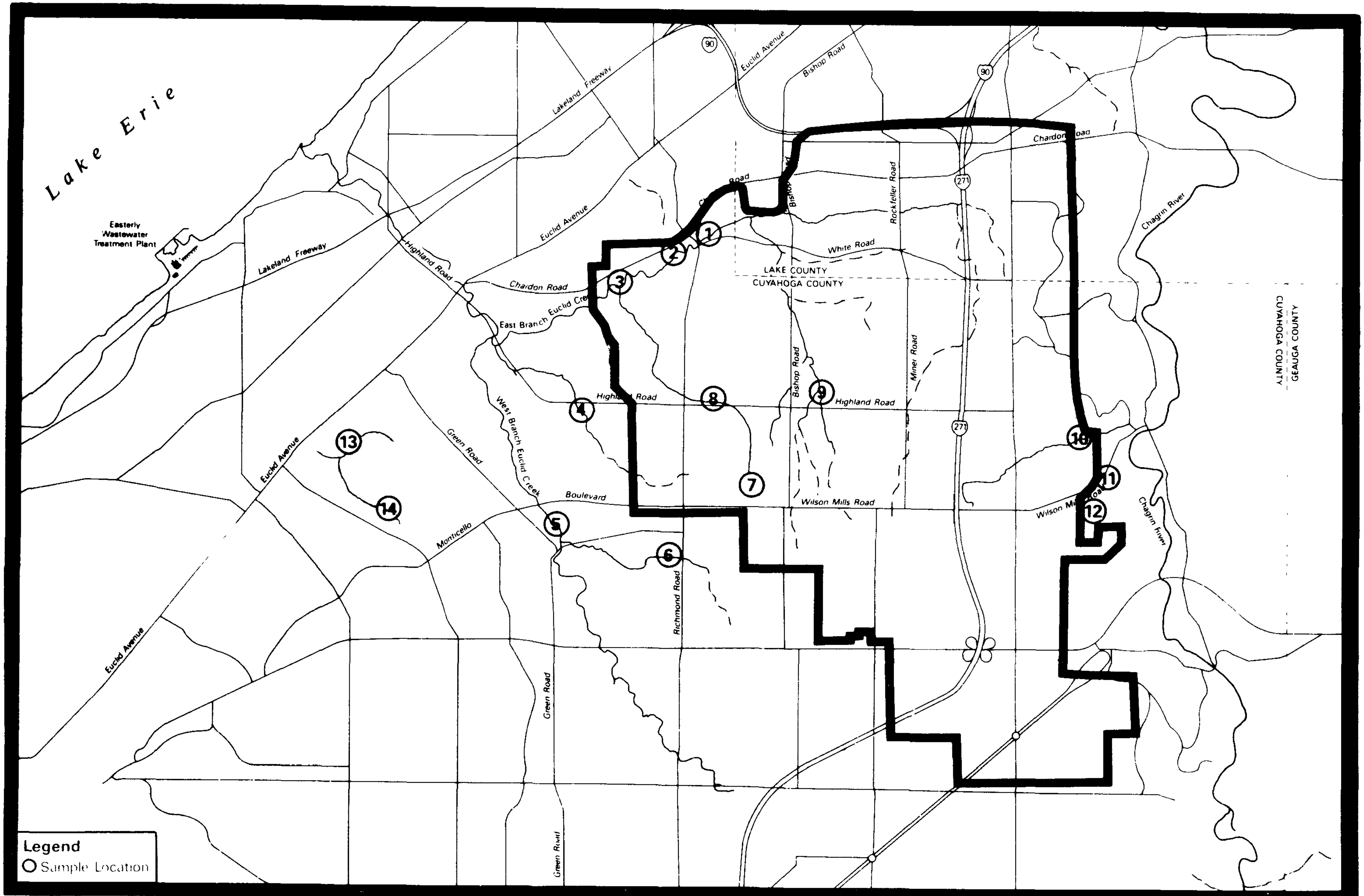


Figure 4-7. Locations of Benthic Survey Sampling Stations in the Hilltop Facility Planning Area

Source: ERAI 1984

Table 4-8. Species Diversities and Biotic Indices of Stream Benthic Communities, Heights-Hilltop District

Station Number	Species Diversity	Biotic Index
1	1.938	3.616
2	1.543	3.739
3	1.804	4.199*
4	.814	3.823*
5	.804	4.396*
6	.786	4.286*
7	.400	4.709*
8	1.287	3.768*
9	.642	3.850*
10	1.016	4.304*
11	.517	4.564*
12	.430	3.852*
13	1.438	4.713*
14	1.842	3.984*
15	1.431	3.845*
16	1.299	3.858*
17	1.614	3.572
Similar Clean Streams	>3.000	<1.750

*Categorized as grossly enriched according to Hilsenhoff (1977). All other sites are categorized as significantly enriched.

Source: ERAI 1984

All sampling locations showed low species diversity and high biotic index values, indicating poor water quality. The results indicated that the stations were dominated by a few pollution-tolerant species. Many of the organisms collected were decomposing or fungused. Oligochaetae and orthocladinae were the most common taxon, representing a total of 65 percent of the organisms collected. The oligochaetae are aquatic earthworms (also called sludgeworms) found in streams with high organic pollution. The orthocladinae are midge flies found in polluted water with low dissolved oxygen. Although benthic fauna found at all stations indicate severe to moderate stress from pollution, the substrates were varied and flows heavy enough to support some diversity of fauna. Macroinvertebrates that contributed to diversity were primarily mayflies, stoneflies, and caddisflies.

In addition to indices, the data were used to calculate percent of fauna at each station (Figure 4-8). The individuals were placed into one of five categories: oligochaetes (sludgeworms), chironomids (larval flies), isopods, amphipods (both aquatic crustaceans), and others. Organisms in the first four categories are pollution-tolerant and the fifth category represents species which are not pollution-tolerant. For comparison, the benthic community found in a stream with flow and substrate characteristics similar to Euclid Creek is included in the graph and labeled 'R'. Clearly, the Euclid Creek stations have a preponderance of pollution-tolerant species as compared with the reference station 'R'.

Sample Station 1, located upstream of the Richmond-White pumping station, has physical characteristics indicative of a moderately enriched condition. This area has primarily a bedrock substrate with limited stones. Benthic organims were abundant and diverse, although the plecoptera were conspicuously absent. The species diversity index at this site was the highest of all sites examined, and the biota index was the lowest of all sites, indicating that it was the least enriched stream segment sampled. It was the only station not situated closely downstream of a point source of pollution (ERAI 1984).

The physical characteristics of Sample Station 2, located 50 feet downstream of the Richmond-White pumping station, were essentially the same as Station 1. Sediments of gray, yellow, and black flocculant materials were

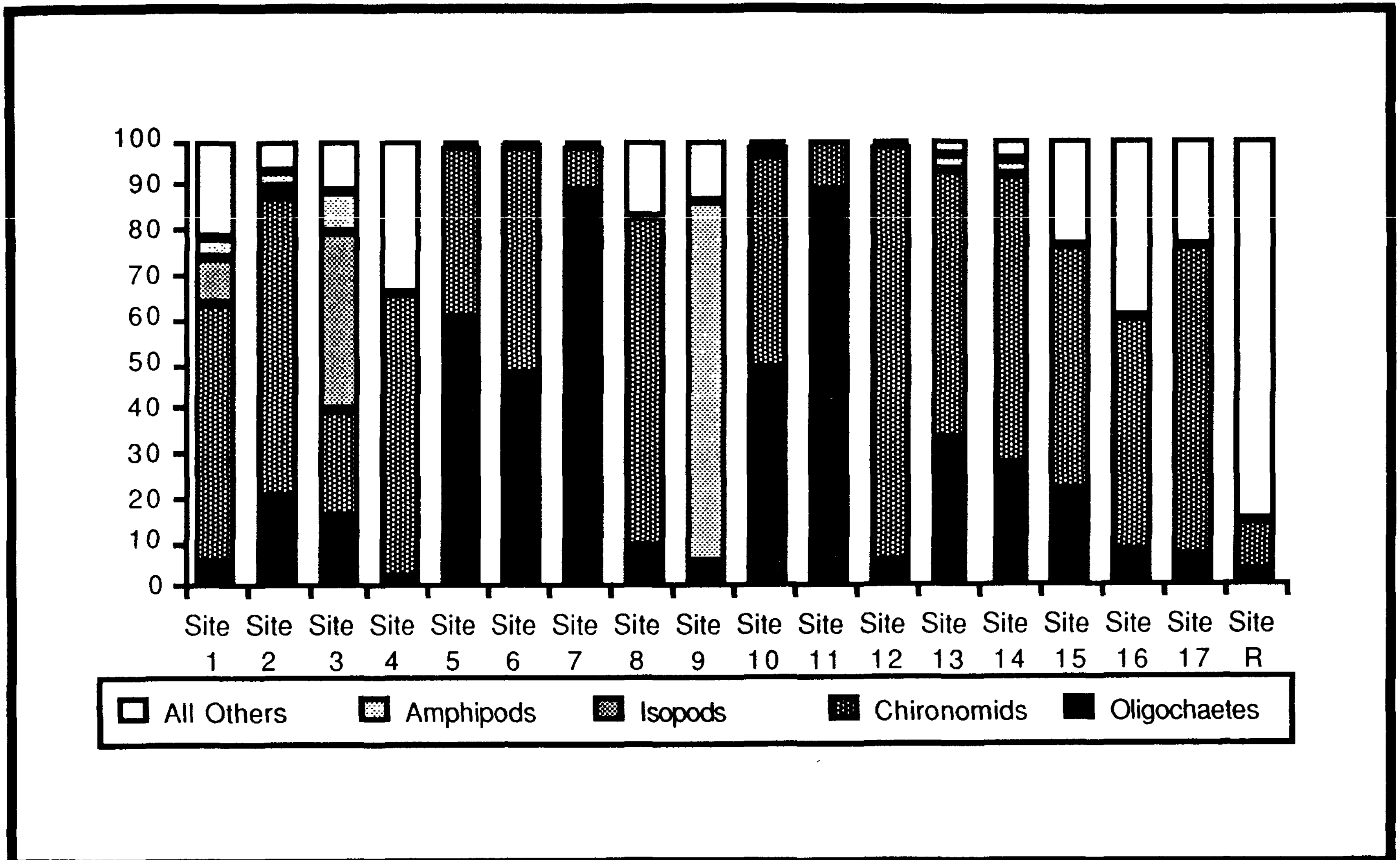


Figure 4-8. Percent of Fauna at Benthic Survey Sampling Stations in the Hilltop Facility Planning Area

Source: ERAI 1984

present due to the sewer overflow that enters the creek at this location. The diversity and abundance of benthic organisms was different than that of Station 1. Oligochaetes and chironamids were more dominant here than at Station 1, and additional species, which normally indicate septic conditions, were present. Although many forms of larvae were present, the more sensitive forms collected were dead at Station 2. These individuals may be carried downstream from the area above the pumping station, near Station 1. More than 60 percent of the mayfly nymphs were decomposed and fungused. Compared to Station 1, conductivity increased at Station 2 by nearly 40 percent, and dissolved oxygen was reduced by nearly 20 percent. The cause of this stream degradation is the result of a sanitary sewer overflow under the Richmond Road bridge (ERAI 1984).

Sample Station 3, located downstream of the Scottish Highlands WWTP, had a species diversity similar to Station 1. However, the biotic index increased, indicating a relatively poorer benthic community. Water from upstream of this station flows over a steep bank into a valley. The substrate at this station was a combination of silted sands mixed with organic material, as opposed to the bedrock substrate at Stations 1 and 2 (ERAI 1984).

Sample Station 4, located downstream of the Richmond Mall pump station overflow, contained similar habitat to Stations 1, 2, and 3. No septic sediments were evident and the water color was clear, but oil slicks appeared when the sediments were stirred. The percentage of benthic organisms (i.e., oligochaetes, orthocladinae) that are associated with septic conditions was lower than at most other sites examined and the percentage of pollution-intolerant species was higher than at most other stations. However, the diversity index was extremely low. ERAI (1984) suggested that a nonorganic (sewage) pollution source may be present, perhaps a heavy metal or pesticide. Havens and Emerson (1984) also suggest nonpoint source runoff and an undefined conductivity source may be causing aquatic degradation at this site.

Sample Station 5, located at the intersection of Green Road and Anderson Road, is inundated by continuous dry weather wastewater overflows which have been identified in the 1983 Easterly Separate Sewer Area Summary Report. This station had similar physical conditions to Station 1, with the addition of small areas of stone, sediments, coarse sand, and leaves. Algae beds covered the bottom of the stream in some areas, and the sediments were highly septic and black. Small numbers of fish were present; some were fungused; and others were dead. This station had a low diversity and a high biotic index, indicating severe pollutant loading (ERAI 1984). The percent of intolerant fauna was extremely low.

Sample Station 6, located at Richmond Road at Ridgebury Road, was similar to habitat at Station 3, except that it was more heavily canopied. An outfall entered the creek just upstream of the sampling location. Both indices and percent fauna indicate grossly enriched water conditions.

Sample Station 7, located downstream of Wilson Mills Road pump station, was very septic, with raw sewage visible. Strong septic and chlorine odors were also apparent. The sewage and heavy chlorination have destroyed nearly all forms of aquatic life, with the exception of a few sludgeworms and chironomids. The percentage of oligochaetes was one of the highest recorded at any station (ERAI 1984).

Sample Station 8, located downstream of the Franklin Radford pumping station, consisted of shallow riffles with a pool at the base of a small rock ledge. Algae was present in pools. An odor of a septic nature was also evident. Both indices and percent of fauna indicate that this station was organically enriched, but it showed improvement over Station 7 which is located upstream in the same tributary. The stream was 2 to 4 feet wider at Station 8 than at Station 7 (ERAI 1984).

Sample Station 9, located downstream of the Williamsburg pumping station, was physically similar to Stations 7 and 8. The stream is 1.5 to 4 feet wide and composed of bedrock and stones with only slight flow. The streambed was silted. The physical characteristics of this segment prevent accumulation of septic sediments. The lack of oligochaetes reflects this. The fauna at this station was predominantly composed of amphipods. Both indices point to enriched conditions (ERAI 1984).

Sample Stations 10, 11, and 12 are located on tributaries of the Chagrin River. Station 10, located below the Mount Vernon pumping station, was characterized by bedrock and a high gradient. Conditions were so poor that oligochaetes were dominant on the bare concrete, living among the strands of algae. More than 99 percent of the fauna was composed of oligochaetes and a tolerant form of the orthocladinae (Cricotopus sp.) (ERAI 1984).

Sample Station 11, located below Wilson Mills pump station, was completely canopied and cool, with substrates of sand, leaf litter, and stones and slight natural flow. Collections indicate that the sediments were contaminated with organic pollutants. Benthic diversity was low, and the faunal quality was very poor.

Sample Station 12, located below the Bonnieview facility, was physically similar to Station 1. No septic areas were present. The substrates were clean, and the habitat relatively diverse; however, the fauna was very depressed. The low diversity index indicates that the fauna may be affected by a pollutant such as chlorine or a toxic material (ERAI 1984).

Stations 13 through 17 were located outside the Hilltop FPA. All of these stations were affected by an overloaded sewer system and nonpoint loadings, which is reflected in the diversity and biotic indices. The sewer system overflows are numerous and contribute a significant portion to dry weather flows in the streams (Havens and Emerson 1984).

Overall, the benthic study indicates that a lack of clean-water aquatic fauna in the sampled streams can be attributed, in part, to sewer overflows, package plant discharges, and pumping station overflows. Some evidence suggests that nonpoint sources (including septic tank leachate) or toxic components may be degrading fauna (Havens and Emerson 1984). Control of pollution sources is necessary to achieve stable aquatic populations. Other mitigative measures could include minimizing erosion from construction sites and preserving ground cover and protective tree and bush canopies along streambanks (Havens and Emerson 1984).

4.5.2 Euclid Creek: General Habitat and Fisheries

From Lake Erie south to Euclid Avenue, Euclid Creek passes through a highly developed residential, commercial, and industrial area. Upstream of Euclid Avenue, the creek passes through predominately open and unused land, and the quality of the water is consequently better. The west branch is entirely within the Euclid Creek Reservation of the Cleveland Metropark system from Euclid Avenue south to Anderson Road. Benthic Sampling Station 5 is located at the southern tip of the reservation near the intersection of Green and Anderson Roads (Figure 4-7). Water quality is poor and the site is inundated by continuous dry weather flows (Havens and Emerson 1984). It is not possible to determine how far downstream negative impacts from overflows persist, based on the nature of the sampling. From Anderson Road to Mayfield Road, the area is heavily developed for residential and commercial use (OEPA 1985a). In this region, the creek receives several sources of sanitary sewage from overflows (refer to Chapter 2 for details). Benthic Sampling Station 6 is located in this area (Figure 4-7), and like Station 5 is continuously inundated by dry weather sewage overflows. The water quality at the site is severely degraded due to the overflows (Havens and Emerson 1984). Station 6 is situated on a tributary to the western branch of Euclid Creek, and it is not known how much of the tributary is degraded from these overflows. South of Mayfield Road, the creek originates and passes through an open area utilized primarily by several country clubs. The reach of the west branch within the park system passes through a heavily wooded valley with steep sides.

Throughout the watershed of the east branch of Euclid Creek, there are few industrial or commercial operations, but numerous residential developments, particularly in Richmond Heights. As a result of the light development east of Richmond Road, the stream receives insignificant amounts of urban runoff, except at Richmond Road where several major highways merge. There are, however, discharges to the stream from several small package wastewater treatment plants and numerous septic tanks.

Benthic Sampling Stations 1, 2, 3, 7, 8, and 9 are located on the Euclid Creek's east branch itself or on streams that drain into its east branch

(Figure 4-7). Stations 3, 7, and 8 are located on the same tributary, with Station 7 being the furthest upstream, 3 the furthest downstream, and 8 located between. Species diversity improves with distance downstream. The biotic index is highest at Station 7 where diversity is lowest, making it the station with the poorest water quality on the tributary. The biotic index decreased at Station 8 indicating improved faunal characteristics along with improved species diversity. The biotic index increased from Station 8 to 3 indicating overall degradation of fauna and increased nutrient enrichment. Diversity, however, increased from Station 8 to 3.

The east branch of Euclid Creek receives discharges from a small municipal package WWTP, Scottish Highlands, located approximately 2 miles upstream of its confluence with the west branch. Benthic Sampling Station 3 is located just downstream of this plant. The overstory in the area is a mature oak-hickory forest with sparse undergrowth; most of the stream length is heavily shaded. The amount of vegetation present represents ideal habitat for the arboreal forms of aquatic insects and other fauna. The stream substrate is composed of mostly sandstone and conglomerate rubble of varying size and composition. The shale bedrock is exposed in a few sections. The pools in this reach are normally shallow, usually not over 30 inches deep, although there are several deeper pools further upstream. The substrate of the pools is composed of fine gravel, clayey silt, and sand. There is very little organic litter in the stream. The fish in the area are predominantly creek chubs, blacknose dace, stoneroller minnows, common shiners, and emerald shiners, although white suckers, logsuckers, and green sunfish also have been caught.

The main stream of Euclid Creek, located downstream of the confluence of the east and west branches, is within a little-used portion of the Euclid Creek Reservation. East of the creek is an area of mowed grassland with only a narrow strip of trees (i.e., small locusts, cherry, and beech) between the grassland and the creek. The area on the west bank of the creek is densely wooded with beech, oak, maple, cherry, walnut, and locust. These trees hang out over the stream, providing a heavily filtered shade to the creek.

The substrate in this reach is about 50 percent exposed shale bedrock. The extensive riffle areas are composed of shale, sandstone, limestone, and conglomerate (small cobbles to boulders). Underlying the stones in the riffles is a layer of fine and coarse gravel impregnated with clayey silt. The three pools in this area are wide and up to 4 feet deep, with a substrate of fine gravel, silt, and sand. There is almost no organic litter present in this reach. The fish species in this reach are the same as for the upstream segment, although not nearly as numerous. Benthic Sampling Station 4 is located on this branch of Euclid Creek, just downstream of the Richmond Mall pumping station. However, nonpoint source runoff appears to have created degradation more than overflows from the pumping station.

4.5.3 Nearshore Lake Erie

Several large-scale studies have been completed describing aquatic life in the vicinity of the Cleveland Harbor and the Easterly WWTP. The Lake Erie Intensive Study (1978-1979) covered the entire lake and distinguished near-shore areas but did not specifically characterize the nearshore area in the vicinity of the Easterly WWTP (SAIC 1986).

Overall, the baseline assessment concluded that the species composition in the nearshore areas of Lake Erie adjacent to Cleveland has changed from highly valuable food species and clean water forms (such as muskellunge, walleye, lake trout, silver chub, and burbot) to a predominance of rough fish with low food value (such as goldfish, carp, gizzard shad, yellow perch, and drum). The species have changed, since former times, from large fish-eating species to herbivores and bottom-feeding fish. The fish species most severely affected by human settlement, land development, and pollution in the region are those that formerly spawned in the upper river drainages, entering from Lake Erie in the spring. The former spawning grounds have been drained, silted up, blocked off by dams, or obstructed by stretches of highly polluted waters in the lower rivers, so that seasonal migration from the lake to the upper rivers no longer occurs (SAIC 1986).

4.6 ENDANGERED/THREATENED SPECIES

Plans for construction of interceptor sewers must be evaluated to determine potential adverse impacts on endangered or threatened species of plants and animals. These impacts could be direct if habitat is destroyed during construction, or indirect if noise and runoff associated with new development along the interceptor route displaces sensitive animals. The primary objective of this section is to identify all Federal and State threatened, endangered, or rare species potentially present in the FPA and, if possible, to list the habitat requirements and migratory behavior that may be affected by the interceptor construction.

The Natural Heritage Program reports that there have been no observed State-endangered species within the FPA, although the program notes that this lack of records is not a statement that special plant or animal species are absent from the area (Jones 1986).

4.6.1 Plants

No Federal- or State-endangered plant species have been sighted in the FPA; however, some State-listed threatened and potentially threatened species have been seen in the area. Threatened and potentially threatened species are listed in Table 4-9. None of these specimens are located in areas where they could be harmed by interceptor construction.

4.6.2 Birds and Mammals

Four Federally endangered species may be present within the FPA. These species are the Indiana bat (*Myotis sodalis*), the bald eagle (*Haliaeetus leucocephalus*), the peregrin falcon (*Falco pergrinus*), and Kirtland's warbler (*Dendroica Kirtlandii*). Of these species only the bald eagle is known to nest in Ohio (Multerer 1986a).

The Indiana bat may be found within the FPA (Multerer 1986a). The Indiana bat winters in caves and is found along streams and adjacent woodlots during summer. This bat has been found to use loose bark of a dead tree for the nursery roost, but sometimes the bats temporarily move to bark crevices of a living shagbark hickory (Humphrey et al. nd). Foraging habitat includes the foliage of riparian and floodplain trees.

Table 4-9. List of Endangered, Threatened, and Potentially Threatened Species Reported in or Near the Hilltop, Ohio, Facility Planning Area

Scientific Name, Common Name	State Status
Plants	
Ammophila breviligulata, American Beach Grass	P
Betula populifolia, Gray Birch	P
Cakile edentula, Inland Sea-rocket	P
Carex folliculata, Long Sedge	P
Carex scabrata, Rough Sedge	P
Comptonia peregrina, Sweet-fern	T
Epilobium strictum, Simple Willo-herb	T
Euphorbia polygonifolia, Seaside Spurge	P
Gentiana crinita, Fringed Gentian	P
Juncus balticus, Baltic Rush	P
Leptoloma cognatum, Fall Witch-grass	P
Lonicera canadensis, Canada Fly-honeysuckle	P
Trientalis borealis, Star-flower	P
Triplasis purpurea, Purple Sand-grass	P
Fish	
Esox masquinongy masquinongy, Great Lakes Muskellunge	OWE
Hybopsis amblops, Bigeye Chub	P
Ichthyomyzon unicuspis, Silver Lamprey	OWE
Lampetra appendix, American Brook Lamprey	OWE
Notropis emiliae, Pugnose Minnow	OWE
Rhinichthys cataractae, Longnose Dace	T

Status Codes

Animals: OWE = State Endangered
T = Threatened (not a legal designation)
P = Potentially Threatened (not a legal designation)

Plants: T = State Threatened
P = Potentially Threatened (not a legal designation)

Source: Jones 1986

4.6.3 Fish

No Federally listed endangered fish species are expected to occur within the FPA (Multerer 1986a). Four State-endangered species have been reported in the Chagrin River. While the river itself is not part of the FPA, some of its tributaries lie within the FPA boundaries. Discharges to these tributaries could affect fauna in the Chagrin. The Great Lakes muskellunge (Esox masquinongy masquinongy) was collected at the mouth of the Chagrin River. The pugnose minnow (Notropis emiliae) was also collected in the Chagrin River, just downstream of a sewage treatment plant which is closest to the river's mouth on the west bank. The silver lamprey (Lampetra appendix) was found further upstream in the Chagrin River at Willoughby and the Route 90 bridge crossing. The State-threatened longnose dace (Rhinichthys cataractae) has been collected from the mouth of the Chagrin River upsream to the Waite Hill Road bridge (Jones 1986).

4.7 DEMOGRAPHICS

Cleveland is the central city nearest to the Hilltop FPA. It provides the economic base for this community through jobs, educational facilities, and cultural resources. Standard demographic indicators used to compare local and regional trends include (1) population growth rates based on historic trends and accepted projections; (2) the number and type of existing and projected housing units; and (3) the age distribution of the existing population. These indicators are used below to compare growth potential and economic opportunities in each of the Hilltop FPA jurisdictions with the State of Ohio and the overall Cleveland Metropolitan Statistical Area (MSA).

4.7.1 Regional Population Trends

The Cleveland MSA includes four counties: Cuyahoga, Geauga, Lake, and Medina. The city of Cleveland is located in Cuyahoga County. In the period between 1980 and 1985, the population in this county dropped by over 43,000 individuals while the population in the surrounding three counties increased by 9,000 individuals. This difference is due to urban decline and suburban expansion (USDC 1970a, 1970b, 1980a, 1980b). According to the Ohio Data User's Center (ODUC), this trend is expected to continue through 2005 (State of Ohio 1985). This trend is displayed in Table 4-10 which shows regional population projections from 1980 to 2005. ODUC's 1985 population projections

Table 4-10. ODUC Population Projections, 1980-2005

	1980	1985	1990	1995	2000	2005	% Change 1980-2005
Cuyahoga	1,498,400	1,454,957	1,415,334	1,375,308	1,332,991	1,291,377	-13.8
Geauga	74,474	74,877	75,435	76,206	77,099	78,525	5.4
Lake	212,801	216,200	220,036	223,446	226,021	228,646	7.4
Medina	113,150	116,439	119,796	123,211	126,144	128,847	13.9
Cleveland MSA*	1,898,825	1,862,473	1,830,601	1,798,171	1,762,255	1,727,395	-9.0
Ohio	10,797,630	10,743,944	10,681,863	10,616,895	10,533,083	10,453,552	-3.2

*The Cleveland Metropolitan Statistical Area (MSA) includes Cuyahoga, Geauga, Lake, and Medina Counties

Source: State of Ohio 1985

were used for county-wide population estimates because these are the most recent certified estimates.

ODUC is a division of the Ohio State Department of Economic Development; it prepares official State government population projections for Ohio. These projections are based on the 1980 U.S. Census, the 1984 Ohio State Census Update, and historic trends for migration, births, and deaths. These projections are prepared on the county and State level. As Table 4-10 indicates, ODUC projects a continued loss in population in Cuyahoga County through 2005. By 2005, this county is expected to lose over 200,000 individuals, representing a 13 percent loss in the 25-year period (State of Ohio 1985). Ohio is also expected to lose 350,000 individuals during this span of time. This means that Cuyahoga County will contribute two-thirds of the anticipated loss in population projected for the State. Because Geauga, Lake, and Medina Counties are all expected to experience an increase in population, the overall decline for the region will be slightly more than 100,000 individuals, resulting in a 25-year regional loss of 9 percent (State of Ohio 1985).

4.7.2 Hilltop Facility Planning Area Population Projections

This section discusses population projections for the Hilltop FPA. It also includes a comparison of basic demographic characteristics such as age distribution, existing housing stock, household size, and vacancy rates. Where appropriate, regional and national comparisons are included. The population projections used in this Environmental Impact Statement were prepared by the Northeast Ohio Area Coordinating Agency (NOACA) and certified by ODUC. These projections are presented in Table 4-11.

The Hilltop FPA is located in the northeastern section of Cuyahoga County, housing approximately 2 percent of the county population including portions of six cities and villages (USDC 1970a, 1970b, 1980a, 1980b). The FPA includes all of Highland Heights and Mayfield Village, most of Richmond Heights, and approximately half of the population and land area of Gates Mills, Mayfield Heights, and Willoughby Hills (NEORSD 1978a). The proportional distribution of persons in the FPA is shown in Table 4-11. These projections show a population increase of 7 percent in the Hilltop FPA between 1980 and 2005. This represents an annual increase of 0.3 percent. Highland

Table 4-11. Population Projections: Hilltop Facility Planning Area (FPA), 1980-2005

City/Village	Percent of Total Pop. in the FPA	Total 1980 Pop	1985 Proj	1990 Proj	1995 Proj	2000 Proj	2005 Proj	Percent Change 80-05	Average Annual Growth Rate
Gates Mills	44	983	944	971	1000	1027	1031	4.9	0.2
Highland Heights	100	5739	5700	6064	6450	6817	7032	22.5	1
Mayfield Village	100	3577	3189	3026	2914	2793	2653	-25.8	-1
Mayfield Heights	59	12650	11695	11501	11389	11244	10873	-14	-1
Richmond Heights	83	8400	8442	9080	9769	10429	10874	29.5	1.2
Willoughby Hills	42	3654	3946	4243	4540	4780	4996	36.7	1.5
TOTAL	-	35003	33916	34885	36062	37090	37459	-	-

Source: Prepared by Havens and Emerson for NEORSD (1984b) using NOACA (1984).

Heights, Richmond Heights, and Willoughby Hills are all projected to have strong growth rates with average annual growth in these communities approaching or exceeding 1 percent during the 25-year period.

Growth in Gates Mills is projected to be weak. The 25-year growth rate for this community is shown as less than 5 percent. Mayfield Village and Mayfield Heights are projected to lose population during this period. Mayfield Village is estimated to lose approximately 1,000 individuals or 27 percent of its population. Mayfield Heights will lose close to 2000 individuals under these forecasts or 16 percent of its 1980 population (NOACA 1984).

Population increases forecast for Gates Mills, Highland Heights, and Willoughby Hills are outpaced by the increase in the projected number of households in each community. These increases range from 40.3 to 63.7 percent (NOACA 1984). Table 4-12 lists projected households for each of the jurisdictions located in the Hilltop FPA. This table also indicates that household sizes in each community should decrease, following the national trend. This is due to generally decreasing family sizes and an increasing number of single heads of households. FPA household sizes are projected to decrease from 2.96 persons per household in 1980 to 2.11 persons per household in 2008 for Gates Mills, 3.19 to 2.51 in Highland Heights, 2.44 to 2.0 in Richmond Heights, and 2.23 to 2.0 for Willoughby Hills. The forecast increase in dwelling units in Mayfield Village and Mayfield Heights is dependent on vacant land available for residential development. Housing unit and population projections are constrained by the limited amount of vacant land zoned for residential development in these communities. Unlike the State and national age distribution, which displays a normal bell curve where most of the population is between the ages of 25 and 45, the Hilltop FPA is an inverted bell with most of its population either under the age of 19 or over the age of 45. This age distribution can be seen in Table 4-13, a demographic profile of the Hilltop Facility Planning Area. This table also shows that residents of the area are well educated, with a relatively high median household income. They generally own their own homes and most live in established neighborhoods. Since the population is aging, many of these residents will require smaller dwelling units in the future.

Table 4-12. Hilltop Facility Planning Area Housing Units (HU) and Persons Per Household (PPHH)

City/Village	1980		1988		1998		2008		Percent Change	Average Annual Growth Rate
	HU	PPH	HU	PPH	HU	PPH	HU	PPH		
Gates Mills	789	2.96	949	2.39	1092	2.11	1107	2.11	40.3	1.4
Highland Heights	1794	3.19	2214	2.78	2260	2.51	2831	2.51	58.4	2.1
Mayfield	1337	2.74	1337	2.39	1337	2.15	1337	1.69	0	0
Mayfield Heights	9635	2.22	10290	2.0	10290	2.0	10290	1.92	0	0
Richmond Heights	4298	2.44	5540	2.0	6170	2.0	6800	2.0	63.7	2.3
Willoughby Hills	3989	2.23	4820	2.0	5450	2.0	6080	2.0	59.3	2.1

Source: USDC 1970a, 1970b, 1980a, 1980b, and SAIC projections.

Table 4-13. Demographic Characteristics of Local Jurisdictions in the Hilltop Facility Planning Area

	Gates Mills	Highland Heights	Mayfield	Mayfield Heights	Richmond Heights	Willoughby Hills*
Age Distribution (%)						
Under 19	27.8	29.1	24.4	20.2	23.0	20.2
20-24	5.4	7.9	6.7	7.9	10.0	12.6
25-34	9.6	9.2	8.7	13.7	17.3	20.2
35-44	11	11.4	11.2	9.5	11.3	11.9
45-64	33.1	31.8	33.3	26	26.9	25.1
65+	13	10.5	15.5	22.7	11.5	10
Percent of Pop. 25 and Over with a High School Education	91	79.9	79.9	70.2	75.1	81.8
Median Household Income	$38,401	$26,206	$33,097	$17,723	$21,886	$21,641
Average Household Size	2.96	3.19	2.74	2.22	2.44	2.23
Age of Housing Stock						
Percent Built 1979-1970	13.8	12.3	19.2	22	23.9	48.2
1969-1960	25.6	41	39.7	39	43.3	23.1
1959-1950	20.1	32.4	24.4	22.6	27.7	14.1
Prior to 1950	40.6	14.3	16.7	16.1	5	14.6
Housing Type						
Percent Single-Family	96.3	99.3	78.5	50	60	41.9
Percent Multi-Family	3.7	0.7	21.5	50	40	58.1
Vacancy Rate	2	0.2	1.6	0.4	2.7	0.9
Percent Owner-Occupied	90	96.4	76.2	50	59.3	41
Median Asking Price of Single-Family Units	$200,000+	$80,000	$125,000	$65,000	$81,000	

*Willoughby Hills includes Census Tracts 2010 and 2011

Source: USDC 1970a, 1970b, 1980a, 1980b

With the exception of Gates Mills, housing stock in the Hilltop FPA is fairly new, with the majority of the housing built since 1960. Willoughby Hills has the newest stock with 48.2 percent built after 1970. The housing mix in the Hilltop FPA ranges from mostly single family units in Gates Mills and Highland Heights to half multi-family in Willoughby Hills. This corresponds directly to housing ownership in that multi-family units are located in areas where the number of owner-occupied units is low. In communities that are predominated by single family units, home ownership is high. All of the Hilltop FPA communities have relatively low vacancy rates, reflecting a strong housing market (USDC 1970a, 1970b, 1980a, 1980b).

4.8 ECONOMICS AND LOCAL GOVERNMENT FINANCE

4.8.1 Local Economic Characteristics

The Hilltop FPA has a strong economic outlook. Both residential and commercial/industrial development are planned for the area. The demand for housing, retail, and office space is high. Although the recession of 1982 forced the closing of some local industries, a number of new businesses have opened in the region including the Harshaw-Filtrol Partnership (200 to 300 employees) and Harcourt-Brace-Johanovich (120 employees) (GCGA, n.d.).

Some of the largest employers in the Hilltop area include:

Hillcrest Hospital	1200 employees
Allen-Bradley	1100 employees
Richmond Heights General Hospital	600 employees
Country Corner	300 employees
Park View Federal Savings & Loan	200 employees
Mayfield High School	150 employees
Stanley Air Tools	150 employees.

Employment data for the Hilltop FPA indicates that the job mixture in the area shifted from the manufacturing sector to the service sector from 1970 to 1980. In 1970, 51 percent of the FPA labor force was employed in manufacturing compared to 24 percent in 1980. Conversely, the service sector share of employment increased from 49 percent in 1970 to 76 percent in 1980. This turnaround in employment type occurred in all six Hilltop FPA communities. Table 4-14 lists the labor force distribution in the Hilltop FPA. As this table indicates, the labor force in the FPA is more service-oriented than the

Table 4-14. 1980 Employment Comparisons for the Cleveland Area and Local Jurisdictions in the Hilltop Facility Planning Area (FPA)

	Total Labor Force	Percent Pop. In Labor Force	Manufacturing Employment	Percent Manufacturing	Service Employment	Percent Service	Unemployment Rate (Percent)
Gates Mills	1006	45	132	13.1	874	86.9	3.3
Highland Heights	2731	47.6	672	24.6	2059	75.4	5.5
Mayfield	1780	49.8	309	17.4	1471	82.6	2.0
Mayfield Heights	10795	50.1	2699	25.0	8096	75	4.0
Richmond Heights	5375	43.2	1332	24.8	4043	75.2	4.4
Willoughby Hills	5022	58.3	1272	25.3	3750	74.7	3.6
TOTAL FPA	26709	51.6	6416	24	20293	76	
Cuyahoga County	658834	60.9	204968	31.1	453866	58.9	7.1
Lake County	101500	67.9	37201	36.7	64299	53.3	5.2
Cleveland MSA*	843748	62.2	273547	32.4	570201	57.6	6.8

* Metropolitan Statistical Area (includes Cuyahoga, Geauga, Lake, and Medina Counties)
Note: Total Labor Force Includes those Employees 16 years of Age and Over
Source: USDC 1970a, 1970b, 1980a, 1980b; Bureau of Economic Analysis 1986.

four-county Cleveland Metropolitan Statistical Area (MSA) which had 58 percent of the labor force in the service sector. Unemployment rates in the FPA are lower than the rate for the SMSA in 1980 (USDC 1970a, 1970b, 1980a, 1980b). Due to the proximity of the Hilltop area to downtown Cleveland, many of the area's residents work outside of the FPA.

Table 4-15 lists the income characteristics for the communities located in the Hilltop FPA. Each of these six communities had per capita incomes higher than the Nation, Ohio, or the four-county Cleveland MSA in 1979. The 1984 estimates continue this trend. Gates Mills has the highest per capita and household incomes while Mayfield Heights has the lowest per capita and median household incomes in the Hilltop FPA (USDC 1980a, 1980b; Bureau of Economic Analysis 1986).

Between 1969 and 1979, the unemployment rates for the Cleveland region closely followed trends in Ohio and the United States. By 1980, however, the unemployment rate in the region had risen from 5.8 percent to 9.3 percent, compared to an 8.4 percent rate for Ohio and a 7 percent rate for the Nation. This rise in regional unemployment was due to the drop in manufacturing-related jobs and the general decline of the northeastern region of the U.S. compared to the sunbelt region. Comparisons of 1970 and 1980 unemployment figures indicate that the Hilltop FPA had a substantially lower unemployment rate than both Cuyahoga and Lake Counties. Of all the FPA communities, Highland Heights had the highest unemployment rate. This rate was 5.5 percent in 1980, considerably less than the regional rate, indicating that the FPA has a stable economy that is more resilient than the rest of the Cleveland region (USDC 1970a, 1970b, 1980a, 1980b).

4.8.2 Local Government Finances

Local governments in the Hilltop FPA raise most of their operating revenues from three sources: (1) local property taxes, (2) local income taxes, and (3) shared revenues through State tax transfers. Table 4-16 lists revenue distribution for each of the six municipalities in the Hilltop FPA (Ferguson 1985). Local property taxes are also used to finance county, township, and school district operations. Any increase in these local taxes or in State taxes will affect the taxpayers' ability to pay the costs of providing new wastewater facilities in the FPA. Most of the local cost of proposed

Table 4-15. Median Income, Per Capita Income, and Poverty Rates in the Hilltop Facility Planning Area

	SMSA	Cuyahoga County	Lake County	Gates Mills	Highland Heights	Mayfield	Mayfield Heights	Richmond Heights	Willoughby Hills
Median Household Income									
1979	$19,095	$18,009	$22,369	$38,401	$26,206	$33,097	$17,723	$21,886	$21,641
1984 Estimated	-	$25,753	$31,988	$54,913	$37,475	$47,329	$25,344	$31,297	$30,947
Per Capita Income									
1979	$8,130	$8,099	$8,263	$19,897	$9,312	$13,493	$9,004	$10,339	$11,377
1984 Estimated	-	$14,408	$13,550	$28,453	$13,316	$19,295	$12,876	$14,785	$16,269
Percent Below Poverty Level									
1969	6.9%	7.4%	3.4%	1.4%	1.5%	3.6%	2.1%	1.5%	2.5%
1979	7.9%	9.1%	3.1%	1.2%	N/A	0.8%	3.2%	3.0%	N/A

[a] Includes families and unrelated individuals

[b] Median household income

Source: USDC 1970a, 1970b, 1980a, 1980b

Table 4-16. Summary of the 1984 Operating Budget for Each Municipality in the Hilltop Facility Planning Area

	Gates Mills	Highland Heights	Mayfield Village	Mayfield Heights	Richmond Heights	Willoughby Hills
Revenues						
Property Taxes	474,401	541,500	460,953	1,858,959	973,307	564,622
Percent of Total	28	13	20	29	32	23
Income Taxes	351,230	2,582,683	1,269,609	2,052,891	1,178,897	854,175
Percent of Total	21	63	56	32	39	35
Shared State Taxes	457,334	257,578	210,245	911,728	328,125	472,086
Percent of Total	27	6	9	14	11	19
Other	408,997	740,116	318,293	1,537,766	543,036	580,058
Percent of Total	24	18	14	24	18	23
Total Revenues	1,691,962	4,121,877	2,259,100	6,361,344	3,023,365	2,471,471
Expenditures						
Security of Persons and Property	457,763	1,420,287	1,086,976	3,776,843	1,873,407	1,085,954
Percent of Total	28	25	50	30	51	40
General Operations	460,105	491,767	377,940	648,054	837,789	458,083
Percent of Total	28	9	17	5	23	17
Capital Outlays	208,935	1,953,814	100,972	0	676,048	207,348
Percent of Total	13	35	5	0	18	8
Other	519,697	1,745,190	607,498	8,045,186	320,609	942,276
Percent of Total	31	31	28	65	8	35
Total Expenditures	1,649,500	5,611,058	2,173,386	12,470,083	3,707,853	2,693,661
Revenues Less Expenditures	42,462	-1,489,181	85,714	-6,108,739	-684,488	-222,190
Outstanding Bonds	0	5,749,000	941,257	5,629,500	1,709,231	791,700
Investments	1,154,125	1,127,000	526,236	3,256,151	425,000	730,394

Source: Ferguson 1985

wastewater facilities will be financed through city and village revenues. These revenues will pay for local sewers, relief sewers, and sewer rehabilitation work (see Chapter 5). Regional sewer lines and pump stations will be financed by the Northeast Ohio Regional Sewer District (NEORSD). These facilities may be partially financed through State and/or Federal grants. However, costs for local sewers must be financed by each affected jurisdiction in the FPA. This could result in local obligations of $16 million (see Appendix H, Table H-2), requiring either the issuance of general obligation bonds or the establishment of an enterprise fund to issue revenue bonds.

As Table 4-16 indicates, none of the local municipalities have large operating budgets. Mayfield Heights has the largest operating budget with over $12 million in expenditures. This level was twice Mayfield Heights' 1984 total revenues of only $6 million. This unusual expenditure was adsorbed by an accumulated revenue surplus. All of the other communities have budgets under $5 million and maintain reserve investments that are less than half of their operating revenues. In Highland Heights and Mayfield Village, most revenue is raised from income taxes (63 and 56 percent, respectively). Mayfield Heights, Richmond Heights, and Willoughby Hills receive approximately one-third of their revenues from income taxes. Gates Mills is the only municipality that relies on State transfers for more than 20 percent of its operating revenues. Property taxes on the average provide 25 percent of local municipalities' revenues (Ferguson 1985).

Fire and police services are the largest expenditure for municipalities in the Hilltop FPA. These services represent one quarter to one half of local jurisdictions' expenditures. General operations represent an expenditure of 5 percent for Mayfield Heights and 28 percent for Gates Mills. The municipalities of Highland Heights, Mayfield Heights, Richmond Heights, and Willoughby Hills all had expenditures that outpaced revenues in 1984 (Ferguson 1985). Under normal and/or recurring conditions, this is an indicator of fiscal stress. Large expenditures for fire and police services are considered to be an indicator of potential fiscal problems since these services require large retirement funds and disability annuities.

This analysis is restricted to data from a single year, 1984; it should not be considered an absolute predictor of the fiscal health of these communities since it relies on a single operating budget. The 1984 budget was the most recent budget available through the State. An auditors' report from the State was also reviewed to provide consistent and verifiable information. This auditors' report gives an accurate picture of each community during the period of the 1985 State Census (Ferguson 1985). Using this information, a set of indicators was prepared for the fiscal impact analysis presented in Chapter 6.

The bonding capacity of a jurisdiction is one of the best measures of financial capability. Table 4-17 lists the bond ratings given to municipalities in the Hilltop FPA by Moody's Investors Service. The rating reflects informed judgment on the relative investment qualities of municipal bonds and, therefore, the ability of a municipality to fund the project. The Moody's A rating applies to bonds that possess many favorable investment attributes and are to be considered as upper medium-grade obligations. Factors giving security to principal and interest are considered adequate, but elements may be present that suggest a susceptibility to impairment sometime in the future. This rating is an "average" rating and is given to the majority of municipalities. The A1 rating is given to bonds possessing the strongest attributes in the A category (Moody's Investors Service 1986a). As this analysis indicates, these financial institutions consider all of the Hilltop FPA local jurisdictions good credit risks.

Another aspect of the financial capabilities of a municipality is the relationship between revenues, source of revenues, and bonded indebtedness. All of the communities in the FPA rely on a mixture of revenue sources and range from no bonded debt (Gates Mills) to debt equal to annual receipts (Highland Heights).

4.8.3 Northeast Ohio Regional Sewer District (NEORSD)

In 1972, the Northeast Ohio Regional Sewer District (NEORSD) was established as an independent financial authority. This district is responsible for the collection and treatment of industrial, commercial, and

Table 4-17. Financial Indicators for Bonded Debt for Local Jurisdictions in the Hilltop Facility Planning Area

	1985			
	Assessed Value of Property	Equalization Ratio	General Bonded Debt	Bond Rating (Moody's)
Gates Mills	NA*	.35	0	NA*
Highland Heights	139,925,000	.35	899,000	A
Mayfield	79,112,955	.35	825,650	A
Mayfield Heights	187,708,000	.35	1,104,716	A1
Richmond Heights (1984)	107,025,000	.35	913,000	A
Willoughby Hills	93,258,459	.35	1,440,100	A

*Figures for Gates Mills are not available because this municipality has never issued bonds.

Source: Moody's Investors Service 1986b

residential wastewater for the city of Cleveland and 43 surrounding suburban communities. The NEORSD service area encompasses most of Cuyahoga County's approximately 178 square miles. Customers located in the city of Cleveland are part of Sewer District One (SD1). These customers pay operation and maintenance costs as well as capital construction costs for capital improvements benefitting SD1 customers. The average residential sewer bill for SD1 is $11.24 per month. Sewer District Two (SD2) includes those customers located in suburban communities. Suburban customers in SD2 must pay for capital construction as well as operation and maintenance costs. The average residential sewer bill in SD2 ranges from $15.12 to $19.73, depending on local water costs. Sewer bills are collected on a quarterly basis and are based per 1000 cubic feet of water use (Nuveen 1984).

NEORSD's most recent bond issue was in 1984. At that time Moody's Investors Service rated NEORSD's bonding capabilities AAA. Bonds that are rated AAA are judged to be of the best quality and carry the smallest degree of investment risk because interest payouts are protected by a large or by an exceptionally stable margin, and principal is secure. Table 4-18 presents a selected balance sheet for the NEORSD for 1984 and 1985.

Table 4-18. Northeast Ohio Regional Sewer District Annual Report

	1985	1984
ASSETS		
Property, Plant, and Equipment: Current Undepreciated Value of Wastewater Treatment Plants and Interceptor Sewers	551,244,000	522,361,000
Construction Funds and Unamortized Bond and Sinking Funds	122,621,000	115,379,000
Sewerage Fees	29,155,000	25,140,000
TOTAL	761,848,000	731,925,000

Table 4-18. Northeast Ohio Regional Sewer District Annual Report (continued)

		1985	1984
LIABILITIES, CONTRIBUTIONS, AND RETAINED EARNINGS			
Current Liabilities		20,588,000	20,915,000
Retained Earnings		247,767,000	225,012,000
Capitalization of Long-Term Debt		106,220,000	107,085,000
Federal Construction Grants		387,273,000	378,913,000
	TOTAL	761,848,000	73,925,000
COVERAGE FOR OPERATIONS		1.42	1.20
COVERAGE FOR DEBT SERVICE		1.86	2.27
RETAINED EARNINGS AS A PERCENT OF ASSETS		0.33	0.31

Source: Moody's Investors Service 1986b

Standard and Poor's has also given NEORSD a AAA rating which is their highest. This indicates that NEORSD's capacity to pay interest and principal is extremely strong.

4.9 LAND USE

4.9.1 Existing Land Use

The Hilltop FPA is one of the last areas having large tracts of vacant developable land close to downtown Cleveland. This proximity to downtown increases the development pressures in the area (Wolfe 1987). The area's attractiveness is also related to its accessibility to major transportation routes. Two major interstate highways cross through the Hilltop FPA making the area ideal for commercial or light industrial uses. In addition, major arterials connect the area west to downtown Cleveland and to the affluent neighborhoods to the south. The area is also situated close to two major segments of the Cleveland Metropark's "Emerald Necklace"--Euclid Creek Reservation and the North Chagrin Reservation. These two amenities enhance the area.

In all six communities in the Hilltop FPA, a zoning ordinance acts as a guide for development. Only Willoughby Hills has a master plan and this document is used more as a design tool than as a development policy. Figure 4-9 is a composite land use map for the Hilltop FPA. Table 4-19 is an interpretation of this map. It lists the vacant and developed land uses for each jurisdiction according to generalized land use or zoning classifications. Figure 4-9 and Table 4-19 combine information gathered during field surveys as well as data from the Cleveland Regional Sewer District, now known as NEORSD, (CRSD 1979b), the Cuyahoga County Regional Planning Commission (CCRPC 1977), the Ohio Department of Natural Resources (ODNR 1985b), and the Willoughby Hills Planning Commission (WHPC 1979).

Although the predominant land use in all of the FPA jurisdictions estimated for 1986 in Table 4-19 is residential, there are substantial differences in the type and extent of residential uses. In Willoughby Hills, 98 percent of the total area within the FPA is zoned for residential use but only 49 percent (814 acres) has been developed, leaving approximately 849 vacant residentially zoned acres. Richmond Heights has 81 percent of its total area zoned for residential use with 80 percent or approximately 1662 acres developed. Both Gates Mills and Mayfield Heights have zoned 77 percent of their total area residential. Gates Mills, however, has only 59 percent of its total residentially zoned land developed while Mayfield Heights has over 90 percent of its residential land developed. Highland Heights has zoned 76 percent of its land for residential use but only 60 percent of this has been developed. Mayfield has the lowest percentage of land zoned for residential use and the least amount of land available for development.

Most of the residentially zoned land in the Hilltop FPA has low density zoning. Highland Heights and Richmond Heights permit three dwelling units per acre; Willoughby Hills permits one dwelling unit per acre; and Gates Mills and Mayfield Village restrict residential development to one unit every 2.5 acres. In Richmond Heights and Willoughby Hills a small percentage of the vacant developable land is in the flight path of the county airport. Development is not allowed in this zone.

The Hilltop FPA includes over 12,350 acres; approximately one-third of this land is vacant (NEORSD 1978a). Less than 100 acres of vacant

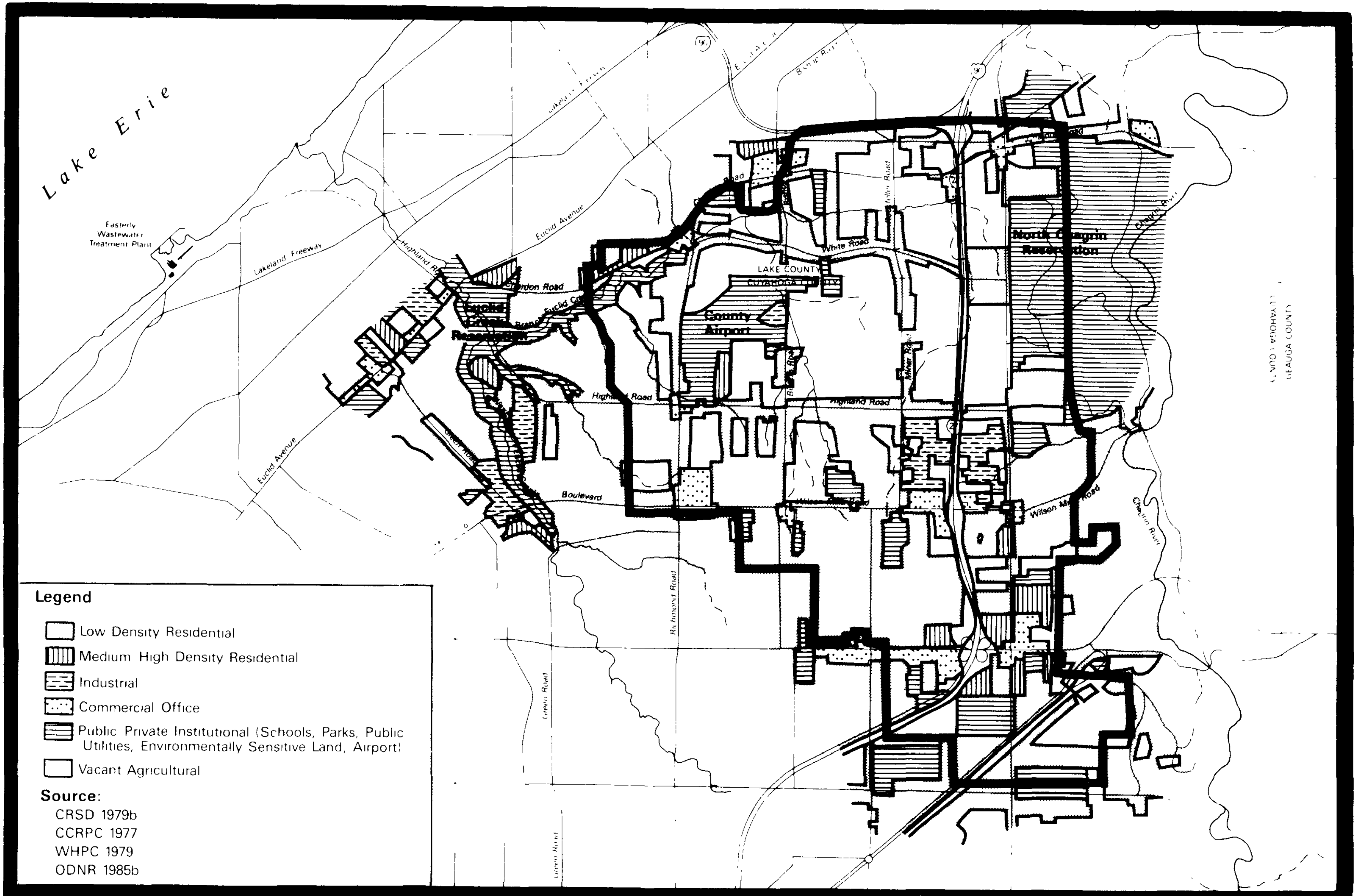


Figure 4-9. Existing Land Use in the Hilltop Facility Planning Area

Table 4-19. Land Use in the Hilltop Facility Planning Area

Community	Total Acres	Land Zoned Residential			Land Zoned Commercial			Land Zoned Industrial			Other Zones
		Total Acres	Dev. Acres	Vacant Acres	Total Acres	Dev. Acres	Vacant Acres	Total Acres	Dev. Acres	Vacant Acres	Total Acres
Gates Mills	419[a]	321	189	132	0	0	0	0	0	0	98
Highland Heights	3355	2551	1528	1023	82	43	39	606	357	249	115
Mayfield Village	1590	1040	928	112	102	192	0	294	112	182	154
Mayfield Heights	2713[a]	2096	1943	153	236	190	46	0	0	0	381
Richmond Heights	2565[a]	2068	1662	406	69	69	0	360	225	135	68
Willoughby Hills	1705[a]	1663	814	849	32	32	0	10	10	0	0
TOTAL	12347	9739	7064	2675	521	436	85	1270	704	566	816

Other Land Uses Include Agriculture as well as Public and Private Institutional Uses. This table was prepared using estimates of developed acres (NEORSD 1978a) and jurisdictional zoning maps.

[a]Portion Within the Facility Planning Area

Source: NEORSD 1978a

commercially zoned land is available for development. Vacant industrially zoned land is concentrated in the communities of Highland Heights, Mayfield Village, and Richmond Hills. Each of these communities has over 100 acres of vacant industrially zoned land. As stated above, most of the area's vacant land (2675 of 3327 vacant acres) is zoned residential. One-third of this vacant land is located in Highland Heights. Industrial and commercial land uses are located near the I-271 interchange and along Miner and Bishop Roads. Although there is little room for new commercial expansion, several commercial centers are located in the area, including one regional shopping center--Richmond Mall.

There are numerous development projects under construction or in the planning stages in the Hilltop FPA. Figure 4-10 illustrates the locations of these projects. Most of these projects are located in Highland Heights. These include the following two projects:

- A 378-acre parcel north of Highland Road between Bishop and Miner Roads slated for high density single family development. Three hundred acres of this project will be reserved for a golf course. This development is referred to as "Highland Greens," and is planned to include 1000 housing units (Hovancek 1987).
- An office park to be located on part of the Landerhaven Country Club (Stumpe 1987).

4.9.2 Recreation

The Cleveland Metropark system consists of more than 18,600 acres of parkland throughout the metropolitan area (Coles 1986). The parks system is known as the "Emerald Necklace" because its 11 reservations encircle the city, offering a variety of recreational opportunities. Major park reservations in or near the FPA include Euclid Creek Reservation and North Chagrin Reservation. The U.S. Land and Water Conservation Fund (Department of the Interior) financed a portion of the Euclid Creek Trail System. This fund also helped finance two other parks in the FPA: Mayfield Heights Park and Willoughby Hills City Park (Jones, 1987).

Euclid Creek Reservation is composed of 344 acres. The park offers an all purpose trail, a baseball diamond, sledding, cross country skiing, a

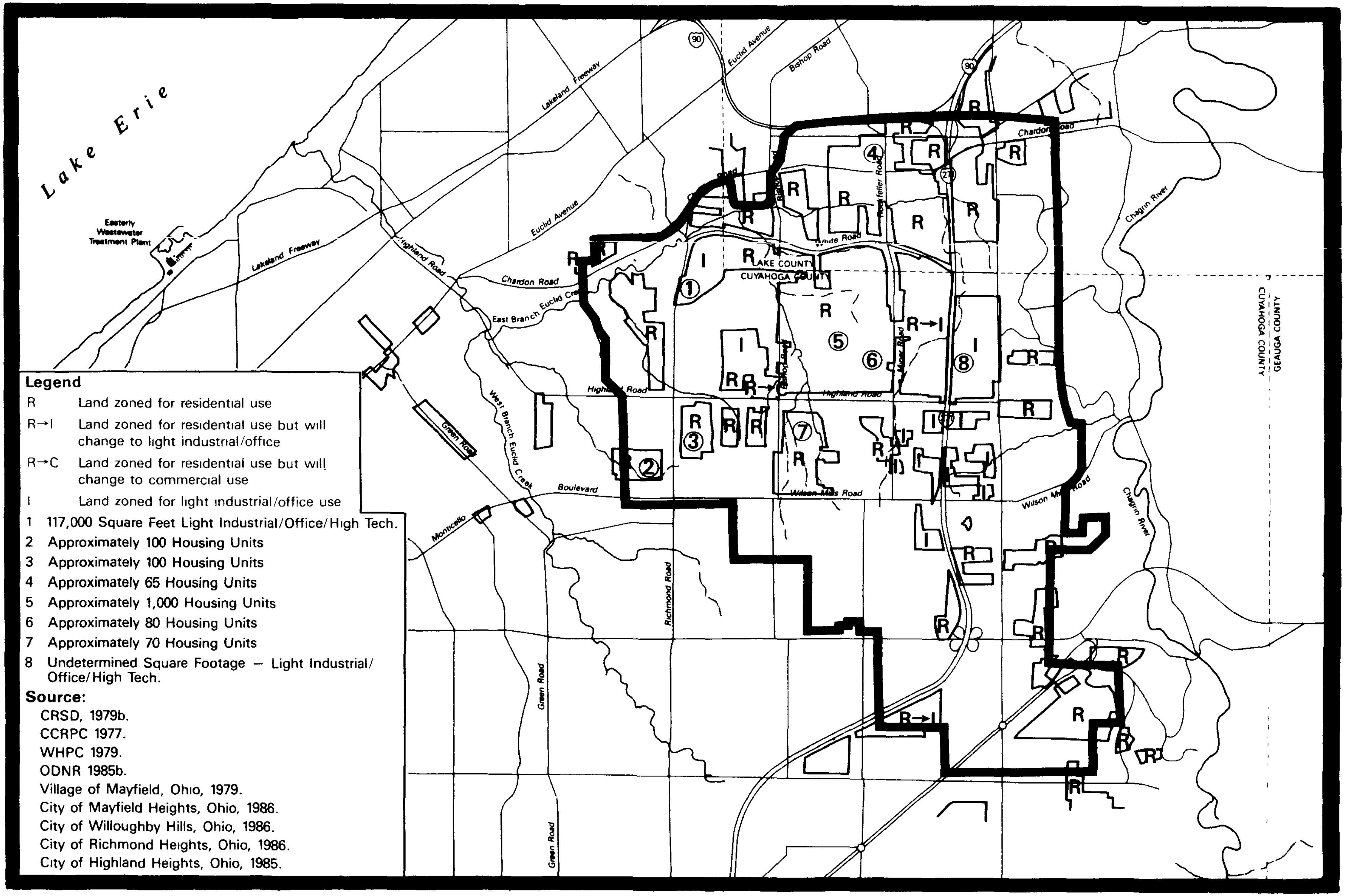


Figure 4-10. Current Development Proposals and Zoning Classifications of Vacant Land in the Hilltop Facility Planning Area

physical fitness trail, and a picnic shelter. The North Chagrin Reservation, which has 1,912 acres, offers a variety of trails, including hiking, biking, and cross country skiing, as well as a baseball diamond, fishing, golf, ice skating, a nature center, a waterfowl sanctuary, and snowmobiling (see Table 4-20 for attendance figures).

Table 4-20. Cleveland Metropark Attendance, 1981-1985

	1981	1982	1983	1984	1985
Euclid Creek	679,000	872,000	809,000	889,000	910,000
North Chagrin	4,618,000	4,378,000	3,126,000	3,807,000	4,101,000
Total	5,297,000	5,250,000	3,935,000	4,696,000	5,011,000

Both the Euclid Creek Reservation and the North Chagrin Reservation offer a variety of scenic attractions that provide a unique natural respite in an urban environment. Smaller recreation areas are available at school grounds in and around the planning area. A tabulation of public facilities in major recreation areas in or near the Hilltop FPA is given in Table 4-21. One private picnic site, Saxon Picnic Area, is also located in the Hilltop FPA (see Section 6.1.12).

Table 4-21. Public Recreation Areas in the Hilltop Facility Planning Area

Park Name and Location	Acreage	Activities
North Chagrin Reservation 3037 SOM Center Road Willoughby Hills	1912 acres	5 Picnic Areas Winter Sports Area Trail Nature Area Marsh Nature Area 10 Trails Snowmobiling Cross-Country Skiing Ice Fishing Ice Skating Sledding Bridle Trails Physical Fitness Trail

Table 4-21. Public Recreation Areas in the Hilltop Facility Planning Area (continued)

Park Name and Location	Acreage	Activities
Manakiki Golf Center 35501 Eddy Road In North Chagrin Reservation	NA	18 Hole Golf Course
Euclid Creek Reservation Entrance on Highland and Green Roads	344 Acres	2.5 Mile All Purpose Trail Basketball Courts Physical Fitness Trail Picnic Areas Playfields Winter Sports Area Sledding Cross-Country Skiiing

Source: Cleveland Metroparks System 1986

4.10 TRANSPORTATION

Major roadways in the planning area include Euclid Avenue, Richmond Road, Chardon Road, Highland Road, and Mayfield Road. Euclid Avenue is a major north-south artery that connects the eastern suburbs to the downtown area of Cleveland. Major roadways that intersect Euclid Avenue include Highland, Mayfield, and Chardon. Euclid Avenue has four through lanes and two parking lanes (Eckner 1987). Traffic on Euclid Avenue is heavy during nonrush hour and congested during rush hour. Highland Road carries commuter traffic to Euclid Avenue without any major traffic congestion (O'Brien 1987a). Highland Road is a major link between the Hilltop area and Interstate 90. Highland Road has four lanes west of Richmond Road and two lanes east of Richmond Road.

Richmond Road is a major north-south roadway that carries commuter traffic and feeds the Richmond Mall, the Cuyahoga County Airport, and an industrial park on the airport property. Traffic is heavy at times and is congested at the intersections near the County Airport (Eckner 1987, O'Brien 1987a).

The Ohio Department of Transportation previously conducted a design study to widen Richmond Road to four lanes. This plan called for widening segments between Mayfield and Cedar Roads and between Euclid Avenue and Highland Road (Owens 1987). The segment between Mayfield and Cedar Roads was recently completed. Although construction of the Euclid Avenue to Highland Road segment has been planned for, as shown in NOACA's Long-Range Transportation Plan, 1985 Status, no schedule is available for this work (NOACA 1985).

Other roads on the FPA include SOM Center Road, Bishop Road, and Miner Road. SOM Center Road is a major two lane north-south artery that serves residential areas south of Wilson Mills Road. Bishop Road, north of Highland Road, feeds the Airport Industrial Park. Miner Road, north of Wilson Mills, feeds the Highland Heights Industrial Park. Both Bishop and Miner Roads experience minor congestion.

The Cuyahoga County Airport, located within the corporate limits of Richmond Heights, is in the far northeastern corner of the county near the Lake County line. This airport is owned and operated by Cuyahoga County. Cuyahoga County Airport is a general aviation airport that serves corporate planes (Surcow 1986).

The Greater Cleveland Regional Transit Authority (RTA) is a publicly owned transit system that provides transportation to Cuyahoga County. The transit system consists of 90 bus routes, three rail transit lines, over 1,200 revenue vehicles, and carries an average of more than 450,000 passengers per day. The rail lines do not extend into the planning area. Bus routes within the planning area transport people to downtown Cleveland, the rail line, and Richmond Mall (Wood 1986).

4.11 ENERGY CONSUMPTION

The Cleveland region's electrical service is provided by the Cleveland Illuminating Company which has a total capability of 4,372 megawatts of power per day. Of this total, approximately 3,400 megawatts are available for use, with the remainder in reserve or down for maintenance (DeChant 1987). The Illuminating Company owns four coal-fired generating plants, one nuclear generating plant, and one coal and oil generating plant. The company is also a co-owner of one coal plant, one pump hydroelectric plant, a second nuclear plant which has one unit currently being tested, and another unit approximately 50 percent completed. Operation of this plant is dependent upon a favorable ruling by the Sixth Circuit Court of Appeals. The Illuminating Company is a member of the Central Area Power Coordinating System that allows for shared capacity with Ohio Edison, Pennsylvania Power, Pittsburg-Duquesne, and Toledo Edison (DeChant 1987). Additional information is provided in Section 6.2.4.

4.12 CULTURAL RESOURCES

4.12.1 Historic Resources

Before the arrival of the English, the French and Indians had established trading posts along the lower Cuyahoga Valley. In 1786, when the area was opened for settlement, the State of Connecticut reserved 3,500,000 acres of land (the Western Reserve) in northeastern Ohio. In 1796, Moses Cleaveland, from the Connecticut Land Company, arrived with surveyors to speed the sale of lots. The plan for the town of Cleveland was completed in that year. Growth was slow until 1825 when the Erie Canal was opened, thereby linking Cleveland with the Atlantic Ocean. In 1830, the Ohio and Erie Canal was completed, which further increased industrial activity. Rail service in 1840 and the completion of the St. Mary's Falls Canal between Lakes Superior and Huron in 1855 established Cleveland as a transfer point for lumber, copper, iron ore, coal, and farm produce and also as a manufacturing center. After the Civil War, the city had firmly established an iron industry and in 1870 John D. Rockefeller, Sr. organized the Standard Oil Company. By the end of the 19th century, the population was growing and commuter trains began to reach out to the suburbs. The Hilltop Facility Planning Area began to develop during the latter part of the 19th century as suburbs of Cleveland. A large part of the area, however, remained agricultural until the mid-1950s and the post-war expansion into the suburbs (Colliers 1984).

The National Register of Historic Places lists a number of historic sites and structures in the jurisdictions comprising the Hilltop Facility Planning Area. The Register lists three historic sites or structures in Gates Mills and two in Mayfield Heights (USDI 1985). The Ohio Historic Inventory (OHI) lists those sites and structures that may not be eligible for inclusion to the National Register, but are nonetheless historic under Ohio Historic Society criteria. Figure 4-11 illustrates known historic and archaeological resources in the Hilltop FPA.

4.12.2 Archaeologic Resources

Information for the archaeological background was obtained from studies completed by the Cleveland Museum of Natural History and the "Heights/Hilltop Interceptor: Cultural Resources Inventory," Havens' and Emerson's "Supplemental Facilities Planning Report" (Brose et al. 1985, Blank 1980, Bush 1978). Figure 4-11 illustrates known historic and archaeologic resources in the Hilltop FPA.

The earliest evidence of human culture within northeastern Ohio is evidenced by the Fluted Point Complex of the Paleo-Indian Tradition, which has been dated to between 18,000 and 10,000 years B.C. The Fluted Point Complex is followed by the Plano Complex of the Paleo-Indian Tradition, dating between 10,000 and 6,000 years B.C. The known distribution of habitation and/or hunting sites of the Plano Complex is concentrated within the Lake Plains physiographic province of northern Ohio. The distribution of excavated sites and surface finds coincides with the beach ridges of the Glacial Lake Stages in the Erie Basin, and with the abandoned shorelines of periglacial swamps, bogs, or major stream valleys. The Archaic Development Stage (8,000 to 1,500 B.C.) overlaps the Plano Complex. The Laurentian Tradition (3,500 to 1,500 B.C.) represents the most recent of the Archaic Development Stage manifestations within Ohio. In northeastern Ohio, the Brewerton Phase of the Archaic Stage occurs as both open sites and within rock shelters in the eastern portion of Ohio. The majority of open sites are situated in close proximity to the then comtemporary shorelines of rivers, lakes, bogs, and swamps. Evidence of the Woodland Period (200 B.C. to 900 A.D.), while not totally absent, is relatively small in scale. Typical distributions would occur on high terraces or bluffs overlooking major stream valleys. Cuyahoga and Lake Counties were major areas of occupation during the Late Prehistoric Period (1,000 to 1,650). Villages typically were located on the high plateaus and ridges along the Lake Erie Shore.

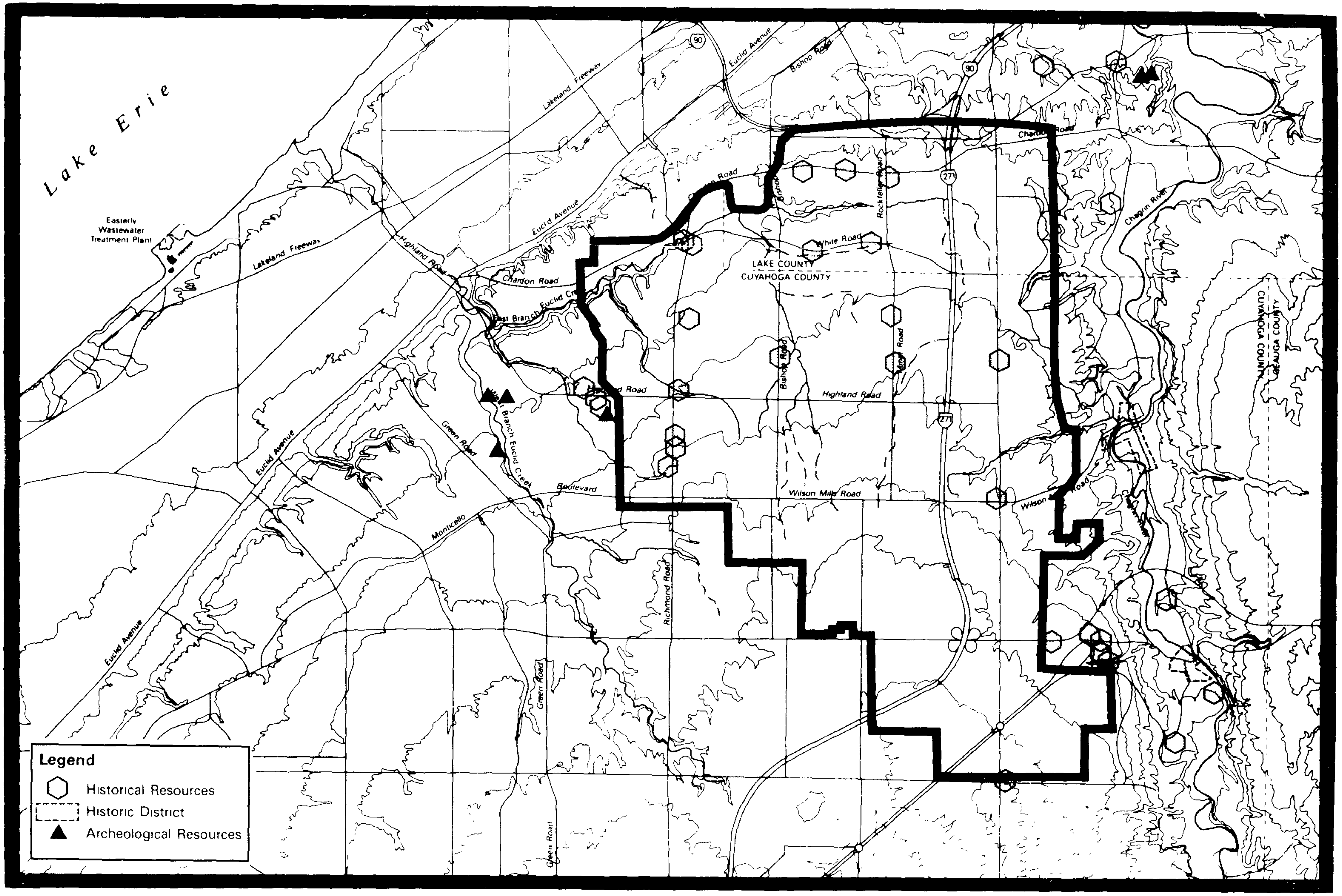


Figure 4-11. Historic and Archaeologic Sites in the Hilltop Facility Planning Area

Most of the archaeological site locations within this region tend to occur within 1 mile of the Chagrin River on relatively flat ground. When the slope is greater than 15 degrees, occupation sites are generally absent. The higher bluff areas are the regions that appear to house the greatest number of sites. Floodplain areas also tend to contain archaeological sites. Sites found near the Chagrin River tend to be relatively undisturbed because of the absence of industrial areas and large residential areas typical of the upper Cuyahoga River. Occupation sites from all prehistoric periods are possible.

The farther west that sites are from the Chagrin River, the less dense they tend to be. Sites are most likely to be located near areas that have had little historic disturbance (such as parks), near water, slightly higher elevations (such as knolls), and major geomorphological differences (such as beach ridges). Major creeks and streams tend to have greater site density than intermittent streams or very minor creeks.

CHAPTER 5. EIS ALTERNATIVES ANALYSIS

This chapter presents an analysis of the wastewater management alternatives developed for the Hilltop Planning Area based on engineering criteria. This is a two-step process involving a screening to eliminate non-viable alternatives. The remaining alternatives are then evaluated in greater detail with respect to monetary costs as well as implementability, reliability, energy use, and feasibility. The environmental consequences are discussed in Chapter 6.

Chapter 3 described the alternatives developed in the Easterly Separate Sewer Segment Wastewater Facilities Plan (ESSSWFP) and the Environmental Assessment including several additional alternatives. In order to avoid the confusion of a dual numbering system, those alternatives retained for detailed evaluation are numbered EIS-1, EIS-2, EIS-3, and EIS-4. The origin of the alternative is documented in the description of each alternative.

5.1 SCREENING OF ALTERNATIVES

The purpose of conducting a screening of all alternatives was to eliminate non-viable alternatives from further consideration. Only those alternatives that are potential solutions will receive a further detailed evaluation. The screening was conducted using the criteria listed below and was generally based on information contained in previous facilities planning documents. Alternatives were eliminated based on environmental considerations, feasibility, or cost.

5.1.1. Screening Criteria

The screening criteria included the following considerations.

- Water Quality Impacts: Would the construction or operation of the alternative significantly degrade water quality or permit problems with existing facilities to continue or worsen?

- Sensitive Natural Areas: Would the construction or operation of the alternative significantly affect sensitive natural areas?

- Costs: Is the alternative significantly more costly in comparison with other alternatives without offering compensating improvements in environmental quality?

- o Engineering Feasibility: Would the alternative be much less feasible than other alternatives under consideration?

Each alternative was initially screened as it was originally proposed. If modifications would improve the potential of an alternative, they were incorporated.

5.1.2 Alternatives Evaluated

Chapter 3 described the alternatives developed during the planning process which were documented in the ESSSWFP and the Environmental Assessment. These alternatives are:

1. Easterly Separate Sewer Segment Wastewater Facilities Plan Alternatives

   - o H-1 - a subregional wastewater treatment plant located north of the Cuyahoga County Airport, including flow from the BBW complex.
   - o H-1A - same as H-1, but excluding flow from the BBW complex.
   - o H-2A - transport system to Easterly Wastewater Treatment Plant composed of gravity interceptors and small pump stations. The northern path would follow the Euclid Creek Bed.
   - o H-2B - same as H-2A, but the northern leg would follow Chardon Road. This was the recommended plan of the ESSSWFP.
   - o H-3 - a regional sewage pumping station located north of the Cuyahoga County Airport to transport flow to the Euclid Wastewater Treatment Plant.
   - o E-1A - transport system to Easterly Wastewater Treatment Plant, including an upgraded BBW pumping complex and twin force mains.

2. Environmental Assessment Alternatives

   - o Alternative 1 - same as ESSSWFP alternative H-2B. This was the recommended plan of the Environmental Assessment.
   - o Alternative 2 - same as ESSSWFP alternative E-1A.
   - o Alternative 3 - combination gravity interceptor sewer and two major pumping stations (Beech Hill and Richmond/White) with twin force mains.
   - o Alternative 4 - combination gravity interceptor sewer and one major pumping station (Beech Hill) with twin force mains.

3. Other Alternatives Considered Prior to the EIS

   - o White Road Modification - a modification of ESSSWFP H-2B or EA alternative 1, which uses White Road in place of the cross-country county line route for the northern leg.

   - o Highland Road Route - another modification of ESSSWFP alternative H-2B or EA alternative 1, which used Highland Road in place of the cross-country county line route for the northern leg.

   - o Supplemental Facilities Planning Alternatives - variations of the recommended ESSSWFP alternative (H-2B). These were developed as a result of routing through the entire Heights/Hilltop system.

4. No Action

   - o No Action - no changes to the existing system, however, flow volumes which are diverted from the Belvoir area will still need to be conveyed and treated. No relief from wet weather bypasses of the Beech Hill pump station or the Bonnieview storage facility would be provided, and the existing force mains would remain in place.

5.1.3 Elimination of Alternatives

The result of the screening process was the elimination of the following alternatives from further evaluation in the EIS process.

- o H-1 and H-1A In-Basin Treatment

  - A total present worth cost which was more than 30 percent greater than alternatives that provide transport to Easterly Wastewater Treatment Plant.

  - Requires extensive construction on an undisturbed site.

  - Requires greater operator time and a larger increase in operation and maintenance staff than other alternatives.

- o H-2A Transport to Easterly (Euclid Creek Alignment)

  - Involves extensive open-cut construction parallel to a natural and undeveloped ravine along Euclid Creek.

  - Limited access for equipment makes construction difficult.

  - Construction difficulties would greatly increase the costs.

- H-3 Transport to Euclid

  - The Euclid Wastewater Treatment Plant has a history of capacity problems associated with wet weather flow.

  - The Euclid Wastewater Treatment Plant has a problem adequately treating its current waste load, and Hilltop flow would compound the problem.

  - Limited area is available to expand the Euclid Wastewater Treatment Plant to accept additional flow volumes.

- White Road Alignment

  - This was proposed as a modification to the H-2B (ESSSWFP) and alternative 1 (EA) alignment; however, it does not offer any significant advantage from an engineering feasibility standpoint.

  - Costs would be greater because of construction in the road bed.

  - If further analysis determines that environmental problems exist with the cross-country alignment, White Road could be used as an alternate route.

- Highland Road Route

  - This was also proposed as a modification to the H-2B (ESSSWFP) and alternative 1 (EA) alignment; however, it does not offer significant engineering feasibility advantages.

  - The cost for this alignment is about 8 percent more than the H-2B (ESSSWFP) and alternative 1 (EA) alignment, which was the highest cost alternative from the Environmental Assessment.

  - The deep alignment of this option would require tunnel construction methods.

- Supplemental Facilities Plan Alternatives

  - Anderson Road diversion was included as a result of flow routing throughout the entire Heights/Hilltop system. Alternatives without Anderson Road diversion were excluded because they resulted in higher attenuated peak flow volumes at Easterly Wastewater Treatment Plant.

  - Bishop Road alignment excluded because of higher total costs.

- No Action

  - Continued bypasses of the Beech Hill pump station during wet weather without modifications.

- Continued overflows of the Bonnieview storage facility during wet weather without modifications.

- Increasing potential for ruptures in the existing force mains which are about 25 years old.

- Flows from the Belvoir area would still need to be conveyed and treated.

Along with these alternatives that were completely eliminated, the following changes were made to the remaining alternatives prior to any further EIS analysis.

- E-1A (ESSSWFP) or alternative 2 (EA), alternative 3 (EA), and alternative 4 (EA) were all originally designed with twin force mains from all major pump stations. Since twin force mains are not necessary (or standard engineering practice) from a design standpoint, the EIS alternatives which include force mains will assume a single main in place of the twins.

  These same alternatives also assumed that complete new facilities would be required at the Beech Hill and Wilson Mills pump stations (including new buildings and wet wells). Completely replacing the facilities is not necessary; the EIS alternatives will include replacing the pumps and control systems, but will use the existing structures.

- H-2B (ESSSWFP) or alternative 1 (EA) were both originally designed with the Bonnieview storage tank removed from service. By including Bonnieview, the size of the eastern interceptor could be reduced. Since both the ESSSWFP and EA recommended this plan with Bonnieview excluded, the EIS alternative will also assume Bonnieview is removed. However, an added discussion will be included on the effects of including Bonnieview.

- All EIS alternatives are analyzed with local sewers to serve the unsewered areas (with sufficient capacity to replace all package plants). Future growth was also included in the EIS analysis. Although the relief sewers and sewer rehabilitation projects outlined in the SSES are not included in the EIS discussion, they are assumed to be carried out by the respective communities.

5.2 EIS ALTERNATIVES

This section describes each of the four alternatives that were retained for detailed evaluation. They include the modifications presented above. Each alternative can collect and transport the Hilltop wastewater flows to the Easterly Wastewater Treatment Plant. All alternatives within this section are assigned an EIS number for identification and ease of discussion.

Several common factors exist with the remaining alternatives. Each system option will transport the Hilltop flows to the Easterly Wastewater Treatment Plant for treatment. Since this EIS is concerned with the Hilltop area, all discussion and costs are for facilities that end at the Green Road and Euclid Avenue intersection. Portions of the Heights interceptor will transport the flow from that intersection to the Easterly plant.

As shown and discussed in the following section, each alternative has the potential to serve the entire Hilltop area. Local sewers which would be needed to serve unsewered areas are shown with the alternatives. However, the need to construct local sewers has not been established and this system analysis does not establish or endorse the construction of all local sewers without additional facilities planning. The primary purpose of each alternative is to provide an interceptor to transport flow from the Hilltop area to the Easterly Wastewater Treatment Plant. The local sewers collect wastes from local areas and carry the material to the main transport system.

Each alternative under evaluation will include Contract G. Contract G (Green Road) was initially included in the Heights Environmental Assessment - FNSI. Since the Hilltop area alternative was not selected at the time, the sizes were presented as a range of 60" to 66" to handle 202 MGD of flow, and 66" to 78" to handle 285 MGD of flow. Because the sewer size is dependent upon which EIS alternative is ultimately selected to serve the Hilltop area, the discussion and costs for each alternative will include Contract G. Also, approximately 59 MGD of flow from the eastern Belvoir area will be routed to the Hilltop area as a result of regional planning (see Section 3.1.3.1). This flow was included with all alternatives as Contract H, and construction is planned for 1994.

The analysis in this section also assumes that the sewer rehabilitation and relief sewer projects, as outlined in the SSES (discussed in Section 2.3), are being conducted by local communities. These projects involve individual communities conducting repairs on local sewers to relieve conveyance problems. The relief efforts will be funded with local money and are, therefore, not evaluated as part of this EIS. The NEORSD is currently working with the communities to coordinate the rehabilitation and relief projects.

Construction of any alternative will require the use of both open-cut and tunnel sewer construction methods. Open-cut construction, as the name suggests, involves digging an open trench with a back hoe to install the sewer pipe. Where soil conditions are poor, open-cut construction requires the use of sheeting and shoring which keep the side walls of the trench in place while the pipe is being installed. Generally, when extremely deep alignments (greater than 20 or 30 feet deep) are required, tunnel construction is used. Conventional tunnel boring machines (TBM) would be used for construction in the Hilltop area. TBM equipment consists of rotating cutter heads which excavate a pipe tunnel. Since local ordinances prohibit the use of explosives, tunnel excavation by blasting will not be used. All spoil from the excavations will be disposed of by the contractor and would be trucked to a landfill site or sold as fill material.

5.2.1 EIS-1 - ESSSWFP and Environmental Assessment Recommended Alternative

This alternative is the previously recommended alternative from both the ESSSWFP (H-2B) and the Environmental Assessment (alternative 1). Transport to the Easterly WWTP from the Hilltop Planning Area will be via a newly constructed interceptor as shown in Figure 5-1. Local sewers needed to serve the unsewered areas with this option are shown in Figure 5-2.

EIS-1 will replace the Beech Hill/Bonnieview/Wilson Mills pumping complex with gravity interceptors (Figure 5-1). The eastern leg will be a 48" diameter sewer installed (open cut) primarily along SOM Center Road, and the western leg will be a 42" to 54" sewer installed (open cut) in Richmond Road with other spurs along Highland Road. The northern 48" leg of this alternative will be layed (open cut) along the Cuyahoga/Lake County line. White Road was also suggested as a feasible alternative for the northern leg; however, the proposed county line route is used in this analysis. Tunnel construction will be used along the northern part of Richmond Road, Chardon Road, and Euclid Avenue. The crossing of Euclid Creek near the intersection of Chardon Road and Euclid Avenue would be constructed using a series of drop manholes and open-cut construction across the stream bed.

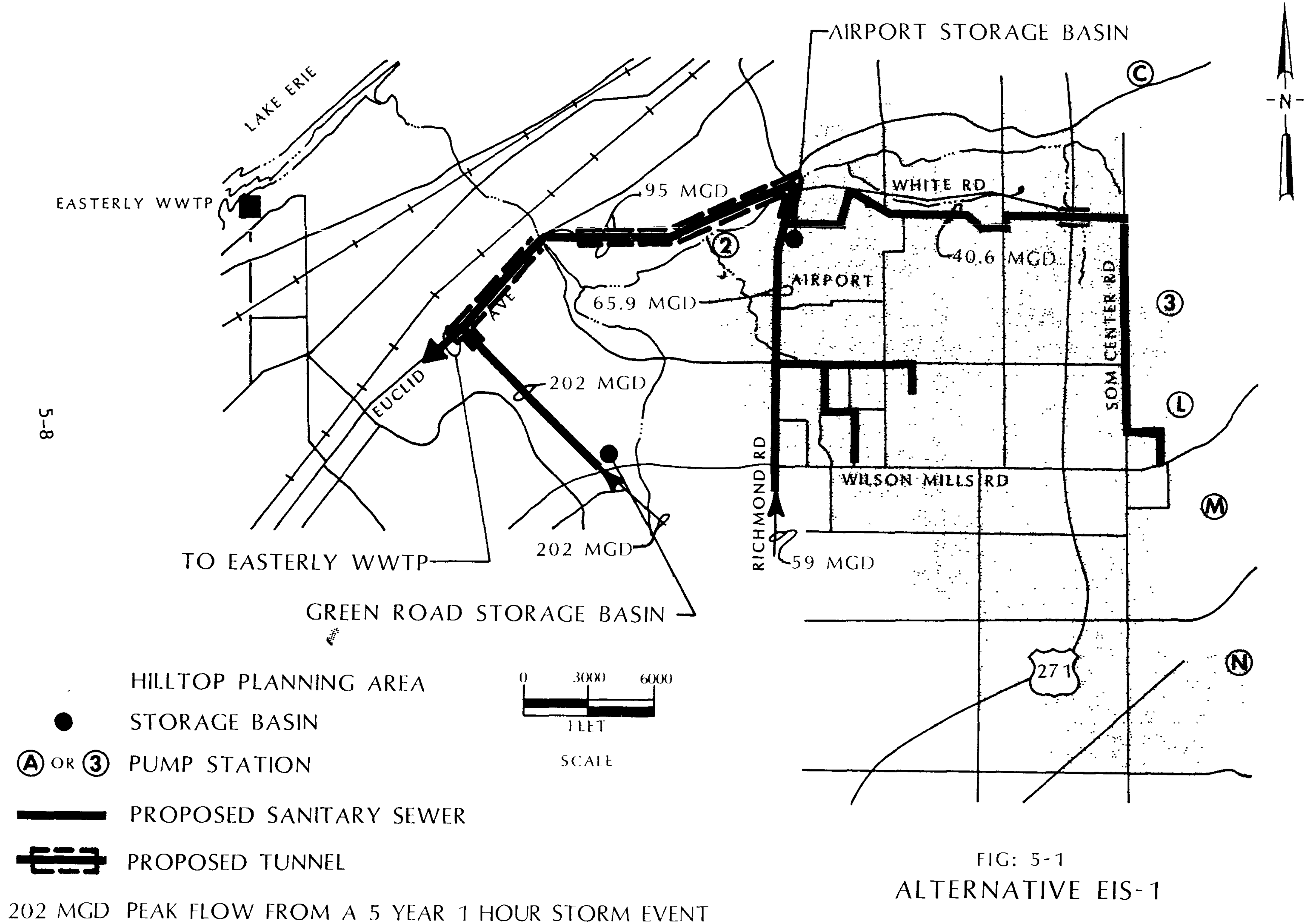


FIG: 5-1
ALTERNATIVE EIS-1

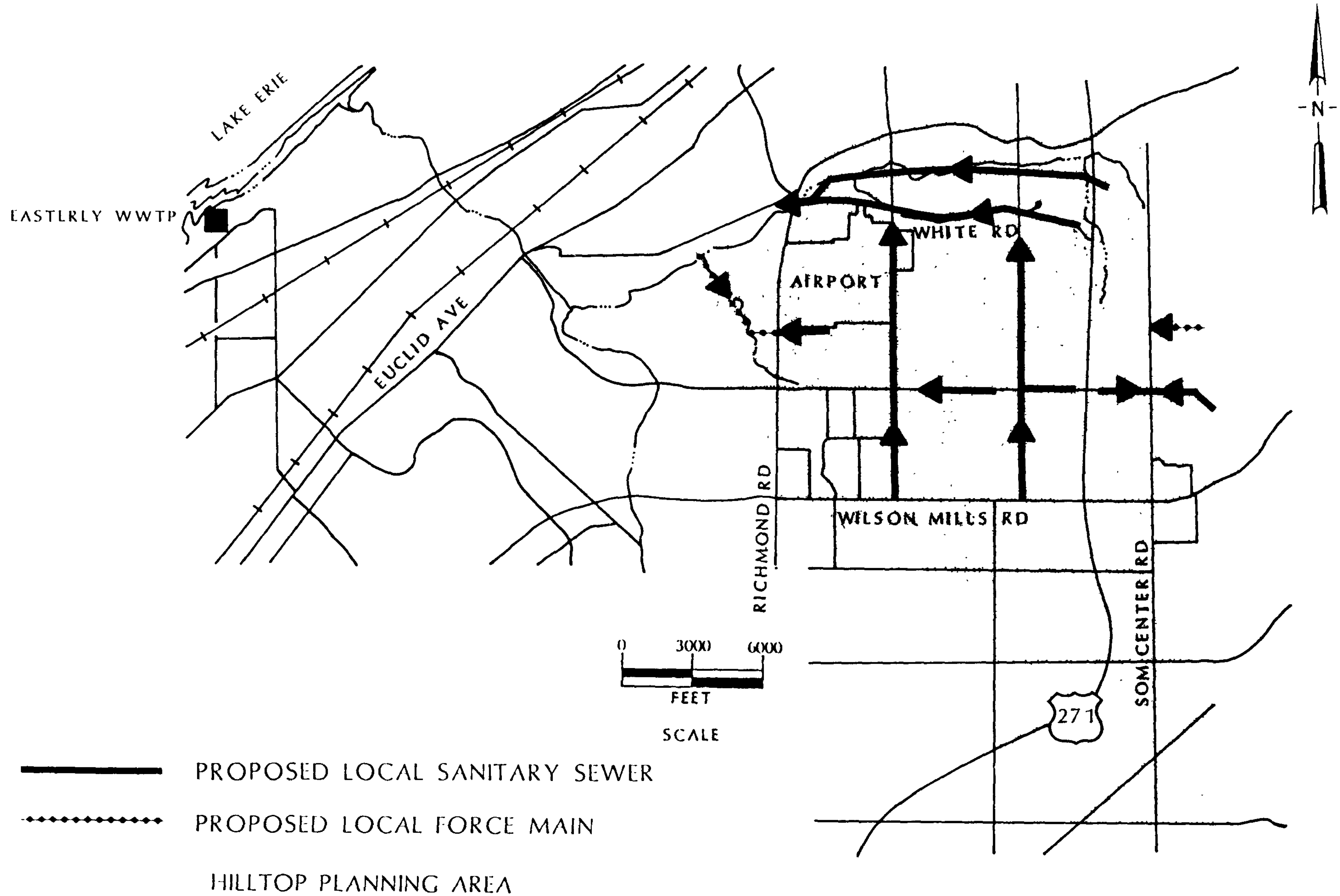


FIG: 5-2

EIS-1 LOCAL SEWERS

New pump stations and force mains would be constructed at the Scottish Highlands (2) and Hickory Hills (3) package plant sites to remove these treatment facilities from service with direct pumping to the gravity system. Stark (C), Thornapple (L), Woods (M), and Suffolk Country Estates (N) pumping stations would all remain in service with EIS-1. Sufficient capacity will be available in the interceptor to remove Sleepy Hollow and Pleasant Hills package plants from service. Bonnieview storage tank would also be removed under this plan.

One additional possibility previously presented was to keep Bonnieview in service as a storage tank with this alternative. By including this tank, the size of the eastern interceptor could be reduced to 30", and a summation of peak flow volumes indicates that the Airport storage basin may not be needed. Although the majority of this analysis is devoted to the original alternative (with Bonnieview eliminated), differences resulting from the inclusion of Bonnieview will also be included in the following discussion.

5.2.2 EIS-2 - Combination Gravity Interceptor Sewer and Pump Station/Force Mains (3 Major Pumping Stations)

This alternative is a modification of the previously discussed ESSSWFP alternative E-1A plus the Hilltop pumping station and the Environmental Assessment alternative 2. EIS-2 consists of upgraded facilities at Beech Hill (A) and Wilson Mills (B) pumping stations, and a new Richmond/White pumping Station (D) as presented in Figure 5-3. The local sewers required with this option are included in Figure 5-4.

The facilities required for EIS-2 include new single force mains along Wilson Mills Road and Richmond Road. The Beech Hill force main will consist of approximately 8,900 feet of 30" pipe, and the Wilson Mills force main will consist of about 2,000 feet of 36" pipe. About 13,400 feet of 30" pipe will be required for the Richmond/White force main. The Beech Hill (A) and Wilson Mills (B) pumping stations would be sized to 11.6 MGD and 24.2 MGD respectively, based upon the SSES results. The Richmond/White (D) pumping station would be sized at 12.9 MGD based on the connection of the unsewered areas, several package plants, and future growth.

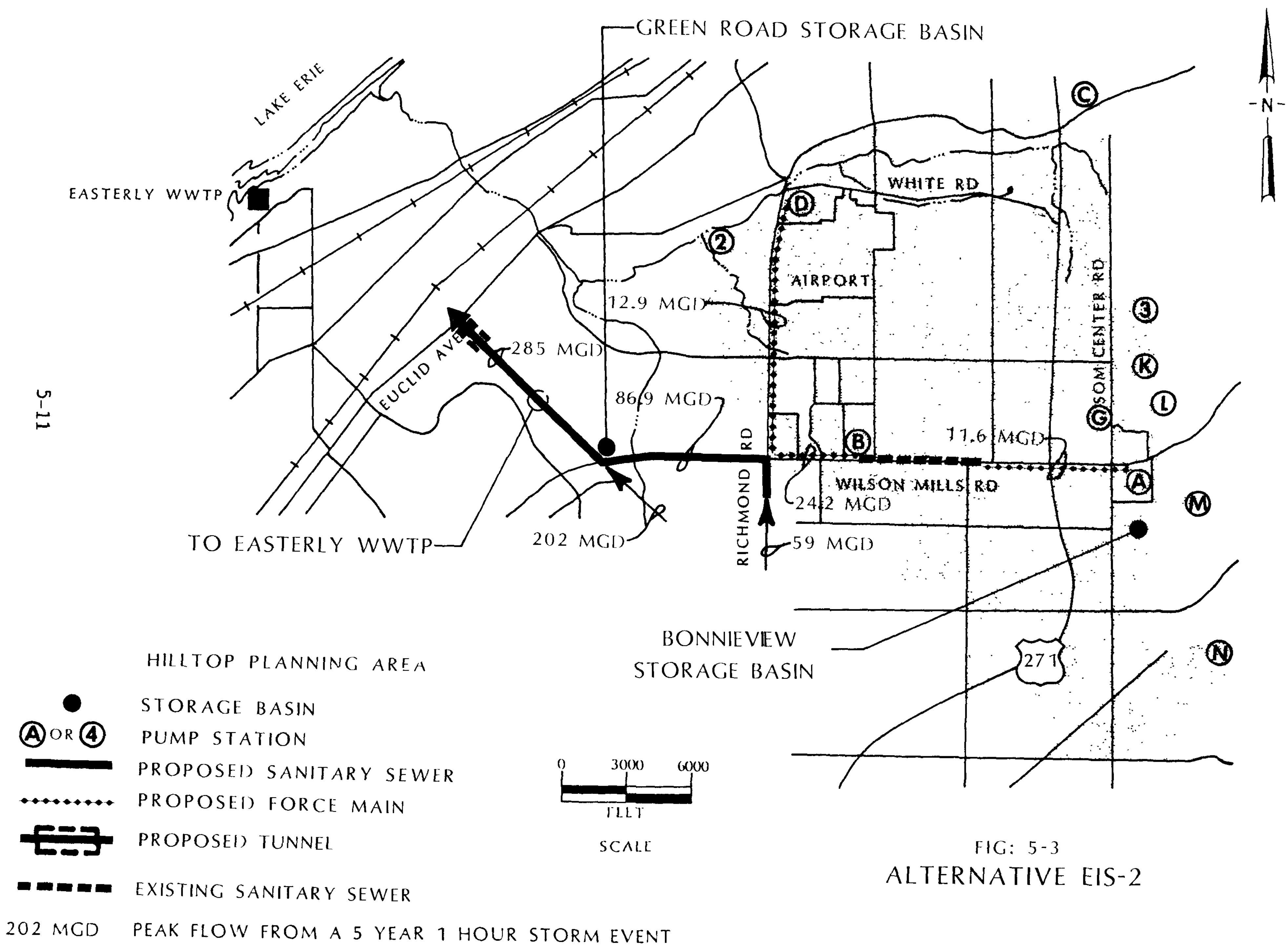


FIG: 5-3
ALTERNATIVE EIS-2

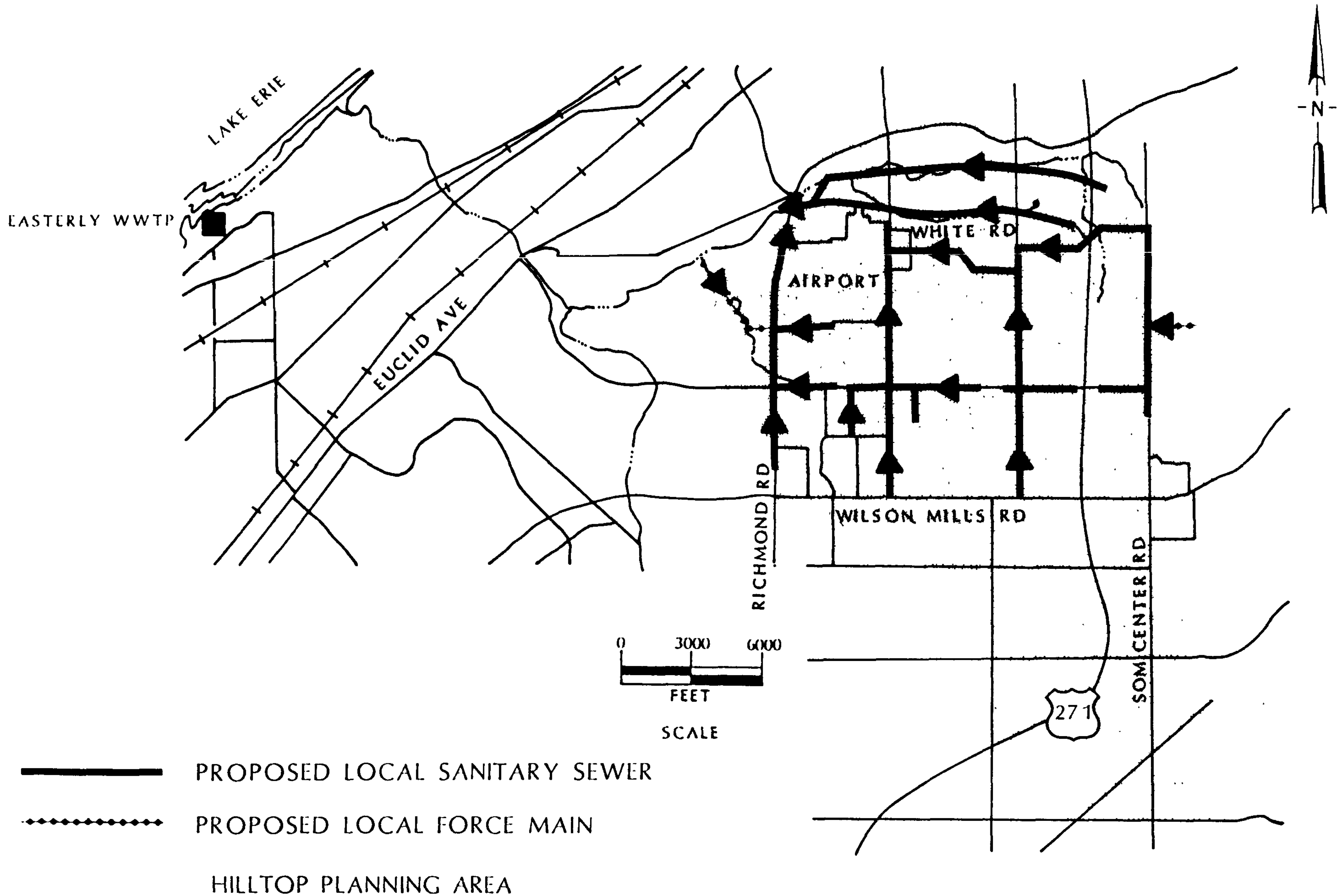


FIG: 5-4

EIS-2 LOCAL SEWERS

Each major pumping station (Beech Hill, Wilson Mills, and Richmond/White) should be designed with sufficient capacity to handle the peak event with one pump out of service. The existing buildings at Beech Hill and Wilson Mills could be used, with a new or expanded structure required for Richmond/White.

The pumping portion of this alternative was designed for reliable operation utilizing the latest in control technology. A central control system (probably located at the Easterly Wastewater Treatment Plant) would have the ability to monitor and control all the major and minor pump stations in the Hilltop area. This system would consist of a telemetered network from the pump stations linked to a central control computer. The central computer would continuously monitor parameters at each station, such as wet well level, flow volumes, and various pump parameters, and control each system based on these inputs. The central control system would be designed to automatically adjust for pump station problems without affecting the normal transfer of wastewater from the Hilltop Planning Area. Should a problem develop with the central computer, control would automatically shift to each individual station. The controls at the individual stations would continue to monitor the parameters (wet well level, flow volumes, and various other factors) and would continue to operate the stations normally. Additionally, an operator at each individual pump station would have the ability to manually control the station operation. Table 5-1 contains a list of possible malfunctions and the response of the control system.

Separate power grids can be supplied to each major pump station to limit the possibility of power failures. Separate power grids consist of electric service from two unrelated power service areas. If one grid suffers a power outage, the other grid will still have the capacity to supply the power unless a total area outage is encountered. Additionally, a backup onsite power generator was included with the pump stations for complete power failures of the two grids. Automatic switching of the onsite diesel generator would allow it to automatically start in the event of a power outage.

Scottish Highlands (2) and Hickory Hills (3) package plants will be eliminated by new pumping stations; however, they will require construction of local gravity sewers before the flow can be collected. Several pumping

Table 5-1. Control System Responses to Possible Malfunctions

Possible Malfunction	Control Response
o Pump not operating properly at one station	- signal at central control alerts remote operator - alarm signal alerts onsite operator that maintenance is required - control automatically shifts away from problem pump to other pumps - station continues operating normally
o Control problem between central control and pump station	- control of problem station automatically shifts to onsite controls - other stations remain under central control - system continues to operate normally
o Central control malfunction	- control automatically shifts to onsite controls for each station - system continues to operate normally
o Power failure at major pump station	- separate power grids at pump station provide power - if total outage along both power grids, backup diesel generators automatically provide power to the station - central control receives power out signal - remote operator dispatched to the station to ensure that equipment is operating normally for duration of the outage - system continues to operate normally
o Power failure at central control	- control shifts to onsite controls for all pump stations - backup power at central control provides power - system continues to operate normally
o Force main rupture	- central control receives signal detected by loss of head - pumps are shut down to the affected force main - flow is diverted to Bonnieview if applicable - repair crew is dispatched - the unaffected portion of the system continues to operate normally

stations will continue to be used with this alternative, as shown in Figure 5-3. Sufficient capacity would also be available to remove Sleepy Hollow and Pleasant Hill package plants from service.

The crossing of Euclid Creek along Monticello Boulevard was assumed to be by a free standing pipe bridge supporting twin 54" sewers. Actually, a single 66" pipe could be used with the existing 30" sewer which is in place under the bridge if the existing pipe is found to be in good condition. This option would be less expensive than using twin 54" sewers, however twin 54" sewers are used in cost estimates as a worst-case assumption.

5.2.3 EIS-3 - Combination Gravity Interceptor Sewer and Pump Station/Force Mains (2 Major Pumping Stations)

This alternative is a modification of the previously discussed Environmental Assessment alternative 3. EIS-3 consists of upgraded facilities at Beech Hill pumping station (A) and a new Richmond/White pumping station (D).

EIS-3 is similar to EIS-2, except that the Wilson Mills pump station is replaced with a gravity tunnel. All other aspects are the same including pump station sizes, controls, and the Euclid Creek crossing. This alternative is shown in Figure 5-5. The local sewers are shown in Figure 5-6.

5.2.4 EIS-4 - Combination Gravity Interceptor Sewer and Pump Station/Force Main (1 Major Pumping Station)

This alternative was previously discussed in the Environmental Assessment (alternative 4). It consists of an upgraded Beech Hill pumping station (A) combined with a new interceptor as shown in Figure 5-7. The local sewers are included in Figure 5-8.

Beech Hill will be the only major pumping station included with this alternative. Wastes will be pumped west along Wilson Mills Road via a 30" force main, until it connects with a gravity sewer near Miner Road. From that point, flow will continue via gravity sewers past Wilson Mills pumping

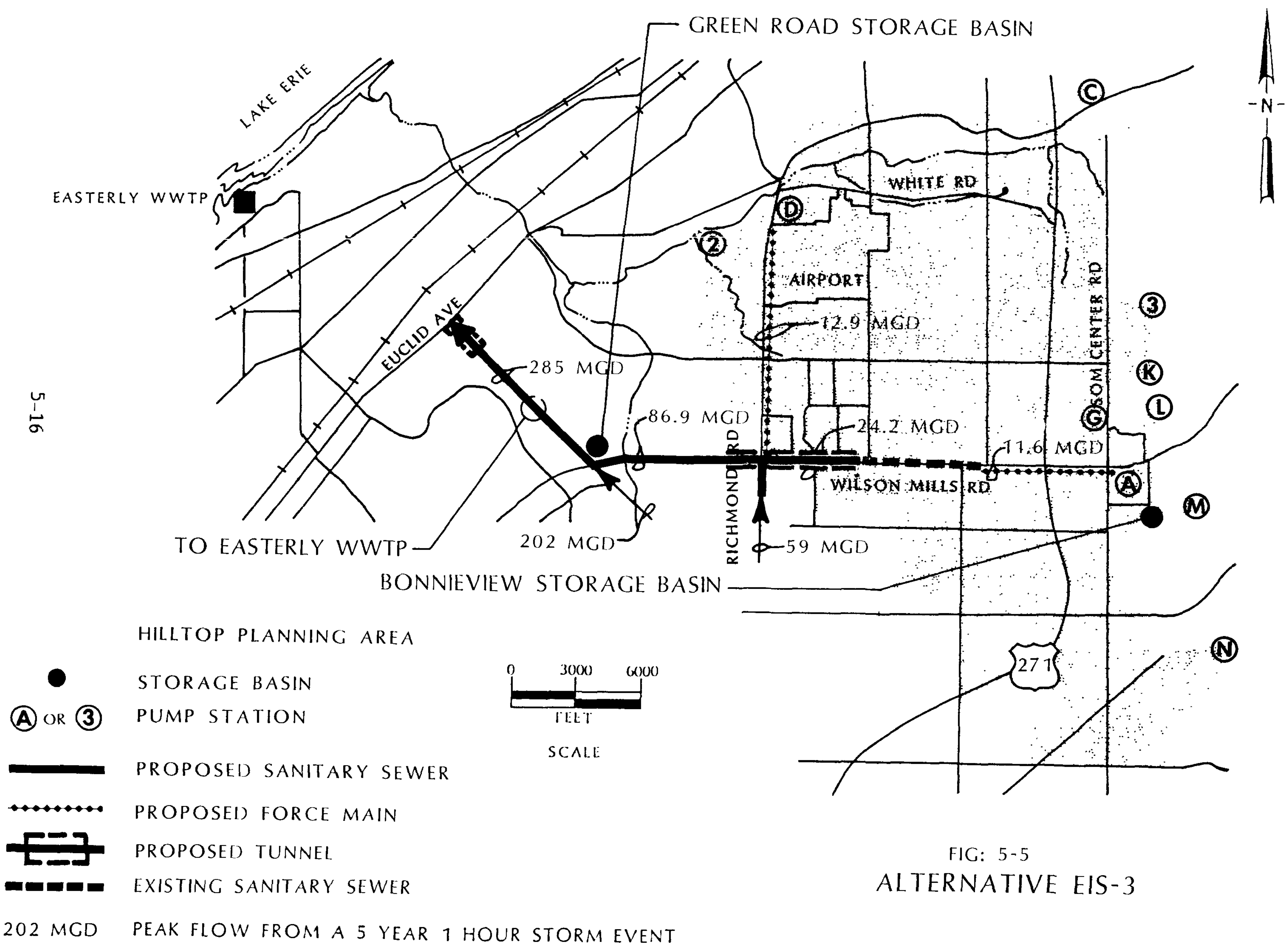


FIG: 5-5
ALTERNATIVE EIS-3

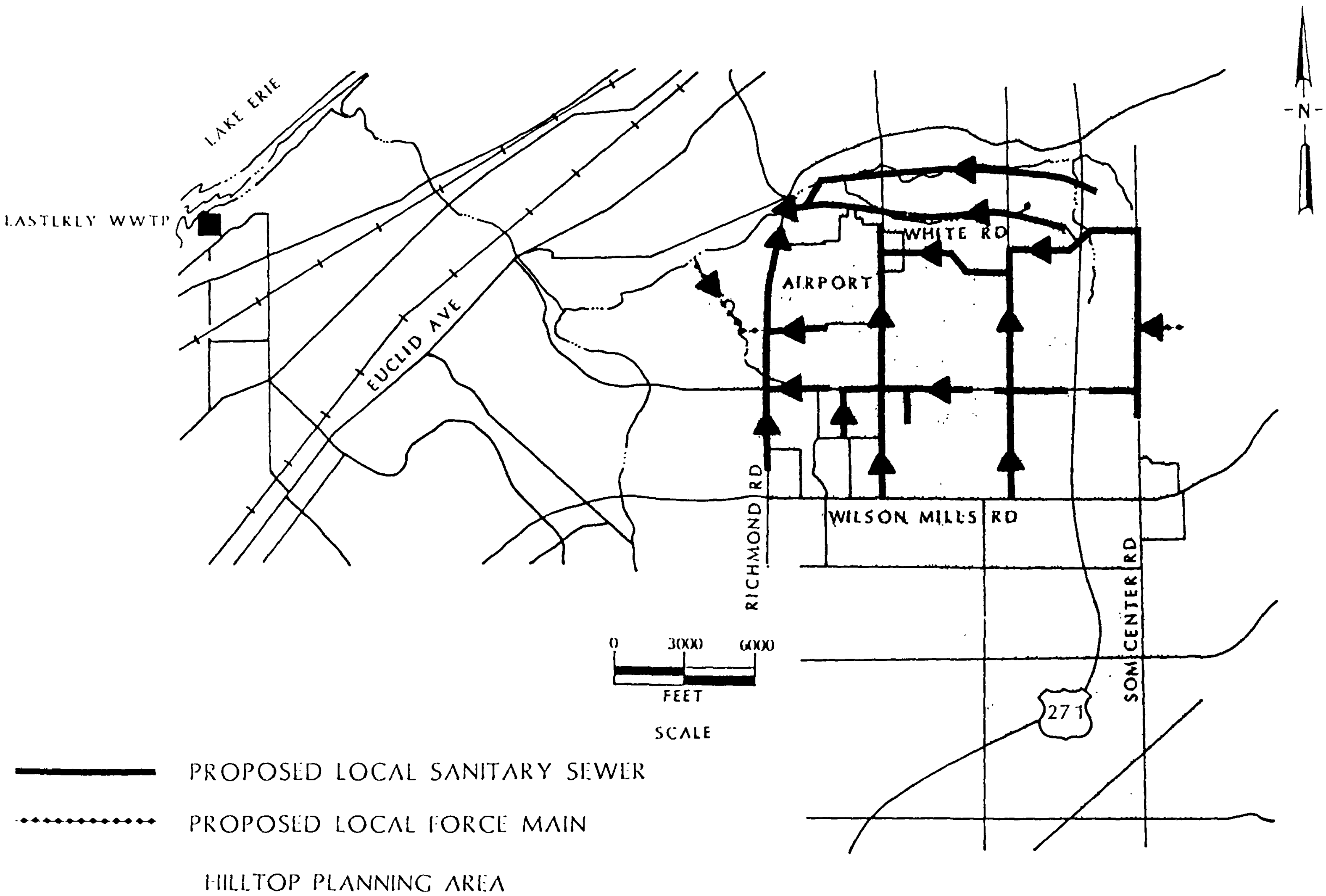


FIG: 5-6
EIS-3 LOCAL SEWERS

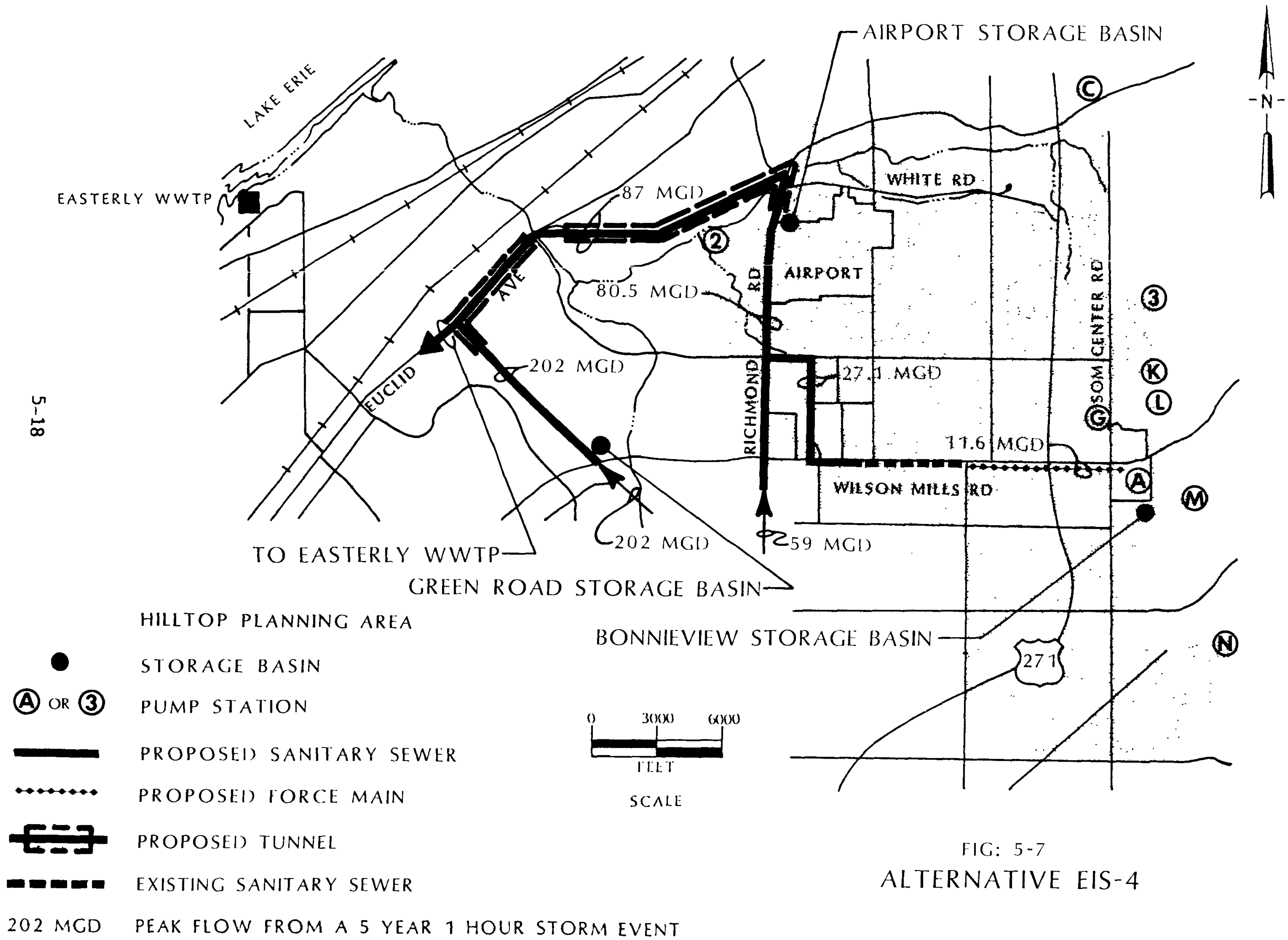


FIG: 5-7
ALTERNATIVE EIS-4

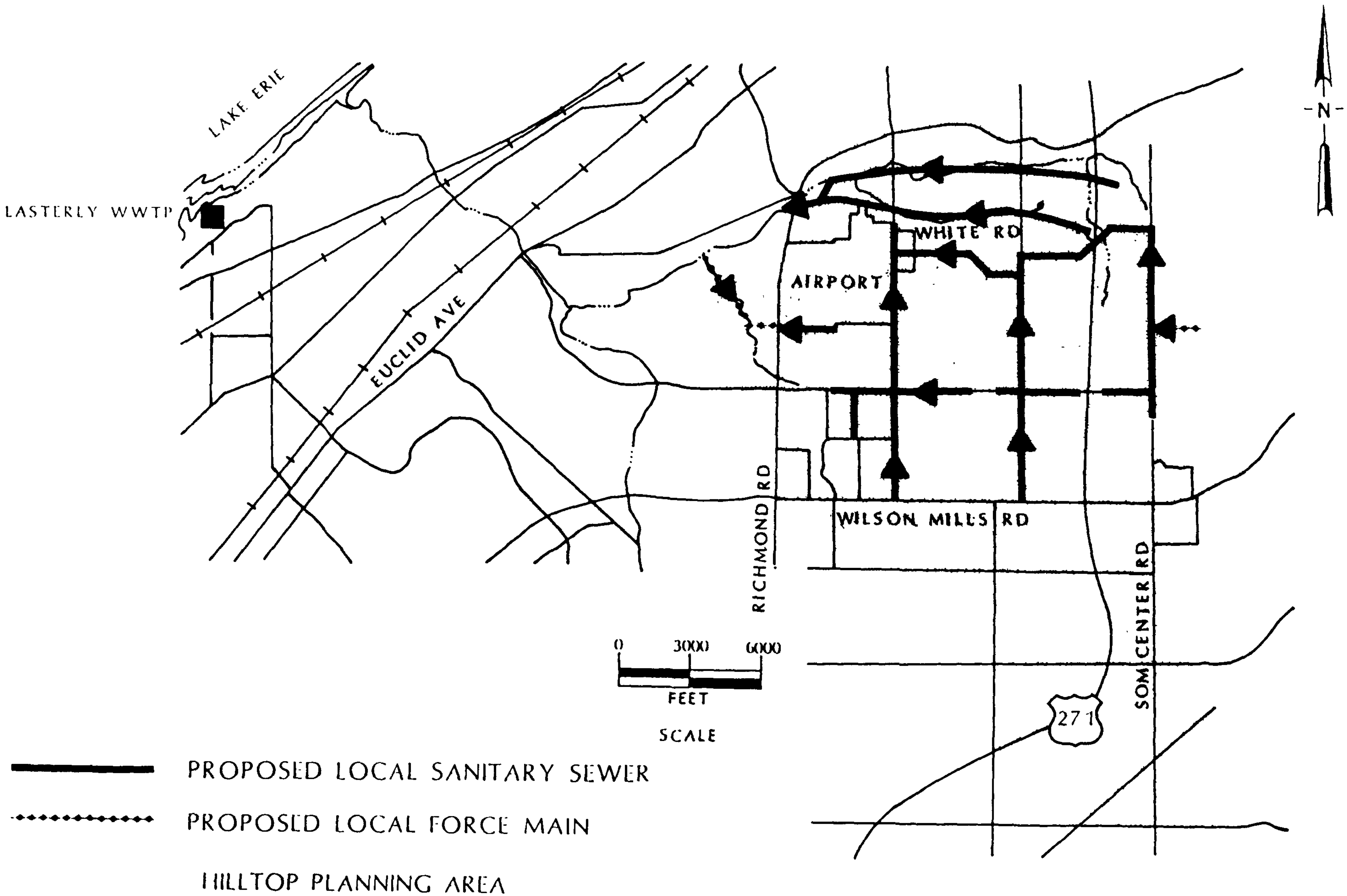


FIG: 5-8

EIS-4 LOCAL SEWERS

station, and then north to Highland Road. This 30" segment (open cut) will connect with a 42" gravity line along Richmond Road (open cut) which will continue north to Chardon Road. This 60" to 66" interceptor (tunnel) will follow Chardon Road and Euclid Road west to Green Road where another 60" spur will be added. The Chardon Road crossing of Euclid Creek will include several energy dissipating manholes and an open cut across the stream bed.

Scottish Highlands and Hickory Hills package plants will be replaced by pumping stations. The Scottish Highlands force main will tie directly into the interceptor, while Hickory Hills will require construction of local sewers before it can be connected. Several existing pumping stations will still be used with this alternative.

5.3 TECHNICAL ANALYSIS OF EIS ALTERNATIVES

This section presents a detailed evaluation of the four EIS alternatives regarding:

- Cost: Total present worth of the alternative over a 20-year period. This includes capital costs for materials and installation as well as operation and maintenance costs. A contingency factor of 15 percent was added to all capital cost estimates in Appendix F. A factor of 40 percent was used during the development of Environmental Assessment costs; this figure was found to be unreasonable by USEPA standards.
- Implementability: The relative difficulty to construct each alternative.
- Reliability: The dependability of each alternative with respect to system failures.
- Energy Use: An analysis of the energy requirements for each alternative.
- Feasibility: The ability of each alternative to convey the Hilltop waste load.

Several basic assumptions are common to all four alternatives. These assumptions include local sewers to serve ultimate future growth, local sewers to eliminate all onsite systems and small package plants, and interceptor capacity to handle wastewater flows from portions of the Belvoir area. A comparison of alternatives which summarizes the advantages and disadvantages of each EIS alternative is provided after the individual alternative discussions.

Local sewers have been included with all alternatives on the assumption that sufficient need exists. As previously discussed, the local sewers collect wastes from the unsewered areas and carry it to the main transport system. Local sewers were included based upon the following factors:

- Poor soils in the area
- The relative age of septic systems in the area (average age is 32 years)
- The fact that several construction projects have recently been rejected in the area because of poor soils and no sewer access.

Since actual documentation of problems with septic systems in the Hilltop area is not available, additional studies may be required to adequately define the extent of the problems.

Connection of the unsewered areas and future growth were both included in this analysis. The projected growth is expected to occur in the northern areas of the basin. Based on NOACA population figures and local community zoning reports, the addition of future growth will include about 2,460 residents and 1,038 commercial-industrial acres. About 5,960 existing unsewered residents and 132 existing unsewered commercial-industrial acres will also be included. This results in a total addition of 8,420 residents and 1,170 commerical industrial acres to the system and will result in a total peak flow rate of about 8.5 MGD (as projected by the NEORSD). Most of this flow will enter the system near the Cuyahoga County Airport.

Each alternative also includes the capacity to convey peak flow rates from the east Belvoir area (Anderson Road Diversion - 59 MGD) and the central Belvoir area (Green Road Segment - 202 MGD). These flows are a result of peak flow routing throughout the entire Easterly service area to reduce peak flow volumes at the Easterly Wastewater Treatment Plant (as described in Section 3.1.3.1).

5.3.1 EIS-1

This alternative is the previously recommended alternative from both the ESSSWFP (H-2B) and the Environmental Assessment (alternative 1), and was detailed in Section 5.2.1. As previously discussed, this alternative had been recommended with Bonnieview excluded. Since the route remains the same with Bonnieview included, this discussion section addresses the alternative both with Bonnieview included and excluded.

Cost

The total present worth of this alternative was calculated to be $64,378,915 as summarized in Appendix F. By including Bonnieview, the resultant total present worth is reduced by over $2,000,000 to $62,141,116. This cost reduction results from the decrease in pipe diameters and removal of the Airport storage basin. A summary of the costs for this alternative is included in Table 5-2.

Table 5-2. Alternative EIS-1 Cost Summary

	Without Bonnieview	With Bonnieview
Capital Costs		
Transport System	$60,426,240	$56,987,611
Local Sewers	13,340,385	13,340,385
Total	73,766,625	70,327,996
Annual O&M Costs		
Sewer Maintenance	66,100	66,100
Basin Maintenance	9,700	9,700
Power	49,600	49,600
Total	125,400	125,400
Present Worth		
Capital	72,900,517	70,150,591
O&M	1,266,327	1,266,327
Salvage	9,787,929	9,275,802
Net	64,378,915	62,141,116

Costs for this alternative include $10,681,946 of local sewer capital costs plus $2,658,439 of local sewers to remove Williamsburg pump station and Richmond Park, Scottish Highlands, and Hickory Hills treatment plants from service. Contract G (which will serve the central Belvoir area) has a capital cost of $8,395,683 and Contract H (which will serve the eastern Belvoir area) has a capital cost of $4,337,637. Both were included in the cost analysis.

Local sewer costs for this alternative are about $3,000,000 less than for the other EIS alternatives because many of the unsewered areas have direct access to the interceptor. Direct gravity access for the Richmond Park package plant and direct connection for the pumping stations at Scottish Highlands and Hickory Hills package plants is also possible with this route.

Implementability

Alternative EIS-1 would require substantial new construction which would make the system somewhat more difficult to implement than the other alternatives. Several segments require open-cut excavations of 20 or more feet in depth which would increase construction difficulty. Extensive sheeting and shoring may be required and could greatly increase the difficulties with this alternative. Shallow depth to bedrock has also been reported in the area and may create problems for deep excavations.

The open-cut crossing of Euclid Creek presents two construction problems. First, the river will need to be diverted in such a manner as to allow construction. Second, the steep river banks may make construction difficult.

Reliability

Because EIS-1 makes use of a minimum amount of mechanical equipment, the reliability of this alternative (with respect to mechanical failure) is very high. With the main flow volumes being transported by gravity, there is a limited possibility of breakdowns which would disrupt the proper transport of wastewater from the Hilltop area. Mechanical breakdowns are still a possibility with the small pumping stations that exist in this plan, but the major transport route would not be affected.

Energy Use

With no major pumping stations included with this option, EIS-1 would have a very low energy requirement. The small pumping stations that would still be used (Scottish Highlands, Hickory Hills, Suffolk Country Estates, Woods, and Thornapple) would account for some energy consumption. This alternative would have the lowest energy requirement of the EIS alternatives, estimated at $49,600 per year.

Feasibility

This alternative was designed to handle peak inflow volumes from a 5-year, 1-hour storm. With Bonnieview excluded, the interceptors must be much larger to handle the flow. By including Bonnieview as a storage tank, parts of the system can be reduced in size because Bonnieview will reduce the peak flow rate. Either system is capable of handling and transporting the wastewater to the Easterly plant. Other than the construction difficulties outlined in the implementability discussion, this system presents no significant design constraints.

5.3.2 EIS-2

As previously described in Section 5.2.2, EIS-2 is a combination gravity interceptor sewer and three major pump stations. This alternative is shown in Figure 5-3.

Cost

The total present worth of EIS-2 was calculated to be $47,818,377 as summarized in Appendix F. This value includes all costs for the extensive control system which was described earlier in this chapter. A summary of the costs for this alternative is included in Table 5-3.

Costs for this alternative include $16,008,346 for local sewers, which are also required to remove Scottish Highlands, Richmond Park, and Hickory Hills package plants and Richmond Mall, Franklin, and Williamsburg pumping stations. Capacity will also be available for connection of Pleasant Hill and Sleepy Hollow treatment plants.

In this alternative, the size of Contract G was increased from 60" and 66" (as required in Alternative EIS-1) to 66" and 78" to accept the flow from the Hilltop area.

Table 5-3. Alternative EIS-2 Cost Summary

Capital Costs	
Transport System	$31,008,399
Local Sewers	16,008,346
Total	47,016,745
Annual O&M Costs	
Sewer Maintenance	38,600
Power	192,900
Labor	463,000
Misc.	33,000
Total	727,500
Present Worth	
Capital	46,199,120
O&M	7,346,513
Salvage	5,727,256
Net	47,818,377

Implementability

Since structures already exist at Beech Hill and Wilson Mills pumping stations, little new construction will be required at these sites. In general, the depth of excavation for force main construction in this alternative does not present any unique implementability problems.

Some local sewer construction will be required before the package plants can be eliminated.

An aerial crossing will need to be constructed over Euclid Creek along Monticello Boulevard. A new pipe bridge will be constructed as described in Section 5.2.2, but does not present any implementation problems.

Reliability

With proper design, the reliability of this alternative will be very good. The entire system of pump stations will be controlled by one central computerized system. All monitoring and control may be done from one station. Additionally, controls will also be available for an onsite operator to control individual stations at each site.

The network can be set up so if a control problem occurs with one station, control will automatically be shifted to the onsite system. All pumps and level controls will continue to operate normally.

Sufficient pumping capacity will be provided so the major pump stations can handle design peak flow volumes with one pump out of service. This feature is included so pumps can be taken off line for routine maintenance without reducing the capacity of the station. The control system will also be designed to automatically shift service away from pumps which are not operating normally. Even with one problem pump, the system will still maintain sufficient capacity to handle design flows.

Several sources of backup power will also be provided. Separate power grids should be installed for the major pump stations. The twin power grids add another measure of reliability. If one grid should fail for any reason, the other grid will continue to operate the station. Also, onsite diesel generators were included with the major pump stations. The diesel generators will be equipped with automatic switching gears that will start the generator if there is a complete power failure and keep the station operating as designed.

With each of these design considerations, the reliability of Alternative EIS-2 is very good.

Energy Use

Because this alternative makes use of three major pumping stations, the energy requirements are the highest of the EIS alternatives. With a total pumping capacity of almost 50 MGD, the estimated yearly energy cost for Alternative EIS-2 is about $192,900 per year.

Feasibility

This alternative makes use of several existing facilities. Beech Hill and Wilson Mills pumping stations and the Bonnieview storage facility would be utilized (with upgrades). The new control system and pump capacities would make this system fully capable of transporting the design flow volumes.

This alternative does not present any unusual design considerations, with the exception of the Euclid Creek pipe bridge (Section 5.2.2). The aerial crossing is entirely feasible with proper design.

5.3.3 EIS-3

As previously described in Section 5.2.3, EIS-3 is a combination gravity interceptor sewer and two major pump stations. This alternative is shown in Figure 5-5.

Cost

The total present worth of EIS-3 was calculated to be $48,983,694 as summarized in Appendix F. The cost analysis includes all costs for the extensive control system which was previously described. A summary of the costs for this alternative are included in Table 5-4.

Local sewer costs of $16,008,346 were included with this alternative. Some local sewers are needed to remove Scottish Highlands, Richmond Park, and Hickory Hills package plants and Williamsburg, Franklin, and Richmond Mall pump stations from service. Capacity will also be available for connection of the Pleasant Hill and Sleepy Hollow treatment plants.

Contract G capacity will be increased from 60" and 66" to 66" and 78" as a result of this alternative.

Table 5-4. Alternative EIS-3 Cost Summary

Capital Costs	
Transport System	$34,221,255
Local Sewers	16,008,346
Total	50,229,601
Annual O&M Costs	
Sewer Maintenance	49,600
Power	176,400
Labor	330,700
Misc.	16,500
Total	573,200
Present Worth	
Capital	49,411,976
O&M	5,788,345
Salvage	6,216,627
Net	48,983,694

Implementability

No unique design considerations exist which would affect the implementability of this alternative. The facilities at Beech Hill will be upgraded, and will require no new construction. A tunnel will be needed for the gravity segment which will replace Wilson Mills pump station; however, this will not present significant implementation problems. In general, the depths of open-cut excavations are not excessive and should not present any problems.

Some local sewers will be required before the package plants will be eliminated. No significant implementation problems exist with the local sewer segments.

Reliability

As previously discussed under Alternative EIS-2, many control system options will be designed to provide reliable operation of the pump stations. Central control systems will allow monitoring and control of all stations from one remote point. The onsite controls and displays will also allow an operator to control the station.

Again, automatic controls will shift the control to the individual station if problems occur with the central system. All stations will remain operating normally.

Backup generator power and separate power grids will also be provided to prevent system failures. The automatic switching gear will start the diesel generator if a complete power failure should occur.

Historically, Wilson Mills has created the majority of problems with the existing system. EIS-3 removes this station from service with a gravity sewer, and consequently there is one less pump station to control.

Overall, with all the design considerations mentioned, the reliability of Alternative EIS-3 is very good.

Energy Use

Because this alternative also relies on pumping for a portion of the transport system, the energy requirements will also be high. With the exception of Alternative EIS-2, EIS-3 will require the largest amount of energy to operate the system. However, because of eliminating the largest of the pumping stations (Wilson Mills), the net energy requirement will be less than for Alternative EIS-2. The estimated annual energy cost for Alternative EIS-3 is $176,400 per year.

Feasibility

The system is designed to transport flow to the Easterly Wastewater Treatment Plant. The feasibility of this option is comparable to the other alternatives in that they all are essentially designed to handle a 5-year, 1-hour peak inflow rate.

The Euclid Creek aerial crossing does not present any major feasibility problems.

5.3.4 EIS-4

This alternative as previously discussed in Section 5.2.4 is a combination gravity interceptor sewer and one major pump station. This alternative is shown in Figure 5-7.

Cost

As detailed in Appendix F, the total present worth of EIS-4 was calculated to be $55,052,081. Because this system contains one major pump station, the control system previously described in this chapter was also included. A summary of the costs for this alternative are included in Table 5-5.

Table 5-5. Alternative EIS-4 Cost Summary

Capital Costs	
Transport System	$47,319,588
Local Sewers	13,590,490
Total	60,910,078
Annual O&M Costs	
Sewer Maintenance	85,400
Power	92,000
Labor	103,400
Misc.	5,500
Total	286,300
Present Worth	
Capital	60,172,405
O&M	2,891,143
Salvage	8,011,467
Net	55,052,081

Costs for this alternative include $13,590,490 of local sewer costs. Scottish Highland's new pumping station and the Richmond Park gravity system will have direct access to the main interceptor. Local sewer access will be needed before Hickory Hills, Sleepy Hollow, and Pleasant Hill can be removed from service.

The capacity of Contract G for this alternative was not increased as a result of Hilltop flow; however, $8,395,683 were included in the Hilltop costs for comparison to the other alternatives.

Implementability

Some of the same implementation concerns exist with this alternative as were discussed in Alternative EIS-1. Several segments require deep excavation for open cut. Substantial sheeting and shoring may be required, and the shallow depth to bedrock may present some construction limitations.

The open-cut crossing of Euclid Creek also presents other implementation problems. The steep walls may present construction problems, and combined with diverting the stream, construction of this segment may be difficult.

Reliability

The expanded control system for the remaining pump station will provide reliable operation. With the exception of several small pump stations, the rest of the system flows by gravity. This presents little chance for mechanical failure. Breakdown of the remaining small pumping stations may still be a possibility; however, major transportation will not be inhibited.

Energy Use

With only one major pumping station included with this option, EIS-4 has a relatively low energy requirement. The estimated energy cost for this alternative is about $92,000 per year.

Feasibility

As with the other alternatives, this system is also feasible for transporting flow to the Easterly Wastewater Treatment Plant. Other than the difficulties outlined in the implementability section, this system presents no significant design problems.

5.3.5 Comparison of Alternatives

This section summarizes the previous discussion for each alternative and compares alternatives for each evaluation criteria.

Cost

The costs presented in the previous discussions are summarized in Table 5-6. As shown EIS-2 has the lowest total present worth of $47,818,377. EIS-3 has a total present worth of $48,983,694 which is approximately 2 percent greater than the EIS-2 value. Alternative EIS-1 has the highest total present worth of $64,378,915 without Bonnieview and $62,141,116 with Bonnieview. Respectively, these costs are 35 percent and 30 percent greater than the least cost alternative (EIS-2). EIS-4 has a total present worth which is about 15 percent greater than the least cost alternative.

Implementability

The alternatives that require open-cut construction across Euclid Creek (EIS-1 and EIS-4) present some very unique construction problems and would probably be more difficult to implement than EIS-2 and EIS-3. These same alternatives also have several segments that require deep (greater than 20 feet) open-cut construction which may also present implementation problems because of the sheeting and shoring required and also the excavation problems of the bedrock.

Alternatives EIS-2 and EIS-3 present less implementation problems than EIS-1 and EIS-4; however, the Euclid Creek aerial crossing will be needed. With proper design of this crossing, few implementation problems should be encountered.

Reliability

Extensive control systems have been designed into Alternatives EIS-2, EIS-3, and EIS-4 to provide good reliability for these options. This control system is designed with the ability to monitor and control the system from one central location as well as onsite. Separate power grids and backup diesel generators will be provided to prevent shutdown from power failures. With these control features, the reliability of these alternatives is very high.

Although Alternative EIS-1 provides main transport by a gravity system, it does utilize pump stations. Several small pump stations will remain in service, and new stations will be added at Scottish Highlands and Hickory Hills.

With proper design considerations, the overall reliability of all the alternatives is relatively good.

Energy Use

Of the EIS alternatives, EIS-1 had the lowest energy costs at $49,600 per year. As would be expected, the alternatives that include the use of major pump stations would have higher energy costs. EIS-4 had an energy cost of $92,000 per year. The two least cost alternatives from a construction and O&M perspective, EIS-2 and EIS-3, had energy costs of $192,900 and $176,400 respectively per year.

Table 5-6. Cost Analysis**

	EIS-1 (Without Bonnieview)	EIS-1 (With Bonnieview)	EIS-2	EIS-3	EIS-4
Capital Present Worth	$72,900,517	$70,150,591	$46,199,120	$49,411,976	$60,172,405
Operation and Maintenance Present Worth	1,266,327	1,266,327	7,346,513	5,788,345	2,891,143
Salvage Present Worth	9,787,929	9,275,802	5,727,256	6,216,627	8,011,467
EIS Total Present Worth*	$64,378,915	$62,141,116	$47,818,377	$48,983,694	$55,052,081

*The western portion of Contract 4 from Green Road to Ivanhoe (renamed Contract 3) is not included in the EIS cost analysis as it was in the Environmental Assessment. These costs include Contract G costs, local sewer costs, and capacity for projected future flow volumes.

**The Chapter 5 analysis of alternatives includes the total costs for Contract G for each alternative. Since Contract G was already approved in a FNSI for the Heights FPA, only the incremental costs of sizing the segment, beyond the previously approved sizing for conveying flows from the Heights area, were included in the Chapter 7 user cost analysis.

Feasibility

Each system as designed has the feasibility to effectively transport wastewater to the Easterly Wastewater Treatment Plant. Since no significant advantages exist for any of the alternatives in this category, no comparisons can be made.

CHAPTER 6. ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

6.1 PRIMARY IMPACTS

6.1.1 Air Quality/Noise/Odors

6.1.1.1 Air Quality

Construction of any of the proposed alternatives will result in some temporary degradation of air quality. These impacts are considered short-term, even though construction is expected to occur during an extended period (through 1997). A primary impact will be the generation of fugitive dust from construction activities. Disturbance of land areas associated with the construction of interceptors, via tunneling or open-cut trenches, and storage basins will generate fugitive dust. Impacts will be mitigated through watering, the rapid covering and seeding of disturbed areas, and other measures as described below and in Section 6.3.1 (OEPA 1985a). In addition, demolition of the pump stations (under Alternatives EIS-1, EIS-3, and EIS-4) will generate localized, short-term dust and noise impacts.

Dust should be controlled by wetting down construction sites as necessary. Piles of excavation spoils, potentially blown about by the wind, should not be allowed to accumulate. Such material should be immediately removed from the construction site and disposed of at approved sites in accordance with local regulations. Blasting should be used only when rocky conditions make it necessary.

Interceptor construction along road right-of-ways will result in extensive, short-term disruption of traffic flow along affected thoroughfares and residential streets. As a combined result of construction equipment and traffic congestion, localized pockets of exhaust-related air pollution will occur, associated with increased levels of oxides of nitrogen, hydrocarbons, and carbon monoxide. This impact will be minimized, to the extent possible, through planned rerouting of traffic. Implementation of any of the proposed alternatives will not contribute directly to any increase in air emissions during project operation.

6.1.1.2 Noise

Noise levels in the area will increase during construction activities. However, project construction specifications will include provisions for minimizing these short-term impacts. In accordance with standard practice, all construction activities will be performed during regular working hours and all vehicles will be equipped with mufflers (Bonk 1987). In addition, noise barriers should be used around sites where required by local authorities.

6.1.1.3 Odors

Wet weather sanitary sewer overflows to storm sewers and small streams have been identified as a severe problem. Dry weather overflows have also been identified to be a problem in certain portions of the area with severe capacity problems (OEPA 1985a). Various combinations of pumping station overflows and small package plant discharges are eliminated under the four action alternatives (see Chapter 5), which will relieve the nuisance of such sewage overflows to creeks that, among other detriments to the environment, contribute to ambient odors. No new discharges to area streams will result from any of the alternatives.

6.1.2 Soils

As described in Chapter 4, soils in the Hilltop Facility Planning Area (FPA) are generally characterized as having slow permeability, low strength, and high corrosivity (USDA 1980). In addition, a perched seasonal high water table is present in much of the FPA. Construction activities under all four of the action alternatives will result in erosion and subsequent sedimentation in area drainageways and streams. Erosion potential will be greatest during the spring when rainfall is heaviest and the groundwater tables are highest. Erosion and sedimentation impacts should be mitigated by the following techniques:

- Permanent erosion control structures, such as rip-rap or rock fill, should be incorporated into the site design where appropriate.
- The contractor should grade, fertilize, seed, and mulch areas as called for on the plans or as directed by the engineer.
- The contractor should provide for temporary seeding or sodding as called for on the plans or as directed by the engineer.

Well-planned construction phasing takes into consideration the adverse effects on construction sites in which work will be left partially completed while construction continues elsewhere. These situations usually result from attempts to reduce costs of mobilizing earth moving equipment by clearing all the area at once. Under such circumstances the savings are often obliterated by increased costs generated by erosion and sedimentation. In this case, such a policy would result in an increased load of sediments and pollutants washed into surface waters. A preferred phasing policy would call for completion of all necessary construction in a section before proceeding to the next section. This will prove more expensive in short-term costs, but environmentally advantageous in the long-term.

Soils in the Hilltop FPA are highly acidic and have caused corrosion of conventional construction sewer materials in existing sewer lines. This has resulted in the release of pollutants from broken lines and contributes to a serious problem of high wet weather inflow of groundwater to area sewers. Corrosion-resistant materials or coatings would aid in protecting against such occurrences in the future.

The high groundwater table in the FPA also causes a significant frost heave problem. Frost heave causes major difficulties for surface facilities such as roadways, but can be addressed during design especially if the sewer lines are suitably deep.

Potential soil impacts for the four action alternatives are presented in Tables 6-1 through 6-4. In all cases a detailed sediment and erosion control plan should be prepared and followed during construction to minimize impacts. Soil-related impacts of the "no action" alternative will be the most severe. Under the no-action alternative onsite disposal of wastewater using septic tanks and leach fields will continue in much of the FPA. Due to slow permeability and wetness, soils in the Hilltop area are severely limited for use with septic systems, and area systems have a history of problems. Based on a recent memo from Havens and Emerson to NEORSD, 75 percent of the Lake County portion of the FPA and over 80 percent of the Cuyahoga County portion of the FPA use substandard septic tanks (Hudson 1985a). The insufficiently treated waste often discharges into roadside ditches, storm sewers, and streams causing a health hazard to nearby residents.

Table 6-1. Soils Impacts of Alternative EIS-1

Location	Item Description	Construction Method	Soil Description	Potential Impacts	Mitigation Measures
Airport	Storage Basin	- -	Mitiwanga o high water table o Shallow bedrock o low strength o slow permeability o corrosive o poorly drained o frost heave	Erosion during construction	Control runon/ runoff
Green Road	Storage Basin	- -	Mitiwanga	Erosion during construction	Control runon/ runoff
Euclid Ave.	Sanitary Sewer	Tunnel	Loudonville o high erosion o rapid runoff o moderate perm. o shallow bedrock o corrosive o low strength	Erosion/seepage during construction Corrosion of pipe	Lower water table during construction Use corrosion-resistant materials
Chardon Road	Sanitary Sewer	Tunnel open cut	Allis silt o poorly drained o high water table o slow permeability o shallow bedrock o corrosive o low strength o mod. frost heave	Erosion/seepage during construction Corrosion of pipe	Lower water table during construction Use corrosion-resistant materials
Cuyahoga County/ Lake County Line	Sanitary Sewer	Open cut	Darien silt loam o high water table o slow permeability o slightly corrosive o frost heave	Erosion during construction Cracking due to frost heave	Control runon/ runoff Design for frost heave

Table 6-1. Soils Impacts of Alternative EIS-1 (Continued)

Location	Item Description	Construction Method	Soil Description	Potential Impacts	Mitigation Measures
Euclid Ave. to Monticello Blvd.	Sanitary Sewer	Tunnel open cut	Mitiwanga o poorly drained o high water table o slow permeability o shallow bedrock o corrosive o low strength o frost heave	Erosion/seepage during construction Cracking due to frost heave Corrosion of pipe	Lower water table during construction Control runon/ runoff Design for frost heave Use corrosion-resistant materials
Between Bishop and Richmond	Local Sanitary Sewers	Open cut	Mitiwanga		
Along Center Rd.	Sanitary Sewer	Open cut	Mitiwanga		

Source: USDA 1979, 1980

Table 6-2. Soils Impacts of Alternative EIS-2

Location	Item Description	Construction Method	Soil Description	Potential Impacts	Mitigation Measures
Green Road	Storage Basin	- -	Mitiwanga o high water table o Shallow bedrock o low strength o slow permeability o corrosive o poorly drained o frost heave	Erosion during construction	Control runon/ runoff
Richmond Road and White Road	Pump Station	- -	Mitiwanga	Erosion during construction	Control runon/ runoff
Wilson Mills Rd. and Center Rd.	Pump Station	- -	Loudonville o high erosion o rapid runoff o moderate perm. o shallow bedrock o corrosive o low strength	Erosion during construction	Control runon/ runoff
Euclid Ave. to Monticello Blvd. along Green Road	Sanitary Sewer	Tunnel open cut	Mitiwanga	Erosion/seepage during construction Cracking due to frost heave Corrosion of pipe	Lower water table during construction Control runon/ runoff Design for frost heave Use corrosion-resistant materials

Table 6-2. Soils Impacts of Alternative EIS-2 (continued)

Location	Item Description	Construction Method	Soil Description	Potential Impacts	Mitigation Measures
Wilson Mills Rd. between Miner Rd. and Route 271	Force Main	Open cut	Ellsworth o moderately drained o high water table o slow permeability o steep slopes o corrosive o frost heave	Erosion during construction Cracking due to frost heave Corrosion of pipe	Control runon/ runoff Design for frost heave Use corrosion-resistant materials
Wilson Mills Rd. between Route 271 and pumping station	Force Main	Open cut	Loudonville		
Monticello Blvd.	Sanitary Sewer	Open cut	Mitiwanga		
Richmond Road	Force Main	Open cut	Mitiwanga		

Source: USDA 1979, 1980

Table 6-3. Soils Impacts of Alternative EIS-3

Location	Item Description	Construction Method	Soil Description	Potential Impacts	Mitigation Measures
Green Road	Storage Basin	- -	Mitiwanga o high water table o Shallow bedrock o low strength o slow permeability o corrosive o poorly drained o frost heave	Erosion during construction	Control runon/ runoff
Richmond Road and White Road	Pump Station	- -	Mitiwanga	Erosion during construction	Control runon/ runoff
Euclid Ave. to Monticello Blvd. along Green Road	Sanitary Sewer	Tunnel open cut	Mitiwanga	Erosion/seepage during construction	Lower water table during construction
				Cracking due to frost heave	Control runon/ runoff
				Corrosion of pipe	Design for frost heave
					Use corrosion-resistant materials
Wilson Mills Rd. between Miner Rd. and pumping station	Force Main	Open cut	Ellsworth o moderately drained o high water table o slow permeability o steep slopes o corrosive o frost heave	Erosion during construction	Control runon/ runoff
				Cracking due to frost heave	Design for frost heave
				Corrosion of pipe	Use corrosion-resistant materials

Table 6-3. Soils Impacts of Alternative EIS-3 (Continued)

Location	Item Description	Construction Method	Soil Description	Potential Impacts	Mitigation Measures
Wilson Mills Rd. between Richmond and Bishop Rd.	Sanitary Sewer	Tunnel	Mitiwanga		
Monticello Blvd.	Sanitary Sewer	Open cut	Mitiwanga		
Richmond Road	Force Main	Open cut	Mitiwanga		

Source: USDA 1979, 1980

Table 6-4. Soils Impacts of Alternative EIS-4

Location	Item Description	Construction Method	Soil Description	Potential Impacts	Mitigation Measures
Airport	Storage Basin	- -	Mitivanga o high water table o Shallow bedrock o low strength o slow permeability o corrosive o poorly drained o frost heave	Erosion during construction	Control runon/ runoff
Euclid Ave.	Sanitary Sewer	Tunnel	Loudonville o high erosion o rapid runoff o moderate perm. o shallow bedrock o corrosive o low strength	Erosion/seepage during construction Corrosion of pipe	Lower water table during construction Use corrosion-resistant materials
Chardon Road	Sanitary Sewer	Tunnel open cut	Allis silt o poorly drained o high water table o slow permeability o shallow bedrock o corrosive o low strength o mod. frost heave	Erosion/seepage during construction Corrosion of pipe	Lower water table during construction Use corrosion-resistant materials Control runon/ runoff

Table 6-4. Soils Impacts of Alternative EIS-4 (Continued)

Location	Item Description	Construction Method	Soil Description	Potential Impacts	Mitigation Measures
Richmond Road	Sanitary Sewer	Open cut	Mitiwanga	Erosion/seepage during construction Corrosion of pipe Cracking due to frost heave	Lower water table during construction Use corrosion-resistant materials Control runon/runoff Design for frost heave
Between Bishop and Richmond	Local Sanitary Sewers	Open cut	Mitiwanga		
Wilson Mills Rd. Between Miner Rd. and pumping station	Force Main	Open cut	Ellsworth o moderately drained o high water table o slow permeability o steep slopes o corrosive o frost heave	Erosion during construction Cracking due to frost heave Corrosion of pipe	Control runon/runoff Design for frost heave Use corrosion-resistant materials

Source: USDA 1979, 1980

Though current standards for installation of new septic leach fields are sufficient to prevent the installation of inadequate systems, Hudson (1985a) estimated that close to two thousand existing homes rely on inadequate septic systems. In addition, current standards have resulted in some construction projects being denied permits for installation of septic systems because of poor soils. The installation of sanitary sewers would greatly relieve the burden on area soils and water resources presently posed by septic systems.

6.1.3 Surface Water

The Hilltop interceptor project, regardless of which of the four action alternatives is selected, should result in a net improvement of water quality in Euclid Creek and the Chagrin River. Each of the collection systems proposed under the four system alternatives will remove three existing waste discharges from the Euclid Creek drainage area--the Richmond Park, Scottish Highlands, and Pleasant Hills wastewater treatment plants. Two discharges will be eliminated from the Chagrin River--the Hickory Hills and Sleepy Hollow plants. These package treatment plants are reported to have a poor history of operation and maintenance (USEPA 1984d), and their removal should enhance existing conditions in the rivers, at least in the vicinity of the discharges.

The four system alternatives involve different alignments of collection systems and require different combinations of pump stations and holding basins. If properly operated and maintained, the pump stations should not impact surface waters.

Adverse water quality impacts resulting from the four alternatives should be temporary, associated with short-term runoff of sediment and attached pollutants from construction activities (see Section 6.1.2). The alternatives all involve crossings of Euclid Creek. These crossings will have the most severe potential impact on water quality and will be discussed in more detail below. Some additional impact to surface waters will occur from the overall construction of sewer lines in the Euclid and Chagrin River drainage areas. Construction of sewer lines in the road right-of-ways will result in sediment runoff that will flow into roadside drainageways and into local streams. The potential adverse impacts resulting from this sewer construction include some nutrient and other pollutant inputs to the Euclid watershed.

The proposed alignments of the regional sewers involve numerous potential crossings of Euclid Creek, its tributaries and Chagrin River tributaries (see Figures 5-1 through 5-8). There are three major Euclid Creek crossings impacting large, significant stream segments. These are: (1) Euclid Avenue west of its intersection with Chardon Road (EIS-1 and EIS-4), (2) Monticello Boulevard east of Green Road (EIS-2 and EIS-3), and (3) Richmond Road near White and Chardon Roads (EIS-1 and EIS-4). Approximately twelve additional crossings of small tributary streams are also included in the four alternatives for regional sewer construction. The location of all stream crossings proposed in the four alternatives are shown in Figure 6-1.

The Euclid Avenue crossing of Euclid Creek (Stream Crossing 1, Figure 6-1) proposed for Alternatives EIS-1 and EIS-4 is planned as an open-cut trench across the river. It is likely that this open-cut trench will cause negative impacts on water quality in Euclid Creek during its construction. The stream is large at this site, and the construction will necessitate temporary diversion of the river. Impacts will result from cofferdam installation and removal, trench excavation, laying of the pipe, backfilling, and final restoration of the stream channel. The pipe crossing can be dewatered and installation can be performed within cofferdams, thus significantly reducing sediment inputs and associated turbidity and water quality degradation. The environmental impacts of open-cut trench construction should be minimal if it is accomplished quickly and if there are no heavy rains. Installation of pipes across Euclid Creek should be scheduled during periods of low flow (during the late summer) to reduce potential sediment resuspension and associated adverse water quality impacts.

The Monticello Boulevard crossing of Euclid Creek (Stream Crossing 2, Figure 6-1) is part of Alternatives EIS-2 and EIS-3. It is planned as a free standing pipe bridge next to the existing road bridge. Adverse impacts to water quality could occur if the new structure requires construction in the waterway (e.g. abutments). However, this will not be decided until the designs are finalized. These impacts can be minimized by following the same recommendations stated for the open-trench construction.

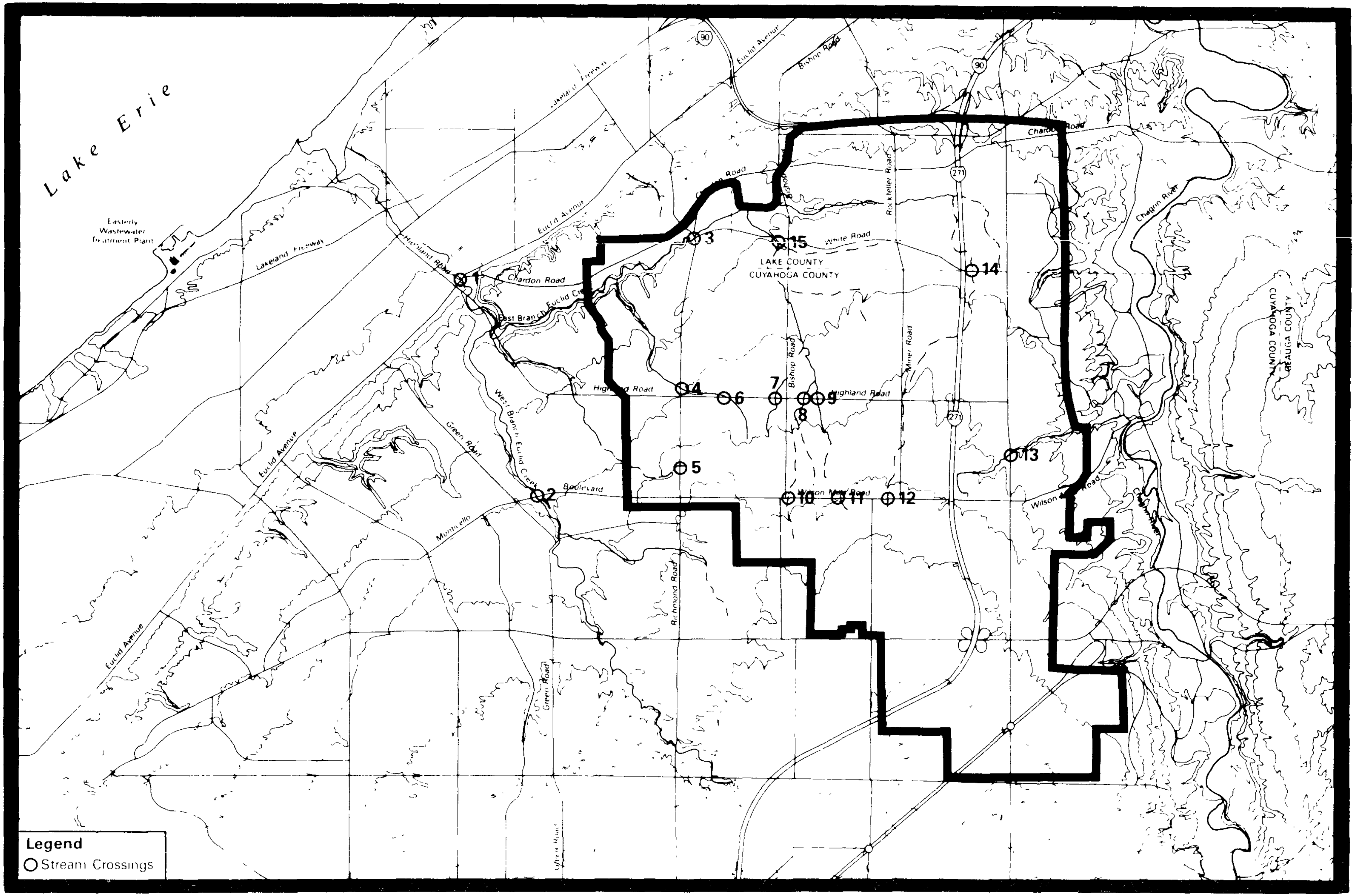


Figure 6-1. Locations of Stream Crossings by Proposed Regional Sewers in the Hilltop Facility Planning Area

Diversion of half of the creek at a time would be the preferred method for crossing Euclid Creek with a pipe bridge. This would entail building an embankment completely around the construction and forming a channel for half of the river width at a time. Both the building of the embankment and the channelization of the stream would cause some increase in erosion and turbidity in the stream. This would in turn cause some detrimental impacts on downstream aquatic life. These impacts should be mitigated by constructing the embankments and bridge during low flow period, and by constructing downstream sediment traps as necessary. Care should be taken following construction to properly remove temporary embankments and sediment traps so as not to cause further sedimentation, to stabilize and restore stream banks with rip rap, and tor return the stream bottom to its original condition.

The northernmost Richmond Road crossing (Stream Crossing 3, Figure 6-1) is proposed in Alternatives EIS-1 and EIS-4. For both alternatives, the pipe will be laid in a tunnel below the creekbed. If adequately mitigated, this crossing should have little impact on surface water quality.

For all the alternatives under consideration, interceptor lines will be laid along Richmond Road between White Road and Wilson Mills Road. This section of road crosses two small Euclid Creek tributaries. Just north of Highland Road, near Highland High School, Richmond Road crosses a tributary of Mayfair Lake (Stream Crossing 4, Figure 6-1). According to Havens and Emerson (1986), the creek at this site is about 4-feet wide and visibly degraded. Additional sediment inputs from interceptor construction will certainly contribute to the water quality problems at this site. Richmond Road also crosses a small creek 1,800 feet north of Wilson Mills Road (Stream Crossing 5, Figure 6-1). Havens and Emerson (1986) describe this creek as "...about 2 1/2 feet wide in this area and...the first reach of the creek that is unculverted. The creek at this point drains the entire Richmond Mall parking area. The water quality is poor and there are visible sign(s) of oil pollution." This crossing will be an open cut for all alternatives. Sediment input from the construction could further degrade the stream.

Interceptor lines will follow Highland Road between Richmond Road and the Williamsburg pump station for Alternatives EIS-1 and EIS-4. This section will be constructed in an open trench. Highland Road makes four minor stream crossings along this reach. The first Highland Road crossing (Stream Crossing 6, Figure 6-1) is described by Havens and Emerson (1986) as "...located 250 feet east of Meadland Drive. This is Franklin Road Creek, which is heavily polluted with sanitary waste." About 500 feet west of Bishop Road, Highland Road crosses "...a very small tributary to the Bishop Road Creek. It is dry most of the year and only receives flow during heavy rainfall or snow-melt" (Havens and Emerson 1986). This is Stream Crossing 7 in Figure 6-1. Two additional Bishop Road Creek tributaries are crossed by Highland Road (Stream Crossings 8 and 9, Figure 6-1). According to Havens and Emerson (1986), "they are both small tributaries to the Bishop Road Creek and are culverted under Highland Road. Both creeks appear polluted from undefined sanitary waste. The creek farthest east receives flow from the Williamsburg pumping station overflow." Impacts from the interceptor construction at Stream Crossings 7, 8, and 9 should be minimal since the streams are quite small. Sediment inputs at Stream Crossing 6 will eventually settle in Mayfair Lake.

Alternatives EIS-2, EIS-3, and EIS-4 include interceptors along Wilson Mills Road between SOM Center Road and Bishop Road. This section of road makes three or four minor stream crossings of headwater tributaries of the north branch of Euclid Creek (Stream Crossings 10, 11, and 12, Figure 6-1). Impacts of these crossings on water quality should be minimal.

The portion of SOM Center Road included in the FPA lies in the Chagrin River drainage area. Interceptor lines along SOM Center Road planned for Alternative EIS-1 will cross a small creek about 2,500 feet north of Wilson Mills Road (Stream Crossing 13, Figure 6-1). According to Havens and Emerson (1986), "the creek is about 3 feet wide in this reach and is considered to have poor water quality." Lines planned for SOM Center Road under EIS-1 will cross a second Chagrin River tributary. Havens and Emerson (1986) describe this crossing as "...Parkview Golf Course Creek located 2,800 feet south of White Road. The creek is about 3 feet wide, culverted, and moderately polluted." Impacts from these crossings should be negligible.

The northern cross-country interceptor line proposed under EIS-1 will make two stream crossings (Stream Crossings 14 and 15, Figure 6-1). According to Havens and Emerson (1986), "the Miner Road Creek crossing is located about 250 feet east of I-271. The creek at this point is about 5 feet wide, has many shallow pools, and appears relatively clean. The Bishop Road Creek crossing is directly north of the Cuyahoga County Airport. It is about 4 feet wide and is relatively clean." Sediment impacts to these streams may have significant affects on existing biota since the streams are currently relatively undisturbed.

For all stream crossings, potentially erodible bank-cuts should be stabilized to prevent erosion. Also, even if the abutments are located outside the creek, construction materials (e.g. excavation, backfill, cement) for any new bridge structures should be kept out of the waterway.

Permits for all or some of the stream crossings may be required from the U.S. Army Corps of Engineers pursuant to Section 10 (Rivers and Harbors Act of 1899) and/or Section 404 of the Clean Water Act (PL 95-217).

6.1.4 Floodplains

Floods with an expected 100-year return interval do not presently inundate existing wastewater treatment facilities within the FPA (see Figure 4-3b). None of the storage basins or pump stations proposed in the EIS alternatives occur in the 100-year floodplain.

Minimal and temporary encroachment into the floodplain will occur with the construction of sewer line stream crossings. These activities will require varied amounts of excavation and backfilling with the proposed restoration of the streambed and streambanks. Although U.S. Army Corps of Engineers Section 404 permits may be required for these activities, no determination can be made until final engineering plans are prepared. General permits will cover filling activities that utilize less than 10 cubic yards of fill. Larger filling projects require individual 404 permits. No serious upstream flood flow or level impacts are anticipated to result from implementation of any of the proposed alternatives.

6.1.5 Aquatic Biota

The existing data reviewed in Chapter 4 on the aquatic biota of Euclid Creek suggest that the system is already stressed. The creek's low species diversity and faunal composition characterized by pollution-tolerant species are typical of poor quality streams. There are no known Federal or State endangered species in Euclid Creek (Jones 1986).

Sediment introduced to the stream by sewer line construction adjacent to stream drainageways under all the proposed alternatives (see Section 6.1.3) will further degrade the available habitat for benthic fauna. Impacts can be minimized by the implementation of proper mitigative measures during construction activities. Since disturbed areas will recolonize after construction has ceased, overall impacts to aquatic biota for all the alternatives will be minimal (Jones 1986).

The open-cut stream crossing of Euclid Creek at Euclid Avenue (proposed for Alternatives EIS-1 and EIS-4) and the numerous minor open-cut crossings of Euclid Creek tributaries and Chagrin River tributaries (see Section 6.1.3) will have direct impacts on stream biota. Habitat will be lost and organisms buried during the excavation and filling of the stream bed. Sediment released from the construction site will cause increased turbidity in the stream and will cover bottom habitats, at least temporarily. The benthic community will recolonize the disturbed areas after construction activities have ceased. The damage to benthic fauna can be minimized by performing as much work as possible in the dry part of the year (see Section 6.1.3) to reduce sediment resuspension. Impacts to fish species should be temporary and minimal since they are mobile and can leave the impacted area during construction. To further reduce potential adverse impacts, construction activities in the waterway should be scheduled to avoid the spawning periods for the fish species present.

The bridge crossing of Euclid Creek proposed for Monticello Boulevard east of Green Road (Alternatives EIS-2 and EIS-3) will have some impact on aquatic biota. Construction of abutments in the waterway, if required in the final engineering plans, will impact benthic organisms by destroying available habitat. Sediment from the construction activities will also smother sections of habitat, but sediment runoff can be minimized by employing proper sediment erosion control measures. Runoff can also be minimized by performing the construction quickly during dry weather periods.

The tunneled crossing of Euclid Creek at Richmond Road near White and Chardon Roads (Alternatives EIS-1 and EIS-4) should have no impact on aquatic biota.

No significant, adverse long-term effects to aquatic biota would be expected during normal operation of the collection systems proposed for the Hilltop area. The system should improve water quality, potentially encouraging the reintroduction of more pollution-intolerant species. Benthic fauna may increase in diversity and conditions may be favorable for achieving and maintaining a trout stock program in Euclid Creek (Hillman 1986). Due to the high reliability of the pump station design criteria (see Chapter 5), no impacts to aquatic biota are anticipated from pump station operation.

6.1.6 Terrestrial Biota

Construction activities associated with the various components of the proposed alternatives (see Chapter 5) could impact wildlife and vegetation. The placement of sewer lines, construction on and around pumping stations, and construction of new holding basins will potentially disrupt existing biota, at least for some period of time. Noise from construction equipment will likely cause a temporary displacement of most vertebrate species. No adverse impacts on Federal- and State-listed threatened and endangered species are anticipated to occur from the proposed work. No significant impacts are expected in ravine habitat areas. Spoils from tunneling will be disposed of in local landfills; responsibility will be conveyed to the tunneling contractor. Detailed impacts of the various proposed construction activities are described below.

Some of the alternatives proposed for the Hilltop collection system include new storage basins. The 0.75 MGD Airport storage basin is included in plans for Alternatives EIS-1 and EIS-4. It will be located north of the airport and just south of the intersection of the cross-country pipeline and the Richmond Road line. The Green Road storage basin will be located on Green Road near its intersection with Wilson Mills Road. It is included in all of the EIS alternatives. These storage areas will be underground, but their initial construction will disrupt some commercial land, probably causing the temporary loss of some grassy areas.

All proposed conveyance lines for Alternatives EIS-2, EIS-3, and EIS-4 are located parallel or contiguous to existing road right-of-ways. Construction of these lines should have a minimal impact on terrestrial biota. Some roadside vegetation may be removed during construction along rural roads and shoulders.

The proposed northern interceptor for Alternative EIS-1 (the cross-country line) will be constructed just north of Cuyahoga Airport, crossing one of the few remaining large, undeveloped areas within the FPA. Alignments through this area will disrupt a strip approximately 20- to 40-feet wide. Displacement of most animals in this section would be temporary, coinciding with the duration of the construction. No known endangered plant species will be affected by construction; however, terrestrial communities will suffer some negative impacts. Natural habitat, including grassland, old field, brushland, and forested wetland and upland, would be affected by construction of this sewer segment. Generally, construction in these habitat types will not create serious long-term negative impacts because similar habitat is located nearby (Havens and Emerson 1986). Construction impacts in areas covered by mature forest will be locally significant because mature forests are not abundant in Cuyahoga County and are not quickly or easily replaced (OEPA 1985a). It is estimated that approximately 1,000 feet of this sewer alignment, between Miner and Bishop Roads, will cross forest community habitat.

The grassland and brushland communities, which cover substantial portions of the cross-country easement, should recover quickly from construction impacts. Grass will be replaced after construction (Havens and Emerson 1986), and ecological community dynamics should stabilize shortly thereafter. Some shrubs, grasses, and tree saplings will be permanently displaced from the brushland. However, due to large brushland areas outside the easement (Havens and Emerson 1986) their loss will not be significant. The same applies to animals inhabiting this habitat type.

The old field community, covering only a small portion of the easement, will experience minor displacement and loss of some plants and animals. Sufficient area exists outside of the easement to compensate for this damage (Havens and Emerson 1986).

The brush forest community comprises the largest area to be impacted by sewer construction. The majority of trees are red maple saplings (OEPA 1985a); their loss to construction is not considered significant. A small portion of the brush forest community has been designated as wetland by the U.S. Fish and Wildlife Service. Loss of this wetland area is not considered significant and is discussed in greater detail in Section 6.1.7.

Forest communities occupy scattered portions of the easement between Miner and Bishop Roads. These areas are dominated by moderate- to large-sized hardwoods, with beeches dominating (Havens and Emerson 1986). Due to the relatively mature age of the trees and lack of mature forest habitat in Cuyahoga County, construction in forested areas will result in the most significant terrestrial disturbance caused by the cross-country sewer segment (OEPA 1985a). Trees will be removed and backfill will be placed to create an accessible and easily maintained sewer easement. The forest habitat will likely be converted to a grass and/or low herbaceous cover. Although removal of mature trees will be avoided if possible and replanting is planned, the area will not be fully restored to its original condition, causing a marginal decrease in habitat quality (OEPA 1985a).

The loss of terrestrial habitat under Alternative EIS-1 is not considered significant on a regional level, since this habitat is not locally unique and because comparable protected habitat is readily available nearby (e.g. Chagrin Reservation) (OEPA 1985a).

Construction activities associated with the four proposed action alternatives would not destroy any extensive stands of unique native vegetation. No known endangered plant species will be impacted by construction of the cross-country alignment (Biffel 1987). No significant impacts to terrestrial wildlife are expected.

6.1.7 Wetlands

Minimal impacts to riparian wetlands associated with Euclid Creek are expected to occur from all proposed stream crossings (see Section 6.1.3). The Euclid Creek watershed is characterized by steep embankments, so a limited amount of riparian wetland habitat is available at these sites. The habitat should reestablish itself once construction activities have ceased and the disturbed areas are brought back to grade.

Construction of the proposed cross-country interceptor in Alternative EIS-1 (see Figure 5-1) would result in the loss of all or part of a 1.6-acre palustrine forested wetland (PF01, see Figure 4-4). This loss would be small, representing a 2.4 percent reduction of the total 68 acres of palustrine forested wetland habitat available within the FPA. A permit may be required from the U.S. Army Corps of Engineers for the placement of fill in wetlands pursuant to Section 404 of the Clean Water Act (PL 95-217). Alternatives EIS-2, EIS-3, and EIS-4 will not directly impact wetlands, although this same 1.6-acre wetland may be lost to induced development after the proposed project is implemented (refer to Section 6.2.3).

Construction and improvement of the wastewater collection system will lead to residential development pressures on wetlands within the FPA (Stumpe 1987). One major parcel available and slated for development is the Highlands Greens development located within the bounds of White Road, Miner Road, Bishop Road, and Highland Road (see Figure 4-10). The proposed construction of the northern, cross-country interceptor for Alternative EIS-1 could service the development or it could tie into sewer lines on SOM Center and Highland Roads.

6.1.8 Demographics

Total population levels and the locations of households in the FPA are not expected to change due to construction and operation of any of the four alternatives. However, demographic effects of providing sewer service in currently unsewered portions of the FPA will occur; these are discussed in

Sections 6.2.1 and 6.2.2. Although construction will cause temporary delays for residents as well as other short-term negative impacts such as an increase in traffic congestion, dust, and noise, these are not expected to change FPA demographic patterns.

6.1.9 Land Use

Most sewer construction in the four action alternatives is proposed to occur within rights-of-way of existing roads and will not significantly affect adjacent land uses. Spoils from construction activities will be disposed of in local landfills (see 6.2.4). The overland sewer route proposed for Alternative EIS-1 is located in an undeveloped area and will not significantly impact existing land uses. However, Saxon Acres, a private picnic area, may be temporarily affected during construction depending upon the location of the route at the design stage. Construction of storage basins proposed for Alternatives EIS-1 and EIS-4 will not significantly affect adjacent land uses, since these are either industrial or are undeveloped areas that are zoned for industrial use.

One pumping station proposed for Alternatives EIS-2 and EIS-3 on Richmond Road, at its intersection with Chardon Road, is also located on undeveloped land zoned for industrial use. However, despite the industrial use zoning, the proposed pump station site is situated between two existing residences. To minimize impacts on these residences, the design of the pump station should be aesthetically compatible with residential neighborhood standards. Other adjacent land uses will not be significantly impacted.

6.1.10 Economics

Construction of sewers proposed under the four action alternatives will temporarily disrupt access to some local businesses and will therefore decrease the number of customers these businesses attract. This impact will only occur during construction activities and should be minimized by using construction techniques that reduce the amount of time each roadway segment is under construction. Site-specific impacts on business access are discussed below.

Alternative EIS-1

Open-cut construction for Alternative EIS-1 occurs along two roads where a small number of commercial businesses are located--Highland Road and Richmond Road (see Figure 4-11). In addition to the above, construction at the intersection of Highland and Wilson Mills Roads will disrupt traffic flow into Richmond Mall, the largest concentration of shopping in the FPA.

Alternatives EIS-2 and EIS-3

Construction of Alternatives EIS-2 and EIS-3 will affect the same areas along Richmond Road as Alternative EIS-1. Construction will also affect access to commercial businesses along Wilson Mills Road, which includes more commercial areas than Highland Road. This disruption will be most severe at the intersection of Richmond Road and Wilson Mills Road adjacent to the Richmond Mall; at the intersection of Wilson Mills Road and SOM Center Road; and between Eastwood Avenue and I-271.

Alternative EIS-4

Business access impacts along Richmond and Highland Roads will be the same as in Alternative EIS-1. Since this alternative follows Wilson Mills Road instead of Highland Road, the impact will be greater than in EIS-1 due to the greater number of businesses along Wilson Mills Road. As with Alternative EIS-1, the lower level of construction around Richmond Mall will result in less access disruption than with Alternatives EIS-2 and EIS-3.

6.1.11 Fiscal Standing

Fiscal impact analysis compares direct costs of the proposed project with the fiscal solvency of the municipality financing the project. In the Hilltop FPA, four municipalities and one sewer district will finance different aspects of the project. The previous discussion of economic impacts reviews the manner in which costs will be distributed.

Municipal costs for local sewers vary for each system alternative. There is no single alternative that places uniformly lower demands upon municipal obligations of each of the financing jurisdictions. If only average local costs are considered, Alternatives EIS-1 and EIS-4 would be the least expensive, requiring less than $14 million of local funding, and Alternatives EIS-2 and EIS-3 would be the most expensive, requiring nearly $16 million of local funding. Due to regional sewer alignments only Highland Heights, Mayfield Village, Richmond Heights, and Willoughby Hills are expected to assume the responsibility for the municipal debt necessary to fund local sewers. It was assumed that, although portions of Gates Mills and Mayfield Heights within the FPA will be included in the service area, they would not be responsible for financing local sewer improvements.

Local municipalities generally finance capital improvements through one of three methods. In the first method, general obligation bonds are issued and the project is financed through general revenues that retire the bond. This results in the entire incorporated area paying an ad valorum tax for the required capital expenditure. In the second method, a special taxing district is established. The revenues from this district would be used to retire a general obligation bond. This method assesses an appropriate ad valorum tax upon those individuals in a community who derive a direct benefit from a capital improvement. Establishment of a special district often requires a local referendum. In the third financing method, a surcharge is added to an already metered public service such as a water and sewer bill. This surcharge is then used to retire general revenue or general obligation bonds. It may also require the establishment of an enterprise fund and a public referendum. Local jurisdictions may use each of these funding mechanisms alone or in various combinations.

USEPA and Ohio EPA use various economic indicators to evaluate the fiscal health of a community and to determine if a proposed project may put a community in economic stress. One of these indicators is the average annual population growth rate. This rate should be greater than 1 percent. For most of the communities in the Hilltop FPA, the rate is below 1 percent, and in some cases, the community is projected to lose population. A slow growth rate is an indicator of decreased economic activity. The financial outlook for these communities is generally considered to be weak. Highland Heights is the only community with a growth rate above 1 percent in the Hilltop FPA, a level categorized as "average." If an increase in housing units instead of population was used as an indicator, this rating would shift from "weak" to "strong" or "average" for most FPA communities.

Because most of the communities in the Hilltop FPA (1) do not rely on the property tax for most of their general revenue, (2) have a bonded debt that is less than 10 percent of annual operating revenues, (3) have large investment reserves, and (4) use income taxes to finance a significant portion of their general operations, they have received average to above-average bond ratings from Moody's Investment Services. This indicates that investment analysts consider the outlook of these communities strong and stable.

Components of a municipal finance analysis are shown in Table 6-5; it lists several economic indicators using 1984 operating budget information. This table shows that Highland Heights has several weak indicators such as a high expenditure per person, a large bonded debt per capita, and an unusually high debt limit with no surplus available for new capital expenditures. Richmond Heights has the lowest bonded debt per capita and expenditure per capita but has other weak indicators such as low investment reserves and expenditures that exceeded revenues in fiscal year 1984.

Further analysis of fiscal accountability will be required once the preferred alternative is chosen, the method of finance is defined, and the amount of outside funding, including Federal and State grants, is assured.

6.1.12 Recreation

Each of the system alternatives was designed to improve water quality in area streams through the elimination of overflows and failing septic systems. Improved water quality should increase the potential for recreation in the Euclid Creek Reservation and the Chagrin River Reservation.

In order to construct the tunneled portions of each of the alternatives, staging areas will be needed to store machinery and access the tunnels. Although the locations and sizes of the staging areas cannot be determined until the project reaches final design, use of some areas may temporarily disrupt recreation in the Hilltop FPA. These impacts are discussed below.

Alternatives EIS-1 and EIS-4

The crossing of Euclid Creek at Euclid Avenue (Stream Crossing 1, Figure 6-1) and the use of a staging area between Euclid Creek and Chardon Road will

Table 6-5. Municipal Finance Analysis by Jurisdiction for the Hilltop Facility Planning Area

	Gates Mills	Highland Heights	Mayfield Village	Mayfield Heights	Richmond Heights	Willoughby Hills
Revenues						
Property Taxes	474,401	541,500	460,953	1,858,959	973,307	564,622
Income Taxes	351,230	2,582,683	1,269,609	2,052,891	1,178,897	854,175
Total	1,691,962	4,121,877	2,259,100	6,361,344	3,023,365	2,471,471
Total Expenditures	1,649,500	5,611,058	2,173,386	12,470,083	3,707,853	2,693,661
Outstanding Bonds	0	5,749,000	941,257	5,629,500	1,709,231	791,700
Investments	1,154,125	1,127,000	526,236	3,256,151	425,000	730,394
Bond Limits						
Inside 10 Mill	3.48	4	3.48	3.48	2.8	3
Outside 10 Mill	5.92	18.6	4.02	6.52	7.4	3.65
Income Tax Rate	0.01	0.015	0.015	0.01	0.015	0.015
1985 Population	2,258	5,995	3,297	20,944	10,700	9,242
Per Capita Expenditures	730.51	935.96	659.20	595.40	346.53	291.46
Bonded Debt Per Capita	0	958.97	285.49	268.79	159.74	85.66
1985 Households	883	2,039	1,293	10,836	4,977	6,730
Property Tax Per Household	537.26	265.57	356.50	171.55	195.56	83.90
Income Tax Per Household	397.77	1,266.64	981.91	189.45	236.87	126.92
Investments/Expenditures	0.70	0.20	0.24	0.26	0.11	0.27
Ratio of Personal Income to Annual Expenditures	39	15	27	21	44	58
Reasonable Debt Limit (Annual Revenues Less Outstanding Bonds)	$1,691,962	$ 0	$1,317,843	$731,844	$1,314,134	$1,679,771

Source: Ferguson 1985

eliminate recreational use of this area for the duration of construction activities. This area is a mowed grassy field with few trees and is currently used for passive recreation and various field activities. The cross-country portion of Alternative EIS-1 would also affect the recreational use of (1) an undeveloped area between Bishop and Miner Roads, and (2) Saxon Acres, a private picnic area south of White Road in Highland Heights (Figure 4-9). In addition, a multi-purpose field on Euclid Avenue currently used for soccer, football, and other activities will be affected.

At Stream Crossing 1, a deep open cut will be required in the west bank of Euclid Creek. At present, this bank is a nearly vertical wall, more than 20 feet above the stream elevation, composed of native shale. Although the open cut will be repaired and stabilized following construction, the aesthetic qualities of this natural feature cannot be restored.

Alternatives EIS-2 and EIS-3

The Euclid Creek Reservation (Figure 4-9) is used for various activities including cross-country skiing, hiking, picnicking, biking, and passive recreational uses such as walking and enjoying the natural scenery. Construction activity involved with the Euclid Creek crossing at Monticello Boulevard (Stream Crossing 2, Figure 6-1) will affect the use of the area for these activities. The extent of disruption will be dependent upon the location of construction activities in relation to the existing bridge, picnic area, and other activities. Plans are not detailed enough to precisely evaluate this impact.

The existing Monticello Boulevard bridge, built in 1954, has an arched design which complements the natural surroundings of the Euclid Creek Reservation gorge. Under Alternatives EIS-2 and EIS-3, construction of a free-standing pipe bridge to carry the sewer line across Euclid River will disrupt the aesthetics of the area both during and after construction. Appropriate standards that consider both the design of the existing bridge and the natural setting should be used in this area to minimize long-term aesthetic impacts.

6.1.13 Transportation

Each of the four system alternatives involve open-cut trenching and/or tunneling to construct regional interceptors. Most of the open-cut construction is proposed to occur in the rights-of-way of existing roads in the FPA. These construction activities will temporarily affect traffic flow on the affected highways; these impacts are outlined below. In addition, tunneling operations will require the use of an unspecified number of staging areas to access the tunnels and to provide for the storage of construction machinery and the removal of spoils. At the current level of generalized planning it is difficult to accurately identify the locations and sizes of staging areas. At the end of each tunnel segment, although an access shaft and some staging area will be necessary, the precise location and size of each associated staging area can vary significantly. In some locations obvious areas of open land or parking areas will be utilized, in other areas acceptable staging areas are not readily available and may require temporary use of the roadway above the tunnel route. Without more detailed designs identifying exact sizes and locations of staging areas, this evaluation can only highlight area roads where traffic disruption will be the most serious based on current levels of use and congestion.

Alternative EIS-1

This alternative involves tunnel construction which may require the use of staging areas in Chardon Road, Euclid Avenue, and Green Road. In addition, open-cut construction may affect traffic on Richmond, SOM Center, and Highland Roads.

Euclid Avenue is a major crosstown artery that connects the eastern suburbs to downtown Cleveland. The affected portions of Euclid Avenue have four through lanes and two parking lanes. Traffic along Euclid Avenue is heavy during most daytime hours and is very congested during rush hours (Eckner 1987). Although Euclid Avenue would not be completely closed during tunnel construction, partial lane loss and/or parking loss may occur at tunnel shaft/staging area locations. Any partial lane loss or parking area loss may cause severe congestion and traffic delays during rush hour and traffic disruption during non-rush hours.

Chardon Road has two through lanes and carries commuter traffic. Since Chardon Road has less traffic and fewer lights than Euclid Avenue, traffic congestion on this route is not as severe as on Euclid Avenue. Tunnel construction along the route of Chardon Road will cause limited traffic delays if lanes are narrowed or traffic re-routed to accommodate staging areas. Green Road has two through lanes and carries moderate levels of traffic; some temporary traffic disruption will occur if staging areas cannot be located outside the roadbed.

Richmond Road, a major north-south artery carries commuter traffic as well as commercial/retail traffic associated with Richmond Mall and nearby business areas (Eckner 1987). Richmond Road has two through lanes north of Highland Road and four through lanes south of Highland Road. Traffic is heavy most of the time and congestion occurs at its intersections near the Cuyahoga County Airport and Richmond Mall (O'Brien 1987a). Open-cut sewer construction along Richmond Road will severely affect traffic north of Highland Road, where the limited number of lanes will make rerouting traffic difficult. In addition, construction of the airport storage basin will affect traffic in and around the Cuyahoga County Airport.

SOM Center Road is a major two lane north-south artery that serves residential areas south of Wilson Mills Road. Traffic congestion occurs during rush hours and delays are encountered from left turning vehicles. Traffic flow will be interrupted by open-cut sewer construction along this route. Any restriction to traffic flow will shift traffic to adjacent north-south streets such as Miner Road or Bishop Road. Construction from Highland Road to Beech Hill pump station along SOM Center Road, Thornapple Drive, and Oakland Drive should have only short-term minor effects on residential areas and local traffic.

Highland Road, an east-west route, has two lanes and carries commuter traffic without regular congestion problems. The segment between Richmond Road past Meadowlane Drive to the Williamsburg pump station will experience some short-term traffic disruption during sewer construction.

Alternative EIS-2

This alternative involves tunnel construction which may require the use of staging areas on Euclid Avenue and Green Road. In addition, open-cut construction will affect traffic on Richmond and Wilson Mills Roads and Monticello Boulevard.

Tunnel construction access shaft/staging area locations may affect traffic on Green Road and at the intersection of Green Road and Euclid Avenue. Any restriction of traffic flow along Euclid Avenue will have significant short-term impacts to traffic flow, especially during rush hours. Impacts to traffic from a potential staging area on Green Road should not be significant.

Open-cut construction along Richmond Road and portions of Wilson Mills Road involving installation of force mains will have less extensive impacts to traffic flow than similar operations under Alternative EIS-1, due to the smaller diameter and shallower installed depth of these sewer lines. Some traffic delays will occur on Monticello Boulevard between Green and Richmond Roads. Construction of the Wilson Mills and Beech Hill pump stations and sewer construction on Wilson Mills Road between Richmond and SOM Center Roads will cause short-term traffic disruption along these routes.

Alternative EIS-3

Alternative EIS-3 is similar to Alternative EIS-2 except that the Wilson Mills pump station is eliminated and replaced by a new tunneled gravity sewer along Wilson Mills Road and Monticello Boulevard. Construction along these roads will cause minor traffic delays near the tunnel access shafts if these cannot be located out of the roadbed. Other traffic impacts are the same as identified above for Alternative EIS-2.

Alternative EIS-4

Implementation of this alternative will result in traffic impacts similar to those described for Euclid Avenue and Richmond and Chardon Roads under Alternative EIS-1. Traffic disruptions along Wilson Mills Road would be similar to those discussed under Alternatives EIS-2 and EIS-3.

Mitigation

To minimize traffic hazards, control devices such as blinkers and barrels should be placed in the construction area during day and night to warn motorists of restricted lanes. Flagmen should be employed during construction working hours to minimize traffic congestion and to protect the construction workers.

The construction should also be phased to minimize land closure. A short section of the interceptor will be completely constructed at one time before the next section is begun. Road surfaces should either be repaved or backfill maintained to permit resumption of normal traffic movement as soon as each section is completed.

6.1.14 Energy Resources

Energy costs each year during operation of the alternatives will depend upon the conveyance methods (gravity or pumping) and the extent of use of each type of conveyance. Energy costs for each of the action alternatives are estimated below.

Alternative EIS-1

This alternative includes approximately 15 miles of sewer construction, with roughly 4 miles of that length tunneled and the remainder constructed using the open-cut method. This alternative is the longest of the alternatives and will, therefore, require the most energy during construction.

Since no major pumping stations are included with this option, Alternative EIS-1 includes a very low annual energy cost. The small pumping stations that would still be used (Scottish Highlands, Hickory Hills, Suffolk Country Estates, Woods, and Thornapple) would not account for major energy consumption. This alternative would have the lowest energy costs of the four action alternatives, estimated at $49,600 per year.

Alternative EIS-2

This alternative includes approximately 9 miles of sewer construction and, with the exception of 1,000 feet of tunneling, relies on the open-cut method. Construction of this alternative or Alternative EIS-3 will require the least amount of energy of the four action alternatives. Because this alternative makes use of three major pumping stations, annual energy costs will be the highest of the four action alternatives. With a total pumping capacity of almost 50 MGD, annual energy costs are estimated at $192,900.

Alternative EIS-3

Because the route of this alternative is the same as the route in Alternative EIS-2, energy consumption during construction will be similar to that for Alternative EIS-2. This alternative also relies on pumping for a majority of the wastewater conveyance system and will therefore have higher energy requirements. This alternative, in comparison to Alternative EIS-2, eliminates the Wilson Mills pumping station, resulting in somewhat lower estimated energy costs of $176,400 per year.

Alternative EIS-4

Alternative EIS-4 is approximately 12 miles in length with 4 miles of that length tunneled. Construction of this alternative will require less energy than Alternative EIS-1 and more than Alternatives EIS-2 and EIS-3.

This alternative has lower annual energy costs than Alternatives EIS-2 and EIS-3 as a result of using only one major pumping station. Annual energy costs for this alternative are estimated at $92,000. This alternative has higher annual energy requirements than Alternative EIS-1 because of continued use of the Beech Hill pumping station.

Accurate estimates of energy usage or energy costs during construction cannot be prepared at the current level of design. However, energy resources used during construction will be dependent upon the type of construction and the length of the interceptors.

6.1.15 Cultural Resources

None of the four system alternatives includes construction that will directly affect known sites of historic or archaeologic significance. Historic and archaeologic resources in the FPA and nearby areas are shown in

Figure 4-11. The following discussion identifies construction activities under each of the alternatives that may affect undiscovered archaeological sites. As mentioned in Chapter 4 (Affected Environment), there is a higher probability for disturbing prehistoric site locations during construction in areas near the Chagrin River and Euclid Creek than in other parts of the FPA. The high bluffs overlooking these two streams may contain as yet undiscovered sites relating to a number of prehistoric periods. Included are cultures of the Paleo-Indian Tradition, the Archaic Development Stage, the Woodland Period, and the Late Prehistoric Period. The Ohio State Historic Preservation Officer has been consulted concerning these archaeological considerations as well as other related cultural resources.

Each of the four system alternatives involves construction of a storage basin adjacent to Euclid Creek near the intersection of Green Road and Monticello Boulevard. This construction will have potential impacts to undiscovered archaeological resources due to the site's location on the bluffs overlooking Euclid Creek. In addition, Alternatives EIS-1 and EIS-4 involve construction of two sewer line crossings of Euclid Creek (Stream Crossings 1 and 3, Figure 6-1) that may have potential impacts to undiscovered archeological resources. Alternatives EIS-2 and EIS-3 involve construction of a free standing pipe bridge across Euclid Creek at Monticello Boulevard (Stream Crossing 2, Figure 6-1) that may also have potential impacts to undiscovered archaeological resources. In each of the above instances, mitigation of potential impacts should be accomplished through field surveys once designs are completed and before construction begins.

6.1.16 Public Health

Disease transmission through water use, including consumptive and recreational uses, can represent a serious problem. Inadequate or malfunctioning private sewage disposal systems in the FPA may present health hazards by contaminating water resources with elevated concentrations of nitrates and pathogenic bacteria and viruses.

Under the no-action alternative, inadequate and failing septic systems will remain in the FPA. Since the smaller streams that drain the FPA are not used for drinking water or significant body contact recreation, the potential health risks of no action will not be significant. Although viruses and bacteria in discharges from onsite systems can represent a potential health hazard further downstream, recreational use of Euclid Creek Reservation has not resulted in documented outbreaks of waterborne diseases. Without epidemiological surveys or extensive water quality sampling more accurate forecasts of public health impacts under the no-action alternative are not possible.

The beneficial public health impacts to Euclid Creek and its tributaries resulting from the four system alternatives are also difficult to estimate since there have not been documented cases of disease outbreaks. However, it is safe to assume that any decrease in bacterial or viral concentrations will reduce health risks to some extent. Replacement or upgrading of onsite systems in the FPA would eliminate potential surface water contamination and would protect against contamination of well water.

6.2 SECONDARY IMPACTS

6.2.1 Demographics

In order to assess the secondary growth impacts of proposed improvements to wastewater facilities in the Hilltop FPA, it is important to review current population projections and other economic indicators. This analysis assumes that growth and development projections were prepared without consideration of proposed wastewater facility improvements and were prepared using basic demographic techniques. Population projections for small areas usually consider the following parameters: current population levels, existing development patterns, building permit activity, zoning patterns, and vacant developable land. The following discussion reviews these indicators and assesses the potential for secondary impacts or induced growth due to proposed wastewater facilities in the Hilltop FPA.

Secondary impacts occur when the action taken changes projected growth, accelerates anticipated growth, or redirects the location of residential and commercial development. Growth can be relocated from one community to another within a metropolitan housing market when a developer perceives one site to be more economically viable than another. This generally occurs when there are less growth constraints in one area than another or when one community can provide services another community can not. Municipal activities that generally affect local growth levels include (1) restrictive or permissive zoning ordinances; (2) the placement and/or quality of local public schools; (3) highway construction that provides new or improved access to employment centers; and (4) provision of centralized water and/or sewer service to an area not previously served. If a proposed project is in response to projected growth and addresses the existing pollution abatement needs without redirecting or inducing additional growth, secondary impacts do not occur.

As stated in Chapter 4 (Affected Environment), population levels in the Hilltop FPA as projected by NOACA are expected to remain roughly constant throughout the planning period. Although combined population levels in the communities of Highland Heights and Willoughby Hills are expected to increase by 4000 individuals in the period between 1988 and 2008, the more established communities of Gates Mills, Mayfield Village, and Richmond Heights will have a combined loss of over 6000 individuals. This will bring the 2008 population in these six Hilltop FPA communities to 48,150 individuals. Sixty-eight percent of this population will be located in the FPA.

Chapter 4 also explored possible explanations for this low projected population growth rate. These include an aging population, a decreased family or household size, reduced vacant available land, and slow economic growth. Traditionally, the Hilltop FPA has attracted affluent (upper income) families. The average household size exceeds 2.8 persons per household; this is slightly higher than the 1980 national and regional average of 2.7 persons per household. Most of the residential development is located in single family detached units located on lots greater than one-half acre. Population projections for the area assume that this large lot development pattern will continue while the household size decreases. In the early 1980s when most population projections were prepared, the economic outlook for "rustbelt" areas such as Cleveland was bleak. More recent trends predict increased economic activity in the metropolitan area. The impacts of this brighter economic outlook are discussed later in the land use section (Section 6.2.2).

Housing activity (i.e., the type and location of new housing units) is one of the most important parameters used to make population projections. Table 6-6 lists the number of housing units in the FPA in both 1980 and 1985. The number of projected units are compared with the actual number of building permits issued. The number of building permits issued during that 5-year period falls short of the total number of anticipated units. In the case of Willoughby Hills, 2913 units were projected and only 78 permits were issued.

There are several reasons for this slower than anticipated building activity. First, mortgage rates were high during the early 1980s. Second, the nation experienced a slight recessionary period in 1982. Third, during this period more stringent controls on permitted septic systems and package plants were enforced in Cuyahoga County. Of these three factors, controls on septic systems and treatment plants have placed the greatest constraint on building permit activity in the FPA. The Cuyahoga County Health Department has denied over 200 septic system requests during this 5-year period. A septic permit is required before a building permit is issued to sites located outside existing severed areas. Based on interviews, local developers consider the lack of adequate wastewater treatment facilities to be a serious constraint to development (Somrak 1987b).

Larger developers are finding alternative methods to overcome this problem. For example, one large development in Highland Heights has contracted to send wastewater to the Euclid Creek wastewater treatment plant. In general, developers of larger subdivisions (20 acres or more) can afford alternative methods of processing domestic wastes. Smaller subdivisions and single lot property owners are forced to postpone their plans until adequate service is available (Paris 1987).

NEORSD is currently conducting an indepth survey of local developers. Preliminary results indicate confirmation that inadequate sewer service is a serious constraint to growth and has resulted in demand for housing in the Hilltop FPA. Continued inability to meet housing needs will result in a failure to reach already modest population projections.

Table 6-6. Comparison of Issued Building Permits with Housing Unit Projections for Cities and Villages in the Hilltop Facility Planning Area

Village/City	Household	Building Permits Issued	Projected Household	Building Permits Required to
	In 1980	Between 1980 and 1985	For 1985	Meet 1980 to 1985 Projections
Gates Mills	789	50	883	94
Highland Heights	1,787	131	2,039	252
Mayfield	1,293	28	1,293	0
Mayfield Heights	9,635	247	10,836	1,201
Richmond Heights	4,154	82	4,977	823
Willoughby Hills	3,817	42	6,730	2,913

Local sewers tributary to the NEORSD regional interceptors will be financed and built by local municipalities and developers. The placement of these local sewer lines will have significant effects on future growth. These alignments will permit growth in the areas where currently unavailable sewer access is made readily available.

6.2.2 Land Use

Table 4-19 lists the acreage of vacant and developed land for each FPA jurisdiction according to general zoning classifications. All of the jurisdictions in the Hilltop FPA have available vacant land, mostly zoned residential. With the exception of Gates Mills, zoning in each of these communities includes a commercial and/or industrial category. Two major interstate highways, I-91 and I-271, bisect the FPA, while the Cuyahoga County Airport is located in the northeast portion of the FPA. These facilities give the FPA rapid access to the entire Cleveland metropolitan area and the midwestern United States. These zoning and access factors create a strong demand for the area's vacant commercial and industrial land. Based on interviews, area developers foresee this land being used for distribution centers and/or office complexes; however, these land uses are considered intensive and require an adequate wastewater collection and treatment system.

In addition to its excellent transportation network, the Hilltop FPA is an attractive area for growth and development for the following reasons: ample vacant developable land, a general acceptance of commercial and industrial development by local officials, and the sociological benefits created by its proximity to the North Chagrin Reservation, a major regional park. Mayfield Village and Gates Mills are both located adjacent to this reservation. Gates Mills is considered a prestige community in the Cleveland metropolitan area.

As stated in the earlier demographic analysis, pressure for development in the FPA is significant. Housing construction levels are not meeting demand. Similarly, commercial and industrial development is currently constrained by inadequate sewers. Industrial and commercial developments generally cannot change their densities or make other adjustments to locate adequate sewer service or accommodate inadequate sewer service in the same manner as residential development. As illustrated in Table 4-19, most of the land slated for development in the FPA is in residential categories.

One of the ways in which residential development can respond to inadequate sewer service is to decrease the number of dwelling units built on each acre of land in order to accommodate onsite septic systems. In most cases in the FPA, this doubles and sometimes triples the land requirements for each unit. Since the soils in the FPA are not well suited to onsite septic systems, even many large lots (those over 2 acres) have been denied permits. Subdivisions designed to accommodate onsite septic systems are highly constrained and, where built, display a typical large-lot sprawl pattern. Creative planning techniques that cluster housing to retain larger open spaces are more difficult to encourage in areas reliant on onsite septic systems. Clustering housing units is an efficient method of providing services and meeting housing demands, but generally requires a centralized sewerage system.

Without significant improvements in sewer service, the FPA will not meet its economic potential. Commercial and industrial development will continue to be delayed or postponed. The area will not be able to meet rising demand for more compact, smaller dwelling units responding to the area's smaller household size. Residential development will continue as large-lot detached single family units. Needs of the area's older fixed-income residents and younger families just entering the market for smaller, more affordable housing will be difficult for developers to meet.

There is proven demand in the FPA for increased multi-family units and commercial and industrial development. For this reason, the four system alternatives (EIS-1 through EIS-4) would accommodate the demand in areas with inadequate sewer service rather than inducing growth from surrounding areas.

6.2.3 Sensitive Environmental Resources

Increased development resulting from the proposed action may subject sensitive environmental resources to secondary impacts. Secondary impacts may include increased air pollution, loss of habitat, or decreased water quality. Projected secondary impacts are discussed in this section.

6.2.3.1 Atmosphere

The proposed alternatives are not expected to contribute to any further long-term deterioration of air quality. As described in Section 6.2.1, population projections for the FPA show little increase in population levels over the planning period. Therefore, no air quality-related secondary growth impacts are expected.

6.2.3.2 Surface Water

Impacts from local sewer development under the four alternatives should be similar. Temporary inputs of sediment from construction activities will cause short-term water quality degradation. Proper sediment control measures should be employed to minimize these impacts. Increased nonpoint source pollution from urban runoff due to projected growth in the FPA is not expected to significantly affect surface water quality.

6.2.3.3 Floodplains

Secondary development under any of the alternatives is not expected to affect the 100-year floodplain areas within the FPA since the terrain is very steep and is not conducive to development.

6.2.3.4 Wetlands

A total of 36.7 acres of palustrine forested wetlands, 54 percent of the forested wetlands within the FPA, could be destroyed by secondary induced development from Alternative EIS-1. One acre of open water wetland (POWZ, see Figure 4-6) would also be lost to development in this area. This specific potential secondary impact is common to all of the action alternatives under consideration. Additional wetlands within the FPA may also be lost to development as a result of the improved/extended sewer lines. However, it is difficult to estimate when or if these wetlands will be disturbed.

6.2.4 Community Facilities

Development resulting from the proposed action might secondarily affect community facilities in the FPA by increasing demand for schools, waste disposal, energy, and other municipal services. Projected secondary impacts on community facilities are discussed in this section.

6.2.4.1 Schools

The Hilltop FPA is currently served by three school districts: the Richmond Heights School District, the Mayfield City School District, and the Willoughby/Eastlake School District. The Mayfield City School District has the largest service area in the FPA, including Gates Mills, Highland Heights, Mayfield, and Mayfield Heights (Moore 1987a). The Willoughby/Eastlake School District includes Willoughby Hills, Willoughby, Eastlake, Willowick, Lakeline, Timberlake, and a portion of Waite Hill (Stojetz 1987). The Richmond Heights School District includes just Richmond Heights (Bowdourif 1987). The enrollment of each district is illustrated in Table 6-7. Declining enrollments in these school districts have forced a number of school closings in the past few years. Both elementary schools in Willoughby Hills were closed and these affected students now attend school in nearby Willoughby at Edison Elementary. The Willoughby/Eastlake School District continues to operate seven elementary schools, three middle schools, two high schools, and one technical school (see Table 6-7). The two elementary schools in Willoughby Hills that were closed will be used to handle any increased demand (Stojetz 1987). Richmond Heights operates one elementary school and one secondary school. According to Dr. George Bowdourif (1987), Superintendent of the Richmond Heights School District, a need for additional capacity is not anticipated. The Mayfield City School District operates four elementary schools, one school for the hearing impaired, and one high school. Due to declining enrollments two elementary schools and one middle school were recently closed. The elementary schools were subsequently razed. Future planning in the Mayfield City School District calls for construction of a new elementary school in Highland Heights and the use of the closed middle school if enrollment begins to increase (Moore 1987a). Based on population projections (Section 6.1.8), significant growth is not anticipated. Therefore, secondary impacts on schools will be minimal.

6.2.4.2 Solid Waste Disposal

Disposal of solid waste is currently handled by independent contractors who contract with Highland Heights, Mayfield, Mayfield Heights, and Richmond Heights, and with individual homeowners in Gates Mills and Willoughby Hills. Businesses and industries also hire independent contractors for refuse disposal. The majority of solid waste is taken to two landfills in Lake County.

Table 6-7. Hilltop Facility Planning Area School Enrollments and Capacity

School District/School	Enrollment Jan. 1987	Capacity	Surplus
Richmond Heights			
Elementary	360	600	240
Secondary	450	800	350
Mayfield City			
Center Elementary	436	500	64
Gates Mills Elementary	150	200	50
Lander Elementary	313	400	87
Millridge Elementary	452	500	48
Total Elementaries	1,351	1,600	249
Mayfield Center School For Hearing Impaired	66	116	50
Mayfield High School	1,760	2,100	340
Willoughby/Eastlake			
Edison Elementary*	633	640	7
Grant Elementary	412	460	48
Jefferson Elementary	650	770	120
Longfellow Elementary	513	650	137
McKinley Elementary	324	550	226
Royal View Elementary	696	950	254
Washington Elementary	444	750	306
Total Elementaries	1,464	2,250	786
Eastlake Middle School	527	900	373
Willoughby Middle School*	599	1,020	421
Willowick Middle School	632	930	298
Total Middle Schools	1,758	2,850	1,092
North High School	1,545	2,000	455
South High School*	1,253	1,500	247
Technical High School	420	800	380
Total High Schools	2,218	4,300	2,082

* Students in Willoughby Hills attend these schools.
Source: Stojetz 1987, Bowdourif 1987, Moore 1987a

One of these landfills, built in 1976, is owned by Lake County and is located in Painesville. This landfill has approximately 15 years of use available at present use rates (Neroda 1987). The second landfill, built in 1950, is owned by Waste Management, Inc., and has approximately 12 years of use remaining at present use rates (Orange 1987). A third landfill, the Inland Landfill, privately owned and operated in Cuyahoga County, is also used by private haulers. This landfill has approximately 12 years of use remaining at present use rates (Moore 1987b).

Expansion of area solid waste disposal sites or the installation of new technologies for the disposal of solid waste will be needed in approximately 10 years (Moore 1987b). Managers of each of the landfills previously discussed are currently investigating additional land to meet this need. It is likely that any land acquired for future solid waste disposal will be located in surrounding counties. Also, Cuyahoga and Lake Counties are both researching the use of high technology waste disposal systems. No adverse effects on solid waste disposal from the proposed action in the Hilltop FPA are anticipated.

6.2.4.3 Electrical Service

The Cleveland region's electrical service is provided by the Cleveland Illuminating Company which has a total capability of 4,372 megawatts of power per day. Usage during 1986 was up 1.2 percent from 1985 (DeChant 1987). This jump involved an increase of 4 percent in residential use, an increase of 5 percent in commercial use, and a decrease of .5 percent in industrial use. Although tightened controls on the use of high sulphur coal may require closing some plants or installing scrubbers, the Cleveland Illuminating Company expects to meet all future demands (DeChant 1987).

6.2.4.4 Water Service

Most drinking water for the Cleveland region and for the Hilltop FPA is provided by the Cleveland Department of Public Utilities which pumps approximately 400 million gallons per day (MGD) and has approximately 400,000 accounts. This central water supply comes from Lake Erie and is stored in reservoirs (O'Brien 1987b). The Lake County Department of Utilities has begun serving portions of Lake County including areas in Willoughby Hills. The department has approximately 28,000 accounts and pumps 11 MGD, yielding a 70 percent storage capability (Pizzi 1987). Both departments expect to meet future demands (Pizzi 1987, O'Brien 1987b). In addition to centralized water systems some portions of the Hilltop FPA rely on groundwater (see Chapter 4). Use of groundwater will decline as centralized service is made available.

6.2.4.5 Public Safety

The communities in the Hilltop FPA area have mutual aid agreements if a fire or police emergency exists. These agreements increase the reliability and quality of service in such situations. Communities involved in the mutual aid agreements and not in the Hilltop Facility Planning Area include Lyndhurst, Pepper Pike, and Chesterland.

Fire Service

Currently, Mayfield has seven full-time and 16 part-time firemen (see Table 6-8). A minimum of one additional full-time or part-time fireman is needed per shift to ensure adequate service (Mohr 1987). Mayfield Heights has 25 full-time firemen and 10 part-time firemen. This level of service is sufficient for projected area growth, and there are no plans to add additional personnel in the future (DeJohn 1987). Gates Mills currently has 31 volunteer firemen. The service currently provided in Gates Mills is sufficient, and there are no plans to modify the type of fire service or the current level of manpower. In Highland Heights, Richmond Heights, and Willoughby Hills, the projected increase in households is significant (see Table 6-6). Currently, Richmond Heights has 11 full-time and 11 part-time firemen. The city will be adding three full-time firemen at the end of 1987 (Boyle 1987). Service is considered adequate, but with any further development, an increase in personnel would be necessary (Stesancik 1987). The city of Highland Heights currently has 11 full-time firemen and 14 part-time firemen. Current fire service is inadequate and with further development an increase in manpower would be needed (Bencin 1987). The Highland Heights City Council is currently studying the possible provision of paramedic service. If approved the council may hire an additional three or four full-time firemen (Bencin 1987).

Table 6-8. City/Village Police and Fire Services in the Hilltop Facility Planning Area

City/Village	Full-Time Firemen	Part-Time Firemen	Full-Time Police	Part-Time Police
Gates Mills	0	31[c]	11	4
Highland Heights	11	14	18	0
Mayfield	7[b]	16	14	10[a]
Mayfield Heights	25	10[c]	34	25[d]
Richmond Heights	11	11	19	13[d]
Willoughby Hills	2	36	13	6

a: This figure includes four auxiliary police
b: The Hillcrest Fire Department also responds to calls
c: Volunteer firemen
d: Auxiliary police for traffic control

Source: Mohr 1987, DeJohn 1987, Boyle 1987, Stesancik 1987, Bencin 1987, Heckler 1987, Hughes 1987, Stevens 1987, Caprara 1987, Dietz 1987, Woodie 1987, Malek 1987

Willoughby Hills currently has two full-time firemen and 36 part-time firemen. While Willoughby Hills recognizes a need for additional manpower, there are no plans for additional personnel at present (Heckler 1987).

Police Service

The current level of police service in Gates Mills is good, but with an increase in population the police department would need to hire additional personnel (Hughes 1987). The department currently has 11 full-time policemen, and four part-time policemen who are used during special events and for traffic control (see Table 6-8). The village of Mayfield currently has 14 full-time, six part-time, and four auxiliary policemen. This level of service is good, but with future industrial development planned, additional personnel will be needed (Stevens 1987). Mayfield Heights currently has 34 full-time policemen and 25 auxiliary policemen who are used for special events and for traffic control. The level of police service in Mayfield Heights is considered good, but with increased industrial development adjacent to I-271, there may be a need for additional manpower (Caprara 1987). Richmond Heights currently has 19 full-time policemen and 13 auxiliary policemen who are used for special events and traffic control. The current level of police service is not considered adequate and an increase in personnel is needed (Dietz 1987). The city plans to add three to four policemen over the next 2 years to meet this need (Boyle 1987). The city of Highland Heights currently has 18 full-time and three part-time policemen. This level of service is good, but with the addition of development already under construction and future development, additional personnel will be needed (Woodie 1987). Willoughby Hills currently has 13 full-time and six part-time policemen. According to Police Chief George Malek (1987), the city does not anticipate a need for additional personnel.

6.2.4.6 Transportation

Very little data is available to quantitatively determine the extent of secondary impacts on the FPA's road network. Impact assessments are based on information gathered through telephone interviews with traffic planners and engineers at the Northeast Ohio Areawide Coordinating Agency (NOACA). There appear to be few secondary impacts from the four action alternatives to the

FPA road network. As previously discussed, most FPA roads experience normal traffic movement during nonrush hours, and minimal traffic problems during rush hours. Two exceptions to this observation are Richmond and SOM Center Roads.

Richmond Road, north of Highland Road, experiences heavy traffic congestion most of the time, especially at intersections near the Cuyahoga County Airport and Richmond Mall. SOM Center Road experiences significant traffic congestion during rush hours; frequent delays are encountered from left-hand turning vehicles (O'Brien 1987a).

Any growth in the FPA, even the modest levels forecast, will worsen traffic on Richmond and SOM Center Roads. No capital improvements are currently projected for these routes. No significant impacts are projected for other FPA roadways due to induced growth.

CHAPTER 7. SELECTED ALTERNATIVE

7.1 INTRODUCTION

This chapter identifies the cost-effective system alternative for solving the present and future wastewater treatment needs of the Hilltop FPA. Included in this chapter is a description of the cost-effective system alternative from the Chapter 5 analysis, including environmental impacts, mitigation measures, and estimated user costs. Because sufficient facilities planning to document the need for all aspects of the cost-effective system alternative has not occurred, and because part of the cost-effective system alternative is based primarily on ultimate future needs, the EIS recommends a component of the cost-effective system alternative to solve the identified needs of the planning area for the 20 year planning period.

The purpose of the proposed improvements to the Hilltop wastewater collection and conveyance system is to solve the current problems in the Hilltop area. These problems include pump station control problems, excessive I/I, poorly operating package plants, and septic system problems. In addition, decisions made during facilities planning for the Easterly Separate Sewer Area (ESSA) were also considered.

The most serious problem with the existing sewage transport system is the operation of the Beech Hill/Bonnieview/Wilson Mills complex (BBW). During periods of extremely wet weather, the Wilson Mills pumping station becomes overloaded, and signals the Beech Hill pumping station to shut down. Beech Hill in turn signals a sluice gate to divert flow to the Bonnieview Storage Tank. Although a majority of the flow is diverted to the storage tank, flow from the tributary area north of the Beech Hill pumping station is not diverted. If pumping is not resumed at Beech Hill, the wet well will continue to fill and eventually overflow to a tributary of the Chagrin River. If pumping is not resumed at Beech Hill, the Bonnieview facility will eventually become full and overflow.

These excessive flow volumes that occur during wet weather are a result of I/I problems in the local collector system. Many of these problems are the result of common trench construction (see Section 2.3). As discussed in

Section 1.1.2, the Sewer System Evaluation Survey (SSES) outlined several sewer rehabilitation and relief sewer projects for the local communities which will help relieve a portion of the I/I problem. The NEORSD is currently working with the communities to coordinate these rehabilitation and relief projects.

Several package plants exist within the Hilltop Facility Planning Area (FPA) and operate with varying degrees of efficiency as discussed in Section 2.2. These plants discharge poor quality effluent to area waterways and thus have problems meeting the NPDES permit limitations.

The original facilities planning efforts listed basement flooding as a problem within the Hilltop area. During the preparation of this EIS, it was determined that sewer maintenance on portions of the existing collector system would help relieve this problem. As previously discussed, the SSES outlined several relief sewer and sewer rehabilitation projects which would increase the sewer capacity and reduce the incidence of basement flooding in the area. These projects are all local improvements and are not part of the scope of this EIS. Operation of the BBW complex is not the cause of basement flooding in the area. A few homes around the pumping stations do suffer basement flooding problems, but this is a result of basement floor elevations below the overflow of the pumping stations' wet wells. Most of these homes have had plumbing modifications to correct the problem.

Failing septic systems within the Hilltop FPA were noted as another problem throughout the facilities planning process. Since a complete study of the problems has never been conducted, the actual extent of failing systems in the area is relatively unknown. Although a complete study of existing onsite systems has not been conducted for the Hilltop FPA, facilities planning identified poor soils in the area, the relative age of the onsite systems, and the fact that construction projects have been rejected because of no sewer access as indicators that the existing onsite systems should be eliminated.

Along with these problems, several other factors were involved with developing a system for the Hilltop area. Since the Hilltop FPA was originally part of the regional solution for the Easterly Separate Sewer Area

(ESSA), several regional decisions were made in the planning process which affect the Hilltop FPA. The USEPA Storm Water Management Model (SWMM) was used to route peak flows thoughout the entire ESSA. Based on the SWMM modeling results (discussed in Section 3.1.3.1), flows from the East and Central Belvoir Areas (shown in Figure 3-6A) were routed along some of the same routes as the Hilltop flows. Approximately 202 MGD of flow from the Central Belvoir area will be routed to the Heights interceptor along Green Road (Contract G). Flow from the East Belvoir area will be routed to the Hilltop area along Richmond Road (Anderson Road diversion of Contract H), for conveyance to the Heights interceptor. This amounts to approximately 59 MGD of peak flow capacity required for the East Belvoir area in the Hilltop transport system.

As described in Sections 1.1.2 and 5.2, Contract G (the Green Road segment of the Heights project) sizing would depend on decisions made for the Hilltop FPA. The 1984 FNSI for the Heights project included Contract G but acknowledged that sizing would depend on the alternative selected for serving the Hilltop FPA. Based on the cost analysis in Appendix G, the cost for Contract G without any Hilltop flows is $8,395,683. Though the costs for Contract G were included for comparison in the analysis in Chapter 5, only the incremental costs of sizing the segment beyond that which is needed for the Heights flows are directly attributable to the Hilltop project. Thus Table 7-1, which presents the costs for the EIS cost-effective system alternative, presents different costs than included in Table 5-6.

7.2 COST-EFFECTIVE SYSTEM ALTERNATIVE

Considering the current problems and conditions in the Hilltop area, this EIS evaluated several options that would serve the needs of the area. Several criteria were evaluated for each EIS alternative, including cost, implementability, reliability, energy use, feasibility, and environmental factors. Since sufficient facilities planning to document need for local sewers to serve the entire FPA has not been conducted, the EIS (Section 7.3) recommends an approach to solve the documented existing needs. Based on the analysis in Chapter 5, Alternative EIS-3 (shown in Figure 7-1) was selected as the best system alternative to serve the entire Hilltop FPA.

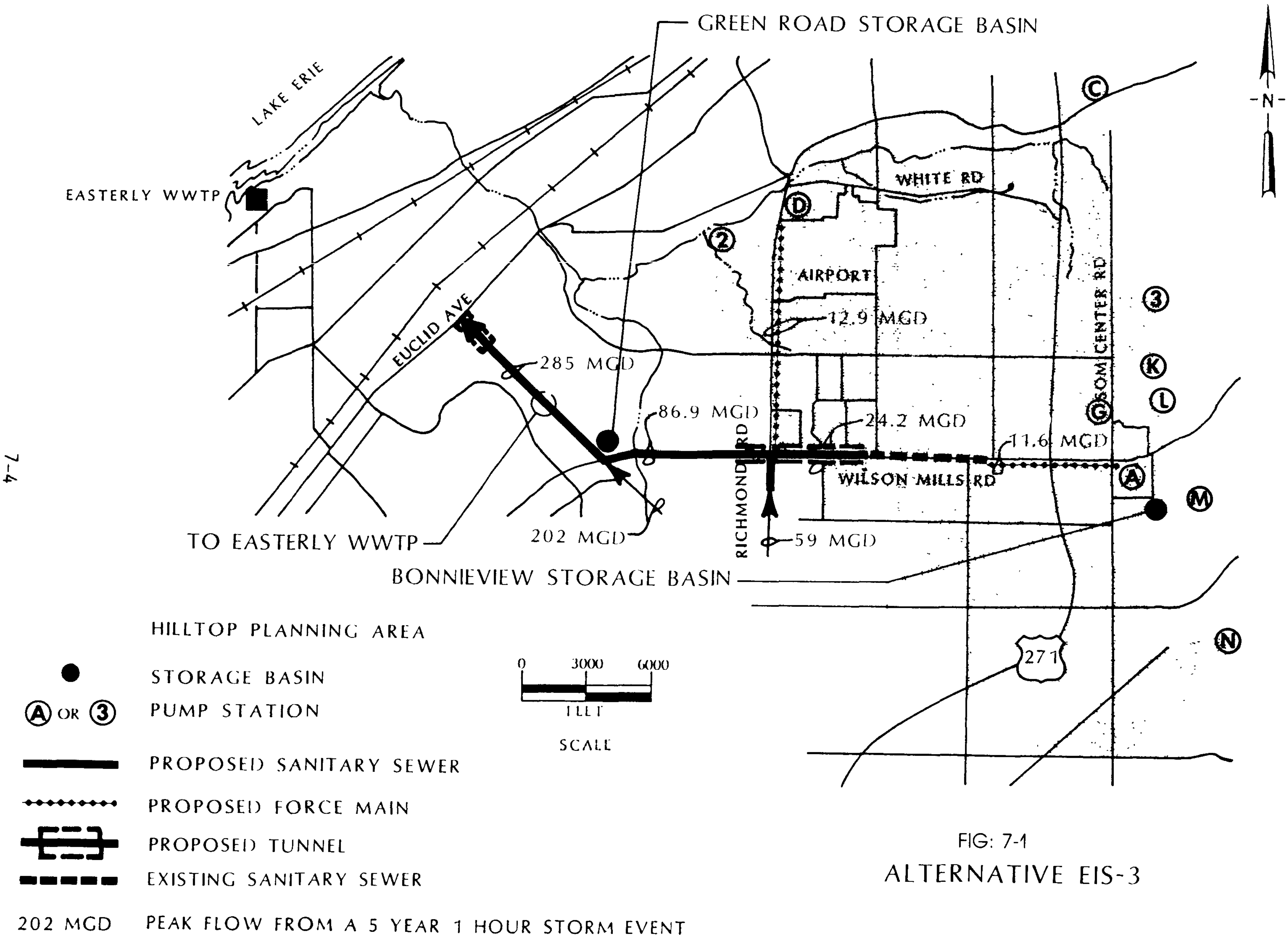


FIG: 7-1
ALTERNATIVE EIS-3

Although EIS-3 was not the lowest cost alternative (see Table 5-6), it was determined that removal of the Wilson Mills pumping station would be environmentally advantageous to the system. As previously discussed, the Wilson Mills pumping station has caused many of the problems for the existing system. Therefore, EIS-3 was selected over the least cost alternative based on this factor.

The analysis conducted in the Chapter 5 compared alternatives on the ability to provide service to the entire Hilltop FPA (for transport of flows to the Easterly WWTP) within the planning period. This was done to maintain the level of detail used throughout the facilities planning process, and to compare all alternatives on equal terms. This analysis, however, was a worst case analysis since it assumed that ultimate growth would occur and that all septic systems, small pump stations, and package plants needed to be replaced by the central and local sewer systems. In reality, only portions of the local sewer system may need to be built to relieve these problems.

The cost-effective system alternative from Chapter 5 would consist of upgraded facilities at the Beech Hill pumping station (A) and Bonnieview storage tank, and an expanded Richmond/White pumping station (D) to serve the northern areas. The Beech Hill pumping station would be sized at 11.6 MGD based on the flows projected in the SSES, and the Richmond/White pumping station would be sized at 12.9 MGD based on the connection of the unsewered areas, several package plants, and ultimate growth. Approximately 8,900 feet of new 30" pipe would be required for the Beech Hill force main, and about 13,400 feet of new 30" pipe would be required for the Richmond/White force main.

The Wilson Mills pumping station would be replaced by a new 60" gravity sewer. Historically, the Wilson Mills pumping station has created problems for the existing system. The majority of overflows from the existing system result from capacity problems at the Wilson Mills station, which signals the Beech Hill pumping station to shut down. By removing this problem source from the system, the overall reliability would be greatly increased.

As described in Chapter 5, the new control system for the pump stations would also improve the reliability of the entire system. Remote monitoring and control of each pumping station by a central control computer will provide a continuous report of all system functions. Central control will also respond to problems in the system with corrective actions. Automatic onsite controls at each pumping station would also contribute to the reliability of the system for EIS-3. Manual controls for onsite operators would also be available at each station.

The major pumping stations would also be designed with sufficient pumping capacity to handle the peak flow rate with one pump out of service. Coupled with separate power grids and onsite backup power generators, the major pumping stations for EIS-3 are designed for continuous reliable operation.

The Bonnieview facility would be upgraded with comminutors, grit removal, 6-inch water line, and odor control measures.

The cost-effective system alternative in Chapter 5 includes provisions for eliminating several package plants and small pump stations and all onsite systems in the Hilltop area with local sewers (Figure 7-2). Under this worst case scenario, Scottish Highlands and Hickory Hills package plants would be eliminated by constructing pump stations and force mains to new local gravity sewers; Richmond Park, Sleepy Hollow, and Pleasant Hills package plants would be eliminated by gravity sewers tributary to local sewers. While Richmond Mall, Franklin, Williamsburg, and Picker X-ray pump stations would be eliminated, several pump stations would remain in use, as shown in Figure 7-1. Before any of these package plants, pump stations, or onsite systems can be eliminated, additional facilities planning by NEORSD is necessary to show that elimination is cost-effective.

The crossing of Euclid Creek along Monticello Boulevard was assumed to be by a free standing pipe bridge supporting twin 54" sewers. Actually, a single 66" pipe could be used with the existing 30" sewer which is in place under the bridge if the existing pipe is found to be in good condition. This option would be less expensive than using twin 54" sewers, however twin 54" sewers are used in cost estimates as a worst-case assumption.

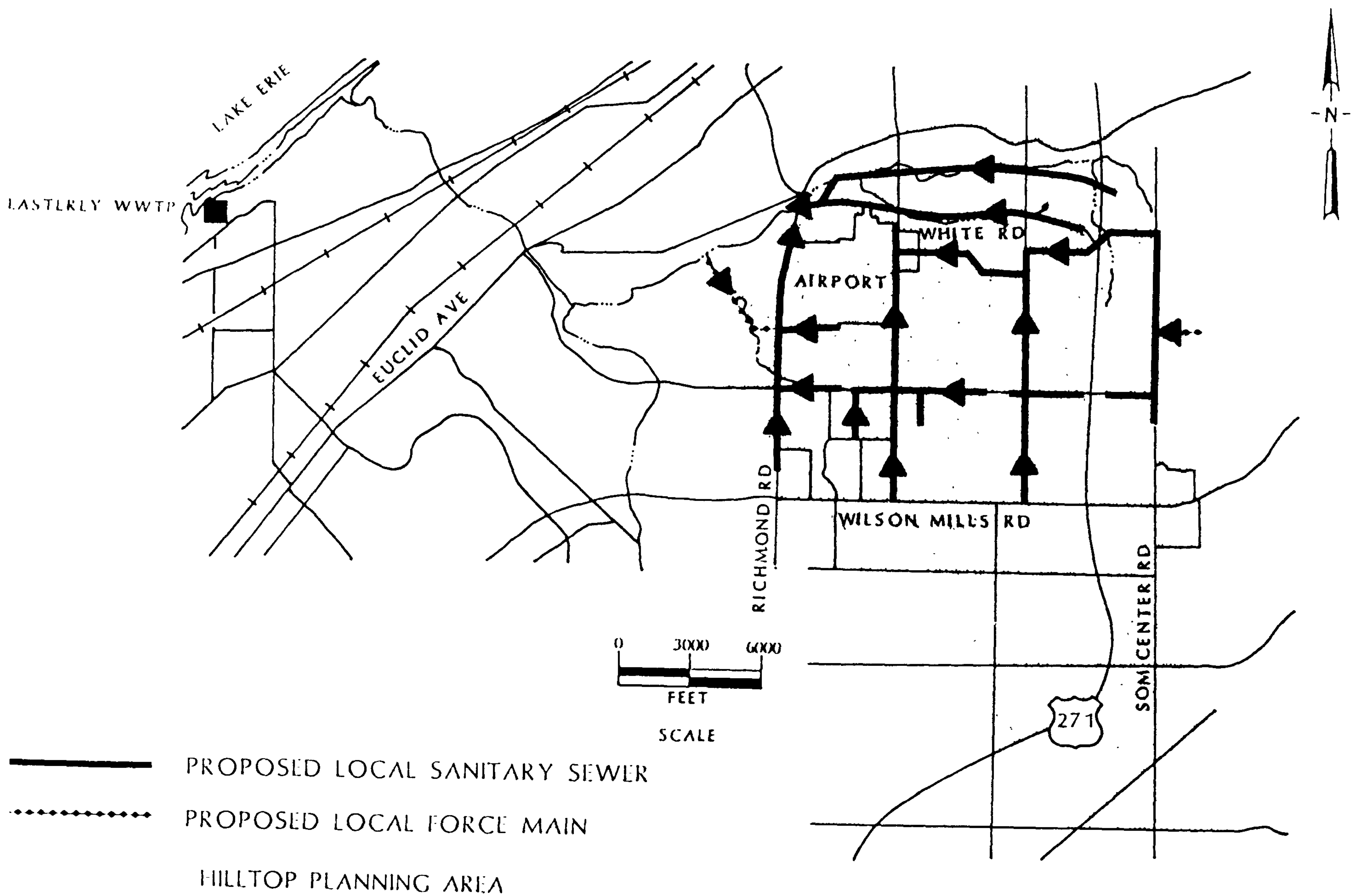


FIG: 7-2

EIS-3 LOCAL SEWERS

The analysis in Chapter 5 included a free standing pipe bridge supporting twin 54-inch sewers for the crossing of Euclid Creek along Monticello Boulevard. This is a worst case assumption since it is not known whether the pipes could be suspended from the existing road bridge as is currently done with the existing 30" sewer. In actuality, twin 48" sewers could be used with the existing 30" sewer which is in place under the bridge. The smaller diameter lines would be easier to suspend and would be less expensive than the twin 54" sewers. If the pipes are suspended from the existing bridge, twin sewers are needed to balance the load on the bridge. If the free standing pipe bridge is built however, it would be less expensive to use a single 66" pipe with the existing 30" pipe instead of the twin 48" sewers.

The projected costs for Alternative EIS-3 are provided in Table 7-1 and Appendix F.

7.3 RECOMMENDED PLAN

Although EIS-3 is the cost-effective system plan for serving the entire Hilltop area, a need to serve the entire area (specifically the unsewered areas) has not been sufficiently demonstrated. This section will describe an approach to serve the area's identified needs for the 20 year planning period.

The immediate needs for the Hilltop area are to relieve I/I problems in existing local sewers and overflows caused by excess flow to the existing BBW complex. This will be done by implementing the recommendations for sewer construction and rehabilitation outlined in the SSES and constructing modifications to the existing BBW complex.

As previously discussed, the NEORSD is currently working with the communities to coordinate several rehabilitation and relief sewer projects. These projects were outlined in the SSES and included as a grant condition for the Heights project. As they are implemented, they will help relieve the I/I and basement flooding problems. See Appendix I for several articles from NEORSD's "Pipeline" newsletter, which describe some ongoing programs for sewer rehabilitation.

Table 7-1. EIS-3: Cost-Effective System Alternative Cost Summary[1,4]

Capital Costs		
Transport System		$25,825,572
Local Sewers		16,008,346
	Total	$41,833,918
Annual O&M Costs		
Sewer Maintenance		$ 49,600
Power		176,400
Labor		330,700
Miscellaneous		16,500
	Total	$ 573,200
Present Worth		
Capital		$41,016,293
O&M		5,788,345
Salvage		5,108,397
	Net	$41,696,241[2]

Table 7-2. EIS-Recommended Alternative (A Component of EIS-3) Cost Summary[1,4]

Capital Costs		
Transport System		$26,131,113[3]
Annual O&M Costs		
Sewer Maintenance		$ 49,600
Power		176,400
Labor		330,700
Miscellaneous		16,500
	Total	$ 573,200
Present Worth		
Capital		$25,973,070
O&M		5,788,345
Salvage		2,954,361
	Net	$28,788,964[2]

[1]Costs shown in Tables 7-1 and 7-2 for EIS-3 do not include those costs for Contract G already covered by the Heights FNSI ($8,395,683).

[2]See Appendix G for detailed costs.

[3]All sewers under this alternative are considered to be interceptor sewers.

[4]Costs were revised during additional evaluations performed in response to comments on the DEIS; these are described in Chapter 8. These evaluations did not shift the recommended alternative and therefore corrections were not made throughout this document to reflect the additional evaluations in Chapter 8.

Because of the problems created by the Wilson Mills pumping station, it should be replaced by a gravity sewer (approximate capital cost of $7 million, see Appendix G) as soon as possible. This would remove the main control problem of the existing BBW complex. Downstream capacity along Monticello Boulevard would also need to be increased to handle the full peak flow from a 5-year, 1-hour storm event in the Hilltop area. A 60" gravity sewer is recommended for this segment. The existing 30" sewer over Euclid Creek at Monticello Boulevard has sufficient capacity to handle this peak storm event.

Upgrading the Beech Hill pumping station (approximate capital cost of $494,500, see Appendix G) and installing the control system (approximate capital cost of $52,000, see Appendix G) could be done during the same time frame as the Wilson Mills elimination. Along with upgrading the Beech Hill pumping station, the force main should also be replaced (approximate capital cost of $2.3 million, see Appendix G) as soon as possible. This will allow the Beech Hill pumping station to operate at full design capacity without the concern of pipe failure. The proposed improvements to Bonnieview, as included in EIS-3, should also be implemented.

As shown in Figure 7-2, all of the proposed local sewers for the cost-effective system alternative are tributary to the Richmond/White pump station. Thus the system sizing of the pump station and force main in EIS-3 was such that all onsite system flows were included. As discussed previously, this need has yet to be established.

In order to solve the documented existing needs of the Hilltop area, the Richmond/White pump station should be upgraded to 1.8 MGD and a 12" force main to Wilson Mills Road constructed. With this configuration, Scottish Highlands and Richmond Park package plants could be eliminated (if demonstrated to be cost-effective by NEORSD) by a gravity sewer from Richmond Park to Richmond/White (to eliminate Richmond Park) and a force main from Scottish Highlands to the new gravity sewer, as shown in Figure 7-3. The Richmond/White pump station would then convey the flows from the eliminated plants and flows from areas now tributary to the pump station (see Section 2.4.2). Though facilities planning by NEORSD to show the cost-effectiveness of package plant elimination has yet to occur, the costs for this approach have been included (Appendix G).

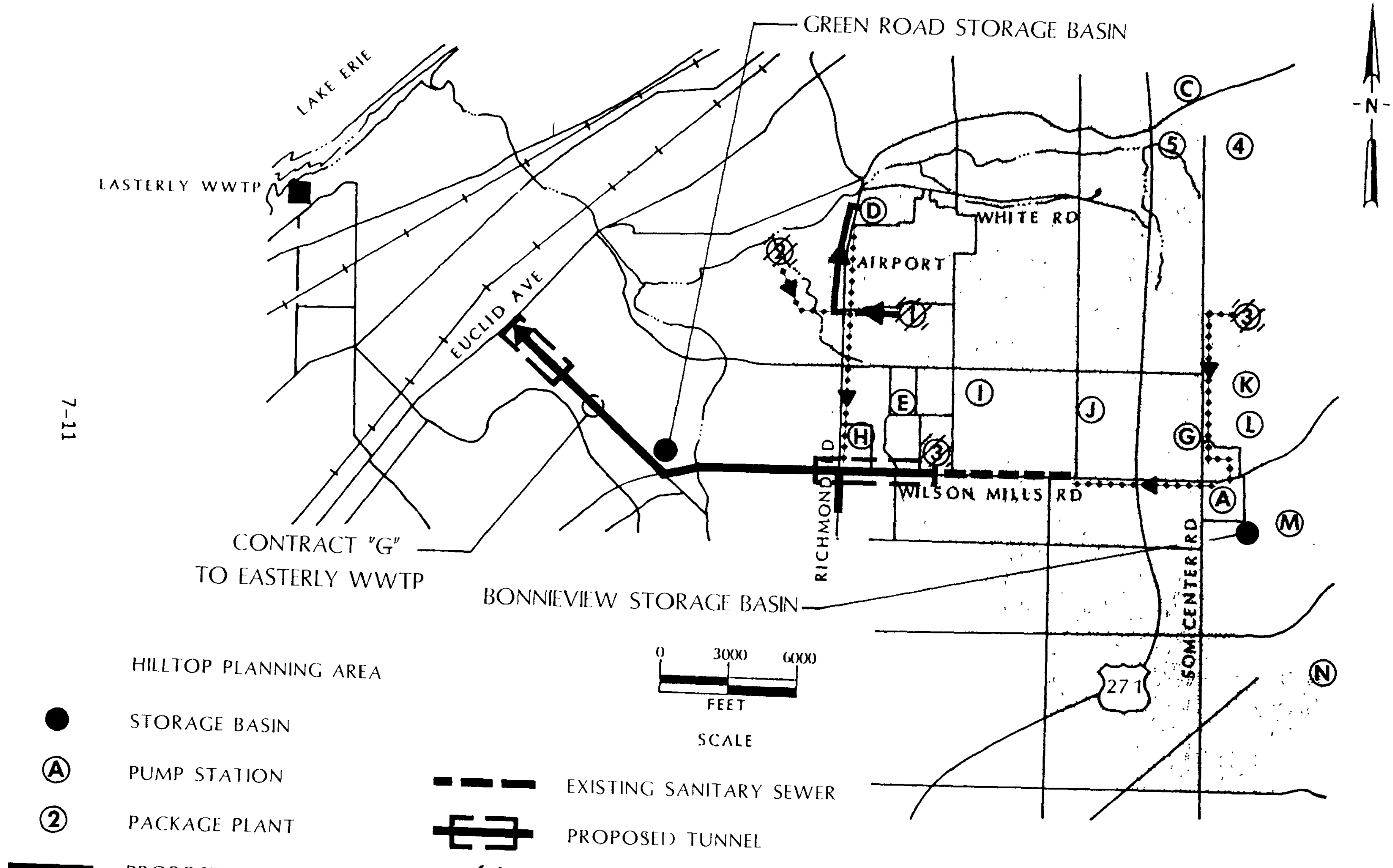


FIG: 7-3

EIS RECOMMENDED ALTERNATIVE

Additional study of the onsite systems areas is needed before any local sewers could be determined to be cost-effective. Innovative options such as cluster systems, mound systems, and small diameter collection systems would need to be evaluated in order to identify a cost-effective solution. Decisions made for handling the unsewered areas, including areas currently undeveloped, may affect the need for additional capacity at Richmond/White pumping station. The recommended plan proposes sizing the pump station structure to accommodate pumping capacity for the future while only recommending pumping equipment capacity for existing needs until planning can be completed.

Since the extent of needed local sewer coverages is unknown at this time, an alternative solution (besides that proposed in system alternative EIS-3) for removing the Hickory Hills package plant from service was also developed. Flow from the Hickory Hills plant could be pumped to Beech Hill pump station via an 8" force main. As with the elimination of Scottish Highlands and Richmond Park, the costs were included for this option (Table 7-2 and Appendix G) even though facilities planning by NEORSD needs to be done to establish if this option is cost-effective. It should also be noted that these sewers which eliminate package plants would be considered interceptor sewers and not local sewers.

The Sleepy Hollow and Pleasant Hill package plants were not a focus of any of the previous facilities planning efforts. Modification may be needed on these plants, and they may eventually be removed from service by the centralized system; however, this will depend on the extent of the local sewer coverages and on future facilities planning to establish the cost-effectiveness of that option.

As previously discussed in this section, the existing sewer under the Monticello Boulevard Bridge now has capacity to handle the existing flows from the area. Additional capacity for the aerial crossing will be needed when the Eastern Belvoir flows enter the Hilltop system. This is currently planned for 1994. The costs for the segment to convey the Eastern Belvoir flows ($897,803) and for the aerial crossing of Euclid Creek ($948,750) were included in Table 7-2 and Appendix G. These costs do not pertain directly to solving the needs of the Hilltop FPA, but are included since decisions to route the Belvoir flows through the Hilltop system were made prior to the EIS. Only the incremental costs for handling Hilltop flows were included in Table 7-2 for Contract G.

The net present worth cost of the EIS-recommended alternative to solve the identified and existing wastewater treatment needs for the Hilltop FPA is $28,788,964. The operation and maintenance (O&M) costs included in Table 7-2 are the same as those included in Table 7-1 for the EIS-3 alternative. Though the alternative to solve existing needs will obviously require somewhat less O&M, the draft EIS does not refine the O&M figures beyond the system level analyses.

Section 7.5 provides estimated annual user costs for the proposed alternative.

7.4 ENVIRONMENTAL IMPACTS

This section summarizes the primary and secondary environmental impacts of construction and operation of the recommended system alternative and the recommended alternative to solve existing needs. Chapter 6 provides a detailed description of the potential impacts of the alternatives. The primary impacts of the cost-effective system alternative and the recommended component of the cost-effective system alternative to solve existing needs are similar for the common components of each project. However, since no local sewers are proposed for the latter, some of the primary impacts and the degree of secondary impacts will be less. This is discussed later in the section.

7.4.1 Primary Impacts

Construction of the selected alternative will result in some short-term, temporary degradation of air quality. A primary impact will be the generation of fugitive dust from construction activities. Impacts will be mitigated through watering, the rapid covering and seeding of disturbed areas, and other measures. In addition, demolition of the Wilson Mills pump station will generate localized, short-term dust and noise impacts. Noise levels in the area will increase during construction activities. However, project construction specifications will include provisions for minimizing these short-term impacts. In accordance with standard practice, all construction activities will be performed during regular working hours and all vehicles will be equipped with mufflers. The selected alternative will relieve the nuisance of sewage overflows to creeks, which contribute to ambient odors.

Construction of the selected alternative may result in some erosion and subsequent sedimentation in area drainageways and streams. Erosion potential will be greatest during the spring when rainfall is heaviest and the groundwater tables are highest. Control of erosion and sedimentation should be achieved by limiting the duration and area of soil disturbance and by using appropriate measures to control runon and runoff of precipitation from disturbed areas. These measures include temporary diversion of surface water from open cuts, stockpiling excavated soils under cover, and quickly reestablishing vegetative cover. At a minimum, the Ohio Department of Transportation requirements for erosion control will be observed.

The cost-effective system alternative would result in a net improvement of water quality in Euclid Creek and the Chagrin River. The proposed collection system will remove three existing waste discharges from the Euclid Creek drainage area--the Richmond Park, Scottish Highlands, and Pleasant Hills wastewater treatment plants. Two discharges will be eliminated from the Chagrin River drainage area--the Hickory Hills and Sleepy Hollow plants. These package treatment plants are reported to have a poor history of operation and maintenance (USEPA 1984d), and their removal would enhance existing conditions.

Adverse water quality impacts resulting from construction of the selected alternative should be temporary, associated with short-term runoff of sediment and attached pollutants from construction activities. The cost-effective system alternative involves one major and five minor crossings of Euclid Creek tributaries. The major crossing will have the most severe potential impact on water quality. Some additional impact to surface waters will occur from construction of sewer lines in the Euclid and Chagrin River drainage areas and from the five minor crossings. Construction of sewer lines in the road right-of-ways will result in sediment runoff that will flow into roadside drainageways and into local streams. The potential adverse impacts resulting from this sewer construction include some nutrient and other pollutant inputs to the Euclid watershed.

The one major Euclid Creek crossing in the selected alternative is located at Monticello Boulevard east of Green Road. The Monticello Boulevard crossing of Euclid Creek is planned as a free standing pipe bridge next to the existing road bridge. Adverse impacts to water quality could occur if the new structure requires construction in the waterway (e.g. abutments). However, this will not be decided until the designs are finalized. These impacts can be minimized by following proper sediment and erosion control practices adjacent to the stream bed. If in-channel construction is necessary the site can be dewatered and installation should be performed within cofferdams, thus significantly reducing sediment inputs and associated turbidity and water quality degradation. The environmental impacts of in-channel construction should be minimal if it is accomplished quickly and if there are no heavy rains. Construction should be scheduled during periods of low flow (during the late summer) to reduce potential sediment resuspension and associated adverse water quality impacts.

Under the selected alternative, interceptor lines will be laid along Richmond Road between White Road and Wilson Mills Road. This section of road crosses two small Euclid Creek tributaries. Sediment input from construction could further degrade these streams. The selected alternative also includes an interceptor along Wilson Mills Road between SOM Center Road and Bishop Road, yielding three minor stream crossings of headwater tributaries of Euclid Creek. Impacts of these crossings on water quality should be minimal.

For all stream crossings, potentially erodible bank-cuts should be stabilized to prevent erosion. Also, even if the abutments are located outside the creek, construction materials (e.g. excavation, backfill, cement) for any new bridge structures should be kept out of the waterway. Permits for all or some of the stream crossings may be required from the U.S. Army Corps of Engineers pursuant to Section 10 (Rivers and Harbors Act of 1899) and/or Section 404 of the Clean Water Act (PL 95-217).

Floods with an expected 100-year return interval do not presently inundate existing wastewater treatment facilities within the FPA. None of the facilities proposed in the selected alternative is located in the 100-year floodplain. Minimal and temporary encroachment into the floodplain will occur with the construction of sewer line stream crossings. Abutments for the proposed aerial crossing will not impact the floodplain of Euclid Creek.

Data on the aquatic biota of Euclid Creek suggest that the system is already stressed. The creek's low species diversity and faunal composition characterized by pollution-tolerant species are typical of poor quality streams. There are no known Federal or State endangered species in Euclid Creek. Sediment introduced to the stream by sewer line construction adjacent to stream drainageways under the selected alternative will further degrade available habitat for benthic fauna. Impacts can be minimized by the implementation of proper mitigative measures during construction activities. Since disturbed areas will recolonize after construction has ceased, overall impacts to aquatic biota for all the alternatives will be minimal.

The five minor open-cut crossings of Euclid Creek tributaries will have minor impacts on stream biota. Habitat will be lost and organisms buried during excavation and filling of the stream bed. Sediment released from construction will cause increased turbidity and will temporarily cover bottom habitat. The benthic community will recolonize the disturbed areas after construction activities have ceased. The damage to benthic fauna can be minimized by performing as much work as possible in the dry part of the year to reduce sediment resuspension. Impacts to fish species should be temporary and minimal since they are mobile and can leave the impacted area during construction. To further reduce potential adverse impacts, construction activities in the waterway should be scheduled to avoid spawning periods for the fish species present.

The crossing of Euclid Creek proposed for Monticello Avenue east of Green Road will have some impact on aquatic biota. Construction of abutments in the waterway, if required in the final engineering plans, will impact benthic organisms by destroying available habitat. Sediment from the construction activities will also smother sections of habitat, but sediment runoff can be minimized by employing proper sediment erosion control measures. Runoff can also be minimized by performing the construction quickly during dry weather periods.

No significant, adverse long-term effects to aquatic biota would be expected during normal operation of the collection systems proposed for the Hilltop area. The system should improve water quality, potentially encouraging the reintroduction of more pollution-intolerant species.

Construction activities associated with the selected alternative could impact wildlife and vegetation. The placement of sewer lines, construction on and around pumping stations, and construction of new holding basins will disrupt existing biota. No adverse impact on Federal- and State-listed threatened and endangered species are anticipated to occur from the proposed work. All proposed conveyance lines are located parallel or contiguous to existing road rights-of-way. Construction of these lines should have a minimal impact on terrestrial biota. Since construction activities associated with the selected alternative will not destroy any extensive stands of unique native vegetation, no significant impacts to terrestrial wildlife are expected.

Minimal impacts to riparian wetlands associated with Euclid Creek are expected to occur from proposed stream crossings. The Euclid Creek watershed is characterized by steep embankments; a limited amount of riparian wetland habitat is available at the Monticello Avenue crossing and the five minor tributaries crossed by sewer routes.

Construction and operation of the selected alternative will not lead to or cause any relocation of residences. Most sewer construction of the selected alternative is proposed to occur within rights-of-way of existing roads and will not significantly affect adjacent land uses.

Construction of sewers proposed under the selected alternative will temporarily disrupt access to some local businesses and will therefore decrease the number of customers these businesses attract. This impact will only occur during construction activities and should be minimized by using construction techniques that reduce the amount of time each roadway segment is under construction.

The Euclid Creek Reservation is used for various activities including cross-country skiing, hiking, picnicking, biking, and passive recreational uses such as walking and enjoying the natural scenery. Construction activity involved with the Euclid Creek crossing at Monticello Boulevard will temporarily affect the use of the area for these activities. The extent of disruption will be dependent upon the location of construction activities in relation to the existing bridge, picnic area, and other activities. Improved water quality should increase the potential for recreation in the Euclid Creek Reservation and the Chagrin River Reservation.

The existing Monticello Boulevard bridge, built in 1954, has an arched design which complements the natural surroundings of the Euclid Creek Reservation gorge. Construction of a free standing pipe bridge to carry the sewer line across Euclid River may slightly modify the aesthetics of the area. Appropriate standards that consider both the design of the existing bridge and the natural setting should be used in this area to minimize long-term aesthetic impacts.

The selected alternative involves open-cut trenching and tunneling to construct regional interceptors. Most of the open-cut construction is proposed to occur in the rights-of-way of existing roads. Tunnel construction may require the use of staging areas on Euclid Avenue, Green Road, and Wilson Mills Road. In addition, open cut construction will affect traffic on Richmond and Wilson Mills Roads and Monticello Boulevard. Any restriction of traffic flow along Euclid Avenue will have significant short-term impacts to traffic flow, especially during rush hours. Impacts to traffic from potential staging areas on Green and Wilson Mills Roads and Monticello Boulevard should not be significant. Open-cut construction along Richmond Road and portions of Wilson Mills Road involving installation of force mains will have minimal impact on traffic flow, due to the small diameter and shallow installed depth of these pressure sewer lines. Some traffic delays will occur on Monticello Boulevard between Green and Richmond Roads. Construction of the Beech Hill Pump Station and sewer construction on Wilson Mills Road between Richmond and SOM Center Roads will cause short-term traffic disruption along these routes.

None of the construction for the selected alternative will directly affect known sites of historic or archaeologic significance.

7.4.2 Secondary Impacts

Secondary growth impacts occur when the action taken changes projected growth (or rate of growth) or redirects the location of residential and commercial development. Population levels in the Hilltop FPA as prepared by NOACA are expected to remain roughly constant throughout the planning period. There are several possible explanations for this low projected population growth rate. These include an aging population, a decreased family or household size, and slow economic growth. Traditionally, the Hilltop FPA has attracted affluent (upper income) families. Population projections for the area assume that an existing large lot development pattern will continue while household sizes decrease.

Housing activity (i.e., the type and location of new housing units) is one of the most important parameters used to make population projections. The number of building permits issued during the 5-year period from 1980 to 1985 falls short of the total number of projected units, due in part to more stringent controls for permitting septic systems enforced in Cuyahoga County, since the passage of an Ohio statute in 1978 that set minimum lot sizes for septic systems. The Cuyahoga County Health Department has denied over 200 septic system requests during this 5-year period.

While larger developers can find alternative methods to overcome the soil limitation problem, absence of sewer service remains a constraint to growth in the Hilltop FPA. Local sewers tributary to the NEORSD regional interceptors would be financed and built by local municipalities. The placement of these local sewer lines would have significant effects on future growth. Various alignments would permit growth in the areas that presently have no central sewer system and where soil and site conditions inhibit use of septic fields.

The Hilltop FPA is an attractive area for residential growth for the following reasons: an excellent transportation network, ample vacant developable land, a general acceptance of development by local officials, and the sociological benefits created by its proximity to the North Chagrin Reservation, a major regional park. All of the jurisdictions in the Hilltop FPA have available vacant land, mostly zoned residential. With the exception of Gates Mills, zoning in each of these communities also includes a commercial and/or industrial category. Zoning and access factors create a strong demand for the area's vacant commercial and industrial land. In summary, there is a demand in the FPA for increased single and multi-family units as well as commercial and industrial development.

Growth levels with the cost-effective system alternative are not expected to contribute to any long-term deterioration of air quality. Temporary inputs of sediment from construction of new developments will cause short-term water quality degradation. Proper sediment control ordinances could be adopted to aid in minimizing these impacts. However, increased nonpoint source pollution from urban runoff due to projected growth in the FPA is not expected to significantly affect surface water quality. Secondary development under any of the alternatives is not expected to affect the 100-year floodplain areas within the FPA, since the terrain is very steep and is not conducive to development adjacent to the waterways. A total of 36.7 acres of palustrine forested wetlands, 54 percent of the forested wetlands within the FPA, could be destroyed by forecast levels of development. One acre of open water wetland could also be lost to development in the FPA.

Development resulting from the cost-effective system alternative might affect community facilities in the FPA by increasing demand for schools, waste disposal, energy, and other municipal services. Projected secondary impacts on most community facilities will not be significant. Increased need for police and fire services will represent the greatest demand on local jurisdictions for improved services. Additional households will also increase traffic pressure somewhat on local roadways such as Richmond and SOM Center Roads.

In the recommended plan to solve existing need (Figure 7-3) most of the proposed local sewer lines shown in Figure 5-6 and associated with Alternative EIS-3 are not retained because the need to serve much of the unsewered portion of the Hilltop FPA has not been demonstrated. The local sewer lines retained in the recommended plan (now termed interceptors) are principally for the purpose of eliminating package plants (subject to demonstration by NEORSD that eliminating them in lieu of plant upgrade is cost-effective). This recommended interceptor system does not significantly extend central sewer service beyond currently served areas and, as such, will not induce growth to the Hilltop FPA. Portions of the Hilltop FPA with the highest growth potential such as the airport vicinity are sufficiently close to existing regional sewers to enable developers in these areas to provide connections with private financing. Most of the larger, centrally located parcels of vacant land in the FPA (those in Highland Heights) are large enough that the cost of providing connections or adding reserve capacity to regional sewers could be absorbed in the cost of site development. Finally, most of the smaller infill parcels in the FPA are located in substantially sewered areas such as Mayfield Heights. Many of the sewers in these areas are currently being rehabilitated or replaced. For these reasons, the growth inducement potential of the recommended plan to solve existing needs is considered low.

7.5 ESTIMATED USER COSTS

This discussion identifies the estimated annual user costs to residents of the six jurisdictions in the Hilltop FPA for the recommended system alternative and associated local sewers. To understand how the costs shown in Tables 7-1 and 7-2 will translate into annual user costs, it is first necessary to understand how the NEORSD apportions costs. NEORSD is divided into two subdistricts: Sewer District 1 (SDI) which includes most of the City of Cleveland and Sewer District 2 (SD2) which includes a large portion of Cuyahoga County. Each district pays a standard operation and maintenance fee. Capital improvements are paid for by the affected district. Since most of the physical plant requirements are already in place for SDI its debt service costs are about half of those paid by the customers of SD2. For this reason SD2 pays the bulk of the system's expansion costs. In most instances, the entire SD2 service area (comprised of over 250,000 customers) pays for required NEORSD capital improvements, which include upgrades at the Easterly WWTP, construction of the Southwest interceptor, the Hilltop and Heights projects, and so on. This practice of spreading the cost of sewer projects throughout the region helps NEORSD keep sewer rates affordable. The user costs presented in Table 7-3 assume an annual service charge of $181 for customers in Sewer District 2.

Table 7-3. Estimated Annual User Costs for the EIS Recommended Plan Plus Current Sewer Rates

	Gates Mills	Highland Heights	Mayfield Heights	Mayfield Village	Richmond Heights	Willoughby Hills	All Communities in NEORSD Sewer District 2
Median Household Income (MHI)	$54,913	$37,474	$47,328	$25,343	$31,296	$30,946	$25,752
"Most Costly" Approach: includes EIS-3 with no Federal $ and full local sewers	$ 227	$ 1,432	$ 227	$ 519	$ 510	$ 1,224	$ 227
Percent of MHI	0.41	3.82	0.48	2.05	1.63	3.95	0.88
"Least Costly" Approach: component of EIS-3 recommended to solve existing needs	$ 207	$ 207	$ 207	$ 207	$ 207	$ 207	$ 207
Percent of MHI	0.38	0.55	0.44	0.82	0.66	0.67	0.80

Local sewers, however, will be built entirely by the local jurisdictions in the Hilltop FPA that will be benefitted by their construction. Because these jurisdictions have a much smaller number of residents to bear these sewer costs, the local sewer component of estimated annual user costs can have a very significant effect on the affordability of the project to Hilltop FPA residents. These components will be paid by users directly to the local jurisdictions, not the NEORSD.

Annual user costs were estimated for two approaches to implementing the selected system alternative, Alternative EIS-3:

- A "most costly" approach detailed in Table 7-1 which assumes the NEORSD will build Alternative EIS-3 (Figure 7-1) without Federal grants, and the local jurisdictions will construct the full set of local sewers shown in Figure 7-2
- A "least costly" approach detailed in Table 7-2 which assumes the NEORSD will build the recommended component of EIS-3 as described in Section 7.3 with 55 percent Federal grants.

Actual costs will probably fall somewhere between these two approaches. Estimated annual user costs for the most costly and least costly approaches to implementing the selected system alternative are shown in Table 7-3. Additional details of user cost development are included in Appendix H.

The significant variation shown in Table 7-3 between annual user cost estimates for the most and least costly approaches occurs because the costs of new local sewers cannot be distributed among a large rate base the way the NEORSD does with regional facility costs. Because this variation is so great, it is important to keep in mind the preliminary nature of plans for local sewers and factors which may reduce the extent and cost of local sewers actually built in the future. It was these factors that led to the recommendation in Section 7.3 for a sewer plan which meets immediate, proven needs and minimizes local costs. For example, local sewers shown in Figure 5-6 represent a "worst case" evaluation and it may not be necessary to convey wastewater from all of the Hilltop FPA to the NEORSD regional sewers. Also, some needed sewers may be built by larger developers. In addition, some parts of the Hilltop FPA may elect to continue relying on septic tank leach fields or utilize a septic tank management system if further evaluation shows that this is feasible and desirable. Most of the funding decisions which could affect the cost of facilities to local residents have not been made; Federal grants for 55 percent of the cost of regional facilities may or may not be available. Depending on the date of construction, loans from an expanded State revolving fund may be available.

7.6 CONCLUSIONS

This EIS evaluated four system alternatives to solve the wastewater treatment problems of the Hilltop Facility Planning Area in a cost-effective, environmentally sound manner. These alternatives are consistent with the level of detail in the Facilities Plan and employ the assumptions used during the facilities planning process. Therefore, the analysis of EIS system alternatives assumed ultimate growth, the elimination of all package plants and several pump stations, and the sewering of all areas previously served by onsite systems. Based on these assumptions, EIS-3 was selected as the cost-effective system alternative for the Hilltop area.

During the EIS process it became apparent that the facilities planning documentation necessary to establish the need for EIS-3 has not been produced, as noted in Section 7.3.

Based on the existing documentation, the EIS recommends a component of the EIS-3 alternative to solve the existing needs of the area. This alternative provides for conveyance of the existing Hilltop flows to the Easterly WWTP. The EIS also encourages the local communities to continue working with NEORSD to develop and implement relief sewer construction and rehabilitation programs, as recommended by the SSES and required by a grant condition, to help control infiltration and inflow problems in the sewers tributary to the regional system and to allow for elimination of basement flooding problems and maximum conveyance of wastewater.

The cost-effective component of EIS-3 which this EIS endorses is illustrated in Figure 7-3. This alternative addresses all documented needs for the service area at a present worth cost of $28,788,964 and has flexibility to be compatible with future growth and additional documented pollution abatement options. Furthermore, the EIS-recommended alternative can proceed as soon as resources are available to correct existing problems.

8.0 RESPONSES TO COMMENTS ON THE DRAFT EIS

8.1 INTRODUCTION

In June, 1987 the U.S. Environmental Protection Agency published the Cleveland Hilltop Planning Area, Ohio Draft Environmental Impact Statement (DEIS). Copies of the Hilltop DEIS were circulated to a large number of federal, state and local agencies and organizations as well as numerous private citizens who had expressed interest in the project. On August 12, 1987 two public hearings were held at 1:00pm, and 7:00pm in the Highland Heights Community Center in Highland Heights, Ohio to receive comments on the DEIS. The period for receipt of written comments was open for 45 days, closing on August 27, 1987.

Forty-one comments received in writing or at the public hearings led to minor corrections reflected in the text of this Final EIS. In addition, 32 comments were selected to which direct responses were prepared. Section 8.2 presents reduced copies of the full texts of all written comments received, with numbers added to the margins identifying the 73 comments for which corrections or responses were prepared. Section 8.3 presents a listing of all 73 comments including the 32 direct responses to comments on the DEIS.

8.2 COMMENT LETTERS

RECEIVED AUG 2 0 1987

Cleveland Metroparks System
4101 Fulton Parkway
Cleveland Ohio 44144
(216) 351 6300

Metroparks

70 years of natural resource conservation

July 30, 1987

Valdas V. Adamkus, Regl. Administrator
U.S. Environmental Protection Agency, Region 5
230 S. Dearborn St.
Chicago, Illinois 60604

RE Draft Environmental Impact Statement
Hilltop Facilities Planning Area
Cleveland, Ohio

Dear Mr. Adamkus:

The Cleveland Metroparks System appreciates the opportunity to participate in and review documents prepared as part of the environmental assessment process for Water Pollution Control Act Program facilities in our area. Because the Draft Environmental Impact Statement for the Hilltop Facilities Planning Area identifies certain proposed pollution control facilities having direct and indirect effect upon land and water resources administered by the Cleveland Metroparks System, we are providing the comments enumerated herein in the interest of protection and enhancement of these resources.

Our comments are directed to the issues which were evaluated and to the statements made regarding these issues on the Draft E.I.S. These comments are organized in general categories as follows:

1. Overall effect of potential facilities on water quality in the planning area
2. Impacts and environmental consequences of implementation of specific facility alternatives
3. Adequacy of the Draft Environmental Impact Statement in identifying and assessing these impacts and consequences.

<u>The overall effect of potential facilities on water quality in the planning area</u>

Each of the alternative facilities plans evaluated in the Draft E.I.S. has the potential to accomplish significant goals in the improvement of water quality in the planning area. (Lake Erie and the Euclid Creek and Chagrin River tributary streams) Because of the strong commitment of the Cleveland Metroparks System to improved water quality, we offer all available support to efforts to implement facilities plans having the greatest potential to accomplish this improvement. Of the alternative plans evaluated in the Draft E.I.S., the one identified as

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Valdas V. Adamkus
U.S. Environmental Protection Agency -2- July 30, 1987

EIS-1 and its associated local sewers plan provide the greatest opportunity to achieve the water pollution control goals. This is because of the ability of this alternative to provide sewerage to all presently unsewered areas and to rely to a minimal degree upon less reliable electro-mechanical support (pump stations) as the EIS-1 interceptor operates principally by gravity. (1)

<u>Impacts and environmental consequences of implementation of specific facility alternatives</u>

The recommended alternatives EIS-2 and EIS-3 require the construction of Stream Crossings of Euclid Creek near Monticello Boulevard (See Draft E.I.S. pp. 7.6-7.8, 7.14-7.18, etc.). The impact of construction of this crossing by the means discussed on the pages listed would be severe. Both temporary construction-related and long-term aesthetic and compatibility effects of construction of a free standing pipe bridge anywhere within the Euclid Creek Reservation would be extremely negative. The effect of this construction within the aesthetic viewscape of the existing Monticello Bridge would be unacceptable and would be vigorously opposed by the Cleveland Metroparks System. The environmental impacts of the Euclid Creek crossing under Alternates EIS-1 and EIS-4 are potentially much less severe than those of EIS-2 and EIS-3. Construction efforts would be essentially as outlined in the Draft E.I.S. Long-term effects of Stream Crossing 1 near Euclid Avenue should lessen over time as areas disturbed by construction heal and blend with undisturbed surroundings. (2)

<u>Adequacy of the Draft Environmental Impact Statement in identifying and assessing these impacts and consequences</u>

In its analysis of Euclid Creek Stream Crossing impacts (pp. 6-27,28), the Draft E.I.S. characterizes the impacts of Stream Crossing 1 (EIS-1 and EIS-4) as being related to the duration of construction and the use of a portion of the area as a "staging area". No commitments for use of any portion of the Euclid Creek Reservation as a "staging area" have been made and it should not be assumed that such commitments will be made. The direct effects of construction of Stream Crossing 1 at the Euclid Creek <u>watercourse itself</u> would be essentially as stated in the Draft E.I.S.

Stream Crossing 2 (EIS-2 and EIS-3) near Monticello Bridge is stated to have the effect of disrupting the aesthetics of the area during and after the construction. The Cleveland Metroparks System is strongly opposed to any design or construction method associated with Stream Crossing 2 which would have any residual effect on aesthetics whatever. The Draft E.I.S. statement on p. 7-18 that a free standing pipe bridge crossing "may slightly modify" the aesthetics is inaccurate in that it would greatly affect the architectural harmony of the existing arch bridge and its natural surroundings. The use of traditional cylindrical pipe and pipe bridge supports at Stream Crossing 2 is unacceptable. The design and construction of any Euclid Creek crossing at the Monticello Bridge must be accomplished in such a way as to have only temporary impact with no rather than 'minimized' long-term impacts. Stream Crossing design alternatives which must be evaluated at this site include: below-grade crossings under Euclid Creek, and, full integration of an aerial crossing into the existing bridge or its replacement. (2)

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Valdas V. Adamkus
U.S. Environmental Protection Agency -3- July 30, 1987

The capital costs for an environmentally acceptable Euclid Creek crossing at Site 2 have not been identified in the Draft E.I.S. in part because of insufficient development of plans for such a crossing. (Draft E.I.S. p. 6-27) Plans detailed enough to precisely evaluate the potential impact and necessary capital costs for complete mitigation should have been developed as a part of the Environmental Assessment and factored into the overall cost effectiveness evaluation of the EIS-1 through 4 alternative comparisons. (2)

Thank you for the opportunity to provide comment and participation in the review process for this important project.

Sincerely,

Stephen D. Coles
Chief of Park Planning

SDC:PC

CC.
L.Stumpe, NEO Regl Sewer Dist

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US Department of Transportation
Federal Highway Administration

August 7, 1987

HPP-05

Mr. Harlan D. Hirt, Chief
Environmental Planning Section, SWPP
U.S. Environmental Protection Agency, Region 5
230 South Dearborn Street
Chicago, IL 60604

Dear Mr. Hirt:

The Federal Highway Administration has completed its review of the draft EIS for the Cleveland Hilltop Planning Area, Cleveland, Ohio. The following comment is offered for your consideration in developing the final EIS.

Page 4-71 - The EIS states that Richmond Road is to be widened between Mayfield and Cedar Roads and between Euclid Avenue and Highland Road. The section between Mayfield and Cedar Roads was let to contract in 1984 and completed on June 30, 1987. (3)

Sincerely yours,

Herbert R. Teets
Regional Administrator

By: E V Heathcock
F. V. Heathcock
Director, Office of Planning
and Program Development

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The City of Richmond Heights

The City With The Forward Look

457 RICHMOND ROAD
RICHMOND HEIGHTS, OHIO 44143
PHONE 486 2474

August 11, 1987

Mr. Harlan D. Hirt, Chief
Environmental Planning Section
U.S. EPA 5WFP, 230 S. Dearborn St.
Chicago, IL 60604

Dear Mr. Hirt,

Enclosed is a copy of Resolution No. 98-87, which was passed and approved by our City Council on August 11, 1987. It is a resolution supporting the position of Northeast Ohio Regional Sewer District with respect to the Hilltop Intercepter Sewer planned.

Very truly yours,

Sharon L. Daviso

Sharon L. Daviso
Clerk of Council

cc: U. S. Rep. Edward F. Feighan

Encl.
sld

RESOLUTION NO.: 98-87
INTRODUCED BY: GASE

A RESOLUTION SUPPORTING THE POSITION OF NORTHEAST OHIO REGIONAL SEWER DISTRICT WITH RESPECT TO THE HILLTOP INTERCEPTER SEWER PLANNED.

WHEREAS, Northeast Ohio Regional Sewer District has developed a plan for the Hilltop intercepter sewer system based upon a gravity flow of sewage which appears to be the most comprehensive and feasible resolution of the problems encountered by Hilltop communities including the City of Richmond Heights; and

WHEREAS, the United States Environmental Protection Agency has recommended the use of pumping stations rather than a gravity flow which would save initial construction costs but would greatly add to the sewer maintenance and operational costs for users in the eastern suburbs over a long period of time; and

WHEREAS, the federal plan deals only with immediate needs rather than long-term projected growth and long-term feasibility of the system; and

WHEREAS, U. S. Representative Edward F. Feighan has indicated he would argue fiercely against the U. S. Environmental Protection Agency's proposal for a combination gravity/pump sewer system; and

WHEREAS, this Council supports the position of Representative Feighan and the plan proposed by the Northeast Ohio Regional Sewer District.

NOW, THEREFORE, Be It Resolved by the Council of the City of Richmond Heights, State of Ohio, that:

Section 1: The Mayor and Council of the City of Richmond Heights do hereby strongly object to the proposed United States Environmental Protection Agency plan for a combination gravity and pump station sewage system to resolve the immediate problems encountered by eastern suburbs, including the City of Richmond Heights, as the same will not be an effective resolution of the problem.

Section 2: The Mayor and Council of the City of Richmond Heights hereby strongly indicate their approval of the plan developed by the Northeast Ohio Regional Sewer District for a complete gravity flow system to address immediate and long-range problems with the northeast suburbs with respect to sewage treatment.

Section 3: The Clerk of Council be and she is hereby authorized and directed to submit a copy of this Resolution to Harlan D. Hirt, Chief, Environmental Planning Section, U.S. EPA, 5WFP, 230 S. Dearborn Street, Chicago, IL 60604, and to United States Representative Edward F. Feighan.

Section 4: This Resolution shall take effect and be in force immediately upon its passage and approval by the Mayor.

PASSED: Aug. 11, 1987
APPROVED: Aug. 11, 1987
ATTEST: Sharon Daviso

Sharon Daviso,
Clerk of Council

Robert J. Boyle
Robert J. Boyle, Mayor

Roy F. Loughlin
Ray F. Loughlin,
President of Council

I, Sharon Daviso, as Clerk of the City of Richmond Heights, Ohio, do hereby certify that the foregoing is a true and correct copy of Resolution No. -87, adopted by the Council of said Municipality on the ______ day of __________, 1987.

Sharon Daviso,
Clerk of Council

HILLTOP AREA PUBLIC ADVISORY COMMITTEE

Providing Direction for Development of Water Pollution Control Facilities in the Hilltop Area

August 12, 1987

To: Mr. Harlan D. Hirt
Environmental Planning Section
U.S. Environmental Protection Agency
5WFP-TUB-08
230 South Dearborn Street
Chicago, Illinois 60604-1586

From: Mr. Joseph J Singer, Acting for
Mr. Lawrence M. Baker, Chairman
Hilltop Area Public Advisory Committee

Subject: Draft Environmental Impact Statement
Hilltop Facilities Planning Area

The Hilltop Area Public Advisory Committee (HAPAC) was formed to follow the preparation of the Hilltop Environmental Impact Statement. Our membership is comprised of a broad range of interests, including local elected officials, private citizens, area businessmen and representatives of environmental and special interest groups. (Our membership list is attached.)

Since its formation in September of 1986, the Committee has invested a considerable effort to become aware of the issues and to formulate positions regarding future water pollution control facilities in the Hilltop area. The Committee has conducted regular monthly meetings which were well attended and open to the public. Minutes of these meetings were sent to your agency and other interested elected officials, as well as agencies and individuals

Additionally, the group formed four subcommittees which met separately, usually monthly, to perform detailed analysis of issues in specific areas. The four subcommittee subject areas are:

1. Technical
2. Growth and Development
3. Environmental
4. Economic

As a product of this substantial local effort, the full Committee will offer the following specific comments on the draft Hilltop Environmental Impact Statement. (A copy of these comments is attached.) I will present comments on growth and development, and other members of the Committee will comment on technical, environmental, and economic aspects.

A707COMM
Attachment

RECOMMENDATIONS FOR FULL COMMITTEE POSITIONS
BY GROWTH AND DEVELOPMENT SUBCOMMITTEE

1. Sec. 4.7.2
Population growth in Highland Heights is substantially underestimated by the EIS figures due to lack of consideration of proposed development. We project the year 2005 population to be 9,606 rather than 7,032 as shown in Table 4-11. This represents a 67% increase over 1980 levels as opposed to the 22.5% change as shown in the table. The results of a survey and paper which supports this projected growth is included as an attachment. 4

2. Sec. 4.8.1
We concur with the EIS statement regarding a high demand in the Hilltop area for housing, retail, and office space. The results of a survey by the Growth and Development Subcommittee projects substantial growth in each of these three types of development by 2005. See attachment.

We note that this projected growth is expected as a result of a number of factors which contribute to favorable market conditions.

A. Areas north of Highland Road contain a substantial portion of some of the large blocks of undeveloped land in Cuyahoga County. As other development areas become more saturated attention is necessarily turned to this area.

B. Key zoning issues which have blocked development of land have been settled.

C. Some overall growth is expected to be driven by a basic manufacturing growth in the area.

Finally, we would note while relatively few building permits were issued during the period 1980 through 1985 as referenced in Section 6.2.1 of the EIS, there has been a substantial upturn in building since 1985.

3. Figure 4-10 should be updated in accordance with subcommittee survey data. See attachment. 5

4. Sec. 5.3
The recommended plan is deficient in not addressing the growth needs of the area which would be tributary to the Richmond-White pump station. The EIS should develop a recommended plan which serves this area throughout the 20-year planning period. The Hilltop Interceptor is part of the Heights/Hilltop Interceptor already under construction which was sized to handle this growth. Further, proceeding with a long-term regional solution which accommodates 20-year growth will assure maximum environmental protection and minimize expenditures for interim solutions. 6

LAS:mm.
A707cEIS
Attachment

ATTACHMENT TO GROWTH AND DEVELOPMENT POSITION PAPER

Introduction

Within the Hilltop area there exists a substantially undeveloped area. The extent of this area can be characterized as including the Northern two-thirds of Highland Heights, the southern portion of Willoughby Hills, areas around the County Airport, and portions of Mayfield Village between SOM Center Road and I-271, north of Highland Road. These identified areas remain as some of the last major undeveloped lands in northeast Cuyahoga County. The vast majority of this undeveloped area is presently held by developers. Recent resolution of zoning issues and rezonings have set the stage for development to proceed. The area is seen as highly desirable for new residential dwelling, office space and commercial development.

These factors lead the members of this subcommittee to conclude that the most of this property will be developed within the next twenty years. The EIS statement should consider the need to accommodate this growth.

(1) Members of the Growth and Development Subcommittee contributing to this position paper include: Joseph J. Singer, Jack Wolfe, Julius Paris, Jack Craig, Robert Parry, Willoughby Hills Mayor Melvin Schaefer and Richmond Heights Mayor Robert J. Boyle. Lester Stumpe, NEORSD planning manager, serves as staff person to this subcommittee.

Population Projections

The facilities planning work which has been conducted by the Northeast Ohio Regional Sewer District (NEORSD), to date, has been based upon official population projections prepared by the Northeast Ohio Areawide Coordinating Agency (NOACA). Under authority of Section 208 of the Clean Water Act, NOACA has been designated as the areawide planning agency responsible for developing population projections to be used in facilities planning efforts. NOACA also prepares population projections for use in its other roles such as transportation planning.

TABLE 1 POPULATION(1) AND SEWER SERVICE PROJECTION

	1980		2005	
Community	Total(2)	Sewer(3)	Total(2)	Sewer(3)
Highland Hts.	5,739	4,764	7,032	7,032
Gates Mills	2,236	870	2,344	1,027
Mayfield	3,577	3,215	2,653	2,653
Mayfield Hts.	21,550	12,650	18,522	10,872
Richmond Hts.	10,095	7,542	13,065	10,883
Willoughby Hills	8,612	0	11,774	4,996
Total	51,809	29,041	55,390	37,463

(1) Based upon official NOACA population projections.
(2) In service area
(3) In service area and sewered.

Page 3

To make population projections, NOACA has relied on an approach which involves a population model known as the Newling Model. A summary of the theoretical basis of the Newling Model is included as Attachment 1. The basic approach of the Newling model is to assume that an area will eventually reach the standard density assigned to one of four categories which describes the particular community in question. The four categories are: Rural Area, Rural Small Town, Urbanizing and Rapidly Urbanizing. For instance, Highland Heights has been classified as an Urbanizing community. Ultimately this type of community is expected to reach a specified density level. The community's projected rate of growth is a function of the gap between the present population and the ultimate assumed density. A final critical factor concerning population figures developed by NOACA for its area is that the projections must agree with a pre-assigned population level determined by the State of Ohio. To meet this pre-assigned total population level, the model can be calibrated to produce either higher or lower population projections by adjusting the ultimate density level for each of the four categories.

One of the shortcomings of the model is that it does not account for actual development plans and schedules. As mentioned above, the Newling model projects growth rates as a function of how far a certain community is from its ultimate population density. This approach is likely to produce erroneous data where specific large development projects subsequently undertaken are not known at the time the projections are developed.

Page 4

Based upon the material which follows, we expect the development of 1,547 homes in Highland Heights in the next 20 years. Assuming an average of 2.5 persons per household, this results in an estimated population increase of 3,867. NOACA has projected a growth of 1,293 or 2,574 fewer people than we estimate.

Subcommittee Development Survey

As a result of the concerns about existing population projections discussed above, the subcommittee determined that it was appropriate to develop its own data on proposed development projects. To keep the scope of its task within a manageable level the subcommittee decided to focus primarily on the community of Highland Heights. Our initial knowledge of the situation (substantial undeveloped land tracts and desirable zoning) prompted us to suspect that existing official population projections for Highland Heights are low.

At an initial meeting the subcommittee developed a three-point approach for collecting and assessing likely development in the area. The first step consisted of surveying land holders concerning their development plans and schedules. The second step consisted of asking area realtors to assess the development projections in light of their own knowledge of market conditions. The third step consisted of looking at historical absorption rates as a check on the data developed in the previous two steps.

Page 5

The subcommittee began by developing a survey questionnaire. The next step was to develop a list of parcels within Highland Heights which had some potential for development. This information was then supplemented by a check of property tax records for all parcels which were identified as having some potential for development.

Realizing that the market is affected by surrounding developments, the committee also developed a list of known or likely development projects in surrounding communities to be surveyed. It is important to note that while the ultimate survey does produce data on a substantial number of developments in surrounding communities, it is by no means as complete as the work done in our Highland Heights focus area.

The survey results are shown in Attachment 2. They are further summarized in the table below.

HIGHLAND HEIGHTS DEVELOPMENT

Development	Type	1985-90	1991-95	1996-05	Total
Residential	(Units)	722	612	213	1,547
Industrial	(Sq.Ft.)	-	-	-	-
Office	(Sq.Ft.)	300,000	500,000	200,000	1,000,000
Commercial	(Sq.Ft.)	200,000	200,000	-	400,000

Page 6

HILLTOP COMMUNITIES(1)

Development	Type	1985-90	1991-95	1996-05	Total
Residential	(Units)	1,113	682	284	2,079
Industrial	(Sq.Ft.)	450,000	330,000	600,000	1,380,000
Office(2)	(Sq.Ft.)	2,294,000	2,183,000	1,234,000	5,711,000
Commercial	(Sq.Ft.)	238,000	238,000	39,000	515,000

(1) Includes Highland Heights, Gates Mills, Mayfield, Mayfield Heights, Richmond Heights, Willoughby Hills.

(2) Includes an estimate for Larderhaven development of 1.5 million square feet which is not in Hilltop sewer service area.

Evaluation of Market Demand

The second step was to compare development survey results with actual market demands. The subcommittee proceeded by inviting representatives of two of the major realtors in the area to a subcommittee meeting to discuss survey results. In these discussions we did not narrow our focus to the Highland Heights data. The subcommittee reasoned that market demand should consider all developments in the general Hilltop area.

The next step was to assess development projections in light of historical absorption trends. The subcommittee felt comfortable with the figures showing the development and sale of 2,079 homes over the next 15 years as shown in the survey results. To assume this level of development over the 20-year planning period only acts to add another layer of assurance that the development estimates will be realized. (1,547 of the new homes will be in Highland Heights.) Assuming 2.5 persons per household results in 3,867 residents added. This is 2,574 more people than projected by NOACA for the 20-year period.

The subcommittee has some reservations about the ability to absorb 5,711,000 square feet of office space over the next 20 years, (i.e.,285,000 square feet per year). A survey of absorption rates for office space by Victor S. Voinovich Company shows that historical absorption rates for all the eastern suburbs over the past five years has been at a rate of 200,000 square feet per year. (It should be noted that the survey area encompasses about 25% of the area included in the Voinovich east side study). The subcomittee also noted a Regional Planning Commission study[1] containing office rate absorption for the Rockside and I-77 area, noted for its rapid office development. It showed an absorption rate of 150,000 square feet per year between the years 1974 and 1984.

(1) "Economic Impact Analysis Relocated U.S. 422" by Regional Planning Commission. 11/1/84

The group did note that the area included in its survey includes four distinct office areas. These are the Cedar Road-Lander Road-I-271 area, the Wilson Mills Road and I-271 area, the Delta Business Park area located along Bishop Road, and the Cuyahoga County Airport area. After reviewing all of the data available, the group concluded that there was substantial concern that our survey projections were too high for office space development. The final conclusion of the group was that actual office space development for a 20-year period will probably only achieve 60% of the 5.7 million square feet projected (i.e., 3.4 million square feet). However, the group also felt that the amount of commercial development projected by the survey is too low. Survey results show projected retail development at 515,000 square feet over the next 20-year period.

<u>Schools, Storm Drainage, Water Supply, Roads</u>

The subcommittee briefly reviewed other basic community services in addition to sewerage facilities to assess the area's ability to absorb growth.

A check with Steve Hovancsek, Highland Heights city engineer, found that major culverts transporting storm flow from the area between Bishop and Miner Roads and north of Highland are adequately sized for full development. A culvert on White Road, just east of Bishop was noted as needing enlargement. Thus storm drainage is not expected to be a

problem, if adequate storm sewers and retention facilities are installed during land development. The area around the County Airport in Richmond Heights was noted as an area needing drainage improvements to allow full development. The County and Richmond Heights are presently cooperating in developing a solution to this problem. Drainage problems are presently encountered on the developable land between I-271 and SOM Center Road that runs through the Cleveland Metroparks. Further development in this area will likely need to incorporate extensive measures for drainage control.

It should be noted that development is likely to cause substantial changes in runoff characteristics, particularly increased sedimentation of receiving streams during construction. Communities should monitor development and perhaps institute programs of mitigative measures. NOACA and the County soil and water conservation district can be a resource for program development.

The Hilltop Area's water supply is provided by the City of Cleveland's Nottingham plant. The plant and the main feeder line on Highland Road are expected to meet growth demands without any substantial improvements.

Dr. Robert G. Stabile, the superintendent for the school district serving Mayfield Heights, Mayfield Village and Highland Heights, reports a present ability to absorb approximate 3,000 additional students.

Roads presently serving undeveloped areas, such as Bishop Road, are not considered adequate to handle traffic volumes created by the projected amount of development.

Although some road improvements are presently under construction, it is likely that a major road-widening program would be needed to accommodate increased traffic flow. Logically, this increased development will also impact the major interchange with I-271 at Wilson Mills Road and Bishop Road and I-90.

In summary, some services are in place; where services are not in place, it appears that they can be provided in conjunction with development.

/mm.

ATTACHMENT II

QUESTIONNAIRE RESULTS
FOR HILLTOP AREA DEVELOPMENT SURVEY

COMMUNITIES SURROUNDING HIGHLAND HEIGHTS

Property	Parcel #	Owner	1985-1990	1991-1995	1996-2005	Size	Comments
*40	-	Royalwood	128 (R)	-	-	-	Under construction
*41	-	Consolidation of Parcels				40 acres	Nine property owners have recently agreed to market property as block with help of Richmond Hts
*42	Curtiss Wright Center	Cuyahoga County	80,000 (I), 130,000 (O)	-	-	20+ acres	Compilation of 42 & 43
*43	Curtiss Wright Center	Cuyahoga County	See 42				See 42.
44	-	Cuyahoga Co.	-	250,000 (O)	-	-	-
*45	-	G&M Properties	100,000 (I), 250,000 (O)	200,000 (I), 250,000 (O)	600,000 (I), 400,000 (O)	123 acres	Will need zoning changes
*46	-	Scaravilli & Marra	-	-	-	38 acres	No plans for the foreseeable future
48	-	Cuyahoga County	70,000 (I)	-	-	20 acres	-
*49	-	Crawford Fittings	(I)	-	-	20 acres	One manufacturing building under construction
*50	Sayle Farm & Camelot Subdivision	CPM Realty	100 (P)	-	-	125 acres	-

ATTACHMENT II

QUESTIONNAIRE RESULTS
FOR HILLTOP AREA DEVELOPMENT SURVEY

COMMUNITIES SURROUNDING HIGHLAND HEIGHTS
(Continued)

Property	Parcel #	Owner	1985-1990	1991-1995	1996-2005	Size	Comments
*51	-	John Calabreeze	20 (R)	-	-	25 acres	-
*60	831-04-001	CAPCO Enterprises	-	-	-	7.5 acres	No present plans - land could be developed in 5-10 yrs.
*61	831-05-066	Richard W. & R. Laconte	-	-	-	-	For 61, 62 & 63 - Unable to obtain response due to pending zoning litigation. Survey forms provided to attorney of record requesting information.
*62	831-07-001	Pat Laconte	-	-	-	-	
*63	831-07-002	Pat Laconte	-	-	-	-	
*64	831-07-008	CAPCO Enterprises	5 (R), 200,000 (I), 200,000 (O)	130,000 (I), 100,000 (O)	-	42 acres	This is a compilation of properties 64, 70, 71, 72 & 73
65	831-07-003	Anthony & J. Ciofani	-	-	-	-	Existing residential dwelling
*66	831-07-004	W. A. Howarth	1 (R)	-	-	1 acre	-
67	831-07-005	James L. Rivers	-	-	-	-	Existing residential dwelling
68	831-07-006	Frank Rivers	-	-	-	-	Existing residential dwelling
*70	831-07-009	CAPCO Enterprises	See 64				Properties 64, 70, 71, 72, 73 and 74 potential site for Allen Bradley headquarters office.
*71	831-06-002	CAPCO Enterprises	See 64				
*72	831-07-007	CAPCO Enterprises	See 64				
*73	831-09-001	CAPCO Enterprises	See 64				
*74	831-09-002	Madelon Cortwright	200,000 (O)	-	400,000 (O)	38 acres	-
*7[illegible]	831-09-004	Kenneth Zako	-	-	-	-	Existing residential dwelling.

ATTACHMENT II

QUESTIONNAIRE RESULTS
FOR HILLTOP AREA DEVELOPMENT SURVEY

HIGHLAND HEIGHTS

Property	Parcel #	Owner	1985-1990	1991-1995	1996-2005	Size	Comments
*1	-	Crawford Fittings	-	-	I	-	#1 and #2 are approximately 14 acres, Buildings are existing on #1. Room for development on #2.
*2	-	Crawford Fittings	-	-	I	-	
*3	Highland Greens	Miner Properties	320 (R)	532 (R)	213 (R)	368 acres	Combinations of attached, detached and cluster housing.
*4	UPS	UPS	-	(O), (C)	-	18.8 acres	
*5	Delta Bus. Park	Miner Properties	300,000 (O)	500,000 (O)	200,000 (O)	86.5 acres	
*6	Highland-woods West	Miner Properties	200,000 (C)	200,000 (C)	-	44.7 acres	
*7	Highland-woods #2	Miner Properties	156 (R)	-	-	51.3 acres	Highlandwoods #1 was constructed in 1978 (99R) and 1984 (23R)
*8	821-14-001	Richard Bass	-	-	-	-	No present plans for development.
*9	821-13-012	Richard Bass	-	-	-	-	No present plans for development
10	821-13-008	V. Urbanija	-	-	-	-	Existing residential dwelling
11	821-13-006	Georgia Hunter	-	-	-	-	Existing residential dwelling.
12	821-13-009	Celeste Frate, Inc	-	-	-	-	Existing residential dwelling
13	821-13-010	John Frate	-	-	-	-	Existing residential dwelling.
14	821-13-011	Jenson, Melargero, Caran	-	-	-	20 acres	Properties 14 & 15 are the potential site for 69 homes.
15	821-15-001	M. Morscher	-	-	-	20 acres	Properties 14 & 15 are the potential site for 69 homes

ATTACHMENT II

QUESTIONNAIRE RESULTS
FOR HILLTOP AREA DEVELOPMENT SURVEY

HIGHLAND HEIGHTS
(Continued)

Property	Parcel #	Owner	1985-1990	1991-1995	1996-2005	Size	Comments
*16	Highland-woods N.E.	Miner Properties	24 (R)	-	-	40 acres	-
*17	Highland-woods East	Ratner-Sunrise, Miner	148 (R)	80 (P)	-	125 acres	-
18	822-01-065	Robert Planisek	-	-	-	-	-
*19	822-01-002	Domenic Nero Const. Co	(R)	-	-	7 acres	For Domenic Nero Const. Co. #19, 20, 21 and 23, Total land is 43 acres. Plans to develop now. Have contract w/county to tie in.
*20	822-01-013	Domenic Nero Const. Co.	(R)	-	-	-	
*21	822-02-025	Domenic Nero Const. Co	(R)	-	-	-	
*23	822-13-008	Domenic Nero Const. Co.	(R)	-	-	27 acres	
*22	Williamsburg	Sunrise Development Co.	74 (R)	-	-	-	-
24	822-15-001	Rose E. Bogolin	-	-	-	-	-
25	822-15-002	Chas A. Joan Lavrich	-	-	-	-	-
26	822-15-004	Robert Kann	-	-	-	-	-
*27		Picker Corp.	-	-	-	15 acres	Unspecified development anticipated within 5-10 years.

TOTAL DEVELOPMENT	1985-1990	1991-1995	1996-2005	Total
Residential (Units)	722	612	213	1,547
Industrial (Ft^2)	-	-	-	-
Office (Ft^2)	300,000	500,000	200,000	1,000,000
Commercial (Ft^2)	200,000	200,000	-	400,000

KEY
R - Residential
I - Industrial
O - Office
C - Commercial
* - Survey received
\+ - Survey filled out through conversation

D K - H&F - 5/1/87

ATTACHMENT II

QUESTIONNAIRE RESULTS
FOR HILLTOP AREA DEVELOPMENT SURVEY

COMMUNITIES SURROUNDING HIGHLAND HEIGHTS
(Continued)

Property	Parcel #	Owner	1985-1990	1991-1995	1996-2005	Size	Comments
*76	831-09-003	G. Weisberg	-	-	-	-	Existing residential dwelling.
*77	831-09-006	Federation Holdings	-	-	-	25 acres	No plans for development.
*78	831-09-005	Charles & B. Studen	-	-	-	8.2 acres	Development depends upon adequate sewers.
79	831-11-001	Max & K. Leonardi	-	-	-	-	-
80	831-11-004	Max & K. Leonardi	-	-	-	-	-
81	831-11-002	Daniele Duesi	-	-			Existing residential dwelling.
82	831-11-030	Clarkwood Apts. Co.	-	-	-	-	For #82, 83 & 84 - Anxious to develop but unable to formulate plans pending outcome of zoning litigation. Availability of sewer service will have definite impact upon the type of development.
83	831-11-003	Clarkwood Apts. Co.	-	-	-	-	
84	831-11-004	Clarkwood Apts. Co	-	-	-	-	
85	-	Brau Supply Co. Inc	-	-	-	5 acres	
*86	Mt Vernon Square	Paris	85,000 (O)	-	-	-	Based upon subcommittee meeting conversation of 2/4/87 with Mr. Paris
*87	Georgian Center	Nacy Panzica	21,000 (O)	-	-	9+ acres	-
+88	831-15-023	Jefferson Park Prop.	-	-	-	-	Built.
+89	831-15-026	Jefferson Park Prop.	-	-	-	-	Built.
+90	-	Hanover Woods	67 (R)	-	-	-	Under construction.

ATTACHMENT II

QUESTIONNAIRE RESULTS
FOR HILLTOP AREA DEVELOPMENT SURVEY

COMMUNITIES SURROUNDING HIGHLAND HEIGHTS
(Continued)

Property	Parcel #	Owner	1985-1990	1991-1995	1996-2005	Size	Comments
*91	-	Progressive Casualty Insurance Company	250,000 (O)	50,000 (O)	-	40 acres	-
*92	Landerhaven	Larry Davis	500,000(O)	800,000(O)#	-	160 acres	Being developed by Landerhaven Country Club Estates.
+93	-	Negrelli	233,000(O)#	233,000(O)#	234,000(O)#	67.8 acres	Supported by newspaper article.
94	Lyndhurst Golf Course Development	-	70 (R), # 38,000 (C)#	70 (R)# 38,000 (C)#	71 (R)# 39,000 (C)#	-	Based upon News Herald article of 1/23/87.
*95	-	Trebmal-Landerhaven	125,000 (O)	-	-	10.5 acres	Landerhaven Office Plaza
*96	-	Reliance Electric Co.	-	-	-	40 acres	No present plans-property may be developed within five years.

TOTAL DEVELOPMENT	1985-1990	1991-1995	1996-2005	Total
Residential (Units)	391	70	71	532
Industrial (Ft²)	450,000	330,000	600,000	1,380,000
Office (Ft²)	1,994,000	1,683,000	1,034,000	4,711,000
Commercial (Ft²)	38,000	38,000	39,000	115,000

KEY
R - Residential
I - Industrial
O - Office
C - Commercial

* - Survey received
\+ - Survey filled out through conversation
\# - No specific development schedule available

D K - H&E - 5/1/87

ECONOMICS SUBCOMMITTEE COMMENTS
ON DRAFT EIS

The HAPAC economics subcommittee met on Wednesday July 22, to discuss the Draft EIS. Subcommittee members present were Bill Peirce, Norm Prusa, Thury O'Connor, and Linda Johnson. Subcommittee members not in attendance were sent the comments for review. The comments are as follows.

- Costs presented in text are not always comparable, and may be misleading, we assume Appendices F and G costs are accurately presented and that these costs should be used in identifying EPA's position (7)
- The subcommittee feels that costs presented in text are inconsistent with those presented in Appendix G concerning the size of the Richmond/White Pump Station and forcemain. We feel costs as presented in Appendix G for the full size pump station and forcemain should appear in any selected pump station plan (7)
- An allowance for costs associated with pump station component failures which may result in overflows and other environmental concerns should be made (8)
- The costs for an aesthetically pleasing structure for the Euclid Creek crossing should be included in any pumping plan (2)
- Draft EIS Beech Hill Pump Station renovation costs appear too low for adequate renovation (9)
- In general there is no disagreement with the unit prices used in estimating EIS costs
- The subcommittee feels that the inconsistency in contingencies used for "long term @15%" vs. "short term @ 40%" cost analyses is not logical. A 15% contingency factor is too low for any selected plan. (10)
- In general, there is no disagreement with the development of the $207/home user cost. However it should be noted that the incremental cost associated with the recommended plan is only $37/home. Selection of any other plan, including gravity, will have a minor impact on the user cost in comparison to the costs associated with the local improvements required

- 1 -

6/4/87

The factors used by EPA in performing a present worth (PW) analysis are not realistic. Using realistic assumptions, there is little difference between the PW of the gravity (EIS 1) alternative and the 2 P.S. (EIS 3) plans. The draft EIS finds that EIS 1 has a PW of $64.4 million while EIS 3 has a PW of only $49.0 million. Their analysis assumes that wage rates and electricity prices will never increase. If we assume operating costs increase at 6% per year (which corresponds to the long run average) and include a $10.4 million allowance for the recommendations of the technical subcommittee, then for a 20 year planning period the PW of EIS 1 is approximately $74.9 million, and the PW of EIS 3 is approximately $69.2 million. This analysis did not include salvage values which would reduce the difference between these present worth values. Neither EPA's analysis nor our's considers the necessary replacement of pumping equipment and accessories which would further increase the PW of EIS 3. Using a more comparable planning period of 50 years results in a PW for EIS 3 of $77.8 million which is $1 million greater than the PW for EIS 1. (11)

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6/4/87

HAPAC TECHNICAL SUBCOMMITTEE

SUMMARY POSITION STATEMENTS

The HAPAC technical subcommittee met on Wednesday, July 22, to finalize a position paper on the draft EIS for the Hilltop area. Subcommittee members present at this meeting included Sam Babic, Steve Hovancsek, Dick Hyland, Mike Kalstrom, Moe Julich, and Dave Klunzinger. John Croft had a previous engagement, but has also reviewed the summary positions taken by the subcommittee. These positions are as follows

- We strongly disagree with the statement frequently made in the EIS that the reliability of a gravity and pumped system are essentially equal. We believe this is contrary to sanitary engineering experience, which clearly indicates that pumping stations and their force mains are less reliable than gravity sewers due to the potential for failures associated with mechanical breakdowns, control systems, human error, and direct lighting strikes. (1)

  Given this difference in reliability, we believe that the EIS decision was strictly an economic one, and did not adequately consider the costs of the environmental impacts associated with a system that includes pumping as an integral component.

- The subcommittee does not see a problem with the general unit prices used in the EIS comparison, and believes that the cost summaries and comparisons produced using these unit costs are generally valid.

  The subcommittee believes that there are several areas in which the plan selected in the EIS can be improved in terms of bringing its reliability closer to that associated with the gravity plan. These are as follows

1. The Beech Hill Pumping Station should be completely rebuilt, and not just refurbished as the EIS recommends (12)

   - the present pumping station site is on a residential lot and is surrounded by residential uses,
   - the present site was originally intended to serve as a temporary location, and not suitable as a long-term site,
   - a better location for a permanent Beech Hill pumping station would be at the Bonnieview site which has room for the station. Location of the station near Bonnieview would allow for easier continuing operation of the pump station storage complex, and would allow easy abandonment of the existing station when the new facility becomes available
   - Total cost for a fully rebuilt and relocated Beech Hill pumping station and force main (including 40% contingencies and appurtenances) is likely to be around $4,910,000, as opposed to the cost noted in EIS Appendix G of $665,000 for station refurbishing and controls.
   - Note that in sizing the 11 6 mgd pump station certain local flows, including Hickory Hills Pump Station, were projected to be [illegible] to the Richmond-White Pump Station. This is an issue which must be analyzed in further detail during the design phase

2. Regardless of the Beech Hill location, provisions must be made to use Bonnieview as storage for flow from Beech Hill's direct service area north of Wilson Mills Road (13)

   - it should be noted that the minor fraction of flow which comes directly to Beech Hill cannot be routed presently to Bonnieview in case of system upset - a consideration mentioned on page 4 21 of the EIS, but not included in the recommended plan

3. All proposed force mains should be constructed in pairs (14)

   - We feel that twin force mains are an essential step toward equalizing the reliability of the pumping and gravity systems. Although the EIS is correct in its contention that paired force mains are not standard engineering practice, Hilltop is a unique situation in which a viable gravity alternative to pumping does exist. We would point out that the EIS calls for redundant pumps, motors, and control systems (all of which we agree with), but has no provisions for avoiding bypassing and overflow in the event of a force main failure. We feel that twin force mains are essential to avoid the consequences of inevitable force main breaks - an inevitability that is made even more likely by the underlying bedrock, high water table, corrosivity, and heavy vehicular traffic along the force main routes. The only backup that would be available under the EIS plan would be the Bonnieview basin, which would hold no more than eight hours of even dry weather flows.

4. To further close the reliability differences between the gravity and pumping alternatives, the subcommittee continues to believe that emergency holding tanks are necessary. (15)

   - Our recommendation is that the Bonnieview dome be duplicated on the site of the present dome, thus giving a total of roughly [illegible] million gallons of storage, and completely utilizing the available site.
   - Given the similarity in the proposed siting of the Richmond-White Station, we also recommend providing a similar storage capacity in conjunction with this station
   - We believe this basin will lessen at least three of the risks associated with pumping which are not associated with gravity, human error, lighting strikes, and lack of surcharging capability

The subcommittee also takes issue with several of the recommendations of the EIS, including the following

We strongly recommend that, due to a lack of accessibility and repairability, the leaking 30-inch sewer presently in the Monticello Boulevard bridge over Euclid Creek be abandoned (16) and replaced with a crossing that is aesthetically consistent with the existing or modified Monticello Boulevard bridge (2)

We believe that the Green Road basin should be part of the immediate needs plan, since its presence has allowed the Green Road sewer to be sized as per the EIS recommendations (no basin would mean a larger sewer and a more expensive plan) (17)

We believe it inappropriate for the [illegible] to select the recommended plan based on a comparison of long-term alternatives and then to propose a reduced version of this plan for implementation that does not address many of the existing sources of pollution. The final recommended immediate needs plan is not equivalent to the gravity plan in the service provided to the area, in that a good many of the present pollution sources would be removed directly by the gravity interceptor, but require "local" sewers for their removal under the pumping plan - local sewers which are not included in the immediate needs plan (6)

HILLTOP AREA PUBLIC ADVISORY COMMITTEE

ENVIRONMENTAL COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT

August 7, 1987

The gravity alternative is judged clearly to be the environmentally preferred solution for sewer service in the Hilltop area. It provides maximum protection to the environment from sewage overflows because of the plan's high reliability. Further, the route of the gravity system involves less long term environmental disruption than the route for the pumping plans

As further comment, we believe that the Environmental Impact Statement (EIS) has not adequately identified and addressed the environmental impacts of the unsewered portions of the study area (6)

Although the economic analysis showed a clear cost difference in the evaluation of the alternatives, certain advantages of the all-gravity system were not fairly considered. We feel that the environmental impacts of each alternative should be quantified and converted into a monetary value in order to more fairly evaluate alternatives

The following specific comments are offered

1. Substandard treatment of sewage from small package plants and septic tanks have resulted in water quality disruptions in roadside ditches and streams. More than 200 [illegible] to install septic systems have been denied due to poor soil conditions and the lack of a flowing stream. The draft EIS does not [illegible] what the basis was for determining that the local sewers were [illegible] effective. The water quality disruptions in this area have been sufficiently documented and a cost for local sewers should be included in the evaluation of alternatives (18)

2. The all-gravity system provides the highest level of reliability of the evaluated alternatives. The reliability of the pumping alternative may be improved and made more comparable to the gravity alternative by the inclusion of additional safeguards. Items such as dual force mains and storage for the major pump stations should be considered when evaluating alternatives (1) (14) (15)

Although these safeguards increase the reliability of the pumping system the possibility of a mechanical malfunction still exists. Environmentally, a discharge from the system is unacceptable, but is considered secondary in comparison to basement flooding. The potential for public health problems and the cost to the homeowner associated with basement flooding warrants consideration during the design of the pump stations. (19)

3. The proposed crossing of Euclid Creek at the Monticello Boulevard bridge in the pumping alternatives will have a permanent impact on the aesthetics of the bridge and the park area below it. (2) In addition, the existing crossing is over 30 years old, is leaking, and in its present location, is difficult to maintain and repair. The EIS recommendation should include an appropriate allowance for a new crossing that would transport all flow, provide access for maintenance and be of minimal distraction to the aesthetics of the bridge and surrounding area (16)

4. The draft EIS notes that open-cut crossing of Euclid Creek at Highland Road and Euclid Avenue in the gravity alternative may be difficult to implement during construction. We agree that open-cut crossing of the creek will have a negative environmental impact. We recommend that the FIS consider the possibility of using a partial tunnel/partial open-cut method during the construction of this crossing. (20)

- 2 -

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

August 13, 1987

REPLY TO ATTENTION OF
Regulatory Branch

SUBJECT: Draft Environmental Impact Statement (EIS) for the Cleveland Hilltop Planning Area, Ohio

Harlan D. Hirt, Chief
Environmental Planning Section, 5WFP
U.S. Environmental Protection Agency
Region 5
230 South Dearborn Street
Chicago, Illinois 60604-1586

Dear Mr. Hirt:

This letter pertains to your request for comments in regards to the Draft Environmental Impact Statement (EIS) for the Cleveland Hilltop Planning Area, Ohio.

Under Section 404 of the Clean Water Act, the Secretary of the Army, acting through the Corps of Engineers, regulates the temporary and/or permanent discharge of dredged and/or fill material into wetlands and other waters of the United States. Euclid Creek is a water of the United States. Therefore, Department of the Army approval is required for all project features which involve the discharge of dredged material or fill (earth, stone, concrete, sand, etc.) below the plane of Ordinary High Water (OHW) of Euclid Creek or in adjacent wetlands.

Any temporary fills, such as cofferdams, also require Department of the Army authorization.

Department of the Army regulations at Title 33 of the Code of Federal Regulations Part 330.5(a)(12) provides authorization for the discharge of material for backfill or bedding for utility lines including outfall and intake structures, provided there is no change in preconstruction bottom contours (excess material must be removed to an upland disposal area) and the conditions of Title 33 of the Code of Federal Regulations Part 330.5(b) are met (copy enclosed). A "utility line" is defined as any pipe or pipeline for the transportation of any gaseous, liquid, liquifiable, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone and telegraph messages, and radio and television communication.

A final determination of Department of the Army jurisdiction cannot be made until we receive a copy of the final project plans and a description of the work methodology.

-2-

Regulatory Branch
SUBJECT: Draft Environmental Impact Statement (EIS) for the Cleveland Hilltop Planning Area, Ohio

Questions pertaining to this matter should be directed to Mr. Joseph Jarnot who can be contacted at 716-876-5454, extension 2316, or by writing to the above address.

The Buffalo District -- Leadership in Engineering.

Sincerely,

Walter Long
for
Daniel R. Clark
Colonel, U.S. Army
Commanding

Enclosure

ACTIVITIES AUTHORIZED UNDER 33 CFR 330.5(a):

(12) Discharge of material for backfill or bedding for utility lines including outfall and intake structures, provided there is no change in preconstruction bottom contours (excess material must be removed to an upland disposal area). A "utility line" is defined as any pipe or pipeline for the transportation of any gaseous, liquid, liquifiable, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone and telegraph messages, and radio and television communication. [The utility line and outfall and intake structures will require a Section 10 permit if in navigable waters of the United States. See 33 CFR Part 322. See also paragraph (a) (7) of this section]. [Section 404]

(7) That the activity ... Congress as a "study river" for possible ...

(8) That the activity shall not cause an unacceptable interference with ...

(9) That, if the activity may adversely affect historic properties which the National Park Service has listed ... listing on, the National Register of Historic Places the permittee will notify the district engineer If the district engineer ... such historic properties may be adversely affected he will provide the Advisory Council on Historic Preservation an opportunity to comment ... the effects on such historic properties or he will consider modification, suspension, or revocation in accordance with 33 CFR 325.7. Furthermore, that, if the permittee before or during prosecution of the work authorized, encounters a historic property that has not been listed or determined eligible for listing on the National Register, but which may be eligible for listing in the National Register he shall immediately notify the district engineer,

(10) That the construction or operation of the activity will not impair reserved tribal rights including, but not limited to, reserved water rights and treaty fishing and hunting rights,

(11) That in certain states an individual state water quality certification must be obtained or waived (See § 330.9),

(12) That in certain states, an individual state coastal zone management consistency concurrence must be obtained or waived (See § 330.10);

(13) That the activity will comply with regional conditions which may have been added by the division engineer (See § 330.8(a)) and

(14) That the management practices listed in § 330.6 of this part shall be followed to the maximum extent practicable

Part 330.6 Management Practices

(a) In addition to the conditions specified in part 330.5 of this Part, the following management practices shall be followed to the maximum extent practicable, in order to minimize the adverse effects of these discharges on the aquatic environment. Failure to comply with these practices may be cause for the district engineer to recommend or the division engineer to take, discretionary authority to regulate the activity on an individual or regional basis pursuant to part 330.8 of this Part

(1) Discharges of dredged or fill material into waters of the United States shall be avoided or minimized through the use of other practical alternatives

(2) Discharges in spawning areas during spawning seasons shall be avoided

(3) Discharges shall not restrict or impede the movement of aquatic species indigenous to the waters or the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound waters).

(4) If the discharge creates an impoundment of water adverse impacts on the aquatic ecosystem caused by the accelerated passage of water and/or the restriction of its flow shall be minimized

(5) Discharge in wetlands areas shall be avoided

(6) Heavy equipment working in wetlands shall be placed on mats.

(7) Discharges into breeding areas for migratory waterfowl shall be avoided

(8) All temporary fills shall be removed in their entirety

... Conditions.

The following special conditions must be followed in order for the nationwide permits identified in paragraph (a) of this section to be valid:

(1) That any discharge of dredged or fill material will not occur in the proximity of a public water supply intake.

(2) That any discharge of dredged or fill material will not occur in areas of concentrated shellfish production unless the discharge is directly related to a shellfish harvesting activity authorized by paragraph (a)(4) of this section.

(3) That the activity will not jeopardize a threatened or endangered species as identified under the Endangered Species Act (ESA), or destroy or adversely modify the critical habitat of such species. In the case of federal agencies, it is the agencies' responsibility to comply with the requirements of the ESA. If the activity may adversely affect any listed species or critical habitat, the district engineer must initiate Section 7 consultation in accordance with the ESA. In such cases, the district engineer may:

(i) Initiate section 7 consultation and then, upon completion authorize the activity under the nationwide permit by adding, if appropriate, activity specific conditions, or

(ii) Prior to or concurrent with section 7 consultation he may recommend discretionary authority (See section 330 8) or use modification suspension or revocation procedures (See 33 CFR 325 7)

(4) That the activity shall not significantly disrupt the movement of those species of aquatic life indigenous to the waterbody (unless the primary purpose of the fill is to impound water);

(5) That any discharge of dredged or fill material shall consist of suitable material free from toxic pollutants (see section 307 of the Clean Water Act) in toxic amounts;

(6) That any structure or fill authorized shall be properly maintained.

(7) That the activity will not occur in a component of the National Wild and Scenic River System nor in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status

(8) That the activity shall not cause an unacceptable interference with navigation;

(9) That, if the activity may adversely affect historic properties which the National Park Service has listed on or determined eligible for listing on, the National Register of Historic Places the permittee will notify the district engineer If the district engineer determines that such historic properties may be adversely affected he will provide the Advisory Counsel on Historic Preservation an opportunity to comment on the effects on such historic properties or he will consider modification, suspension, or revocation in accordance with 33 CFR 325 7. Furthermore, that, if the permittee before or during prosecution of the work authorized, encounters a historic property that has not been listed or determined eligible for listing on the National Register but which may be eligible for listing in the National Register, he shall immediately notify the district engineer,

(10) That the construction or operation of the activity will not impair reserved tribal rights, including but not limited to reserved water rights and treaty fishing and hunting rights,

(11) That in certain states, an individual state water quality certification must be obtained or waived (See § 330 9),

(12) That in certain states, an individual state coastal zone management consistency concurrence must be obtained or waived (See § 330 10);

(13) That the activity will comply with regional conditions which may have been added by the division engineer (See § 330 8(a)) and

(14) That the management practices listed in § 330 6 of this part shall be followed to the maximum extent practicable

Part 330 6 Management Practices

(a) In addition to the conditions specified in part 330 5 of this Part, the following management practices shall be followed to the maximum extent practicable, in order to minimize the adverse effects of these discharges on the aquatic environment Failure to comply with these practices may be cause for the district engineer to recommend or the division engineer to take, discretionary authority to regulate the activity on an individual or regional basis pursuant to part 330 8 of this Part.

(1) Discharges of dredged or fill material into waters of the United States shall be avoided or minimized through the use of other practical alternatives.

(2) Discharges in spawning areas during spawning seasons shall be avoided.

(3) Discharges shall not restrict or impede the movement of aquatic species indigenous to the waters or the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound waters).

(4) If the discharge creates an impoundment of water, adverse impacts on the aquatic ecosystem caused by the accelerated passage of water and/or the restriction of its flow shall be minimized.

(5) Discharge in wetlands areas shall be avoided

(6) Heavy equipment working in wetlands shall be placed on mats.

(7) Discharges into breeding areas for migratory waterfowl shall be avoided.

(8) All temporary fills shall be removed in their entirety

LAND USE AND TREATMENT SITE PLAN REVIEW

FOR

ENVIRONMENTAL IMPACT STATEMENT
CLEVELAND HILLTOP PLANNING AREA, OHIO

5 WFP-TUB-08

Requested by: U. S. Environmental Protection Agency
Region 5
230 South Dearborn St.
Chicago, Illinois 60604

Attention 5 WFP-TUB-08

Requested of: Soil Conservation Service, U.S.D.A.

Assisted by: James D. Storer, District Conservationist
Valley View Field Office
Soil Conservation Service, U.S.D.A.
6100 West Canal Road
Valley View, Ohio 44125

Telephone: 216-524-6580

Date: August 13, 1987

Technical review made by the Soil Conservation Service, U.S. Department of Agriculture, at the request of the Cuyahoga Soil and Water Conservation District. A review of the design calculations and construction specifications has not been made.

SITUATION: The Soil Conservation Service, U.S.D.A. was asked to review on Environmental Impact Statement (EIS). The EIS is for the Cleveland Hilltop Planning Area, Ohio sanitary sewer plans. The project takes place in Cuyahoga and Lake Counties, Ohio. The Valley View Field Office reviewed the draft copy of the EIS. The Soil Survey of Cuyahoga County, Ohio issued December 1980, and the Soil Survey of Lake County, Ohio issued January 1979, were used to check the soils information in Chapter 4 of the EIS. These publications can be obtained free of charge from the Cuyahoga and Lake Soil and Water Conservation District offices.

Several components of the write-up on soils were referenced to either USDA 1979 or USDA 1980. The USDA 1979 appears to be the Soil Survey of Lake County, Ohio issued January 1979. The USDA 1980 appears to be the Soil Survey of Cuyahoga County, Ohio issued December 1980.

Six soil associations are listed on page 4-11. These were stated as to being in either Cuyahoga or Lake Counties The Tioga-Euclid-Orville soil association was listed as being in Cuyahoga County. It is not in Cuyahoga County. However, this soil association is in Lake County. (21) (22)

The Soil Associations map on page 4-13 (figure 4-1) is a composite map. It appears to be taken from the general soils maps from the two soil surveys. This map appears to be correct.

There seems to be some existing and potential problems with the table titled "Soil Characteristics and Limitations" on page 4-12. The table is broken down into different units. These units are evaluated below. In the following material the soil surveys are numbered for abbreviated references. The "Soil Survey of Cuyahoga County, Ohio" issued December 1980 is number 1. The "Soil Survey of Lake County, Ohio" issued January 1979 is number 2.

Depth to High Water Table (inches):

1. The units of measure are not uniform. The first three are in inches and the second three are in feet.

2. The title should include the word "seasonal". It is a Seasonal High Water Table. (23)

3. The depth is incorrect in the Mahoning-Ellsworth unit. It should be 0.5 - 1.5 feet (2)

Depth to Bedrock (inches):

1. The depth for Darien-Mahoning is incorrect. It should be 40" - 60" (2). (23)

Drainage:

1. The Wadsworth-Rittman and Mahoning-Ellsworth soil associations are listed as somewhat poorly drained. The soil surveys list them as ranging from moderately well to somewhat poorly drained. (23)

Permeability (inches/hour):

1. The Wadsworth-Rittman soil association is listed as slow to very slow. The Soil Survey (1) lists it as moderate above the fragipan and slow in the fragipan.

2 The Tioga-Euclid-Orville soil association is listed as slow to very slow. The Soil Survey (2) lists these soils individually as ranging from moderate to moderately slow. The Tioga loam is rated as moderately rapid to rapid in the substratum. (23)

Rating For Septic Leach Fields:

1. The Urban Land-Mitiwanga soil associates fails to list the "wetness" characteristic

2. The slow percolation characteristic was not listed for the following soil associations. (23)

Darien-Mahoning
Wadsworth-Rittman
Mahoning-Ellsworth
Tioga-Euclid-Orville

Ratings for Shallow Excavations:

1. The Urban Land-Mitiwanga soil association does not list the wetness characteristic.

2. The Mahoning-Ellsworth soil association does not list the "slope: and "slippage" and "too clayey" characteristics (2). "Slippage" is given as an additional characteristic in the Soil Survey of Cuyahoga County, Ohio (1). (23)

3. The Tioga-Euclid-Orville soil association does not give the "floods" characteristics (2). The Soil Survey of Cuyahoga County, Ohio also lists the "cut banks cave" characteristics for these soils.

Risk of Corrosion - uncoated steel; concrete:

1. The Mahoning-Ellsworth soil association rates concrete as moderate to high (EIS). The Soil Survey (2) lists it as low to high (23)

In two places the EIS table 4-5 lists "texture" as a limitation. It is not clear what this means. It did not come from the USDA Soil Surveys.

The written descriptions of the soil associations have some omissions and incorrect information.

Mitiwanga Soil: The EIS states that this soil exhibits moderately rapid to moderate permeability. Page 39 of the Soil Survey (1) states that "Permeability is moderate."

Darien-Mahoning soil association: The EIS states that this soil association has moderate to slow permeability. The soil survey (2) states the permeability is slow or very slow (page 5). (23)

Tioga-Euclid-Orville soil association: The limitations of "floods", "cut banks cave", "slope", and "slippage" are not mentioned (1 and 2).

In reference to potential soil erosion and sedimentation problems the EIS (page xxx) states that "At a minimum, the Ohio Department of Transportation requirements for erosion control will be observed." The major area of soil erosion and sediment control problems will be at the stream crossings.

GENERAL COMMENTS:

The soil information in the EIS lists the USDA as the source of the information. The dates 1979 and 1980 imply that the Cuyahoga and Lake soil surveys were used. However, these documents do not appear to be adequately represented in the information.

It is possible that any two soils surveys can give what appears to be conflicting information on the same soil. This can occur for two reasons. The soil characteristics for the particular mapping units can vary from county to county. In this case both mapping units would still comply with the soil series information. The second reason is explained by the dates of publication. Soil science is a dynamic science. It is in a constant state of change. Updated information can be used to alter the text of two soil survey between printing dates. The most current information for the soils in any one county can be found in the field office Technical Guide for that county. 21

In reference to soil erosion and sedimentation it should be noted that stream crossings are not the only potential problem. The upland areas should not be taken lightly. Soil erosion in these areas can quickly cause off site sedimentation and damage. Care needs to be taken to keep all silt out of storm sewers and on the area under construction. Storm sewers are a direct pathway to streams, rivers, ponds, lakes and other drainageways. Silt can also cause damage to adjoining properties.

RECOMMENDATIONS:

A complete Soil Erosion and Sediment Control Plan should be developed before construction begins. Then this plan should be aggressively followed and enforced.

The errors and omissions in the soils information should be corrected.

It would be helpful to most users of this EIS if a glossary was added. The terms used in the soils section could be defined in a glossary. This would not add to the chapter's length; but, it could be very helpful to the EIS users.

EDNA L. DAVIS
President
FRED PIZZEDAZ
Executive Director

NORTHEAST OHIO AREAWIDE COORDINATING AGENCY
SERVING THE COUNTIES OF & MUNICIPALITIES WITHIN CUYAHOGA, GEAUGA, LAKE, LORAIN AND MEDINA

August 19, 1987

Mr. Harlan D. Hirt
Chief, Environmental Planning Section
5 WFP
USEPA Region V
230 South Dearborn Street
Chicago, IL 60604

Dear Mr. Hirt:

RE. DRAFT EIS CLEVELAND HILLTOP PLANNING AREA, OHIO

The NOACA is the designated areawide water quality management planning agency for the five-county Cleveland and Lorain-Elyria Metropolitan areas, an area which includes the Cleveland Hilltop Planning Area, Ohio. This Agency has previously determined that federally funded wastewater treatment facility planning for the Hilltop Area is consistent with the Northeast Ohio Lake Erie Basin 208 Water Quality Plan, as updated.

Our comments on the "Draft Environmental Impact Statement Cleveland Hilltop Planning Area, Ohio," June, 1987 will be limited to the population projections presented in Tables 4-10 on page 4-50 and 4-11 on page 4-52, and certain inaccuracies in Section 4.7 "Demographics" on pages 4-49 and following

Comments Regarding Population Projections

1 Table 4-10, page 4-50.

Community level population projections currently certified for water quality management planning proposes are the projections adopted by the NOACA Board as part of its 1984 Water Quality Plan Update, and subsequently certified by the State of Ohio in January, 1985. Currently certified county level projections are represented below. These should be reported in lieu of values in Table 4-10 4

1501 EUCLID AVENUE CLEVELAND OHIO 44115 (216) 241 2414

Certified County Level Population Projection Totals for Cuyahoga, Geauga, Lake, Lorain and Medina Counties

	1980	1985	1990	1995	2000	2005
Cuyahoga	1,498,400	1,393,086	1,386,219	1,393,067	1,395,864	1,379,265
Geauga	74,474	80,087	85,180	89,976	94,100	97,235
Lake	212,801	219,458	225,569	230,640	234,348	237,278
Lorain	274,909	283,768	293,644	303,542	313,085	322,927
Medina	113,150	129,365	143,516	155,635	165,037	171,083
Area Total	2,173,734	2,105,764	2,134,128	2,172,860	2,202,434	2,207,788

2 Table 4-11 of page 4-52·

The community level population projections presented in Table 4-11 are consistent with NOACA's currently certified water quality management planning projections, given the indicated percent by community of total population in the facility planning area

Other Comments

3 P 4-51, line 3

To our knowledge there was no 1984 Ohio State Census 24

4 P 4-56, bottom of page

The discussion of employment data makes an erroneous assumption that a worker's city residence is the same as his city of employment 25

5 PP 4-58-59

The first paragraph references, 1984 income estimates without providing an accurate source name Table 4-15 inaccurately names 1984 income "estimates" as "projections" There is a difference 26

We appreciate the opportunity to comment

Very truly yours,

NORTHEAST OHIO AREAWIDE COORDINATING AGENCY

Fred Pizzedaz
Executive Director

FP/jy/0688E

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STATE CLEARINGHOUSE
State of Ohio - Office of Budget and Management

30 EAST BROAD STREET • 39TH FLOOR • COLUMBUS, OHIO 43266 0411 • (614) 466 0697 / 0698

Date 87-08-21

U S ENVIRONMENTAL PROTECTION AGENCY
230 SOUTH DEARBORN STREET, SWEP, ENVIRNL PLNG
CHICAGO IL 60604-0000

Attention HARLAN D HIRT, CHIEF Phone (000)000-0000

RE State Clearinghouse Intergovernmental Review-Application Clearance Letter
Project Description DRAFT EIS, CLEVELAND HILLTOP PLANNING AREA, CITY OF CLEVELAND, CUYAHOGA COUNTY, OHIO

SAI Number OH870710-1089-36552
Proposed Federal Funding $00

The State Clearinghouse (Single Point of Contact) has reviewed the application for the above identified project that is covered by the Intergovernmental Review Process (Presidential Executive Order 12372) and Gubernatorial Executive Order authorized under Ohio Revised Code, Section 107.18(A)

Following the guidelines of Presidential Executive Order 12372 and Ohio's Intergovernmental Review Process, this application has been simultaneously reviewed by the impacted Area Clearinghouse(s) and other interested agencies

As a result of our review we have determined that your application is consistent with State or local plans, programs, and objectives Therefore you should proceed with your application to the appropriate funding agency

A copy of this clearance letter should be attached to your application In addition, the State Application Identifier (SAI) Number noted on the top of this form must appear as item number 3 on the Federal Standard Notification Form 424, which is a part of your application

The results of this review are valid for one year A continuation or renewal application must be submitted to the State Clearinghouse and impacted Area Clearinghouse(s) annually An application not submitted to the funding agency, or not funded within one year after completion of this review, must be resubmitted to receive a valid intergovernmental review

Sincerely,

Larry W. Weaver

Larry W Weaver, State Federal Funds Coordinator
Office of Budget & Management

OFFICE OF BUDGET AND MANAGEMENT
STATE CLEARINGHOUSE TRANSMITTAL

State Office Tower 30 E Broad St 39th Floor
Columbus Ohio 43266 0411
Phone (614) 466 0697/0698 2

674

STATE APPLICATION IDENTIFIER NO OH870710 1089 36552
RESPONSE ON 60 DAY REVIEW SHOULD BE RETURNED 15 DAYS PRIOR TO CLEARANCE DATE OF 87-08-21
FOR FULL APPLICATION CALL BY

APPLICANT U S ENVIRONMENTAL PROTECTION AGENCY
ADDRESS 230 SOUTH DEARBORN STREET SWEP, ENVIRNL PLNG
CITY CHICAGO STATE IL ZIP 60604-0000
ATTENTION HARLAN D HIRT, CHIEF PHONE (000) 000 0000

PROPOSED FEDERAL FUND $00
PROPOSED TOTAL FUND $00

PROJECT ENVIRONMENTAL IMPACT STATEMENT

PROJECT DESC DRAFT EIS, CLEVELAND HILLTOP PLANNING AREA CITY OF CLEVELAND, CUYAHOGA COUNTY OHIO

REVIEW AGENCY DEPARTMENT OF AGRICULTURE – FC
DEPARTMENT OF NATURAL RESOURCES – Y FCo
OHIO DEPARTMENT OF HEALTH – FC
DEPARTMENT OF TRANSPORTATION – 2 FC/o
ENVIRONMENTAL PROTECTION AGY – Y FC/o
GOVERNOR ~~Cleveland Office~~ – FC
ST HISTORIC PRESERVATION OFF – FC

CLEARINGHOUSE
NORTHEAST OHIO AREAWIDE COORDINATING AGENCY (NOACA)

Dependent upon the choice of alternative, the Hilltop Planning Area facilities may impact on several highway projects currently under development by ODOT or local governments (county, city, or village) using ODOT administered federal funds As its plans become clearer the Northeast Ohio Regional Sewer District should coordinate with ODOT's District 12, 10100 Broadway Garfield Heights, Ohio to avoid conflicts with future highway projects within the Hilltop Planning Area

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AUG 05 1987
State Clearinghouse
Budget & Management

Reviewing agency must complete this section
COMMENTS attach another sheet Comments cited in this Section must include (1) Identification of reviewing agency's statute or specific plan or program related to this proposal (2) Description of impact of this proposal on identified plan or program (3) Reviewer's recommended changes ... Please type all comments and include SAI number on your comment sheet

REVIEWING AGENCY POSITION ON PROJECT (Mark one only)

- [ ] No comment
- [ ] Clearance of the project should be granted
- [x] Clearance of the project should not be delayed but applicant should answer the reviewer's questions or concerns See enclosed comments
- [ ] Clearance of the project should only be granted on the condition that the applicant use the recommendations in the enclosed comments
- [ ] Clearance of the project should be delayed until the applicant has satisfactorily addressed the concerns stated in the enclosed comments

PLEASE TYPE THE FOLLOWING INFORMATION

Reviewer

Gerald J Justin 7-28-87
Reviewer's Signature

Name Gerald J Justin, Transportation Planning Engr
Phone (216) 641-1926 Ext 284

Executive or Deputy Signature

Agency

Name Ohio Department of Transportation
Street address 10100 Broadway
City Garfield Heights Ohio Zip Code 44125

OBM 6005 (Rev 5 85)

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OhioEPA
State of Ohio Environmental Protection Agency
P O Box 1049 1800 WaterMark Dr
Columbus Ohio 43266-0149

Toward A Cleaner Environment

August 24, 1987

Richard F Celeste
Governor

Mr Harlan D Hirt, Chief
Environmental Impact Section
ATTN 5 WFP - TUB 08
U S EPA, Region V
230 S Dearborn Street
Chicago, IL 60604

Dear Mr Hirt

We have reviewed the Draft Environmental Impact Statement (EIS) for Cleveland Hilltop Planning Area Enclosed are comments from the Division of Water Pollution Control, Environmental Planning Section, Ohio Environmental Protection Agency

p 1-13 The next to last sentence in the second paragraph is incorrect When a community chooses to construct wastewater treatment facilities without financial support from the State or the Federal government, OEPA does not require that facilities planning requirements be satisfied. (27)

p 4-51 The last sentence in the first paragraph does not agree with the table on p 4 50 According to the Ohio Data Users Center, the State of Ohio will have a 3 2% decline from 1980-2005, not the region The Cleveland MSA will decline by 9% over this period of time (28)

p 4-56 The economic outlook for the entire Cleveland area is less than strong As population ages and as population in the metropolitan area diminishes, the economic factors of the areas in the FPA that are already developed could be affected These factors are lower demand for housing and households on fixed incomes

p 4-71 Richmond Road between Mayfield Road and Cedar Road has already been widened to four lanes (3)

Appendix B 2 - For future reference, the State of Ohio does not have a Department of Justice, a Department of Energy or a Department of Parks and Recreation The Ohio Department of Health and the Department of Development are the official titles of state departments that are referenced incorrectly (29)

Page 2

The Environmental Planning Section is concerned that where adverse environmental impacts are possible, that these impacts be minimized

General mitigation measures that should be used for this project are discussed below (30)

Traffic

To minimize traffic hazards, control devices such as blinkers and barrels should be placed in the construction area during day and night to warn motorists of restricted lanes Flagmen should be employed during construction working hours to minimize traffic congestion and to protect the construction workers

The construction should also be phased to minimize lane closure A short section of the interceptor will be completely constructed at one time before the next section is begun Road surfaces should either be repaved or backfill maintained to permit resumption of normal traffic movement as soon as each section is completed (31)

Erosion

Erosion and sedimentation impacts should be minimized by the following techniques

- Permanent erosion control structures, such as rip-rap or rock fill, should be incorporated into the site design where appropriate
- The contractor should grade, fertilize, seed, and mulch areas as called for on the plans or as directed by the engineer
- The contractor should provide for temporary seeding or sodding as called for on the plans or as directed by the engineer

Well-planned construction phasing takes into consideration the adverse effects on construction sites in which work will be left partially completed while construction continues elsewhere These situations usually result from attempts to reduce costs of mobilizing earth moving equipment by clearing all the area at once Under such circumstances the savings are often obliterated by increased costs generated by erosion and sedimentation In this case, such a policy would result in an increased load of sediments and pollutants washed into surface waters A preferred phasing policy would call for completion of all necessary construction in a section before proceeding to the next section This will prove more expensive in short term costs, but environmentally advantageous in the long-term (32)

Noise

Noise impacts should be minimized by the following techniques

- Vehicles and motorized equipment should be properly muffled to state standards
- Surface construction work should occur only during normal workday hours
- Any activity potentially causing excessively high noise levels (e g., blasting) should be carried out in accordance with applicable state and local regulations (33)
- Noise barriers should be used around sites where required by the local authorities

Dust

Dust should be controlled by wetting down construction sites as necessary Piles of excavation spoils, potentially blown about by the wind, should not be allowed to accumulate Such material should be immediately removed from the construction site and disposed of at approved sites in accordance with local regulations Blasting should be used only when rocky conditions make it necessary. (34)

Stream Crossing

Since the method of crossing Euclid Creek has not been determined, the amount of mitigation that will be needed is not yet clear If an independent pipe bridge is necessary, impacts to the stream would be greater than suspending the pipes from the existing bridge, for which mitigation would not be necessary

From an environmental standpoint, utilizing the existing bridge would be preferable to constructing a separate bridge to support the proposed sewer lines. However, if use of the existing bridge is not structurally possible, then construction techniques minimizing stream impacts and proper mitigation should be employed in building a separate pipe bridge

For building a pipe bridge, stream crossing construction techniques could involve either total or partial diversion of the creek Total diversion of Euclid Creek would be unwise due to the lack of a suitable diversion course and the water volume in the creek Other possible techniques would involve either partial diversion with temporary impoundments, dredging, or boring under the creek bed

Diversion of half of the creek at a time would be the preferred method for crossing Euclid Creek with a pipe bridge. This would entail building an embankment completely around the construction and forming a channel for half of the river width at a time. Both the building of the embankment and the channelization of the stream would cause some increase in erosion and turbidity in the stream This would in turn cause some detrimental impacts on downstream aquatic life These impacts should be mitigated by constructing the embankments and bridge during low flow periods, and by constructing downstream sediment traps as necessary Care should be taken following construction to properly remove temporary embankments and sediment traps so as not to cause further sedimentation, to stabilize and restore stream banks with rip rap, and to return the stream bottom to its original condition (35)

If there area any questions concerning the above comments, please contact Robert Monsarrat of my staff at (614) 481-7090

Sincerely,

Robert Monsarrat, Jr.
for

Gregory H. Smith, Manager
Environmental Planning Section
Division of Water Pollution Control

GHS/SSF
RM/ep
0662D/5-8

cc. Reading/File

NORTHEAST OHIO REGIONAL SEWER DISTRICT
3826 EUCLID AVENUE • CLEVELAND OHIO 44115 [illegible]

August 26, 1987

Mr. Harlan D. Hirt, Chief
Environmental Planning Section
U.S. Environmental Protection Agency
5WFP-TUB-08
230 South Dearborn Street
Chicago, Illinois 60604-1586

Re: Draft Environmental Impact Statement
Cleveland Hilltop Planning Area, Ohio

Dear Mr. Hirt:

The Northeast Ohio Regional Sewer District (NEORSD) has previously presented comments on the subject Draft EIS at the public hearing of August 12, 1987. A copy of these comments is included as Attachment A. At this time we are providing the following additional comments:

1. It is suggested that the EIS contain a section putting the EIS process in context relative to the Construction Grants Program. Several points should be covered:

   a) A number of comments in the Executive Summary and throughout the report call for further study. The EIS should be clear that this further study is not required for private and governmental agencies to proceed outside the realm of the Construction Grants Program.

   b) The EIS should clarify that costs in the EIS are developed for comparative purposes in selecting a recommended alternative. Actual cost for the purpose of construction grant funding will be developed during the detailed design and the subsequent grant awards process. (36)

   c) Specific eligibility determinations for the purposes of the Construction Grants Program will be made at the state level by the Ohio EPA, the delegated program authority, as a part of the construction grants approval process.

   d) The recommended plan establishes base line facility capacities which are eligible for full participation under the Construction Grants Program. However, nothing in the EIS would prohibit construction of larger capacity facilities (for example, the Richmond-White pumping facility and force main). Determination of the grant eligible project cost of facilities with larger than recommended capacities would be conducted in accordance with construction grant regulations, procedures, and management policies. (36)

   e) The EIS should clarify that for the purpose of the Construction Grants Program, capacity to serve existing needs is referenced to the date of grant award or September 30, 1990 whichever is earlier.

2. The EIS should recognize that the recommended plan would result in environmental disruption along Richmond Road during at least two phases of construction. The recommended plan suggests an initial force main to serve existing needs. The plan recommends subsequent construction to expand the force main system for area growth. It should be noted that in addition to environmental disruption, the final cost of the recommended plan will be substantially greater than if capacity for growth was provided for initially. (6)

3. The EIS should not create an illusion that the recommended plan provides for an immediate solution to existing needs of the Hilltop study area. The entire sewer system downstream of the Bonnieview-Beech Hill-Wilson Mills complex to the point of completion of the Heights/Hilltop Interceptor is inadequate to handle peak flows. It is not possible to upgrade an intermediate section of the system to provide additional capacity without providing adequate downstream capacity throughout the system. To do so would likely solve a portion of the problem at a considerable expense to downstream areas. Assuming the recommended plan for discussion purposes, construction should logically start from the point of adequate downstream capacity and proceed upstream to eventually eliminate Wilson Mills and reconstruct the Beech Hill facility. (37)

4. The recommended plan should include a component for the incremental size increase to the Green Road storage basin to accommodate flows from the Hilltop study area. (17)

5. Facilities planning efforts have previously established water quality disruptions resulting from septic tank discharges in the area. Upgrading of area septic tanks was not seen as a viable alternative by U.S. EPA, Ohio EPA or NEORSD during facilities planning reviews due to the unsuitable nature of the area's soil and expected development of the area. (18)

This logic which led to screening on-site treatment from further consideration remain valid today. In fact, the *case is stronger as a result of the density and type of* developments occurring and expected for the area. The *EIS should eliminate on-site treatment as a viable* option during the process of screening alternatives. (18)

6. Judging from a comparison of the cost-effective and recommended plan cost tables, the EIS is including in its recommended plan (i.e., eligible for federal participation) a structure for the Richmond-White pump station adequate to handle a flow of 12.8 MGD. (We note that identical costs have been used to estimate both the 1.8 MGD and 12.8 MGD stations. In fact, this is not an unreasonable method for cost estimating at the facilities planning level given the above intent.) Further, this is logical policy in that it is much more *cost-effective to initially provide adequately sized* elements such as building space and wet well capacity to *accommodate additional flows and the additional pumps* which will be needed in the future expansion. The EIS should clarify its intent to include these structural elements as part of the recommended plan. Also, it should be noted that the principal comment of the Northeast Ohio Regional Sewer District is that the recommended plan should include all elements needed to provide for 20-year reserve capacity. (6)

In addition to the preceding comments, NEORSD has in its review of the Draft EIS noted areas where refinements to the document are appropriate. A list of recommended refinements is included as Attachment B.

The NEORSD appreciates this opportunity to provide these comments. Any questions regarding these comments may be addressed to Mr. Lester Stumpe, Planning Manager.

Sincerely,

Erwin J. Odeal

Erwin J. Odeal
Director

EJO:mm.
Attachments
A711DRAF

ATTACHMENT A

NORTHEAST OHIO REGIONAL SEWER DISTRICT

GENERAL COMMENTS ON THE DRAFT HILLTOP EIS
FOR PRESENTATION AT U.S. EPA PUBLIC HEARING
AUGUST 12, 1987

A regional sewering plan to serve the Hilltop area has been in the planning stages for more than a decade. As a part of its facilities planning efforts, in 1981, the Northeast Ohio Regional Sewer District (NEORSD) recommended a gravity interceptor to serve the Hilltop area. Another alternative that had been considered was to reconstruct the existing pump station system.

A cost analysis of the two alternatives indicated that over a *20-year period, the cost differential was not* significant. In terms of reliability, there was no question that the gravity plan was the best way to serve the area. And as an added advantage, the gravity plan would provide a skeletal structure of sewers that would aid in the implementation of a logical pattern for future local sewering.

Subsequent to that facilities planning effort, EPA required the District to do further studies to determine the size of the interceptors. Detailed monitoring of sewer flows during wet weather showed that much larger sewer sizes were needed than previously anticipated. As a result of these changes, EPA required NEORSD to evaluate pumping alternatives. This evaluation showed that the costs had shifted to *substantially favor the pumping alternative.* In turn, this precipitated the need for an Environmental Impact Statement (EIS).

The Draft EIS, published by EPA in June 1987, now projects that the cost difference between pumping plans and the all-gravity plan is even greater than NEORSD's estimates. (In a comparison of all-gravity to the two-pump-station plan, the EIS projects a capital cost difference of $23.5 million as compared to $16.6 million estimated by the District.)

Our review of the Draft EIS suggests there should be some revisions to the cost data, however, it is clear that the capital cost differences continue to be substantial. In *conducting a present worth analysis,* it appears that EPA cannot go outside its regulatory guidelines in considering such items as *planning periods, discount rates, and rules for determining* operating costs adjusted for inflation. Thus, the present worth analysis using EPA's parameters show the all-gravity plan to be substantially more costly. (In a comparison of all-gravity to the two-pump-station plan, the EIS projects a present worth cost difference of $15.4 million vs. the District's $8.7 million estimate.)

In contrast to this clear cost difference shown by the economic analysis, the advantages of the all-gravity plan elude quantification and conversion into a monetary value. For example, it has been difficult to quantify the environmental benefit which would result from the superior reliability of an all-gravity system. (1)

The NEORSD supports the recommendations of the Draft EIS to eliminate the Wilson Mills pumping station by constructing a gravity interceptor. Elimination of the Wilson Mills pumping station and the provision of adequate downstream sewer capacity are, in the NEORSD's opinion, the most critical factors in establishing highly reliable sewer service for the Hilltop area. NEORSD continues to believe there are substantial advantages to the gravity plan. However, assuming that Wilson Mills pump station will be eliminated, NEORSD believes that it could accept a plan which retains some pumping facilities, provided the remaining pumping facilities are designed for a high level of reliability. Either the all-gravity system or the EIS-recommended alternative which employs two major pump stations would bring about dramatic environmental improvements.

The issues of providing sewer service to the Hilltop area have generated considerable discussion at the local level. As a result, NEORSD believes there are new points of view and technical comments that warrant serious consideration in the final selection and refinement of the recommended plan.

Since no sewer improvements can proceed in the Hilltop area until the EIS is finalized and additional delay would negatively impact the District's ability to proceed with downstream portions of the Heights/Hilltop Interceptor and Contract G up Green Road, we urge EPA to move quickly to address these concerns and issue the final EIS.

As a part of the public hearing process, NEORSD submits the following general comments. Further detailed comments will be provided during the public comment period.

Page 4

1. The NEORSD strongly maintains that the subject portion of the Hilltop interceptor is "grandfathered" under facilities planning regulations by virtue of being a segment of the District's total program for which facilities planning was approved prior to October 1, 1984. Inasmuch as we believe the subject project is "grandfathered" it should be eligible to receive 75% federal funding and federal participation in providing for "20 years reserve capacity." (38)

2. The recommended plan is deficient in not addressing the growth needs of the area which would be served by the Richmond-White pump station. The EIS should develop a recommended plan to serve this area throughout the 20-year planning period. The Hilltop Interceptor is part of the Heights/Hilltop Interceptor, already under construction, which was sized to handle this growth. Further, proceeding with a long-term regional solution which accommodates 20-year growth will assure maximum environmental protection and minimize expenditures for interim solutions. (6)

3. NEORSD believes that it has successfully concluded facilities planning requirements through the aggregate of previously submitted studies. This was confirmed to us as part of the scoping effort for the present EIS during which it was clearly established that the EIS is a post facilities planning effort rather than as a concurrent

Page 5

effort with facilities planning. Recognizing, however, that the EIS may recommend a fundamentally different route than the all-gravity plan, NEORSD is willing to participate in the preparation of a general plan for sewering of the areas in question.

A general sewering plan would establish the economics of alternate sewer routes as well as the economics of elimination of point sources. We also call upon Ohio EPA to play a lead role in coordinating the implementation of practical interim solutions which are in concert with long-range sewering plans.

4. The final EIS should acknowledge that despite high quality operation and maintenance of a pumping system there is a statistical probability, however slight, that a pump station and its force main system will malfunction and cause dry weather overflows to the environment. Such overflows from pump stations would have a negative environmental effect but are clearly more acceptable than allowing sewage to back up into basements. (1)

5. If pump station facilities are included in the final recommendations of the EIS, they should be designed to meet high standards of reliability. Public discussion of the reliability issue has generated proposals to increase the reliability of pumping systems which warrant

Page 6

consideration. A detailed consideration of some of these proposals seems to be beyond the scope of the EIS. NEORSD suggests that these proposals could be appropriately considered as a part of the detailed design.

For example, evaluation of the reuse of the Beech Hill structure versus construction of a new facility, (12) (13) continued use of the existing Beech Hill force main as an emergency conduit, or developing a plan which provides (13) for dual force mains from Richmond-White as part of a phased expansion of that facility to accommodate growth. (14) NEORSD suggests that the EIS structure its recommended plan to allow costs for items which will increase reliability and can be shown as cost-effective during detail design.

We thank you for this opportunity to comment and pledge our support to work with U.S. EPA in its efforts to finalize the EIS.

LAS:mm.

A700COMM

ATTACHMENT B

REFINEMENTS TO DRAFT HILLTOP EIS

EXECUTIVE SUMMARY

(PG ix) THE DESCRIPTION OF ALTERNATIVE EIS-1 STATES THAT "BONNIEVIEW STORAGE BASIN WOULD ALSO BE REMOVED UNDER THIS PLAN" AS INDICATED IN FIGURES 2 AND 3. THIS SEEMS TO BE INCONSISTENT WITH TABLE 2, COST ANALYSIS, WHICH ANALYZES EIS-1 UNDER SCENARIOS WITH AND WITHOUT THE BONNIEVIEW FACILITY. (39)

(PG xxiii) "STORAGE TANK" SHOULD BE USED HERE AND THROUGHOUT THE TEXT WHEN DESCRIBING THAT PORTION OF THE BONNIEVIEW FACILITY. (40)

CHAPTER 1

CHAPTER 2

* INTRODUCTION (PG 2-1)

THE EASTERLY WWTP SERVES THE CITY OF CLEVELAND AND ITS SUBURBS. (41)

* SECTION 2.1

(PAGE 2-4) THE DESCRIPTIONS OF THE FLOW CAPACITIES OF THE EASTERLY WWTP, FOUND IN THE FIRST AND LAST PARAGRAPHS ON THIS PAGE, SHOULD BE CONSISTENT WITH EACH OTHER. (42)

(PAGE 2-5) THE EASTERLY WWTP WAS UPGRADED TO AN ACTIVATED SLUDGE PLANT IN 1938. THE PLANT WAS FURTHER UPGRADED AND EXPANDED FROM 1974-76. (43)

(PAGE 2-5) CONCERNING THE DESCRIPTION OF THE TREATMENT STEPS AT EASTERLY: a) SCREENING OCCURS BEFORE GRIT REMOVAL. b) FLOW FROM THE PRIMARY SETTLING TANKS IS INTRODUCED TO THE EIGHT FOUR-PASS AERATION TANKS. (44)

(PGS 2-6,2-7) FIG.2-2,2-3 THESE FIGURES ARE OUT OF DATE. WE HAVE ATTACHED UPDATED DIAGRAMS OF THE EASTERLY LAYOUT AND FLOW SCHEMATIC. THE ATTACHED FIGURES WERE TAKEN FROM THE CURRENT EASTERLY O&M MANUALS. (45)

* SECTION 2.4.1

(PG 2-26) a) THE BEECH HILL PUMP STATION IS LOCATED AT 6830 WILSON MILLS ROAD.
b) BEECH HILL MAY OPERATE A MAXIMUM OF TWO SMALL PUMPS (MODIFIED BY THE DISTRICT TO 150 HP) FOR 2700 GPM EACH (5400 GPM) OR ONE LARGE PUMP FOR A MAXIMUM STATION OUTPUT OF 6200 GPM. BEECH HILL PUMP STATION CANNOT OPERATE THREE PUMPS SIMULTANEOUSLY DUE TO POWER CONSTRAINTS AND SEWER PROBLEMS DOWNSTREAM OF THE BBW COMPLEX.
c) A DIESEL-DRIVEN GENERATOR AT BEECH HILL PROVIDES EMERGENCY POWER TO OPERATE ONE SMALL PUMP.
d) THE DISTRICT DOES NOT OWN THE BBW COMPLEX. THE DISTRICT OPERATES THESE FACILITIES UNDER A LEASE ARRANGEMENT WITH CUYAHOGA COUNTY. (46)

(PG 2-28) a) THE BEECH HILL PUMP STATION IS COUPLED WITH THE BONNIEVIEW HEADWORKS, NOT THE STORAGE TANK.
b) THE BONNIEVIEW HEADWORKS INCLUDE A GRIT CHAMBER, COMMINUTORS, GRIT TRANSFER PUMPS AND CLASSIFIER AND DIVERSION FACILITIES TO THE STORAGE TANK.
c) THE WILSON MILLS PUMP STATION MAY OPERATE THREE PUMPS AT ONE TIME, HOWEVER, PUMP STATION DISCHARGE IS LIMITED TO 10,400 GPM MAXIMUM DUE TO DOWNSTREAM SEWER PROBLEMS.
d) WILSON MILLS PUMP #4 (10"/4800 GPM) IS OPERATED BY A DIESEL ENGINE THROUGH A RIGHT-ANGLE DRIVE UNDER EMERGENCY CONDITIONS.
e) SEWAGE FROM THE 2500 ACRE SERVICE AREA SOUTH OF BEECH HILL FLOWS TO THE GRIT REMOVAL AND COMMINUTOR BUILDING AT THE BONNIEVIEW HEADWORKS. DURING DRY WEATHER, SEWAGE BYPASSES THE STORAGE TANK, NOT THE HEADWORKS AT BONNIEVIEW. (47)

(PG 2-30) a) UNDER WET WEATHER CONDITIONS, WHEN THE WILSON MILLS PUMP STATION CAPACITY IS ABOUT TO BE EXCEEDED, FLOW FROM THE 30" SEWER LINE AT BONNIEVIEW IS DIVERTED TO THE STORAGE TANK THROUGH A 30" OVERFLOW CONTROLLED BY A FIXED SET-POINT SLUICE GATE.
b) ALTHOUGH THE BONNIEVIEW STORAGE TANK REMOVES A MAJOR PORTION OF THE FLOW TO BEECH HILL, THE 15" GRAVITY LINE TO BEECH HILL CONTINUES TO FILL THE BEECH HILL WET WELL, EVENTUALLY OVERFLOWING TO A TRIBUTARY OF THE CHAGRIN RIVER. FLOW IN THE 15" LINE IS FROM THE TRIBUTARY AREA NORTH OF THE BEECH HILL PUMP STATION AND DOES NOT FLOW THROUGH THE BONNIEVIEW FACILITY.
c) THE OVERFLOW FROM THE BONNIEVIEW STORAGE TANK IS EQUIPPED WITH SCUM BAFFLES AND WEIRS TO TRAP FLOATING SOLIDS.
d) SHORT DURATION SURCHARGE CONDITIONS AT WILSON MILLS ARE CAUSED BY EXCESS FLOWS IN THE GRAVITY SEWERS TRIBUTARY TO THE WILSON MILLS PUMP STATION COMPOUNDED BY RESIDUAL FLOW IN THE GRAVITY LINE FROM BEECH HILL PUMP STATION AFTER SHUT DOWN. (48)

CHAPTER 3

CHAPTER 4

* SECTION 4.3.3.2

(PG 4-27) THE WELL SYSTEMS LISTED ARE IN THE MUCH LARGER 201 PLANNING AREA AND ARE NOT LOCATED IN THE HILLTOP EPA. THE HILLTOP EPA IS SERVED GENERALLY BY THE CITY OF CLEVELAND WATER DEPARTMENT. (49)

* SECTION 4.7

(PG 4-54) MORE DISCUSSION OF THE PURPOSE AND APPLICABILITY OF TABLE 4-12 WOULD BE BENEFICIAL.

* SECTION 4.8.2

(PG 4-58) ..."LOCAL INTERCEPTOR SEWERS" IS INCORRECT. THE CORRECT DESCRIPTION IS "LOCAL SEWER." (50)

(PG 4-60) TABLE 4-16 IS MISLEADING. THERE ARE OTHER COMPONENTS OF "TOTAL REVENUES" AND "TOTAL EXPENDITURES" . THE INFORMATION PRESENTED ON "OUTSTANDING BONDS" AND "INVESTMENTS" IS NOT A PART OF THE CALCULATION LEADING TO "REVENUES LESS EXPENDITURES" AND SHOULD APPEAR AS MEMO OR FOOTNOTE ITEMS (51)

(PG 4-61) a) THE BASIS FOR "LOCAL OBLIGATIONS OF $20 TO $80 MILLION" IS UNCLEAR. THE EIS SHOULD IDENTIFY WHAT IS INCLUDED IN THESE COSTS. (52)
b) COMMUNITY EXPENDITURE OUTPACING COMMUNITY REVENUE IS AN INDICATOR OF FISCAL STRESS ONLY UNDER CONTINUOUS OR RECURRING CONDITIONS. (53)

(PG 4-62) THE PRESENTATION OF THE INTERRELATIONSHIP OF REVENUES, SOURCES OF REVENUES, EXPENDITURES AND BONDED INDEBTEDNESS WOULD BENEFIT FROM MORE DISCUSSION (54)

* SECTION 4.8.3

(PG 4-63) a) THE NEORSD WAS ESTABLISHED BY COURT ORDER UNDER O.R.C. 6119, NOT BY THE STATE OF OHIO. (55)
b) THE "32 SURROUNDING COMMUNITIES" REFERRED TO IN THE TEXT REFERS TO THE COMMUNITIES SERVED BY THE DISTRICT AT THE TIME OF ITS FORMATION. THE DISTRICT NOW SERVES 43 SURROUNDING COMMUNITIES. (56)
c) CUSTOMERS IN SUBDISTRICT 1 PAY CAPITAL CONSTRUCTION COSTS FOR CAPITAL IMPROVEMENTS BENEFITING SUBDISTRICT 1 CUSTOMERS AS WELL AS O&M COSTS. (57)
d) TABLE 4-18 PRESENTS SELECTED BALANCE SHEET DATA NOT "NEORSD INCOME AND EXPENSES FOR 1984 AND 1985". (58)

(PG 4-64) STANDARD AND POOR'S AAA RATING FOR NEORSD IS DUE TO THE DISTRICT'S PURCHASE OF BOND INSURANCE WHICH IS ALSO AVAILABLE TO LOCAL COMMUNITIES.

CHAPTER 5

* SECTION 5.3

(PGS 5-20 TO 5-34) THE EIS SHOULD NOTE THE COST OF THE DISTRICT PURCHASE OF PROPERTY, SUCH AS THE RICHMOND-WHITE PUMP STATION, IN THE TABLES PRESENTING THE COSTS OF ALTERNATIVES IN THIS SECTION. (59)

(PG 5-22) ANNUAL O&M COSTS FOR EIS-1 WILL DIFFER BETWEEN THE OPTIONS WITH AND WITHOUT BONNIEVIEW. (60)

CHAPTER 6

* SECTION 6.1.7

(PG 6-21) THE HIGHLAND GREEN'S DEVELOPMENT WOULD NOT BE ABLE TO TIE INTO SEWER LINES ON S.O.M. CENTER ROAD., I-271 LIES BETWEEN MINER AND S.O.M. CENTER ROADS. (61)

* SECTION 6.1.11

(PG 6-24) THE STATEMENT DESCRIBING THE LOCAL SEWER FINANCIAL RESPONSIBILITY FOR GATES MILLS AND MAYFIELD HTS. IN THE HILLTOP AREA IS UNCLEAR. INSERT "LOCAL" BEFORE "SEWER" IN THE LAST SENTENCE OF THE FIRST PARAGRAPH ON THIS PAGE. (62)

(PG 6-25) a) A LOW GROWTH RATE IS NOT A TRUE INDICATOR OF DECREASED ECONOMIC ACTIVITY. PER CAPITA INCOME IS MORE INDICATIVE OF THE ECONOMIC ACTIVITY OF THE COMMUNITY.
b) THE DESCRIPTION OF "SUPERIOR" BOND RATINGS OF THE HILLTOP EPA COMMUNITIES IS INCONSISTENT WITH THE DISCUSSION OF THE SAME BOND RATINGS IN SECTION 4.8.2, PG 4-62 AND TABLE 4-17 WHICH DESCRIBE THOSE RATINGS AS "AVERAGE". (63)

(PG 6-26) THE REASONABLE DEBT LIMIT, SHOWN IN TABLE 6-5, FOR GATES MILLS ($1,649,500) APPEARS TO BE INCORRECTLY CALCULATED FROM THE DATA PRESENTED IN THE TABLE. SINCE $0 IN OUTSTANDING BONDS ARE IDENTIFIED, THE REASONABLE DEBT LIMIT SHOULD EQUAL THE ANNUAL REVENUES ($1,691,962). (64)

* SECTION 6.1.12

(PG 6-28) THE DISCUSSION OF IMPACTS RELATED TO STREAM CROSSING 1 APPLIES TO ALTERNATIVES EIS-1 AND EIS-4 ON PG 6-27, NOT EIS-2 AND EIS-3 AS IT APPEARS HERE. (65)

CHAPTER 7

* SECTION 7.1

(PG 7-1) THE DISCUSSION OF THE RESIDUAL FLOW TO BEECH HILL AFTER MOST FLOW IS DIVERTED TO THE BONNIEVIEW STORAGE TANK SHOULD RECOGNIZE THE FACT THAT THIS RESIDUAL FLOW TO BEECH HILL IS FROM THE TRIBUTARY AREA NORTH OF THE BEECH HILL PUMP STATION. IF PUMPING IS NOT RESUMED AT BEECH HILL, THE BEECH HILL WET WELL CONTINUES TO FILL AND EVENTUALLY OVERFLOWS TO A TRIBUTARY OF THE CHAGRIN RIVER. (13)

* SECTION 7.3

(PG 7-8) THE IMMEDIATE NEEDS OF THE HILLTOP EPA ARE TO RELIEVE I/I PROBLEMS IN EXISTING LOCAL SEWERS (NOT RELIEF SEWERS) AND OVERFLOWS CAUSED BY EXCESS FLOW TO THE BBW COMPLEX. (66)

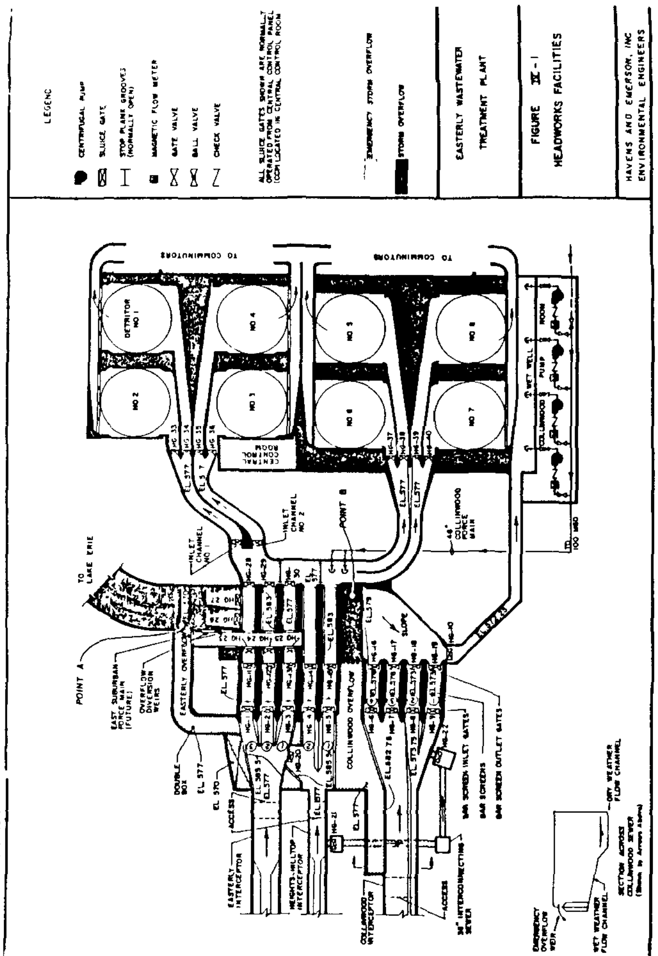
(PG 7-10) THE EIS SHOULD PROVIDE A CLEAR ACCOUNTING OF THE SOURCES AND FLOWS WHICH CONSTITUTE THE 1.8 MGD ASSOCIATED WITH THE RECOMMENDED PLAN. (67)

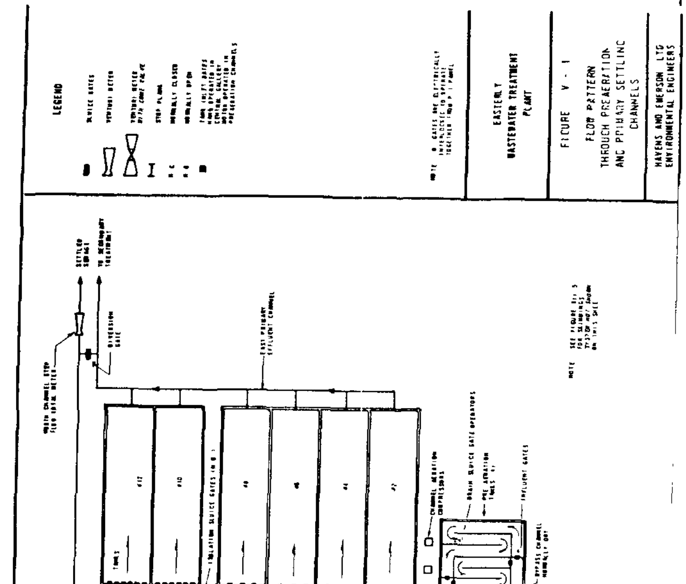
* SECTION 7.5

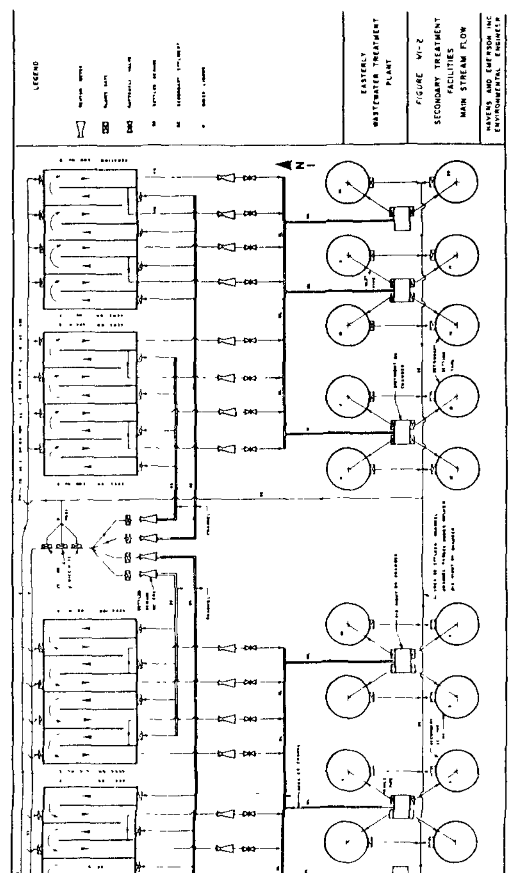
(PG 7-21) THE DISCUSSION OF HOW USER COSTS FROM EACH SUBDISTRICT ARE APPORTIONED BY THE DISTRICT IS INCORRECT. SUBDISTRICT 1 USERS DO PAY FOR CAPITAL IMPROVEMENTS AT THE WWTP'S AND SEWER SYSTEM IMPROVEMENTS WHICH AFFECT THAT SUBDISTRICT IN ADDITION TO OPERATION AND MAINTENANCE OF DISTRICT FACILITIES. BASICALLY, USER COSTS ARE APPLIED TO THE SUBDISTRICT AFFECTED BY SPECIFIC PROJECTS. BOTH SUBDISTRICTS WOULD PAY FOR WWTP IMPROVEMENTS. ALSO, THE ANNUAL USER (SERVICE) CHARGES CITED ARE NOT DISTRICT CHARGES. DISTRICT USER CHARGES ARE UNIFORM ($6.457/MCF) OVER THE ENTIRE DISTRICT. ADDITIONALLY, SUBDISTRICT 1 USERS PAY $2.093/MCF FOR DEBT SERVICE RETIREMENT WHILE SUBDISTRICT 2 USERS ARE CHARGED $4.603 FOR DEBT SERVICE RETIREMENT PLUS EQUITY EQUALIZATION WHICH IS SUBDISTRICT 2 PAYMENT TO THE CITY OF CLEVELAND (SUBDISTRICT 1) FOR CLEVELAND'S WWTP AND (68)

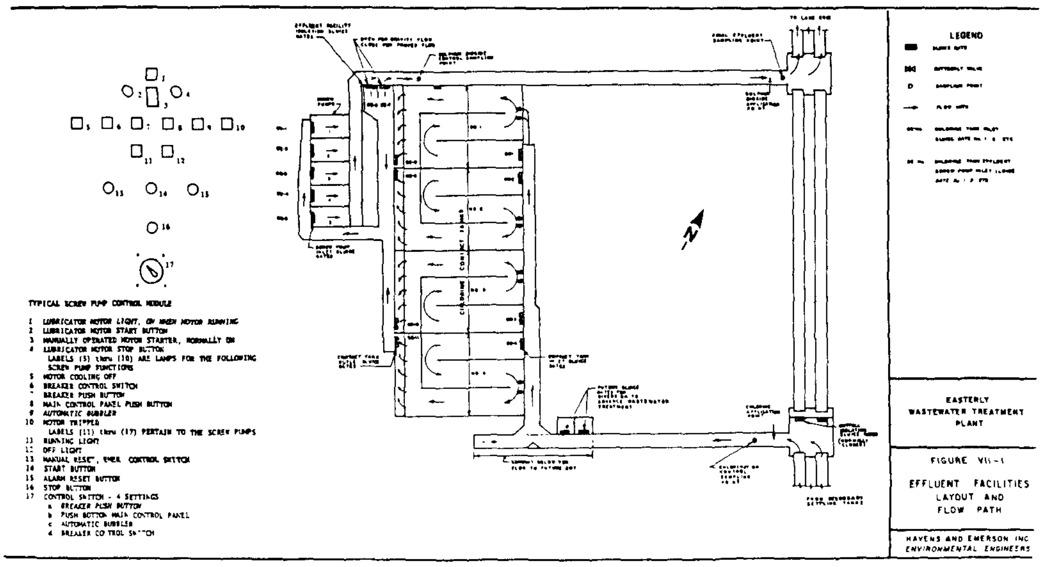
FACILITIES ACQUIRED AS A RESULT OF THE DISTRICT'S FORMATION SERVICE CHARGES ARE LOCAL COMMUNITY CHARGES FOR O&M, ETC. ON THE COLLECTOR SEWERS WHICH ARE OWNED BY THE INDIVIDUAL COMMUNITIES. CONSEQUENTLY, THESE CHARGES ARE NOT AVAILABLE TO THE DISTRICT. THESE LOCAL CHARGES MAY BE USED BY LOCAL COMMUNITIES TO PAY FOR LOCAL SEWER IMPROVEMENTS SUCH AS THOSE MANDATED IN THE COMMUNITY DISCHARGE PERMITS.

JDG j
A711DRAF
8/21/87









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STEPHEN HOVANCSEK & ASSOCIATES, INC
Consulting Engineers & Planners
269 RICHMOND ROAD CLEVELAND OHIO 44143
(216) 731 6255 (216) 381 1953

August 26, 1987

United States Environmental Protection Agency
Region 5
230 South Dearborn Street
Chicago, Illinois 60604

Attention: Mr. Harlan D Hirt, Chief,
Environmental Planning Commission
5-WFP-TUB-08

Re *DRAFT ENVIRONMENTAL IMPACT STATEMENT*
Cleveland Hilltop Planning Area,
OHIO

Dear Mr Hirt

For the past twenty-five years, Stephen Hovancsek, of the firm of Stephen Hovancsek & Associates, Inc has represented communities in the Hilltop Planning Area as their Engineer City of Richmond Heights (1962 to 1972), Village of Mayfield (1969 to present), City of South Euclid (1973 to present) and City of Highland Heights (1979 to present)

In the past and up until the fall of 1984, the Beechhill Pump Station and the Wilson Mills Pump Station were represented to the communities by the County and later by the Northeast Ohio Regional Sewer District that the Pump Stations were temporary facilities which would be abandoned when the Hilltop Interceptor gravity sanitary sewer was installed

After the communities endured and tolerated the hardships of pump station malfunctions, force main breaks, etc the EPA DRAFT EIS now states that the gravity interceptor is too costly and that the Beechhill Pump Station would be renovated and become permanent pump station

The DRAFT EIS skims over the environmental issue and considers a gravity system and a sanitary sewer system with two large pump stations as being environmentally equal I strongly recommend that the EIS be modified to include holding tanks with a 24-hour dry weather flow capacity, at the two large pump stations This would make the reliability of the two systems more nearly equal (15)

The dual forcemains are definitely needed due to the subsoil conditions and the need to make the reliability of the Pump Station system more nearly equal to the gravity system (14)

The permanent Beechhill Pump Station, if constructed, should be placed on the ten-acre Beechhill Site located opposite Bonnieview (12)

It is the recommendation of the undersigned that the gravity alternative should be chosen because this system has no moving parts and is, therefore, not subject to mechanical equipment failure and human error as is the pumping alternative (1)

The cost of a gravity sewer system over a slightly longer period of time would permanently become less costly to the users and I request that the local government be allowed to install the gravity system, and if necessary, pay the difference (11)

The gravity system is the most effective system environmentally technically and in the long run, economically

Very truly yours,

Stephen J Hovancsek

cc Mayor Fred Carmen, Mayfield Village
Mayor Arnold D'Amico, South Euclid
Mayor Thomas Hughes, Highland Heights
SJH jr

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United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
230 S DEARBORN SUITE 3422
CHICAGO ILLINOIS 60604

ER-87/930

August 31, 1987

Mr. Valdas V. Adamkus
Regional Administrator
Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Adamkus:

The Department of the Interior (Department) has reviewed the draft environmental impact statement (statement) for the Cleveland Hilltop Planning Area, Cuyahoga County, Ohio. This statement pertains to the proposed construction of wastewater collection and treatment facilities in an area that encompasses about 20 square miles northeast of Cleveland on the border of Cuyahoga and Lake Counties.

General Comments

In general, the statement adequately addresses the environmental consequences of improving the wastewater collection and treatment system. The Department concurs with the selection of alternative EIS-3 as the recommended alternative, as it is environmentally preferable to the originally proposed project, alternative EIS-1. Alternative EIS-1 would have directly impacted mature forest and 1.6 acres of forested wetlands. Alternative EIS-3 avoids these impacts.

However, the draft statement does not mention mineral resources in the proposed project area. An examination of library and file data, without benefit of field investigation, revealed that mineral resources in Cuyahoga and Lake Counties include salt, clay, lime, and peat. According to Pennwell's 1982 Map of Natural Gas Pipelines of the United States and Canada, a natural gas pipeline and a gasfield are in or near the project area. The final statement should describe mineral resources and discuss impacts on them that may occur as a result of project implementation. Plans for relocating or protecting pipelines should also be included. If no adverse impacts to mineral resources and pipelines are identified, a statement to that effect should be included in the Affected Environment Section of the final statement. (69)

In addition, the proposed project could have an impact on several parks which were developed or acquired with Land and Water Conservation Fund assistance. These parks include:

Project No.	Cuyahoga County Park
39-00110	Quarry Park
39-00176	Mayfield Heights Park
39-00434	Cleveland Heights Bikeways
39-00537	Winslow Park
39-00900	Euclid Creek Trail
39-00945	City Park Pool
Project No.	Lake County Park
39-00112	Willoughby Hills City Park
39-00644	Willoughby Hills City Park

Any construction involving above-listed park land may be in conflict with Section 6(f)(3) of the Land and Water Conservation Fund Act (Public Law 69-578, as amended). Section 6(f)(3) states: "No property acquired or developed with assistance under this section shall, without the approval of the Secretary (of the Interior), be converted to other than public outdoor recreation uses." The project sponsor should consult with the official who administers the Land and Water Conservation Fund program in the State of Ohio to determine potential conflicts. The administrator of the program for Ohio is Mr. Joseph J. Sommer, Director, Department of Natural Resources, Fountain Square, Building D-1, Columbus, Ohio 43224. (70)

The proposed project could also have an impact on the following sites which were developed with funding assistance under the Urban Park and Recreation Recovery Act of 1978:

Project No.	Cuyahoga County Sites
39-035-CNTY-79-01	Alta House Cumberland Pool Superior Hill Park Foot Memorial Park
39-035-CNTY-80-02	Cleveland Heights High School
39-035-CNTY-84-01	Taft Park Euclid Memorial Park Bohlken Park Staford Park Miller Park Purvis Park

Any conversion of all or any part of these sites to other than public recreation use must comply with the Urban Park and Recreation Recovery Act and the specific requirements for any such conversion specified in 36 CFR Part 72 (51 Federal Register pages 34186-7). Any application for such conversion should be made to the Regional Director, Midwest Region, National Park Service, 1709 Jackson Street, Omaha, Nebraska 68102-2571, and should describe compliance with the specific requirements of 36 CFR Part 72. (70)

Specific Comments

Page 6-40 states that 1 acre of open water wetland would be eliminated through the implementation of alternative EIS-1, and reference was made to Figure 4-4 for wetland locations. However, Figure 4-4 provides the locations of water quality sampling stations and does not show the location of the referenced wetland. A map showing the locations of wetlands, forests, and other environmentally sensitive areas in relation to project features and alternatives should be included in the final statement. (71)

Page 6-20 states that the loss of terrestrial habitat is not considered to be significant on a regional basis because of the abundance of similar cover outside the project easement. No data are presented in the statement to support this conclusion. The final statement should provide acreage figures and additional locations of where such habitat can be found to support the conclusion of nonsignificance. The loss of wetland habitat was also considered not to be significant. Data to support this conclusion should also be added to the final statement. (72)

Page 4-47 identifies *Haliaeetus leucocephalus* as the southern bald eagle. The bald eagle (*Haliaeetus leucocephalus*) is currently listed as a federally endangered species in the conterminous United States, except for the States of Washington, Oregon, Minnesota, Wisconsin, and Michigan. In those States, it is listed as a federally threatened species. There is no listing by northern or southern populations as indicated in the draft statement. In addition, the final statement should be amended to state that the bald eagle does nest in Ohio. Additional information related to threatened and endangered species or fish and wildlife resources can be obtained from the Field Supervisor, Columbus Field Office, Fish and Wildlife Service, 6950-H Americana Parkway, Reynoldsburg, Ohio 43068 (FTS 943-6923 or 614/469-6923). (73)

The opportunity to comment on this draft statement is appreciated.

Sincerely,

Sheila Minor Huff

Sheila Minor Huff
Regional Environmental Officer

cc Harlan D. Hirt
Chief, Environmental Planning Section
U.S. EPA (5WFP)
230 S. Dearborn
Chicago, IL 60604

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present time or system as laid out according to a 75 percent funding form and do it as soon as possible. Let's get on with this. We've been discussing it for a long time.

Thank you, Mr Chairman. I appreciate the opportunity to come before you today.

MR. LUECHT· Thank you. Our next speaker is Dan Clark representing Congressman Ed Feighan's office.

MR. CLARK. Thank you. On behalf of Congressman Feighan, it's a pleasure to be here today. I have written testimony that is from the Congressman that will be submitted to you for the record.

Thank you for this opportunity to comment on the Environmental Impact Statement for the Heights-Hilltop Interceptor.

Before making any comments on the substance of your suggestions, I would like to take this opportunity to publicly thank our local Sewer District

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for their responsiveness to my office and to our community. The Board of Directors and staff of the District have worked long and hard at trying to alleviate the problems experienced by the residents of the Heights-Hilltop community

The work of the Public Advisory Committee convened by the Northeast Ohio Regional Sewer District should also be recognized and commended The volunteer work of these citizens shows the commitment of our residents to becoming part of a solution to our sewer problems. Their work is greatly appreciated by all of us involved in this issue.

The Heights-Hilltop Interceptor has been studied, debated, discussed, revised and reviewed more than any project I have been associated with during my career as a public official.

During our deliberations, a generation of residents have purchased and expanded homes and businesses in the Heights-Hilltop area. This generation

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has had to tolerate a sewer system that would back up in their homes, overflow in their waterways and, generally, destroyed the quality of life they sought so hard to maintain. With this in mind, I urge the USEPA to make action their top priority.

Although I am requesting a different configuration than you have recommended, I think the most important request that I can make is that you allow the Sewer District to go forward and alleviate the tremendous problems experienced by our residents

I strongly disagree with your recommendation that two pump stations be maintained by the District, essentially as a cost saving device Pump stations have been a problem for our community during the past two decades. Public confidence in any system which is dependent upon pump stations which are properly operated and maintained are still subject to failure, will be difficult to gain

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A gravity sewer system would guarantee this community a fail-safe method of transporting sewage The system would take advantage of a favorable topography and Mother Nature. The initial cost estimates have been projected by the EIS to be 23 5 million dollars more than the two pump stations alternative. This cost difference will be spread over the full construction period of the project To put this cost in proper perspective within the federal budget, I would like you to consider that the Defense Department spends roughly 34 million dollars an hour, 24 hours a day, every day of the year

In addition, there will be substantial savings beyond the 20-year period you have taken into consideration No mechanical system can be operated and maintained as economically as a system provided for by Mother Nature

I urge you to take this into account as you make your final decision on the Heights-Hilltop Interceptor. Our residents have worked hard to build a community which will provide for an enhanced quality of life for their children.

I think the best way to insure that quality of life is to build the gravity flow sewer system.

Finally, I would urge you to "grandfather" this project, to allow the Northeast Ohio Regional Sewer District to receive 75 percent federal funding. It would be a travesty of justice to maintain that this is a new project approved after October 1, 1984. The project is part of a whole system which began long before the October 1, 1984 date. 38

In conclusion, I look forward to working with you to build a sewer system which insures that the environment is protected and the citizens are releived of the problems that they have experienced for two decades. To that end, I believe we should eliminate all

pump stations and move forward as quickly as possible. Thank you.

MR. LUECHT: Thank you. Our next speaker is Lee Courtney.

MR. COURTNEY: Thank you, Mr. Chairman. I'm Lee Courtney. I am the engineer for Richmond Heights and the engineer for Gates Mills. I live in Richmond Heights and my office is in Mayfield Village. I've been here a long time. I know the area well and I feel very strongly about it.

I want to commend these gentlemen for presenting their case well. Unfortunately, I don't agree with them. It was a good presentation, and if their object was to cut the cost, they did their job very well.

I would suggest that there is another alternative that they didn't present. That's the alternative to do nothing at all, then we would have a marvelous cost of zero. Life will still go on. It has for the last 20 years while all local people have been studying

8.3 COMMENT RESPONSES

The following responses are keyed to circled numbers in the texts of the preceding comment letters in Section 8.2.

Comment 1

Comment: NEORSD's proposed gravity alternative is inherently more reliable than the recommended alternative, because gravity sewer systems are more reliable than pumping systems.

Commentor/s: Cleveland Metroparks System
HAPAC Technical Subcommittee
HAPAC Environmental Subcommittee
Northeast Ohio Regional Sewer District
Steven Hovancsek
Congressman Edward F. Feighan
Commissioner Mary Boyle
Citizens for Land and Water Use
Arnold Gieisser
Ed Flammang
Dee Brescia
Lee Gase
G.H. Goodman

Response:
Experience in Cleveland and elsewhere shows that a conveyance system utilizing pumps with proper design, operation, and maintenance of the pumping stations and force mains, can be as reliable as a gravity system. To ensure the reliability of a pumped system, the Draft EIS included several control features which would improve the overall reliability of the major pump stations. A central control system was included to monitor and control all the pumping stations in the Hilltop area. The central computer would continuously monitor parameters at each pumping station, such as wet well level, flow volumes, and various pump parameters, and control each system based on these inputs. The central control system would be designed to automatically adjust for pump station problems without affecting the normal transfer of wastewater from the Hilltop area. Should a problem develop with the central computer, control would automatically shift to each individual station. The controls would continue to monitor and operate the stations normally.

In addition to the central control computer, each major pumping station would be designed with sufficient capacity to convey a peak event with one pump out of service. Separate power grids and on-site power generators would be included with the pump stations to avoid power failures. Automatic switching of an on-site diesel generator would allow it to automatically start in the event of a power outage.

It should be noted that neither gravity nor pump stations/forcemains are 100 percent reliable. Gravity sewers may develop clogs which can cause sewage to backup and overflow from the system. They are also subject to cracks and breaks which may result from tree roots or other factors. Similarly, pump stations and forcemains also have potential for mechanical problems. Both a pumped system and gravity sewers require good design and a maintenance program to ensure proper operation. It should be noted that none of the systems studied in this EIS is an all gravity system. Every alternative contained some pump stations and force mains which are needed to provide transport of wastewater from the area.

One final point regarding pump station reliability is the fact that many small pump stations now exist within the Hilltop area (Woods, Williamsburg, Franklin, Richmond Mall, Thornapple, Richmond-White, Suffolk County Estates, Aintree, Mount Vernon, Picker X-Ray and Stark), and no major problems were noted with these stations during review of material for the Draft EIS. No comments were received during the comment period which addressed existing problems at any of the small pump stations. The principles of operation at these stations are the same as for the larger stations recommended at Beech Hill and Richmond-White. Although these are on a somewhat smaller scale, they do show that pump stations can work effectively to transport wastewater.

<u>Comment 2</u>

Comment:	The pipe bridge across Euclid Creek proposed in Alternative EIS-3 will seriously detract from the aesthetics of the park it crosses. Costs shown do not reflect the costs of constructing a compatible structure.
Commentor/s:	Cleveland Metropark System HAPAC HAPAC Environmental Subcommittee HAPAC Economic Subcommittee

Response:

Due to concerns regarding the aesthetics of a pipe bridge over Euclid Creek along Monticello Boulevard, costs for an independent reinforced concrete pipe bridge which would match the existing road bridge were developed. This bridge would not detract from the aesthetics of the area because of the use of building materials and an architectural design similar to that of the existing bridge. Figure 8-1 shows a conceptual drawing of the pipe bridge. As shown, the design of this bridge enables full enclosure of the pipes, and thus they are not visible from the adjacent land areas.

The cost estimates for this structure are as follows:

Description	Quantity	Unit Cost	Total Cost
14" Diameter Steel Piling filled with Concrete	660 LF	$70/LF	$ 46,200
Concrete Footings	150 CF	$300/CY	$ 45,000
Structural Concrete Columns	190 CY	$450/CY	$ 85,500
Bridge Arches			
Forming	4,800 SF	$37.50/SF	$ 180,000
Concrete	360 CY	$350/CY	$ 126,000
Intermediate Walls (Precast)	30 units	$2,000/unit	$ 60,000
Top Slab (Precast)	7,200 SF	$18/SF	$ 129,600
Longitudinal Side Walls (Precast)	4,500 SF	$15/SF	$ 67,500
Grating, Primary Steel, Handrail	12,000 SF	$10/SF	$ 120,000
Steel Pipe	800 SF	$715/LF	$ 572,000
Painting			$ 20,000
			$1,451,800
	Contingency +15%		217,770
			$1,669,570

Due to questions regarding the cost variance between an aesthetically compatible pipe bridge versus a basic design shown in the NEORSD environmental assessment, an independent cost analysis for a basic pipe bridge was developed. The costs shown for a basic pipe bridge in the DEIS were taken from

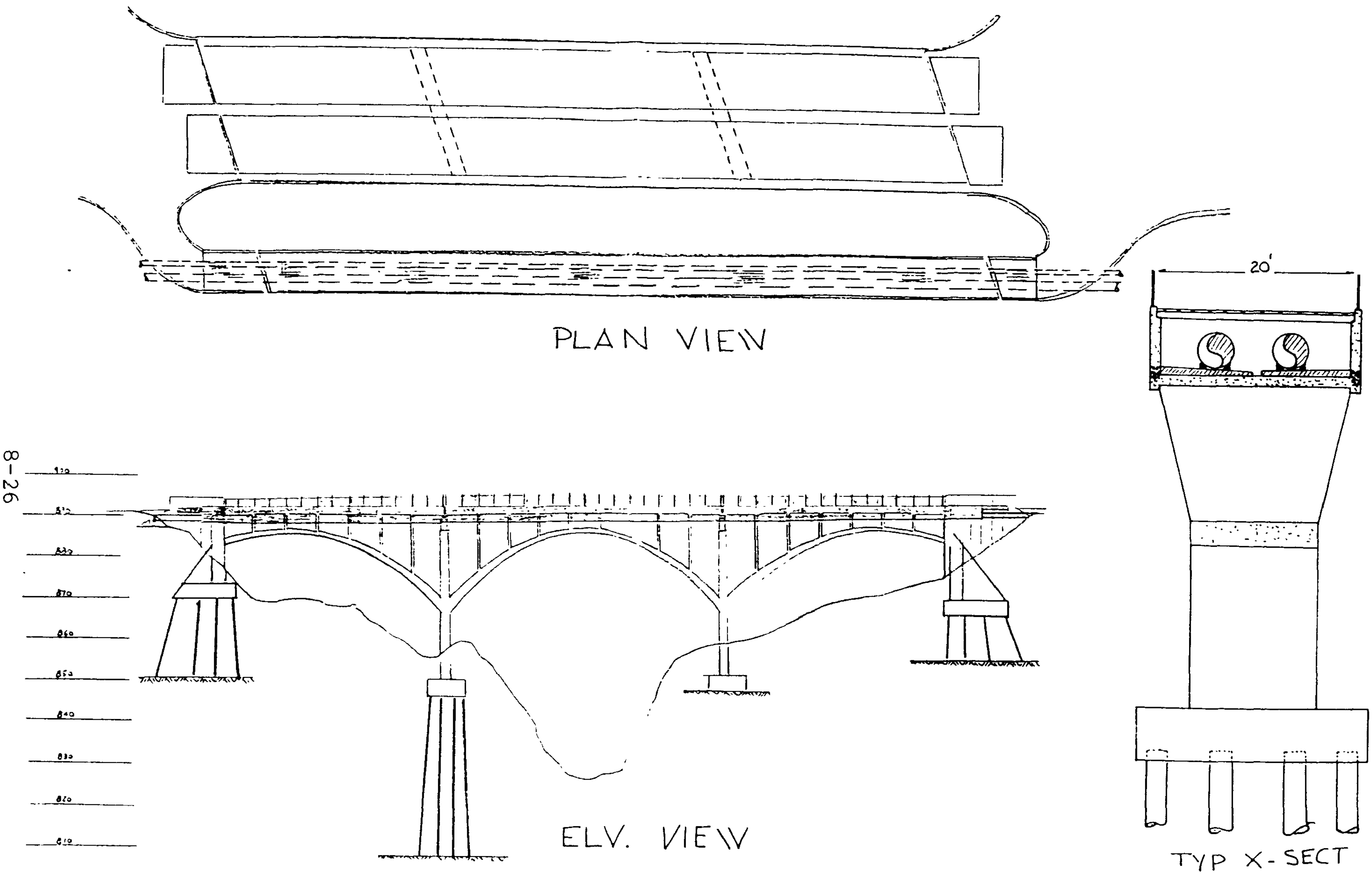

Figure 8-1. Aesthetically Compatible Pipe Bridge

NEORSD facilities planning/environmental assessment sources; the costs estimated below reflect a more detailed costing. These costs include a steel bridge crossing with a reinforced concrete foundation. Figure 8-2 shows a conceptual drawing of the basic pipe bridge. The cost estimates for this structure are as follows:

Description	Quantity	Unit Cost	Total Cost
14" Diameter Steel Piling Filled with Concrete	660 LF	$70/LF	$ 46,200
Concrete Footings	150 CY	$300/CY	$ 45,000
Structural Concrete Columns	250 CY	$450/CY	$ 112,500
Structural Steel Beam System	105 Ton	$1,800/Ton	$ 189,000
Grating and Handrail	8,000 SF	$10/SF	$ 80,000
Steel Pipe	800 LF	$715/LF	$ 572,000
Painting			$ 45,000
			$1,089,700
	Contingency +15%		163,455
			$1,253,155

As can be seen from these data, an aesthetically compatible pipe bridge would cost roughly one-third more than a basic pipe bridge, and would not significantly change the cost-effectiveness of the selected alternative, EIS-3. The added costs for aesthetics may not be grant allowable.

Comment 3

Comment noted; correction placed on page 4-73.

Comment 4

Comment: Population forecasts used in the EIS are too low.

Commentor/s: Northeast Ohio Areawide Coordinating Committee
HAPAC Growth and Development Subcommittee
Mayor Hughes, Richmond Heights

Response:

Population forecasts used in the Draft EIS are the most recent officially-sanctioned figures provided by the Ohio Data Users Center (ODUC). It should be noted that sizing of sewer lines in the Hilltop area is relatively

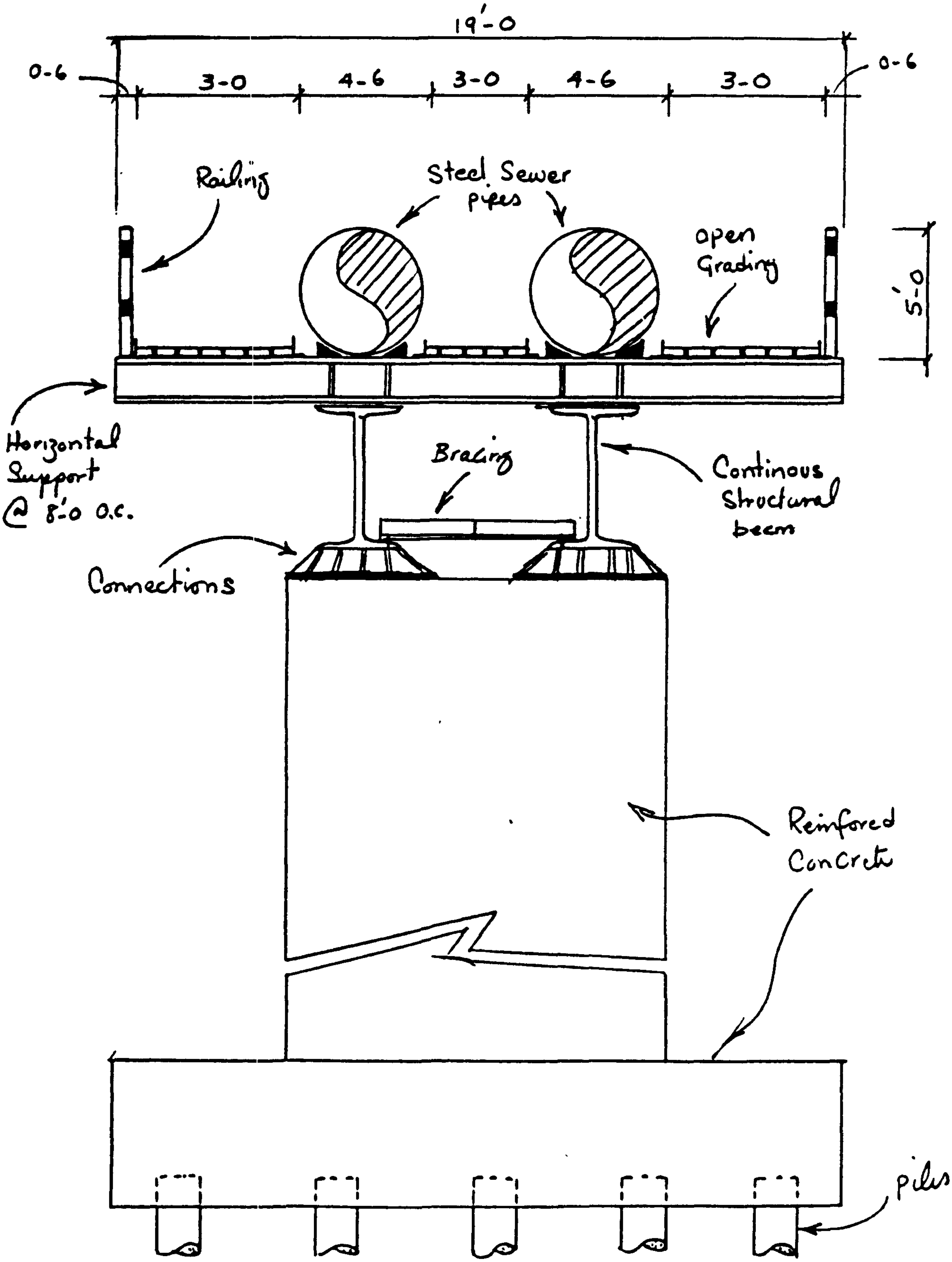

Figure 8-2. Basic Pipe Bridge

insensitive to future population due to the high level of infiltration and inflow in the area.

Comment 5

Comment: Figure 4-10 does not include all proposed developments and should be updated.

Commentor/s: HAPAC Growth and Development Subcommittee

Response:
The HAPAC survey of developers cited by the comment includes additional proposed developments, however the basic growth conclusions of the DEIS document would not be changed by updating Figure 4-10.

Comment 6

Comment: The recommended plan does not address the growth needs of the area tributary to the Richmond-White pump station.

Commentor/s: HAPAC Growth and Development Subcommittee
HAPAC Technical Subcommittee
Northeast Ohio Regional Sewer District
Mary Boyle
Lee Case

Response:
The EIS and facilities planning addressed alternatives for solving the ultimate needs of the Hilltop area. Alternative EIS-3 was found to be the cost-effective system alternative to solve the needs of ultimate growth and provide for local sewering of all unsewered areas, most of which occur in the northern portion of the Facilities Planning Area (FPA).

Due to insufficient documentation of the need for extensive local sewering of the northern portion of the FPA (i.e., a lack of facilities planning which addresses the various alternatives to a network of conventional local gravity sewers), the EIS recommended a component of EIS-3 which would address the needs of the 20 year planning period population and more specifically the existing needs of the Hilltop FPA.

The EIS Recommended Plan (the component of EIS-3) includes an upgraded Beech Hill Pump Station and forcemain, elimination of the Wilson Mills Pump Station, and expansion of the Richmond/White Pump Station with a forcemain to the gravity sewer at Wilson Mills Road. The Recommended Plan includes provisions for the elimination of package plants that would not depend on an extensive network of local sewers. All portions of the Recommended Plan are sized for 20 year growth, with the exception of the Richmond/White forcemain and pumps, which were sized for existing flows. Because it is anticipated that flows from the northern portion of the FPA (both from existing on-site systems areas and future growth) would be handled by the Richmond/White Pump Station, the structure was costed out to handle the necessary 12.8 mgd capacity pumping for the 20 year planning period. The recommended forcemain is sized for existing needs, but the NEORSD may decide how to address reserve capacity for future growth (depending on what alternatives are developed for the northern portion of the FPA) in the construction of the forcemain along Richmond Road. Any increase in capacity beyond the recommended 12" as forcemain for existing needs would be funded locally.

Comment 7

Comment noted; an incorrect version of Appendix G was inadvertently published in the Draft EIS. The correct appendix is included at pages G-1 through G-5.

Comment 8

Comment: Costs for pump station component failures should be included in the cost estimates.

Commentor/s: HAPAC Economics Subcommitee

Response:
While no costs associated with pump station component failures are directly listed, they are included in the cost analysis as part of the operation and maintenance costs. With proper operation and maintenance of the pump stations, no component failures should occur; and consequently, there should be no overflows and other environmental concerns as a result of component failures. The control features recommended for the pump stations should help alert operators of maintenance requirements prior to a problem which could cause an overflow event. Consequently, corrective actions can be taken before a component failure can cause any environmental damage.

Comment 9

Comment: Draft EIS Beech Hill pump station renovation costs appear too low.

Commentor/s: HAPAC Economics Subcommittee

Response:

The costs associated with upgrading the Beech Hill pumping station include the pumping system, controls, and backup generator. In addition, the operation and maintenance costs include allowances for labor and miscellaneous other costs. This allowance should cover routine yearly maintenance which will keep the Beech Hill pumping station in good condition. The existing structure of the building is sound, and does not appear to require substantial renovation. With adequate routine maintenance, the existing structure should remain sound.

Comment 10

Comment: The 15 percent contingency used in some of the calculations is too low.

Commentor/s: HAPAC Economics Subcommittee

Response:

In general, a contingency is usually included in planning-level cost estimates to account for unforeseen changes in costs and any changes which may be included in the construction stage which were not considered during the cost analyses. A 15 percent contingency was recommended for use by USEPA. Use of a 15 percent contingency is consistent with present USEPA cost analysis guidelines (Innovative and Alternative Technology Assessment Manual, CD-53). This 15 percent contingency was applied consistently for all alternatives in the draft EIS analysis and therefore, would not affect the overall economic evaluation of alternatives.

Comment 11

Comment: The present worth assumptions used in the Draft EIS are not realistic.

Commentor/s: HAPAC Economics Subcommittee
Steven Hovancsek

Response:
The economic analysis assumptions were based on guidelines developed for the USEPA Construction Grants program. In general, the guidelines clearly define how a cost analysis should be conducted. The economic analysis should not include an allowance for inflation of wages and prices. This is based on the assumption that prices for resources involved in treatment works construction and operation will tend to change over time by approximately the same percentage.

The evaluation performed by the HAPAC Economics Subcommittee showed little cost difference between the present worth of EIS-1 and EIS-3. This analysis did include an inflation of operating costs which is not allowed by the Construction Grants program. In addition to this inflation, the HAPAC evalution also included an allowance of $10 million for inclusion of features recommended by the HAPAC Technical Subcommittee. Without these additions, the present worth of EIS-3 is still considerably less than the present worth of EIS-1.

The issue of a 50-year versus a 20-year planning period is also governed by the Construction Grants guidelines. A project must be cost-effective when compared to other alternatives based on capacity to serve the area for a 20-year period.

Comment 12

Comment: The Beech Hill pump station should be rebuilt at the Bonnieview Site.

Commentor/s: HAPAC Technical Subcommittee
Northeast Ohio Regional Sewer District
Steven Hovancsek

Response:
While the existing site of the Beech Hill pump station may have originally been intended as a temporary location, there is no structural reason to rebuild the existing station. The structure of the Beech Hill pumping station is in good condition and normal operation and maintenance of the facility should keep the existing structure in good condition.

It is true that the pumping station is located in a residential area, however, its existence does not visually detract from the area. The design is consistent with the single family homes found in the area. Several large trees and a split rail fence are present on the lot and add to the overall quality of the area. There is no excessive noise emitted from the station.

An evaluation conducted to determine the feasibility of moving the Beech Hill pumping station to the Bonnieview site has indicated that, while the Bonnieview site has sufficient land space to accommodate the Beech Hill pumping station, other factors exist which make the site less desirable. The elevation of the Bonnieview site is higher than the elevation of the Beech Hill site. Some type of pumping station would still be needed at the Beech Hill site to transport wastewater from the area north of Beech Hill to the new pumping station at the Bonnieview site. Using the new site would require the addition of another pumping station, and comsequently the evaluation concluded that the Beech Hill pumping station should not be relocated.

Comment 13

Comment: No provision has been made to store flows from the Beech Hill service area north of Wilson Mills Road.

Commentor/s: HAPAC Technical Subcommittee
Northeast Ohio Regional Sewer District

Response:
As noted by the commenters, it is true that flow from the service area north of the Beech Hill pump station cannot presently be routed to Bonnieview in case of system upsets. As discussed in the response to Comment 10, there is no basis for moving the Beech Hill pumping station to the Bonnieview site. Therefore, it is recommended that an auxilliary pump and generator be installed in the existing Beech Hill pump station to transfer flow to the Bonnieview storage basin in the event of a system upset. A force main from Beech Hill to Bonnieview would also be required. In the event of a problem with the main Beech Hill transport system, flow from the area south of Beech Hill would be diverted to the Bonnieview storage basin, while flow from the

northern area would be pumped from the Beech Hill wet well to the Bonnieview storage basin. The estimated costs for this system are as follows:

Item	Quantity	Unit Cost	Cost
12" Pipe	2,000 FT	$27.00/FT	$ 54,000
Manholes	3	$1,465/EA	4,395
Excavation and Backfill	2,370 CY	$10.19/CY	24,150
Rock Excavation	593 CY	$66.19/CY	39,251
Surface Restoration	889 SY	$33.75/SY	30,004
Sheeting and Shoring	40,000 SF	$ 1.30/SF	52,000
Pump	3 MGD		50,000
Generator			$ 29,400
	Subtotal		$283,200
	Contingency (15%)		42,480
	TOTAL		$325,680

The salvage value (not including pump and generator) is $26,902. Since this is a standby system which would only be used in emergency situations, the additional operation and maintenance costs would be minimal.

This system should be implemented as part of the plan recommended in the Draft EIS.

Comment 14

Comment: Twin force mains are essential for a reliable gravity sewer system.

Commentor/s: HAPAC Technical Subcommittee
HAPAC Environmental Subcommittee
Northeast Ohio Regional Sewer District
Steven Hovanacsek

Response:
The USEPA believes twin force mains are not standard engineering practice and were, therefore, not used within the Hilltop analysis. With proper design, construction, and maintenance the reliability of the force mains will be very high; consequently, twin force mains are not needed.

Comment 15

Comment: Emergency holding tanks are necessary to the reliable operation of a gravity sewer system.

Commentor/s: HAPAC Technical Subcommittee
HAPAC Environmental Subcommittee
Steven Hovancsek

Response:

Emergency holding tanks at major pump stations are not standard engineering practice. This is because the pumping stations will be designed to handle peak flows from sanitary sewers; consequently, emergency holding tanks would not be used. With the control system and backup power sources used at the major pump stations, these stations should be extremely reliable and not subject to failures which result in overflows of sewage. Investing a large sum of money in a structure which is not intended to be used is not cost-effective and is, therefore, not included in the recommended plan.

Emergency holding tanks would only be needed during an extreme system failure. Such a failure would probably require substantial repairs, which would exceed a 24-hour shutdown period. Even an emergency holding tank with capacity to handle the 24-hour flow volume would be exceeded during such a major failure. Therefore, overflows would probably occur from the system with or without 24-hour storage basins during the unlikely event of extreme system failures.

Comment 16

Comment: The existing 30" sewer presently in the Monticello Avenue bridge over the Euclid River is leaking and should be replaced.

Commentor/s: HAPAC Technical Subcommittee
HAPAC Environmental Subcommittee

Response:

No evidence of a leak in the 30-inch sewer in the Monticello Boulevard bridge over Euclid Creek was presented during the development of the Draft EIS. References have been made to water which drips from the sewer pipe as evidence of a pipe leak. If the dripping water is a result of a pipe leak (and not a result of condensation, rainfall runoff, etc.), many methods are available to repair leaks. In general, a pipe is not replaced because of a small leak but is more frequently repaired in place. At the present time, based on discussions with the NEORSD, it does not appear that this pipe needs to be replaced. However, should it be found that the existing 30-inch sewer does need replacement, the new pipe bridge was designed to support twin 54-inch sewers which would be required to transport the full flow volume.

Comment 17

Comment:	The Green Road Basin should be part of immediate plans.
Commentor/s:	HAPAC Technical Subcommittee Northeast Ohio Regional Sewer District

Response:
The Green Road Storage Basin was previously approved as part of the Heights Interceptor project. This basin will be included as part of the overall system because of the Heights project. The flows from the Hilltop area will not have an extensive effect on the size of the Green Road basin, however, a size increase of 0.18 mg was included with the EIS-3 costs. Not all of this flow is attributable to the Hilltop area since an estimated peak flow of 59 MGD will be routed to the Hilltop area from the Belvoir area along Richmond Road as a result of total system peak flow attenuation. Since the 0.18 mg increase can not be related directly to the Hilltop area, it was not included as part of the costs for the recommended plan.

Comment 18

Comment:	The EIS did not eliminate on-site treatment as a viable option during alternative screening.
Commentor/s:	HAPAC Environmental Subcommittee Northeast Ohio Regional Sewer District

Response:
On-site systems in the Hilltop Area were evaluated in Section 2.5 of the DEIS. Various studies were documented on pages 2-40 and 2-41. It was concluded that these studies, although informative, did not adequately document the need for extending sewer service to the subject areas as referenced in 40 CFR 35.2030(a)(1).

Agency guidance requires that in order to allow federal grant participation, the need for sewer service must be adequately justified. This justification may consist of evidence, both indirect and direct, which will yield conclusive proof that a public health problem exists and cannot be cost-effectively corrected via any other means. As stated, some of this evidence may be indirect, that is, conditions unsuitable for on-site system performance may be cited. These conditions may include the existence of poor soils, shallow depth to bedrock, or improper lot sizes. While such indirect evidence is important, it cannot be used to totally justify the need for sewers. The use of direct evidence provides the strongest case for obtaining federal grant assistance. Such evidence would usually cite hard data obtained through field surveys, on-site investigations and sampling. Certified reports containing evidence of nearby drinking water well contamination, surface ponding, or sewage backups of a large percentage of residences would satisfy this requirement. In the absence of such information it is difficult at best to make a judgement as to the need for obtaining federal funds to correct perceived problems.

Comment 19

Comment: Existing problems with basement flooding should be considered in the design of pump stations.

Commentor/s: HAPAC Environmental Subcommittee
Mayor Hughes, Richmond Heights

Response:
The issue of basement flooding in the Hilltop area was discussed in Section 2.3 of the Draft EIS. The following discussion is from that section.

Based upon discussions with NEORSD personnel, it was determined that the majority of basement flooding problems in the Hilltop FPA are a result of poorly maintained collector sewers. Generally, these poorly maintained sewers cause basement floods because of tree roots or other obstructions which decrease the pipe capacity. Increased sewer maintenance and repairs are currently underway to remedy the problem (Kennedy 1987c).

A few homes around Beech Hill and Wilson Mills pumping stations experience basement floods because of design problems with the homes. These homes were built with the basement drains below the level of the pump station wet well and consequently have flooding problems when the level in the wet well rises.

Overall, basement flooding in the Hilltop area does not appear to be a result of the main transport system. Proper maintenance of house laterals and collector sewers should greatly reduce the problem.

As discussed in Section 1.1.2, a condition for grant funding to the Heights area required NEORSD to work with the local communities to develop programs for relief sewer rehabilitation and construction. The NEORSD is currently working with communities to develop the necessary programs to mitigate the problems of infiltration and inflow and basement flooding.

Comment 20

Comment: Consider using an open cut/tunnel combination in crossing Euclid Creek under Alternative EIS-1.

Commentor/s: HAPAC Environmental Subcommittee

Response:
USEPA agrees that the partial tunnel/partial open-cut method of construction for the crossing of Euclid Creek would be preferred if EIS-1 were the selected alternative. While the environmental impacts would be reduced by this method of construction, the additional tunneling would also marginally increase the costs of this alternative.

Comment 21

Comment: The Draft EIS confuses the Lake County and Cuyahoga County soil associations.

Commentor/s: Soil Conservation Service

Response:
Because the Hilltop FPA includes parts of both Lake and Cuyahoga Counties, it was necessary to generalize information prepared at different times for each

county's separate soil survey. Corrections making this clearer and eliminating technical concerns of the SCS have been added to the text.

Comment 22

Comment noted; a correction was made on page 4-11.

Comment 23

Comment noted; corrections were made on page 4-12.

Comment 24

Comment noted; a correction was page on page 4-51.

Comment 25

Comment noted; a clarification has been added on page 4-58.

Comment 26

Comment noted; corrections have been added on page 4-57 and 4-58.

Comment 27

Comment noted; a correction has been added to page 1-13.

Comment 28

Comment noted; a correction has been added to page 4-51.

Comment 29

Comment noted; a correction has been added to page B-2.

Comment 30

Comment: Mitigating measures should be added to some of the environmental impact evaluations.

Commentor/s: Ohio EPA

Response:
Input from Ohio EPA regarding appropriate mitigation requirements has been added to the text (see below).

Comment 31

Comment noted; suggested mitigation has been added on page 6-32.

Comment 32

Comment noted; suggested mitigation has been added on pages 6-2 and 6-3.

Comment 33

Comment noted; suggested mitigation has been added on page 6-2.

Comment 34

Comment noted; suggested mitigation has been added on page 6-1.

Comment 35

Comment noted; suggested mitigation has been added on page 6-15.

Comment 36

Comment: The EIS should contain a section putting the EIS process in context relative to the Construction Grants Program.

Commentor/s: Northeast Ohio Regional Sewer District

Response:

Comment noted. The EIS makes recommendations for a project to receive Federal funds under the Construction Grants Program to solve wastewater treatment problems in the Hilltop area. Allowability and eligibility of specific expenditures for Federal participation is determined in the granting of funds. The project for which funds are received must be within the recommendations of the EIS.

Comment 37

Comment: The EIS should not create the impression that the recommended plan provides an immediate solution to existing needs in the Hilltop area.

Commentor/s: Northeast Ohio Regional Sewer District

Response:

The EIS makes recommendations for construction of a project to solve the wastewater treatment needs of the Hilltop area. The EIS describes what are perceived as the most significant problems that need to be corrected. It is up to the grantee, NEORSD, to determine construction phasing and scheduling, in order to implement the recommendations of the EIS. In determining the construction scheduling for the Hilltop project NEORSD should evaluate phasing based on downstream flow constraints, but also should recognize that those problems which are related to reliability of the pumping system could be addressed sooner. Implementation of the recommended plan can proceed as soon as resources are available to correct the wastewater treatment problems.

Comment 38

Comment: The project components should be eligible to receive funding at pre-1984 rates (i.e., 75% funding and funding for 20 years reserve capacity) as provided for in USEPA facilities planning regulations which reduced the allowable percentages and categories effective Oct. 1, 1984 for grants except under specified conditions.

Commentor/s: Northeast Ohio Regional Sewer District

Response:
The level of Federal funding is identified in the EIS to facilitate estimating the potential local costs associated with the alternatives. While the identified levels of funding represent USEPA's current interpretation of the applicable regulations, (40 CFR 35.2030, 35.2108, 35.2123, and 35.2152) the content of the EIS is not a final agency decision on this matter, and the EIS review is not the vehicle to reach a final resolution. That decision will not be made until an application for funding is processed.

Recognizing that the 1987 amendments to the Clean Water Act have further revised the categories of allowable funding, have scheduled the phase out of the Federal grant program after 1990 and have established a revolving loan fund, it is emphasized that the distribution of capital costs between local and Federal sources is an estimate based on the present regulations.

Comment 39

Comment noted; a revision was placed on page ix.

Comment 40

Comment noted; revisions were placed on pages ix, xxiii, 2-28, 2-30, 2-31, 3-48, 5-5, 5-10, 5-24, 7-5, 7-6, and Index page 1.

Comment 41

Comment noted; a revision was placed on page 2-1.

Comment 42

Comment noted; a revision was placed on page 2-5.

Comment 43

Comment noted; a revision was placed on page 2-5.

Comment 44

Comment noted; a revision was placed on page 2-5.

Comment 45

Comment noted; Figures 2-2 and 2-3 have been replaced with Figures 2-2 through 2-5.

Comment 46

Comment noted; revisions were placed on pages 2-28 and 2-30.

Comment 47

Comment noted; a revision was placed on pge 2-30.

Comment 48

Comment noted; revisions were placed on pages 2-31 and 2-33.

Comment 49

Comment noted; a revision was placed on page 4-27.

Comment 50

Comment noted; a revision was placed on pae 4-61.

Comment 51

Comment noted; a revision was placed on page 4-60.

Comment 52

Comment noted; a revision was placed on page 4-61.

Comment 53

Comment noted; a revision was placed on page 4-61.

Comment 54

Comment noted; a revision was placed on page 4-62.

Comment 56

Comment noted; a revision was placed on page 4-64.

Comment 57

Comment noted; a revision was placed on page 4-64.

Comment 58

Comment noted; a revision was placed on page 4-64.

Comment 59

Comment: The EIS should note the cost of the sewer district's purchase of property in the cost tables.

Commentor/s: Northeast Ohio Regional Sewer District

Response:
The Draft EIS does not specifically note the cost of the district purchase of property because this was not historically defined in the Facilities Plan or Environmental Assessment. Since all the alternatives require some structure in the vicinity of the existing Richmond-White pumping station, the land costs should be similar. Consequently, the cost analysis would not be significantly affected by including the land costs. The expanded Richmond-White pumping station for EIS-2 and EIS-3 may be built on the site of the existing Richmond-White pumping station; therefore, there may be no land costs associated with these alternatives.

Comment 60

Comment: Annual operations and maintenance costs for EIS-1 will differ between the options with and without Bonnieview.

Commentor/s: Northeast Ohio Regional Sewer District

Response:
The annual O&M costs for EIS-1 with and without Bonnieview will not differ significantly. The same quantity of pipe is used in the two options, and there is one basin included with each. For this reason, the costs in the Draft EIS do not reflect a difference in O&M costs between the two options.

Comment 61

Comment: The proposed Highland Greens development would not be able to tie into sewer lines on S.O.M. Center Road due to I-271.

Commentor/s: Northeast Ohio Regional Sewer District

Response:

Although it is questionable whether a developer would elect to bear the costs to transport flow to S.O.M. Center Road, it is not impossible simply because it would require a crossing of I-271. A tunnel crossing under I-271 would be needed which may be extremely costly for a developer and would require highway department approval. Since the general topography slopes toward the west, a small pumping station would probably be required to convey flow to the S.O.M. Center Road sewer. These features could make the extension prohibitively expensive for a private developer.

Comment 62

Comment noted; a revision has been placed on page 6-25.

Comment 63

Comment noted; a revision has been placed on page 6-26.

Comment 64

Comment noted; a revision has been placed on page 6-27.

Comment 65

Comment noted; a revision has been placed on page 6-28.

Comment 66

Comment noted; a revision has been placed on page 7-8.

Comment 67

Comment: The EIS should provide a clear accounting of the sources and flows which constitute the 1.8 MGD associated with the plan.

Commentor/s: Northeast Ohio Regional Sewer District

Response:

The 1.8 MGD flow associated with the recommended plan was developed using the Sewer System Evalution results generated by Frank A. Thomas & Associates, Inc.

The flows represent maximum flows from a 5-year, 1-hour storm event. The 1.8 MGD was compiled as follows:

Source	Monitor	Flow 5 yr/1 hr
Richmond Park Package Plant	RPA1	0.356 mgd
Scottish Highlands Package Plant	SH1	0.639 mgd
Scottish Highlands Package Plant	SH5	0.205 mgd
Richmond-White Pump Station	ES1	0.553 mgd
	TOTAL	1.753 mgd

This value was rounded to 1.8 mgd to account for flow from the airport which was not measured in the survey.

Comment 68

Comment noted; a revision has been placed on page 7-21.

Comment 69

Comment: The EIS should mention mineral resources in the project area.

Commentor/s: U.S. Department of the Interior

Response:
While mineral resources were not documented in detail, because the impacts on these resources are not expected to be significant, no additional data has been prepared for this Final EIS.

Comment 70

Comment: Numerous recreational sites in Cuyahoga and Lake Counties have been identified on computer bases. If any of these occur in the project area, they should be noted and any potential impacts identified.

Commentor/s: U.S. Department of the Interior

Response:
Two park sites not identified in the resource inventory of the Draft EIS were identified by the commentor. These have been added to the text; no impacts to these resoures are expected due to the project.

Comment 71

Comment noted: revisions have been placed on page 6-41 and on Figure 4-6.

Comment 72

Comment: Provide additional information to justify why loss of terrestrial habitat due to the project is not considered significant.

Commentor/s: U.S. Department of the Interior

Response:

It should first be noted that this comment applies to Alternative EIS-1, which was not the chosen alternative. Two references were used in preparing this EIS that contain specific information on types of terrestrial habitat within the construction easement of the cross country interceptor in EIS-1. "Hilltop Interceptor Review, Construction Effects" (Havens and Emerson 1986) and Ohio EPA's "Environmental Assessment" (OEPA 1985a). Based on similarities in language and organization of applicable sections of these reports, they appear to have been derived from a common source. Neither reference contains information on acreage of habitat types to be impacted or acreage of similar habitat outside the construction easement. Both references state that the loss of grassland, old field, brushland and brush forest habitats will either be replaced after construction (grassland), exist in significant quantity nearby (old field and brushland) or are not unique terrestrial resources (brush forest). This conclusion is supported by the fact that these habitat types result from ecological succession of abandoned fields used for farming, lumbering and grazing (Havens and Emerson 1986, OEPA 1985a) and thus were previously disturbed.

The discussion of wetlands in the Draft EIS (Section 6.1.7) states that if EIS-1 were the chosen alternative, 1.6 acres or 2.4% of the total area of palustrine forested wetland in the FPA (estimated at 68 acres) could be expected to be lost due to construction of interceptors. The stand of palustrine forested wetlands potentially affected by interceptor construction (see Figure 4-6) is part of the area's brush forest habitat. The brush forest habitat contains a "monoculture of red maple, no more than four inches in diameter at breast height" (OEPA 1985a). Red maples in the area are relatively young and abundant (Havens and Emerson 1986, OEPA 1985a). The conclusion that the loss of 1.6 acres of palustrine forested wetland in the construction easement is not significant is based on the assumption that the area in question is dominated by a relatively recent monoculture of red maple saplings and is, therefore, not unique.

Comment 73

Comment noted; a revision has been placed on page 4-47.

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CRSD. 1979b. Cleveland Regional Sewer District. Map: Easterly Separate Sewer Segment Wastewater Facilities Plan. Land Use Map - Figure V1-3-2. Prepared by: CH_2M Hill. August 1979.

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APPENDIX A

HILLTOP AREA PUBLIC ADVISORY COMMITTEE

HILLTOP AREA PUBLIC ADVISORY COMMITTEE

ECONOMIC INTERESTS

Joseph J. Singer 747 Alpha Drive Highland Heights, Ohio 44143	Engineer-Allen Bradley Co.
Paul Porges, General Manager Shoregate Mall - Suite 216 Willowick, Ohio 44094	Forest City (east side management)
Jack Wolfe Greater Cleveland Growth Assn. 690 Huntington Building Cleveland, Ohio 44115	Manager, Business Development
Julius Paris President Paris Development Corp. 781 Beta Drive Mayfield Heights, Ohio 44143	Area developer
Randy Kertes President Kertes Enterprises, Inc. 3439 W. Brainard Road Pepper Pike, Ohio 44122	Area developer
Jack Craig Cleveland Electric Illuminating Co. 6200 Oak Tree Blvd. Independence, Ohio 44131	Area Development Dept.
(Person to be designated) National Association of Women in Construction	
Gussie McCoy 12606 Mt. Overlook Cleveland, Ohio 44120	F.W. Dodge Co.

HILLTOP AREA PUBLIC ADVISORY COMMITTEE

PRIVATE CITIZENS

Mrs. Frank Hable 419 Cary Jay Blvd. Richmond Heights, Ohio 44143	Member S.O.L.E.; concerned citizen
Dennis Rash 823 Beech Hill Mayfield Village, Ohio 44143	School guidance counselor; lives within view of pump station
William S. Peirce 7000 Upper Forty Drive Box 154 Gates MIlls, Ohio 44040	Professor of Economics, CWRU; taught cost-benefit analyis for 20 years. Lives in Mayfield with a Gates Mills P.O. Box)
Maurice Gulich 5650 Highland Road Highland Heights, Ohio 44143	Concerned citizen with a knowledge of architecture and civil engineering
Dianne Brescia 4584 Catlin Road Richmond Heights, Ohio 44143	Teacher; member of Richmond Heights Environmental Board Phone:
John Croft 1895 Sunset Drive Richmond Heights, Ohio 44143	Retired plumber; concerned citizen
Richard T. Hyland, Sr. 1255 Argonne Road South Euclid, Ohio 44121	Retired CYO Athletic Director; member South Euclid Sewer Study Committee

Sam Babic 643 Trebisky Road South Euclid, Ohio 44143	Civil Engineer
Norman R. Prusa 826 Rose Blvd. Highland Heights, Ohio 44143	Attorney At Law Involved, peripherally, in the litigation which led to the formation of the District

HILLTOP AREA PUBLIC ADVISORY COMMITTEE

PUBLIC INTERESTS

Gabi W. Hays 1223 Julius Weil Drive Mayfield Village, Ohio 44124	Executive Director Schnurmann House (senior housing); Greater Cleveland Housing Council; National Council on Aging
Robert Parry 415 The Arcade Cleveland, Ohio 44114	Deputy Director, Regional Planning Commission
Joyce M. Laird 5252 Case Avenue Lyndhurst, Ohio 44124	President, Hillcrest Area League of Women Voters (studied environmental issues for LWV)
Karen Hiatt 1276 West 3rd Street Room 425 Cleveland, Ohio 44114	President, League of Women Voters, Cleveland Area (will alternate with Joyce Laird
Arnold Gleisser 5005 South Barton Road Lyndhurst, Ohio 44124	Hilltop Committee for Clean Creeks, Sierra Club, SOS (Save Our Streams); retired school teacher
Don Cummings 6602 Wilson Mills Road Mayfield Village, Ohio 44143	Senior Minister, Mayfield United Methodist Church Mayfield Village
Alfred Lee Museum of Natural History Wade Oval Cleveland, Ohio 44106	Associate Curator of Archeology Natural History Museum

Thury O'Conner Keel-Haulers Canoe Club 34300 Sherwood Drive Solon, Ohio 44139	Member of Keel-Haulers (canoe club)
Stephen D. Coles Cleveland Metroparks System 4101 Fulton Parkway Cleveland, Ohio 44144	Chief of Planning Dept. Metroparks
Robert Somrak Cuyahoga County Board of Health 112 Hamilton Avenue Cleveland, Ohio 44114	Supervisor of Environmental Health

HILLTOP AREA PUBLIC ADVISORY COMMITTEE

PUBLIC OFFICIALS

Robert J. McHugh 6620 Suffield Road Mayfield Heights, Ohio 44124	Zoning & Planning Chairman of Mayfield Heights
Mayor Melvin Schaefer 35405 Chardon Road Willoughby Hills, Ohio 44094	Mayor of Willoughby Hills
Dorothy Robertson 5268 Edenhurst Lyndhurst, Ohio 44124	Lyndhurst Council; Designated by Mayor Creary of Lyndhurst to be city representative
Mayor Fred N. Carmen 6621 Wilson Mills Road Mayfield Village, Ohio 44143	Mayor of Mayfield Village
Stephen J. Hovancsek 6621 Wilson Mills Road Mayfield Village, Ohio 44143	Engineer of Mayfield Village
Lawrence M. Baker 4096 Colony Road South Euclid, Ohio 44121	Attorney At Law; former councilman of South Euclid; co-chairman South Euclid Sewer Study Commission; Designated representative by South Euclid Mayor D'Amico
Mayor Thomas A. Hughes 5827 Highland Road Highland Heights, Ohio 44143	Mayor of Highland Heights

Mayor Robert J. Boyle 457 Richmond Road Richmond Heights, Ohio 44143	Mayor of Richmond Heights
John J. Garner Dept. of Community Services 6100 West Canal Road Valley View, Ohio 44125	Cuyahoga County Sanitary Engineer; Designated representative of Cuyahoga County Commissioners

HILLTOP AREA PUBLIC ADVISORY COMMITTEE

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Josephine Cordray
421 Cary Jay Blvd.
Richmond Hts., OH 44143

APPENDIX B

EIS DISTRIBUTION LIST TO PUBLIC GROUPS AND OFFICES

Federal Agencies

U.S. Department of Agriculture,
  Soil Conservation Service
U.S. Department of Commerce,
  National Oceanic and Atmospheric Administration
U.S. Department of Defense,
  Army Corps of Engineers
U.S. Department of Energy
U.S. Department of Housing and Urban Development
U.S. Department of Health and Human Services,
  Public Health Service
U.S. Department of the Interior,
  Fish and Wildlife Service
  National Park Service
  Bureau of Indian Affairs
  Geological Survey
U.S. Department of Labor
U.S. Department of Transportation
  Coast Guard
  Federal Highway Administration
Ohio Congressional Delegation,
  U.S. Senators
  U.S. Representatives

State of Ohio

Office of the Governor
Ohio Office of Management and Budget
State Clearinghouse
Ohio Environmental Protection Agency
Ohio Department of Natural Resources
Ohio Department of Public Health
Ohio Department of Transportation
Ohio Department of Justice
Ohio Department of Economic and Commercial Development
Ohio Department of Energy
Ohio Water Development Authority
Ohio Department of Agriculture
Ohio Federation of Soil and Water Conservation Districts
Ohio Historic Preservation Office
Ohio Attorney General
Ohio Department of Parks and Recreation

Local

City of Beachwood
City of Bedford Heights
City of Brecksville
City of Brook Park
City of Chagrin Falls
City of Cleveland
City of Cleveland Heights
City of East Cleveland

City of Euclid
City of Garfield Heights
City of Glenwillow
City of Highland Heights
City of Independence
City of Kirtland
City of Lyndhurst
City of Maple Heights
City of Mayfield Heights
City of Middleburg Heights
City of North Olmsted
City of North Royalton
City of Olmsted Falls
City of Parma
City of Richmond Heights
City of Shaker Heights
City of Solon
City of South Euclid
City of University Heights
City of Warrensville Heights
Cleveland Metroparks
Cuyahoga County
Cuyahoga County Board of Health
Cuyahoga County Public Library
Cuyahoga County Regional Planning Commission
Gates Mills
Geauga County
Great Lakes Commission
Northeast Ohio Area Coordination Agency
Northeast Ohio Regional Sewer District
Olmsted Township
Suburban Council of Mayors
Town of Mayfield Village
Town of North Randall
Town of Valley View
Village of Cuyahoga Heights
Village of Glenwillow
Village of Oakwood
Village of Walton Hills

Public Interest Groups

American Association of University Women Great Lakes Basin
  Task Force
Archaeological Society of Ohio
Audubon Society of Ohio
Better Environment for Everyone
Citizens for a Better Environment
Citizens for Clean Air and Water
Citizens for Land, Air, and Water Use
Cleveland Audubon Society
Environmental Clearinghouse, Inc.
Environmental Defense Fund
Environmental Studies Center

Greater Cleveland Growth Association
Hilltop Area Public Advisory Committee
Izaak Walton League
League of Ohio Sportsmen
League of Women Voters of Ohio
Natural Wildlife Federation
Nature Conservancy of Ohio
Ohio Academy of Sciences
Ohio Air Quality Development Authority
Ohio Biological Survey
Ohio Chamber of Commerce
Ohio Conservation Foundation
Ohio Conservation Fund
Ohio Electric Utility Institute
Ohio Environmental Council
Ohio Environmental Health Association
Ohio League of Conservation Voters
Ohio Lung Association
Ohio Municipal League
Ohio Natural Areas Council
Ohio State University, College of Biological Sciences
Ohio Natural Heritage Program
Ohio Sierra Club
Ohio Soil and Water Conservation Commission
Ohio Water Pollution Control Conference
Ohio Water Resources Center
Shaker Lakes Regional Nature Center
Students for Environmental Action
Trust for Public Lands
United Area Citizens Agency
Water Pollution Control Federation
Water Resources Council
Wildlife Legislative Fund

Interested Citizens

Complete list available upon request.

APPENDIX C

PACKAGE PLANT DATA

Monthly Summary Data

RICHMOND PARK PACKAGE PLANT
MONTHLY SUMMARY DATA

		Flow (mgd)	D.O. (mg/l)	BOD5 (mg/l)	SS (mg/l)	Fecal Coliform (#/100 ml)
1985	November	0.134	5.7	4.8	8.3	--
	December	0.140	6.5	6.0	15.7	--
1986	January	0.140	6.0	5.8	13.0	--
	February	0.145	5.6	20.8	20.8	--
	March	0.133	5.5	1.8	6.3	--
	April	0.131	5.5	3.0	10.5	--
	May	0.130	5.6	7.5	14.8	2.0
	June	0.127	6.2	9.0	7.5	17.3
	July	0.139	5.8	5.3	7.0	424.7
	August	0.119	6.0	7.6	5.4	62.3
	September	0.130	6.5	8.5	10.5	4205.1
	October	0.127	5.2	7.4	10.1	--
	AVERAGE	0.133	5.8	7.3	10.8	942.3
	NPDES LIMIT (30 day average)	--	5.0	10	12	200

SOURCE: OEPA 1986a

SCOTTISH HIGHLANDS PACKAGE PLANT
MONTHLY SUMMARY DATA

	Flow (mgd)	D.O. (mg/l)	BOD5 (mg/l)	SS ((mg/l)	Fecal Coliform (#/100 ml)
1985 November	0.138	5.6	1.5	2.8	--
December	0.105	5.7	2.7	5.7	--
1986 January	--	5.7	11.3	12.8	--
February	--	5.5	18.5	19.3	--
March	0.098	5.5	7.0	9.3	--
April	0.096	5.5	5.3	5.0	--
May	0.130	5.5	6.3	7.0	7.1
June	0.129	5.0	10.0	5.0	388.3
July	--	5.2	8.3	6.3	199.0
August	0.107	5.1	6.6	7.6	23.6
September	0.128	--	29.3	88.1	957.2
October	0.131	5.1	5.9	11.4	249.0
AVERAGE	0.118	5.4	9.4	15.0	304.0
NPDES LIMIT (30 day average)	--	5.0	10	12	200

SOURCE: OEPA 1986a

HICKORY HILLS PACKAGE PLANT
MONTHLY SUMMARY DATA

	Flow (mgd)	D.O. (mg/l)	BOD5 (mg/l)	SS (mg/l)	Fecal Coliform (#/100 ml)
1985 November	0.048	5.6	8.0	10.0	--
December	0.034	5.7	7.0	14.3	--
1986 January	0.036	5.5	21.0	22.5	--
February	0.036	5.6	8.7	15.7	--
March	0.033	5.7	8.8	10.0	--
April	0.028	5.5	9.5	5.5	--
May	0.029	5.5	14.8	5.5	0
June	0.027	5.0	8.8	6.5	23.7
July	0.028	6.3	8.0	6.2	87.9
August	0.022	7.1	14.3	7.5	11.0
September	0.027	6.9	34.0	145.5	6102.9
October	0.029	5.8	19.6	16.6	--
AVERAGE	0.031	5.8	13.5	22.2	1245.1
NPDES LIMIT (30 day average)	--	5.0	10	12	200

SOURCE: OEPA 1986a

SLEEPY HOLLOW PACKAGE PLANT
MONTHLY SUMMARY DATA

		Flow (gpd)	D.O. (mg/l)	BOD5 (mg/l)	SS (mg/l)	Fecal Coliform (#/100 ml)
1985	November	12,907	--	22.0	31.0	--
	December	9,093	--	11.0	6.0	--
1986	January	10,727	--	24.0	24.5	--
	February	12,158	--	33.0	33.5	--
	March	12,000	--	25.0	17.5	--
	April	10,016	--	12.0	5.0	--
	May	11,083	--	12.5	13.0	--
	June	11,613	--	11.0	5.0	--
	July	10,159	--	8.0	13.5	--
	August	8,514	--	4.5	11.5	--
	September	13,102	--	10.0	13.5	--
	October	11,862	--	21.0	16.5	--
	AVERAGE	11,103	--	16.2	15.9	--
	NPDES LIMIT (30 day average)	--	--	10	12	1,000

SOURCE: OEPA 1986a

PLEASANT HILL PACKAGE PLANT
MONTHLY SUMMARY DATA

		Flow (mgd)	D.O. (mg/l)	BOD5 (mg/l)	SS (mg/l)	Fecal Coliform (#/100 ml)
1985	November	--	--	--	--	--
	December	--	--	--	--	--
1986	January	0.050	--	28	27	--
	February	0.046	--	21	23	--
	March	0.052	--	108	60	--
	April	0.049	--	27	20	--
	May	0.042	--	68	39	--
	June	0.040	--	16	8	--
	July	--	--	6	6	--
	August	0.045	--	--	8	--
	September	0.043	--	--	11	--
	October	0.043	--	6	9	--
	AVERAGE	0.046	--	35.0	21.1	--
	NPDES LIMIT	--	--	--	--	--

SOURCE: OEPA 1986a

APPENDIX D

COST ANALYSIS OF ENVIRONMENTAL ASSESSMENT ALTERNATIVES

Environmental Assessment Alternatives

ALTERNATIVE 1
(ENVIRONMENTAL ASSESSMENT)

SEGMENT/ITEM	METHOD	SIZE	LENGTH	CAPITAL COST (MILLIONS $)
Contract 4	tunnel	102 in.	5,800 ft.	10.69
	tunnel	66 in.	5,500 ft.	7.51
Contract 5	open cut	48 in.	1,600 ft.	
	tunnel	60 in.	12,100 ft.	
				16.16
Contract G	tunnel	66 in.	1,600 ft.	
	open cut	60 in.	8,000 ft.	
				7.38
Contract F				
Swetland Blvd. to Highland Rd. along Richmond Rd.	open cut	54 in.	3,800 ft.	2.44
	open cut	42 in.	3,000 ft.	1.69
Richmond Rd. to Meadowlane Dr. along Highland Rd.	open cut	30 in.	2,200 ft.	0.70
Highland Rd. to Wilson Mills Pump Station along Meadowlane Dr.	open cut	30 in.	6,700 ft.	2.15
Meadowland Dr. to Williamsburg Pump Station along Highland Rd.	open cut	21 in.	2,900 ft.	0.78
	open cut	18 in.	1,130 ft.	0.28
	open cut	15 in.	1,100 ft.	0.23
Richmond Rd. to Bishop Rd. through County Airport	open cut	48 in.	5,800 ft.	2.70
Bishop Rd. to SOM Center Rd. along County Line and White Rd.	open cut	48 in.	11,400 ft.	5.29
	tunnel	48 in.	400 ft.	0.61
White Rd. to Highland Rd. along SOM Center Rd.	open cut	48 in.	6,400 ft.	2.98

ALTERNATIVE 1 (CONT.)
(ENVIRONMENTAL ASSESSMENT)

Contract F				
Highland Rd. to Beech Hill Pump Station along SOM Center Rd., Thornapple Dr., and Oakwood Dr.	open cut	48 in.	6,700 ft.	4.06
Richmond Park Package Plant elimination	open cut	12 in.	2,000 ft.	0.22
Scottish Highlands Package Plant elimination	Pump station and 4,500 ft. of 12 in. Force Main	--	--	1.48
Hickory Hill Package Plant elimination	Pump station and 2,500 ft. of 8 in. Force Main	--	--	0.79
Contract H	open cut	42 in.	6,300 ft.	3.54
Airport Storage Basin	--	0.75 million gallons	--	2.54
Local sewers	open cut	--	--	10.90
Small pump station improvements	--	--	--	0.42
TOTAL				$85.54

ANNUAL O&M	COST
Sewer maintenance	$ 60,000
Basin maintenance	8,800
Power	45,000
TOTAL	$113,800

PRESENT WORTH	
PW Capital	$84,213,200
PW O&M	1,257,290
PW Salvage	9,305,680
NET PW	$76,164,810

Source: OEPA 1985a

ALTERNATIVE 2 PRESENT WORTH
(ENVIRONMENTAL ASSESSMENT)

SEGMENT/ITEM	METHOD	SIZE	LENGTH	CAPITAL COST (MILLIONS $)
Contract 4	tunnel	102 in.	5,800 ft.	10.64
Contract G	tunnel open cut	78 in. 66 in.	1,600 ft. 8,000 ft.	3.52 6.00
Green Rd to Richmond Rd along Monticello Blvd.	open cut	24 in. to 60 in.	9,616 ft.	3.49
Euclid Creek	aerial	twin 54 in.	400 ft.	1.05
Wilson Mills Pump Station	--	24.2 mgd	--	4.48
Wilson Mills Force Main	open cut	twin 24 in.	2,000 ft.	0.95
Beech Hill Pump Station	--	11.6 mgd	--	3.19
Beech Hill Force Main	open cut	twin 18 in.	8,900 ft.	3.43
Bonnieview improvements	--	--	--	0.39
Richmond Rd./White Rd. Pump Station	--	12.9 mgd	--	3.16
Richmond Rd./White Rd. Force Main	open cut	twin 18 in.	13,400 ft.	5.17
Wilson Mills Rd. to Anderson Rd. along Richmond Rd.	open cut	42 in.	1,300 ft.	0.73
Green Rd. Storage Basin size increase Basin	--	0.18 million gal.	--	0.69
Pump station Force main	-- open cut	0.4 mgd 12 in.	-- 1,000 ft.	0.61 0.20
Local Sewers	open cut	--	--	17.90
Small pump station improvements	--	--	--	0.37
TOTAL				$66.02

ALTERNATIVE 2 PRESENT WORTH (CONT.)
(ENVIRONMENTAL ASSESSMENT)

ANNUAL O&M	COST
Sewer & Force Main Maintenance	$ 35,000
Pump Station Costs	
Power	175,000
Labor	420,000
Miscellaneous	30,000
TOTAL	$634,840

PRESENT WORTH	
PW Capital	$65,046,855
PW O&M	6,941,565
PW Salvage	5,961,900
NET PW	$66,026,520

Source: OEPA 1985a

ALTERNATIVE 3 PRESENT WORTH
(ENVIRONMENTAL ASSESSMENT)

SEGMENT/ITEM	METHOD	SIZE	LENGTH	CAPITAL COST (MILLIONS $)
Contract 4	tunnel	102 in.	5,800 ft.	10.69
Contract G	tunnel	78 in.	1,600 ft.	3.52
	open cut	66 in.	8,000 ft.	6.00
Green Rd. to Wilson Mills Tunnel along Monticello Blvd.	open cut	42 in. to 60 in.	5,844 ft.	2.30
Euclid Creek Crossing	aerial	twin 54 in.	400 ft.	1.05
West of Richmond Rd. to Wilson Mills Pump Station along Wilson Mills Rd.	tunnel	60 in.	6,130 ft.	9.47
Beech Hill Pump Station	--	11.6 mgd	--	3.19
Beech Hill Force Main	open cut	twin 18 in.	8,900 ft.	3.43
Bonnieview improvements	--	--	--	0.39
Richmond Rd./White Rd. Pump Station	--	12.9 mgd	--	3.16
Richmond Rd./White Rd. Force Main	open cut	twin 18 in.	13,400 ft.	5.17
Wilson Mills Rd. to Anderson Rd. along Richmond Rd.	open cut	42 in.	1,300 ft.	0.73
Green Rd. Storage Basin size increase		0.2 million gallons		
Pump station	--	0.4 mgd	--	0.61

ALTERNATIVE 3 (CONT.)
(ENVIRONMENTAL ASSESSMENT)

SEGMENT/ITEM	METHOD	SIZE	LENGTH	CAPITAL COST (MILLIONS $)
Force Main	open cut	12 in.	1,000 ft.	0.20
Local Sewers	open cut	--	--	17.90
Small pump station	--	--	--	0.37
TOTAL				$68.94

ANNUAL O&M	COST
Sewer & force main maintenance	$ 45,000
Pump station costs	
Power	160,000
Labor	300,000
Miscellaneous	15,000
TOTAL	$520,000

PRESENT WORTH	
PW Capital	$68,350,450
PW O&M	5,884,400
PW Salvage	6,764,880
NET PW	$67,469,975

Source: OEPA 1985a

ALTERNATIVE 4 PRESENT WORTH
(ENVIRONMENTAL ASSESSMENT)

SEGMENT/ITEM	METHOD	SIZE	LENGTH	CAPITAL COST (MILLIONS $)
Contract 4	tunnel	102 in.	5,800 ft.	10.69
	tunnel	66 in.	5,500 ft.	7.51
Contract 5	open cut	48 in.	1,600 ft.	1.27
	tunnel	60 in.	12,100 ft.	14.89
Contract G	tunnel	66 in.	1,600 ft.	2.03
	open cut	60 in.	8,000 ft.	5.35
Contract F				
Swetland Rd. to Highland Rd. along	open cut	54 in.	3,800 ft.	2.44
Richmond Rd.	open cut	42 in.	3,000 ft.	1.69
Richmond Rd. to Meadowlane Dr. along Highland Rd.	open cut	30 in.	2,200 ft.	0.70
Highland Rd. to Wilson Mills Pump Station along Meadowlane Dr.	open cut	30 in.	6,700 ft.	2.15
Meadowlane Dr. to	open cut	21 in.	2,400	0.78
Williamsburg Pump	open cut	18 in.	1,130	0.28
Station along Highland Rd.	open cut	15 in.	1,000	0.23
Contract H				
Airport Storage Basin	--	0.30 million gallons	--	1.15
Local sewers	open cut	--	--	16.15
Small pump station improvements	--	--	--	0.37
TOTAL				$77.84

ALTERNATIVE 4 (CONT.)
(ENVIRONMENTAL ASSESSMENT)

Annual O&M	Cost
Sewer and force main maintenance	77,440
Pump station costs	
Power	83,500
Labor	93,800
Miscellaneous	5,000
TOTAL	$259,740

PRESENT WORTH	
Capital PW	$76,424,345
O&M PW	2,638,700
Salvage PW	7,995,595
NET PW	$70,427,565

Source: OEPA 1985a

APPENDIX E

OHIO WATER QUALITY STANDARDS AND ANTIDEGRADATION POLICY

3745-1-04 CRITERIA APPLICABLE TO ALL WATERS.

The following general water quality criteria shall apply to all surface waters of the State including mixing zones. To every extent practical and possible as determined by the Director, these waters shall be:

(A) Free from suspended solids or other substances that enter the waters as a result of human activity and that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life.

(B) Free from floating debris, oil, scum and other floating materials entering the waters as a result of human activity in amounts sufficient to be unsightly or cause degradation;

(C) Free from materials entering the waters as a result of human activity producing color, odor or other conditions in such a degree as to create a nuisance;

(D) Free from substances entering the waters as a result of human activity in concentrations that are toxic or harmful to human, animal or aquatic life and/or are rapidly lethal in the mixing zone;

(E) Free from nutrients entering the waters as a result of human activity in concentrations that create nuisance growths of aquatic weeds and algae.

Effective: April 4, 1985
Promulgated under: RC Chapter 119
Rule amplifies: RC Section 6111.041
Prior effective date: 2/14/78

3745-1-05 ANTIDEGRADATION POLICY.

(A) Existing instream water uses as defined in Rule 3745-1-07 of the Administrative Code and designated in Rules 3745-1-08 to 3745-1-32 of the Administrative Code, shall be maintained and protected. No further water quality degradation which would interfere with or become injurious to existing designated uses is allowable.

(B) Waters in which existing water quality is better than the criteria prescribed in these rules and exceeds those levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water shall be maintained and protected. However, the Director of Ohio Environmental Protection Agency may, after compliance with public notice and intergovernmental coordination requirements listed at 40 CFR Part 25 and Part 29, and after due consideration of such technical, economic, social and other criteria as provided by Sections 301 and 302 of the Act, 33 U.S.C. Sections 1311 and 1312, choose to allow lower water quality. Degradation of water quality shall not interfere with or become injurious to existing or planned uses, and the Director shall require that the most stringent statutory and regulatory controls for waste treatment be employed by all new and existing point sources, and that feasible management or regulatory programs pursuant to Sections 208 and 303 of the Act, 33 U.S.C. Sections 1288 and 1313, be applied to nonpoint sources.

(C) "State Resource Waters" are surface waters of the State that lie within National, State and Metropolitan park systems, wetlands, and wildlife refuges, areas, and preserves, and also include wild, scenic and recreational rivers, publicly owned lakes and reservoirs and waters of exceptional recreational or ecological significance (e.g., waters which provide a habitat for identified threatened or endangered species) as determined by the Director of Ohio Environmental Protection Agency. Present ambient water quality in State Resource Waters will not be degraded for all substances determined to be toxic or to interfere with any designated use as determined by the Director of Ohio Environmental Protection Agency. All other substances shall be limited to the criteria associated with each designated use, as outlined in Rules 3745-1-07 to 3745-1-32 of the Administrative Code. Areas that do not meet general water quality standards as defined in Rules 3745-1-07 to 3745-1-32 of the Administrative Code shall not be degraded as stated above for all such classified areas.

Effective: April 4, 1985
Promulgated under: RC Chapter 119
Rule amplifies: RC Section 6111.041
Prior effective date: 2/14/78

3745-1-07 WATER USE DESIGNATIONS AND CRITERIA.

Water Quality Standards consist of two parts: designated uses and numerical or narrative criteria designed to protect the uses. Each water body in the State is assigned one or more aquatic life habitat use designations or the Nuisance Prevention use designation. Each water body may be assigned one or more water supply use designations and/or one recreational use designation. In addition, a water body may be designated as a State Resource Water as described in the antidegradation policy (Rule 3745-1-05 of the Administrative Code). Criteria for the support of use designations are presented in Tables 2 through 11 to this Rule. Streams are assigned use designations in Rules 3745-1-08 to 3745-1-30 of the Administrative Code. The most stringent criteria associated with any one of the use designations assigned to a water body will apply to that water body. These criteria will be met outside the mixing zone. Use designations are defined as follows:

(A) Aquatic Life Habitat

(1) "Warmwater" - these are waters capable of supporting balanced reproducing populations of warmwater fish and associated vertebrate and invertebrate organisms and plants on an annual basis.

(2) "Limited Warmwater" - these are waters incapable of meeting specific Warmwater Habitat criteria necessary for the support of populations of fish and associated vertebrate and invertebrate organisms and plants either on a seasonal or year-round basis due to natural conditions, irretrievable, man-induced conditions or the demonstration that meeting the criteria would cause substantial and widespread economic and social impact. Criteria for the support of this use designation will be the same as the criteria for the support of the use designation Warmwater Habitat. However, individual criteria will be varied on a case-by-case basis and will supersede the criteria for Warmwater Habitat where applicable. Any exceptions from Warmwater Habitat criteria will apply only to specific criteria during specified time periods and/or flow conditions. Mine drainage streams, i.e., those streams currently degraded by mine drainage primarily resulting from inactive surface and underground mining operations and associated refuse piles, may be exempt from one or more of the following criteria: pH, total dissolved solids, iron, zinc. Allowable stream concentrations for these exempted parameters will vary depending upon the condition of the inactive mines in that area. The Limited Warmwater Habitat use designation must be recommended in a written report approved by the Director. All stream segments designated Limited Warmwater Habitat will be reviewed on a triennial basis (or sooner) to determine whether the use designation should be changed.

(3) "Exceptional Warmwater" - these are waters capable of supporting exceptional or unusual populations of warmwater fish and associated vertebrate and invertebrate organisms and plants on an annual basis. These will include waters of exceptional chemical quality that support sensitive species of warmwater fish, exceptionally diverse aquatic communities, and/or outstanding recreational or commercial fisheries. In addition to those stream segments designated in Rules 3745-1-08 to 3745-1-30 of the Administrative Code, all publicly owned lakes and reservoirs, except upground storage reservoirs, are designated Exceptional Warmwater Habitats.

(4) "Seasonal Salmonid" - these are waters capable of supporting the passage of salmonids from October through May and are water bodies large enough to support recreational fishing. This use will be in effect the months of October through May. Another aquatic life habitat use designation will be enforced the remainder of the year (June through September).

(5) "Coldwater" - these are waters capable of supporting populations of coldwater fish and associated vertebrate and invertebrate organisms and plants on an annual basis. These waters are not necessarily capable of supporting successful reproduction of salmonids and may be periodically stocked with these species.

(B) Nuisance Prevention

These waters include acid mine drainage streams where the fauna is substantially degraded and other heavily polluted stream segments where the fauna is degraded and the potential aquatic life use is not being attained due to irretrievable, man-induced conditions or the demonstration that meeting criteria for the support of a balanced aquatic community would cause substantial and widespread economic and social impact. This designation must be recommended in a written report approved by the Director. All stream segments designated Nuisance Prevention will be reviewed on a triennial basis (or sooner) to determine whether the use designation should be changed. The Nuisance Prevention criteria represent the minimum water quality to be met in all surface waters of the State outside the mixing zone.

(C) Water Supply

(1) "Public" - these are waters that, with conventional treatment, will be suitable for human intake and meet Federal regulations for drinking water. Although not included in Rules 3745-1-08 to 3745-1-30 of the Administrative Code, the bodies of water with the following characteristics are designated Public Water Supply:

(a) All publicly owned lakes and reservoirs, with the exception of Piedmont reservoir;

Table 2

Numerical and narrative criteria for Aquatic Life Habitat, Nuisance Prevention and Water Supply use designations. All values are expressed as total concentration unless specified otherwise. Concentrations are not to be exceeded unless noted differently.

		Use Designations						
		Aquatic Life Habitat					Water Supply	
Parameter	Units	Warmwater	Exceptional Warmwater	Seasonal Salmonid [a]	Coldwater	Nuisance Prevention	Public	Agricultural
~~Ammonia-N~~								
Maximum	mg/l	---	---	---	---	Table 6	b	b
30-day avg.	mg/l	Table 4	Table 4	d	Table 5	---	b	b
Arsenic (Total Recoverable)								
Maximum	ug/l	---	---	---	---	116	50	100
30-day avg.	ug/l	36	36	36	36	---	b	b
Barium (Total Recoverable)								
Maximum	mg/l	---	---	---	---	---	1.0	---
30-day avg.	---	---	---	---	---	---	---	---
Beryllium (Total Recoverable)								
Maximum	ug/l	---	---	---	---	Table 8	b	100
30-day avg.	ug/l	Table 7	Table 7	d	Table 7	---	b	b
Cadmium (Total Recoverable)								
Maximum	ug/l	---	---	---	---	Table 8	10	50
30-day avg.	ug/l	Table 7	Table 7	d	Table 7	---	b	b
Chlorides								
Maximum	mg/l	---	---	---	---	---	250	---
30-day avg.	---	---	---	---	---	---	---	---
Chlorine (Total Residual)								
Maximum	---	---	---	---	---	---	---	---
30-day avg.	ug/l	2	2	c	2	---	b	b
Total Chromium (Total Recoverable)								
Maximum	ug/l	---	---	---	---	---	50	100
30-day avg.	---	---	---	---	---	---	---	---
Hexavalent Chromium (Total Recoverable)								
Maximum	ug/l	---	---	---	---	19	b	b
30-day avg.	ug/l	10	10	10	10	---	b	b
Trivalent Chromium (Total Recoverable)								
Maximum	ug/l	---	---	---	---	Table 8	b	b
30-day avg	ug/l	Table 7	Table 7	d	Table 7	---	b	b

Table 2 continued

Numerical and narrative criteria for Aquatic Life Habitat, Nuisance Prevention and Water Supply use designations. All values are expressed as total concentration unless specified otherwise. Concentrations are not to be exceeded unless noted differently.

Parameter	Units	Use Designations: Aquatic Life Habitat: Warmwater	Aquatic Life Habitat: Exceptional Warmwater	Aquatic Life Habitat: Seasonal Salmonid[a]	Aquatic Life Habitat: Coldwater	Nuisance Prevention	Water Supply: Public	Water Supply: Agricultural
Copper (Total Recoverable)								
Maximum	ug/l	---	---	---	---	Table 8	1000	500
30-day avg	ug/l	Table 7	Table 7	d	Table 7	---	b	b
Cyanide (Free)								
Maximum	ug/l	---	---	---	---	38	b	b
30-day avg.	ug/l	8.1	8.1	8.1	4.2	---	b	b
Dissolved Oxygen								
Minimum at any time	mg/l	4.0	6.0	d	6.0	2.0	b	b
Minimum 24-hour avg.	mg/l	5.0	---	d	---	3.0	b	b
Dissolved Solids								
Maximum	---	---	---	---	---	---	750[f]	---
30-day avg.	mg/l	1500[e]	1500[e]	1500[e]	1500[e]	---	500[f]	b
Fluoride								
Maximum	mg/l	---	---	---	---	---	1.8	2.0
30-day avg.	---	---	---	---	---	---	---	---
Iron (Total Recoverable)								
Maximum	mg/l	---	---	---	---	---	---	5.0
30-day avg	mg/l	1.0	1.0	1.0	1.0	---	b	---
Iron (Soluble)								
Maximum	mg/l	---	---	---	---	---	0.3	---
30-day avg.	---	---	---	---	---	---	---	---
Lead (Total Recoverable)								
Maximum	ug/l	---	---	---	---	---	50	5000
30-day avg	ug/l	30	30	30	30	---	---	---
Manganese (Total Recoverable)								
Maximum	ug/l	---	--	---	---	---	50	---
30-day avg.	- -	---	---	---	---	---	---	---
MBAS (Foaming Agents)								
Maximum	mg/l	0 50	0.50	0 50	0.50	0.50	b	b
30-day avg.	---	---	---	---	---	---	---	---

Table 2 continued

Numerical and narrative criteria for Aquatic Life Habitat, Nuisance Prevention and Water Supply use designations. All values are expressed as total concentration unless specified otherwise. Concentrations are not to be exceeded unless noted differently.

Parameter	Units	Use Designations: Aquatic Life Habitat: Warmwater	Aquatic Life Habitat: Exceptional Warmwater	Aquatic Life Habitat: Seasonal Salmonid[a]	Aquatic Life Habitat: Coldwater	Nuisance Prevention	Water Supply: Public	Water Supply: Agricultural
Mercury (Total Recoverable)								
Maximum	ug/l	---	---	---	---	2.2	2.0	10
30-day avg.	ug/l	0.2	0.2	0.2	0.2	---	b	b
Nickel (Total Recoverable)								
Maximum	ug/l	---	---	---	---	Table 8	b	200
30-day avg.	ug/l	Table 7	Table 7	d	Table 7	---	b	b
Nitrate-N								
Maximum	mg/l	---	---	---	---	---	10	---
30-day avg.	---	---	---	---	---	---	---	---
Nitrates + Nitrites								
Maximum	mg/l	---	---	---	---	---	---	100
30-day avg.	---	---	---	---	---	---	---	---
Oil & Grease	---	g	g	g	g	g	b	b
Pesticides								
Maximum	ug/l	---	---	---	---	---	Table 9	---
30-day avg.	ug/l	Table 9	Table 9	d	Table 9	---	---	b
pH	---	6.5-9.0	h	d	h	6.5-9.0[i]	b	b
Phenolic Compounds								
Maximum	ug/l	---	---	---	---	j	1	b
30-day avg	ug/l	10	1	d	1	---	b	b
Phosphorus	---	k	k	k	k	k	k	b
Phthalate Esters								
Maximum	---	---	---	---	---	---	---	---
30-day avg.	ug/l	3	3	3	3	---	b	b
Polychlorinated Biphenyls								
Maximum	ug/l	0.001[m]	0.001[m]	0.001[m]	0.001[m]	0.001[m]	0	b
30-day avg.	---	---	---	---	---	---	---	---
Selenium (Total Recoverable)								
Maximum	ug/l	---	---	---	---	120	10	50
30-day avg.	ug/l	34	34	34	34	---	b	b

Table 2 continued

Numerical and narrative criteria for Aquatic Life Habitat, Nuisance Prevention and Water Supply use designations. All values are expressed as total concentration unless specified otherwise. Concentrations are not to be exceeded unless noted differently

Parameter	Units	Aquatic Life Habitat				Nuisance Prevention	Water Supply	
		Warmwater	Exceptional Warmwater	Seasonal Salmonid[a]	Coldwater		Public	Agricultural
Silver (Total Recoverable)								
Maximum	ug/l	---	---	---	---	Table 8	50	b
30-day avg	ug/l	1.3	1.3	1.3	0.06	---	b	b
Sulfates								
Maximum	mg/l	---	---	---	---	---	250	---
30-day avg	---	---	---	---	---	---	---	---
Temperature								
Maximum	°F (°C)	Table 10	n	d	n	98 (37)	b	b
30-day avg.	°F (°C)	Table 10	n	d	n	94 (34)	b	b
Toxic Substances	---	p	p	p	p	q	b	b
Zinc (Total Recoverable)								
Maximum	ug/l	---	---	---	---	Table 8	5000	25000
30-day avg.	ug/l	Table 7	Table 7	d	Table 7	---	---	---

Table 2 continued

[a] This aquatic life habitat use designation is in effect only during the months of October through May.

[b] This criterion is determined by the Aquatic Life Habitat or the Nuisance Prevention use designation assigned to the stream segment.

[c] No chlorine is to be discharged.

[d] This criterion is the same as that for the use designation in effect June through September.

[e] Equivalent 25°C specific conductance value is 2400 micromhos/cm.

[f] Equivalent 25°C specific conductance values are 1200 micromhos/cm as a maximum and 800 micromhos/cm as a 30-day average.

[g] Concentrations of the water soluble components of oil and grease shall not violate the toxic substances criterion. Surface waters shall be free from floating oils and shall at no time produce a visible sheen or color film. Levels of oils or petrochemicals in the sediment or on the banks of a watercourse which cause deleterious effects to the biota will not be permitted. At no time will chlorofluorocarbon extractable materials in water exceed 10 mg/l.

[h] pH is to be 6.5-9.0, with no change within that range attributable to man-induced conditions.

[i] Acid mine drainage streams over sandstone geotype are exempt from the pH criterion.

[j] A criterion for the specific phenolic compound being discharged will be determined on a case-by-case basis.

[k] Total phosphorus as P shall be limited to the extent necessary to prevent nuisance growths of algae, weeds, and slimes that result in a violation of the water quality criteria set forth in Chapter 3745-1-04 (E) of the Ohio Administrative Code or, for public water supplies, that result in taste or odor problems. In areas where such nuisance growths exist, phosphorus discharges from point sources determined significant by the Ohio Environmental Protection Agency shall not exceed a daily average of one milligram per liter as total P, or such stricter requirements as may be imposed by the Ohio environmental protection agency in accordance with the International Joint Commission (United States-Canada agreement).

[m] Any whole sample of any representative aquatic organisms shall not exceed 0.64 mg/kg (wet weight).

[n] At no time shall the water temperature exceed the temperature which would occur if there were no temperature change attributable to man's activities.

Table 2 continued

p (1) All pollutants or combinations of pollutants, not specifically mentioned in Rule 3745-1-07 of the Ohio Administrative Code, shall not exceed water quality criteria derived according to the procedures set forth in "Draft Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Life and Its Uses," United States Environmental Protection Agency, July 5, 1983 or, if insufficient data prevent the use of this procedure, shall not exceed, at any time, 1/10 or, for pollutants or combinations of pollutants which are known to be persistent toxicants in the aquatic environment, 1/100 of the 96-hour median tolerance limit (TLm) or LC_{50} for any representative aquatic species. However, more stringent application factors shall be imposed where justified by: "Ambient Water Quality Criteria" documents, United States Environmental Protection Agency, 1980; "Quality Criteria for Water," United States Environmental Protection Agency, 1976; "Water Quality Criteria 1972," National Academy of Sciences and National Academy of Engineering, 1973; or other scientifically based publications.

(2) The median tolerance limit (TLm) or LC_{50} shall be determined by static or dynamic bioassays performed in accordance with methods outlined in "Standard Methods for the Examination of Water and Wastewater," 15th edition, American Public Health Association, American Water Works Association and the Water Pollution Control Federation, 1981; or performed in accordance with procedures outlined in "Methods of Acute Toxicity Tests with Fish, Macroinvertebrates and Amphibians," United States Environmental Protection Agency 660/3-75-009; or performed in accordance with procedures outlined in the "Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices," revised June, 1983. Tests will be conducted using actual effluent, receiving water and representative aquatic species whenever possible.

Table 2 continued

q (1) All pollutants or combinations of pollutants, not specifically mentioned in Rule 3745-1-07 of the Ohio Administrative Code, shall not exceed water quality maximum criteria derived according to the procedures set forth in "Draft Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Life and Its Uses," United States Environmental Protection Agency, July 5, 1983 or, if insufficient data prevent the use of this procedure, shall not exceed, at any time, the 96-hour median tolerance limit (TLm) or LC_{50} for any representative aquatic species. However, more stringent application factors shall be imposed where justified by: "Ambient Water Quality Criteria" documents, United States Environmental Protection Agency, 1980; "Quality Criteria for Water," United States Environmental Protection Agency, 1976; "Water Quality Criteria 1972," National Academy of Sciences and National Academy of Engineering, 1973; or other scientifically based publications.

(2) The median tolerance limit (TLm) or LC_{50} shall be determined by static or dynamic bioassays performed in accordance with methods outlined in "Standard Methods for the Examination of Water and Wastewater," 15th edition, American Public Health Association, American Water Works Association and the Water Pollution Control Federation, 1981; or performed in accordance with procedures outlined in "Methods of Acute Toxicity Tests with Fish, Macroinvertebrates and Amphibians," United States Environmental Protection Agency 660/3-75-009; or performed in accordance with procedures outlined in the "Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices," revised June, 1983. Tests will be conducted using actual effluent, receiving water and representative aquatic species whenever possible.

Table 3

Numerical and narrative criteria for Recreational Use Designations

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BATHING WATERS

Fecal coliform - geometric mean fecal coliform content (either MPN or MF), based on not less than 5 samples within a 30-day period shall not exceed 200 per 100 ml and shall not exceed 400 per 100 ml in more than 10 per cent of the samples taken during any 30-day period.

PRIMARY CONTACT

Fecal coliform - geometric mean fecal coliform content (either MPN or MF), based on not less than 5 samples within a 30-day period shall not exceed 1000 per 100 ml and shall not exceed 2000 per 100 ml in more than 10 per cent of the samples taken during any 30-day period.

SECONDARY CONTACT

Fecal coliform - shall not exceed 5000 per 100 ml (either MPN or MF) in more than 10 per cent of the samples taken during any 30-day period.

APPENDIX F

COST ANALYSIS OF EIS ALTERNATIVES

EIS Alternatives

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Contract 4	66" Pipe	5,800′	--	$ 148/ft	$ 814,000		
	Tunnel with Manholes	5,800′	--	883/ft	4,856,500		
					$ 5,670,500		
	Contingency			+15%	850,575		
					$ 6,521,075	$ 6,521,075	$ 860,782
Contract 5	48" Pipe	1,600′	--	75/ft	$ 120,000		
	Manholes	2	6′	1,045/ea	2,090		
	Excavation & Backfill	3,793cy	8′	10.19/cy	38,651		
	Rock Excavation	5,689cy	(12′)	66.19/cy	376,555		
	60" Pipe	12,100′	--	123/ft	1,488,300		
	Tunnel with Manholes	12,100′	--	883/ft	10,684,300		
	Site Restoration	1,422sy		33.75/sy	47,993		
	Sheeting and Shoring	6,400sf		1.3/sf	83,200		
	Energy Dissipating Manholes	12	25′	3,037/ea	36,444		
	Manholes	1	20′	2,515/ea	2,515		
	Manholes	1	30′	3,565/ea	3,565		
					$12,833,613		
	Contingency			+15%	1,925,042		
					$14,758,655	$14,758,655	$1,948,143
Contract G	66" Pipe	1,600′	--	148/ft	$ 236,800		
	Tunnel with Manholes	1,600′	--	883/ft	1,412,800		
	60" Pipe	8,000′	22-30′	123/ft	984,000		
	Manholes	20	28′	3,355/ea	67,100		
	Excavation & Backfill	21,333cy	8′	10.19/cy	217,383		
	Rock Excavation	53,333cy	(20′)	66.19/cy	3,530,111		
	Site Restoration	8,000sy	--	33.75/sy	270,000		
	Sheeting & Shoring	448,000sf	28′	1.3/sf	582,400		
					$ 7,300,594		
	Contingency			+15%	1,095,089		
					$8,395,683	$8,395,683	$1,108,230

EIS-1 (cont.)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Swetland to Highland along Richmond	54" Pipe	3,800′	22-30′	$ 99/ft	$ 376,200		
	Manholes	10	28′	3,355/ea	33,550		
	42" Pipe	3,000′	22-30′	71/ft	213,000		
	Manholes	8	28′	3,355/ea	26,840		
	Excavation & Backfill	17,244cy	8′	10.19/cy	175,716		
	Rock Excavation	43,111cy	(20′)	66.19/cy	2,853,517		
	Site Restoration	6,467sy	--	33.75/sy	218,261		
	Sheeting & Shoring	380,000sf	28′	1.3/sf	495,040		
					$ 4,392,124		
	Contingency			+15%	658,819		
					$ 5,050,943	$ 5,050,943	$ 666,724
Richmond to Meadowlane along Highland	30" Pipe	2,200′	16-20′	41/ft	$ 90,200		
	Manholes	6	20′	2,515/ea	15,090		
	Excavation & Backfill	4,563cy	8′	10.19/cy	46,497		
	Rock Excavation	6,844cy	(12′)	66.19/cy	453,004		
	Site Restoration	1,711sy	-	33.75/sy	57,750		
	Sheeting & Shoring	88,000sf	20′	1.30/sf	114,400		
					$ 776,941		
	Contingency			+15%	116,541		
					$ 893,482	$ 893,482	$ 117,939
Highland to Wilson Mills PS along Meadowlane	30" Pipe	6,700′	16-20′	41/ft	$ 274,700		
	Manholes	17	20′	2,515/ea	42,755		
	Excavation & Backfill	13,896cy	8′	10.19/cy	141,600		
	Rock Excavation	20,844cy	(12′)	66.19/cy	1,379,664		
	Site Restoration	5,211sy	--	33.75/sy	175,875		
	Sheeting & Shoring	268,000sf	20′	1.30/sf	348,400		
					$ 2,362,994		
	Contingency			+15%	354,449		
					$ 2,717,443	$ 2,717,443	$ 358,702

EIS-1 (cont.)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Meadowlane	21" Pipe	2,900′	16-20′	$21.36/ft	$ 61,944		
to	Manholes	8	20′	2,515/ea	20,120		
Williams-	18" Pipe	1,130′	16-20′	15.50/ft	17,515		
burg along	Manholes	3	20′	2,515/ea	7,545		
Highland	15" Pipe	1,100′	16-20′	12.90/ft	14,190		
	Manholes	3	20′	2,515/ea	7,545		
	Excavation & Backfill	6,080cy	8′	10.19/cy	61,955		
	Rock Excavation	9,120cy	(12′)	66.19/cy	603,653		
	Site Restoration	2,280sy	--	33.75/sy	76,950		
	Sheeting & Shoring	205,200sf	20′	1.30/sf	266,760		
					$ 1,138,177		
	Contingency			+15%	170,727		
					$ 1,308,904	$ 1,308,904	$ 172,775
Richmond	48" Pipe	5,800′	16-20′	75/ft	435,000		
to	Manholes	15	20′	2,515/ea	37,725		
Bishop	Excavation & Backfill	13,748cy	8′	10.19/cy	140,092		
thru	Rock Excavation	20,622cy	(12′)	66.19/cy	1,364,970		
Airport	Site Restoration	5,155sy	--	6.75/sy	34,796		
	Sheeting & Shoring	232,000sf	20′	1.30/sf	301,600		
					$ 2,314,183		
	Contingency			+15%	347,127		
					$ 2,661,310	$ 2,661,310	$ 351,293
Bishop to	48" Pipe	11,800′	16-20′	75/ft	$ 885,000		
SOM Center	Tunnel with Manholes	400′	--	883/ft	353,200		
along	Manholes	29	20′	2,515/ea	72,935		
County Line	Excavation & Backfill	27,023cy	8′	10.19/cy	275,364		
and White	Rock Excavation	40,533cy	(12′)	66.19/cy	2,682,879		
Rd.	Site Restoration	10,133sy	--	6.75/sy	68,398		
	Sheeting & Shoring	456,000sf	20′	1.30/sf	592,800		
					$ 4,930,576		
	Contingency			+15%	739,586		
					$ 5,670,162	$ 5,670,162	$ 748,461

EIS-1 (cont.)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
White to Highland along SOM Center	48" Pipe	6,400′	16-20′	$ 75/ft	$ 480,000		
	Manholes	16	20′	2,515/ea	40,240		
	Excavation & Backfill	15,171cy	8′	10.19/cy	154,592		
	Rock Excavation	22,756cy	(12′)	66.19/cy	1,506,220		
	Site Restoration	5,689sy	--	33.75/sy	192,004		
	Sheeting & Shoring	256,000sf	20′	1.30/sf	332,800		
					$ 2,705,856		
	Contingency			+15%	405,878		
					$ 3,111,734	$ 3,111,734	$ 410,749
Highland to Beech Hill PS along SOM CTR etc.	48" Pipe	6,700′	21-30′	75/ft	$ 502,500		
	Manholes	17	28′	3,355/ea	57,035		
	Excavation & Backfill	15,881cy	8′	10.19/cy	161,827		
	Rock Excavation	39,704cy	(20′)	66.19/cy	2,628,008		
	Site Restoration	5,956sy	--	33.75/sy	201,015		
	Sheeting & Shoring	375,200sf	28′	1.30/sf	487,760		
					$ 4,038,145		
	Contingency			+15%	605,722		
					$ 4,643,867	$ 4,643,867	$ 612,990
Richmond Park Pkg. Plant Elimination	Local Sewers				$ 313,445	$ 313,445	$ 41,375
Scottish Highlands Pkg. Plant Elimination	Local Sewers				$ 656,420	$ 656,420	$ 86,647
Hickory Hill Pkg. Plant Elimination	Local Sewers				$ 379,645	$ 379,645	$ 50,113

EIS-1 (cont.)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Contract H	42" Pipe	6,300′	22-30′	$ 71/ft	$ 447,300		
	Manholes	16	28′	3,355/ea	53,680		
	Excavation & Backfill	14,933cy	8′	10.19/cy	152,167		
	Rock Excavation	37,333cy	(20′)	66.19/cy	2,471,071		
	Site Restoration	5,600sy	--	33.75/sy	189,000		
	Sheeting & Shoring	352,800sf	28′	1.30/sf	458,640		
					$ 3,771,858		
	Contingency			+15%	565,779		
					$ 4,337,637	$ 4,337,637	$ 572,568
Airport* Storage	0.75 MG Basin				$ 1,323,380	$ 634,677	$ 232,915
Local Sewers					$10,681,946	$10,681,946	$1,410,025
Small Pump* Station Improve-ments	Thornapple				$ 73,929		
	Woods				102,679		
	Aintree Elimination				164,286		
					$ 340,894	$ 163,489	$ 37,498
TOTAL					$73,766,625	$72,900,517	$9,787,929

Annual O&M	Cost
Sewer Maintenance	$ 66,100
Basin Maintenance	9,700
Power	49,600
	$125,400

Present Worth	
P.W. Capital	$72,900,517
P.W. O&M	1,266,327
P.W. Salvage	9,787,929
Net P.W.	$64,378,915

* Assumed built 10 years into the planning period.

EIS-2

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Contract G	78" Pipe	1,600′	--	$ 194/ft	$ 310,400		
	Tunnel with Manholes	1,600′	--	950/ft	1,520,000		
	66" Pipe	8,000′	22-30′	148/ft	1,184,000		
	Manholes	20	28′	3,355/ea	67,100		
	Excavation & Backfill	23,704cy	8′	10.19/cy	241,544		
	Rock Excavation	59,259cy	(20′)	66.19/cy	3,922,353		
	Site Restoration	8,889sy	--	33.75/sy	300,004		
	Sheeting & Shoring	448,000sf	28′	1.3/sf	582,400		
					$ 8,127,801		
	Contingency			+15%	1,219,170		
					$ 9,346,971	$ 9,346,971	$1,233,800
Green Rd to East of Richmond along Monticello	42" Pipe	2,116′	22-30′	71/ft	$ 150,236		
	60" Pipe	7,500′	22-30′	123/ft	922,500		
	Manholes	6	28′	3,355/ea	20,130		
	Manholes	19	28′	3,355/ea	63,745		
	Excavation & Backfill	25,016cy	8′	10.19/cy	254,163		
	Rock Excavation	62,539cy	(20′)	66.19/cy	4,139,456		
	Site Restoration	9,381sy	--	33.75/sy	316,609		
	Sheeting & Shoring	538,496sf	28′	1.3/sf	700,045		
					$ 6,566,884		
	Contingency			+15%	985,033		
					$ 7,551,917	$ 7,551,917	$ 996,853
Euclid Creek Aerial Crossing (Twin)					$ 948,750	$ 948,750	$ 125,235

EIS-2 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Wilson Mills Pump Station	Pumps	24.2 mgd	--	--	$ 150,000		
	Backup Generator	1		270,000/ea	270,000		
	Controls	--	--	--	10,000		
					$ 430,000		
	Contingency			+15%	64,500		
					$ 494,500	$ 494,500	--
Wilson Mills Force Main	36" Force Main	2,000′	12′	$ 103/ft	$ 206,000		
	Manholes	3	12′	1,675/ea	5,025		
	Excavation & Backfill	4,148cy	8′	10.19/cy	42,268		
	Rock Excavation	2,074cy	4′	66.19/cy	137,278		
	Surface Restoration	1,556sy	--	33.75/sy	52,515		
	Sheeting & Shoring	48,000sf	12′	1.30/sf	62,400		
					$ 505,486		
	Contingency			+15%	75,823		
					$ 581,309	$ 581,309	$ 76,733
Beech Hill Pump Station	Pumps	11.6 mgd	--	--	$ 150,000		
	Backup Generator	1	--	270,000/ea	270,000		
	Control	--	--	--	$ 10,000		
					430,000		
	Contingency			+15%	64,500		
					$ 494,500	$ 494,500	--
Central Control System	Computer System	1	--	--	$ 5,000		
	Controls	--	--	--	40,000		
					$ 45,000		
	Contingency			+15%	6,750		
					$ 51,750	$ 51,750	--

EIS-2 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Beech Hill Force Main	30" Force Main	8,900′	--	80/ft	$ 712,000		
	Manholes	12	12′	1,675/ea	20,100		
	Excavation & Backfill	18,459cy	8′	10.19/cy	188,097		
	Rock Excavation	9,230cy	(4′)	66.19/cy	610,934		
	Surface Restoration	6,922sy	--	33.75/sy	233,618		
	Sheeting & Shoring	213,600sf	12′	1.30/sf	277,680		
					$2,042,429		
	Contingency			+15%	306,364		
					$2,348,793	$ 2,348,793	$ 310,041
Bonnieview Improvements	Comminutors				$ 36,904		
	Grit Removal				136,544		
	6" Water Line				40,594		
	Odor Control				73,807		
					$ 287,849		
	Contingency			+15%	43,177		
					$ 331,026	$ 331,026	$ 43,695
Richmond Rd/ White Rd Pump Station		12.9 mgd			$2,855,286	$ 2,855,286	--
Richmond Rd/ White Rd Force Main	30" Force Main	13,400′	12′	$ 80/ft	$1,072,000		
	Manholes	17	12′	1,675/ea	28,475		
	Excavation & Backfill	27,793cy	8′	10.19/cy	283,211		
	Rock Excavation	13,896cy	(4′)	66.19/cy	919,776		
	Surface Restoration	10,422sy	--	33.75/sy	351,743		
	Sheeting & Shoring	321,600sf	12′	1.30/sf	418,080		
					$3,073,285		
	Contingency			+15%	460,993		
					$3,534,278	$ 3,534,278	$ 466,525

EIS-2 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Wilson	42" Pipe	1,300′	22-30′	71/ft	$ 92,300		
Mills Rd to	Manholes	4	28′	3,355/ea	13,420		
Anderson Rd	Excavation & Backfill	3,081cy	8′	10.19/cy	31,395		
along	Rock Excavation	7,704cy	(20′)	66.19/cy	509,928		
Richmond Rd	Site Restoration	1,156sy	--	33.75/sy	39,015		
	Sheeting & Shoring	72,800sf	28′	1.30/sf	94,640		
					$ 780,698		
	Contingency			+15%	117,105		
					$ 897,803	$ 897,803	$ 118,510
Green Rd* Storage Basin Size Increase	Basin	0.18mgd			$1,059,017	$ 507,892	$ 186,387
Green Rd*	Pump Station	300gpm		$45,913/ea	$ 45,913		
Basin	Generator Unit	300gpm		27,108/ea	27,108		
Pump	Excavation & Backfill	67cy	8′	10.19/cy	688		
Station	Rock Excavation	58cy	7′	66.19/cy	3,839		
	Site Restoration	25sy		33.75/sy	844		
	Sheeting & Shoring	900sf	15′	1.3/sf	1,170		
	12" Force Main	1,000′	10′	27/ft	27,000		
	Manholes	2	10′	1,045/ea	2,090		
	Excavation & Backfill	1,185cy	8′	10.19/cy	12,075		
	Rock Excavation	297cy	(2′)	66.19/cy	19,658		
	Surface Restoration	444sy		33.75/sy	14,985		
	Sheeting & Shoring	20,000sf		1.30/sf	26,000		
					$ 181,365		
	Contingency			+15%	27,205		
					$ 208,570	$ 100,113	$ 22,943

EIS-2 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Local Sewers					$16,008,346	$16,008,346	$2,113,102
Small Pump* Station Improvements	Aintree				$ 65,714		
	Thornapple				73,929		
	Mt. Vernon				61,607		
	The Woods				102,679		
					$ 303,929	$ 145,886	$ 33,432
TOTAL					$47,016,745	$46,199,120	$5,727,256

* Assumed built 10 years into the planning period.

Annual O&M	Cost
Sewer & Force Main Maintenance	$ 38,600
Pump Station Costs	
Power	192,900
Labor	463,000
Misc.	33,000
	$727,500

Present Worth	Cost
P.W. Capital	$46,199,120
P.W. O&M	7,346,513
P.W. Salvage	5,727,256
NET PW	$47,818,377

EIS-3

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Contract G	78" Pipe	1,600'	--	$ 194/ft	$ 310,400		
	Tunnel with Manholes	1,600'		950/ft	1,520,000		
	66" Pipe	8,000'	22-30'	148/ft	1,184,000		
	Manholes	20	28'	3,355/ea	67,100		
	Excavation & Backfill	23,704cy	8'	10.19/cy	241,544		
	Rock Excavation	59,259cy	(20')	66.19/cy	3,922,353		
	Site Restoration	8,889sy	--	3,375/sy	300,004		
	Sheeting & Shoring	448,000sf	28'	1,30/sf	582,400		
					$ 8,127,801		
	Contingency			+15%	1,219,170		
					$ 9,346,971	$ 9,346,971	$1,233,800
Green Road to Wilson Mills Tunnel along Monticello	60" Pipe	5,844'	20-30'	123/ft	$ 718,812		
	Manholes	15	28'	3,355/ea	50,325		
	Excavation & Backfill	15,574cy	8'	10.19/cy	158,801		
	Rock Excavation	38,960cy	(20')	66.19/cy	2,578,762		
	Surface Restoration	5,844sy	--	33.75/sy	197,235		
	Sheeting & Shoring	327,264sf	28'	1,30/sf	425,443		
					$ 4,129,378		
	Contingency			+15%	619,407		
					$ 4,748,785	$ 4,748,785	$ 626,840
Euclid Creek Aerial (twin)	54" Pipe	800'	--		$ 948,750	$ 948,750	$ 125,235
West of Richmond Road to Wilson Mills PS along Wilson Mills Road	60" Pipe	6,130ft	--	123/ft	$ 753,990		
	Tunnel with Manholes	6,130ft	--	883/ft	5,412,790		
					$ 6,166,780		
	Contingency			+15%	925,017		
					$ 7,091,797	$ 8,633,492	$ 936,117

EIS-3 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Beech Hill Pump Station	Pumps	11.6 mgd	--	--	$ 150,000		
	Backup Generator	1	--	$270,000/ea	270,000		
	Controls	--	--	--	10,000		
					$ 430,000		
	Contingency			+15%	64,500		
					$ 494,500	$ 494,500	--
Central Control System	Computer System	1	--	--	5,000		
	Controls	--	--	--	40,000		
					$ 45,000		
	Contingency			+15%	6,750		
					$ 51,750	$ 51,750	--
Beech Hill Force Main	30" Force Main	8,900′	--	80/ft	$ 712,000		
	Manholes	12	12′	1,675/ea	20,100		
	Excavation & Backfill	18,459cy	8′	10.19/cy	188,097		
	Rock Excavation	9,230cy	(4′)	66.19/cy	610,934		
	Surface Restoration	6,922sy	--	33.75/sy	233,618		
	Sheeting & Shoring	213,600sf	12′	1.30/sf	277,680		
					$ 2,042,429		
	Contingency			+15%	306,364		
					$ 2,348,793	$ 2,348,793	$ 310,041
Bonnieview Improve-ments	Comminutors				$ 36,904		
	Grit Removal				136,544		
	6-inch Water Line				40,594		

EIS-3 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Bonnieview Improvements (cont.)	Odor Control				73,807		
					$ 287,849		
	Contingency			+15%	43,177		
					$ 331,026	$ 331,026	$ 43,695
Richmond Rd/ White Rd Pump Station		12.9 mgd			$ 2,855,286	$ 2,855,286	$ --
Richmond Rd/ White Rd Force Main	30" Force Main	13,400′	12′	$ 52/ft	$ 1,072,000		
	Manholes	17	12′	1,675/ea	28,475		
	Excavation & Backfill	27,793cy	8′	10.19/cy	283,211		
	Rock Excavation	13,896cy	4′	66.19/cy	919,776		
	Surface Restoration	10,422sy	--	33.75/sy	351,743		
	Sheering & Shoring	321,600sf	12′	1.30/sf	418,080		
					$ 3,073,285		
	Contingency			+15%	460,993		
					$ 3,534,278	$ 3,534,278	$ 466,525
Wilson Mills Rd to Anderson along Richmond Rd	42" Pipe	1,300′	22-30′	71/ft	$ 92,300		
	Manholes	4	28′	3,355/ea	13,420		
	Excavation & Backfill	3,081cy	8′	10.19/cy	31,395		
	Rock Excavation	7,704cy	20′	66.19/cy	509,928		
	Surface Restoration	1,156sy	--	33.75/sy	39,015		
	Sheeting & Shoring	72,800sf	28′	1.30/sf	94,640		
					$ 780,698		
	Contingency			+15%	117,105		
					$ 897,803	$ 897,803	$ 118,510

EIS-3 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Green Rd* Storage Basin Size Increase		0.18mg			$ 1,059,017	$ 507,892	$ 186,387
Green Rd* Basin Pump Station	Pump Station	300gpm		45,913/ea	$ 45,913		
	Generator Unit	300gpm		27,108/ea	27,108		
	Excavation & Backfill	67cy	8′	10.19/cy	683		
	Rock Excavation	58cy	(7′)	66.19/cy	3,839		
	Site Restoration	25sy		33.75/sy	844		
	Sheeting & Shoring	900sf	15′	1.3/sf	1,170		
	12′ Force Main	1,000′	10′	27/ft	27,000		
	Manholes	2	10′	1,045/ea	2,090		
	Excavation & Backfill	1,185cy	8′	10.19/cy	19,658		
	Surface Restoration	444sy		33.75/sy	14,985		
	Sheeting & Shoring	20,000sf		1.30/sf	26,000		
					$ 181,365		
	Contingency			+15%	27,205		
					$ 208,570	$ 100,113	$ 22,943
Local Sewers					$16,008,346	$16,008,346	$2,113,102
Small Pump* Station Improvements					$ 65,714		
					73,929		
					61,607		
					102,679		
					$ 303,929	$ 145,886	$ 33,432
					===========		
TOTAL					$50,229,601	$49,411,976	$6,216,627

EIS-3 (continued)

Annual O&M Cost	
Sewer & Force Main Maintenance	$ 49,600
Pump Station Costs	
Power	176,400
Labor	330,700
Misc.	16,500
	$ 573,200

Present Worth	Cost
PW Capital	$49,411,976
PW O&M	5,788,345
PW Salvage	6,216,627
NET PW	$48,983,694

* Assumed built 10 years into the planning period.

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Contract 4	66" Pipe	5,800′	--	$ 148/ft	$ 814,000		
	Tunnel with Manholes	5,800′	--	883/ft	4,856,500		
					$ 5,670,500		
	Contingency			+15%	850,575		
					$ 6,521,075	$ 6,521,075	$ 860,782
Contract 5	48" Pipe	1,600′	--	75/ft	$ 120,000		
	Manholes	2	6′	1,045/ea	2,090		
	Excavation & Backfill	3,793cy	8′	10.19/cy	38,651		
	Rock Excavation	5,689cy	(12′)	66.19/cy	376,555		
	60" Pipe	12,100′	--	123/ft	1,488,300		
	Tunnel with Manholes	12,100′	--	883/ft	10,684,300		
	Site Restoration	1,422sy		33.75/sy	47,993		
	Sheeting and Shoring	6,400sf		1.3/sf	83,200		
	Energy Dissipating Manholes	12	25′	3,037/ea	36,444		
	Manholes	1	20′	2,515/ea	2,515		
	Manholes	1	30′	3,565/ea	3,565		
					$12,833,613		
	Contingency			+15%	1,925,042		
					$14,758,655	$14,758,655	$1,948,143
Contract G	66" Pipe	1,600′	--	148/ft	$ 236,800		
	Tunnel with Manholes	1,600′	--	883/ft	1,412,800		
	60" Pipe	8,000′	22-30′	123/ft	984,000		
	Manholes	20	28′	3,355/ea	67,100		
	Excavation & Backfill	21,333cy	8′	10.19/cy	217,383		
	Rock Excavation	53,333cy	20′	66.19/cy	3,530,111		
	Site Restoration	8,000sy	--	33.75/sy	270,000		
	Sheeting & Shoring	448,000sf	28′	1.3/sf	582,400		
					$ 7,300,594		

EIS-4 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Contract G	Contingency			+15%	1,095,089		
(continued)					$ 8,395,683	$ 8,395,683	$1,108,230
Swetland	54" Pipe	3,800′	22-30′	$ 99/ft	$ 376,200		
to	Manholes	10	28′	3,355/ea	33,550		
Highland	42" Pipe	3,000′	22-30′	71/ft	213,000		
along	Manholes	8	28′	3,355/ea	26,840		
Richmond	Excavation & Backfill	17,244cy	8′	10.19/cy	175,716		
	Rock Excavation	43,111cy	(20′)	66.19/cy	2,853,517		
	Site Restoration	6,467sy	--	33.75/sy	218,261		
	Sheeting & Shoring	380,000sf	28′	1.3/sf	495,040		
					$ 4,392,124		
	Contingency			+15%	658,819		
					$ 5,050,943	$ 5,050,943	$ 666,724
Richmond	30" Pipe	2,200′	16-20′	41/ft	$ 90,200		
to	Manholes	6	20′	2,515/ea	15,090		
Meadowlane	Excavation & Backfill	4,563cy	8′	10.19/cy	46,497		
along	Rock Excavation	6,844cy	(12′)	66.19/cy	453,004		
Highland	Site Restoration	1,711sy	--	33.75/sy	57,750		
	Sheeting & Shoring	88,000sf	20′	1.30/sf	114,400		
					$ 776,941		
	Contingency			+15%	116,541		
					$ 893,482	$ 893,482	$ 117,939
Highland	30" Pipe	6,400′	16-20′	41/ft	$ 274,700		
to	Manholes	17	20′	2,515/ea	42,755		
Wilson	Excavation & Backfill	13,896cy	8′	10.19/cy	141,600		
Mills PS	Rock Excavation	20,844cy	(12′)	66.19/cy	1,379,664		
along	Site Restoration	5,211sy	--	33.75/sy	175,875		
Meadowlane	Sheeting & Shoring	268,000sf	20′	1.30/sf	348,400		
					$ 2,362,994		

EIS-4 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Highland to Wilson Mills (continued)	Contingency			+15%	354,449		
					$ 2,717,443	$ 2,717,443	$ 358,702
Contract H	42" Pipe	6,300′	22-30′	$ 71/ft	$ 447,300		
	Manholes	16	28′	3,355/ea	53,680		
	Excavation & Backfill	14,933cy	8′	10.19/cy	152,167		
	Rock Excavation	37,333cy	(20′)	66.19/cy	2,471,071		
	Site Restoration	5,600sy	--	33.75/sy	189,000		
	Sheeting & Shoring	352,800sf	28′	10.19/sf	458,640		
					$ 3,771,858		
	Contingency			+15%	565,779		
					$ 4,337,637	$ 4,337,637	$ 572,568
Beech Hill Pump Station	Pumps	11.6 mgd	--	--	$ 150,000		
	Backup Generator	1	--	270,000/ea	270,000		
	Controls	--	--	--	10,000		
					$ 430,000		
	Contingency			+15%	64,500		
					$ 494,500	$ 494,500	--
Central Control System	Computer System	1	--	--	$ 5,000		
	Controls	--	--	--	40,000		
					$ 45,000		
	Contingency			+15%	6,750		
					$ 51,750	$ 51,750	--
Beech Hill Force Main	30" Force Main	8,900′	12′	80/ft	$ 712,000		
	Manholes	23	12′	1,675/ea	20,100		
	Excavation & Backfill	18,459cy	8′	10.19/cy	188,097		
	Rock Excavation	9,230cy	(4′)	66.19/cy	610,934		

EIS-4 (continued)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Beech Mill Force Main	Surface Restoration	6,922sy	--	33.75/sy	233,618		
	Sheeting & Shoring	213,600sf	12'	1.30/sf	277,680		
					$ 2,042,429		
	Contingency			+15%	306,364		
					$ 2,348,793	$ 2,348,793	$ 310,041
Bonnieview Improvements	Comminutors				36,904		
	Grit Removal				136,544		
	6-inch Water Line				40,594		
	Odor Control				73,807		
					$ 287,849		
	Contingency			+15%	43,177		
					$ 331,026	$ 331,026	$ 43,695
Local Sewers					$13,590,490	$13,590,490	$1,793,945
Small Pump* Station Improvements	Aintree				65,714		
	Thornapple				73,929		
	Mt. Vernon				61,607		
	The Woods				102,679		
					$ 303,929	$ 145,886	$ 33,432
Airport*	0.3 MG Basin				$ 1,114,672	$ 535,042	$ 196,182
Storage							
TOTAL					$60,910,078	$60,172,405	$8,011,467

EIS-4 (continued)

Annual O&M	Cost
Sewer & Force Main Maintenance	$ 85,400
Pump Station Costs	
Power	92,000
Labor	103,400
Miscellaneous	5,500
	$ 286,300

Present Worth	Cost
Capital PW	$60,172,405
O&M PW	2,891,143
Salvage PW	8,011,467
Net PW	$55,052,081

* Assumed built 10 years into the planning period.

ASSUMPTIONS FOR CHAPTER 5
COST ANALYSIS

1) Trench Width
   - 4 ft. trench for pipe sizes <27"
   - 4 ft. + pipe diameter for sizes >27"
   - 10 ft. trench for dual force mains

2) Trench Depth
   - 12' deep trench for force mains
   - 2 ft. + average pipe depth for gravity

3) Rock Excavation
   - Assumed rock at 8' below surface based on drilling logs HT-21 and HT-14 (only 2 within the Hilltop area)

4) Small Pump Stations
   - Assume excavation 15' x 15' x 15'
   - Assume prefabricated underground station

5) Tunnel Costs
   - updated costs from Facilities Plan (original CCI=2257, present CCI=4333)(September 1986)

6) Pipe Costs
   - Class 3 concrete with gaskets for all gravity pipe (Means)
   - Water Piping-Ductile Iron for force mains (Means)
   - When specific pipe size not given, used a straight line estimate for cost

7) Site Restoration
   - \$33.75/sy for paved (Means)
   - \$6.75/sy for unpaved (Means)

8) Manholes
   - One every 400 ft. for gravity (round up)
   - One every 800 ft. for force main cleanouts (round up)
   - Cost: Manhole (6ft) = \$ 585
     Frame and cover = 460

     \$1045

     + \$105/ft over 6'

9) Excavation and Backfill Costs
   - 8' of excavation (routine) for all sites
   - excavation = \$ 3.40/cy (Means)
   - backfill = 1.14/cy (Means)
   - tamping 5.65/cy (Means)

     \$10.19/cy

10) Rock Excavation Costs

- excavation =	$ 3.40/cy	(Means)
- break up rock =	56.00/cy	(Means)
- backfill =	1.14/cy	(Means)
- tamping =	5.65/cy	(Means)
	$66.19/cy	

11) Sheeting and Shoring
   - assumed that all trenches required sheeting and shoring
   - $1.30/sq. ft. of wall surface area (Means)

12) Bonnieview Upgrade (Improvements) from NEORSD Responses to Comments
   - upgraded to present CCI (x1.0333)
     also includes $100,000 for odor control

13) Local Sewers
   - assumed concrete, non-reinforced, extra strength, B&S or T&G joints (Means)

14) Storage Basins
   - based on standard unit costs developed for the City of Boonville, Indiana Facility Plan (Prepared for: State of Indiana State Board of Health by Triad Engineering, Inc., July 1986)

15) Operating and Maintenance costs from Environmental Assessment. Updated to Present (Original CCI = 3931, Present CCI = 4333)

16) Present Worth based on 7-5/8% discount rate.

17) Salvage Value based on a 50-year life for structures, sewers and force mains; 20-year life for mechanical equipment; straight line depreciation.

    Value available for salvage assumed to only include 10% construction contingency.

18) Contingency factor of 15%.

APPENDIX G

COST ANALYSIS OF EIS RECOMMENDED ALTERNATIVE

EIS RECOMMENDED ALTERNATIVE

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Contract G Costs to Serve Hilltop Area					$ 951,288	$ 951,288	$ 125,570
Green Road to Wilson Mills Tunnel along Monticello	60" Pipe	5,844'	20-30'	123/ft	$ 718,812		
	Manholes	15	28'	3,355/ea	50,325		
	Excavation & Backfill	15,574cy	8'	10.19/cy	158,801		
	Rock Excavation	38,960cy	(20')	66.19/cy	2,578,762		
	Surface Restoration	5,844sy	--	33.75/sy	197,235		
	Sheeting & Shoring	327,264sf	28'	1,30/sf	425,443		
					$ 4,129,378		
	Contingency			+15%	619,407		
					$ 4,748,785	$ 4,748,785	$ 626,840
Euclid Creek Aerial (twin)	54" Pipe	800'	--		$ 907,500	$ 907,500	$ 125,235
West of Richmond Road to Wilson Mills PS along Wilson Mills Road	60" Pipe	6,130ft	--	123/ft	$ 753,990		
	Tunnel with Manholes	6,130ft	--	883/ft	5,412,790		
					$ 6,166,780		
	Contingency			+15%	925,017		
					$ 7,091,797	$ 7,091,797	$ 936,117

EIS RECOMMENDED ALTERNATIVE (cont.)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Beech Hill Pump Station	Pumps	11.6 mgd	--	--	$ 150,000		
	Backup Generator	1	--	$270,000/ea	270,000		
	Controls	--	--	--	10,000		
					$ 430,000		
	Contingency			+15%	64,500		
					$ 494,500	$ 494,500	--
Central Control System	Computer System	1	--	--	5,000		
	Controls	--	--	--	40,000		
					$ 45,000		
	Contingency			+15%	6,750		
					$ 51,750	$ 51,750	--
Beech Hill Force Main	30" Force Main	8,900'	--	80/ft	$ 712,000		
	Manholes	12	12'	1,675/ea	20,100		
	Excavation & Backfill	18,459cy	8'	10.19/cy	188,097		
	Rock Excavation	9,230cy	(4')	66.19/cy	610,934		
	Surface Restoration	6,922sy	--	33.75/sy	233,618		
	Sheeting & Shoring	213,600sf	12'	1.30/sf	277,680		
					$2,042,429		
	Contingency			+15%	306,364		
					$2,348,793	$ 2,348,793	$ 310,041
Bonnieview Improve-ments	Comminutors				$ 36,904		
	Grit Removal				136,544		
	6-inch Water Line				40,594		
	Odor Control				73,807		
					$287,849		
	Contingency			+15%	43,177		
					$331,026	$ 331,026	$ 43,695
Richmond Rd/ White Rd Pump Station		1.8 mgd			$2,855,286	$ 2,855,286	$ --

EIS RECOMMENDED ALTERNATIVE (cont.)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Richmond Rd/	12" Force Main	13,400'	12'	$ 27/ft	$ 361,800		
White Rd	Manholes	17	12'	1,675/ea	28,475		
Force Main	Excavation & Backfill	19,852cy	8'	10.19/cy	202,292		
	Rock Excavation	9,926cy	4'	66.19/cy	657,002		
	Surface Restoration	7,444sy	--	33.75/sy	251,235		
	Sheeting & Shoring	321,600sf	12'	1.30/sf	418,080		
					$1,918,884		
	Contingency			+15%	287,833		
					$2,206,717	$ 2,206,717	$ 291,293
Richmond Rd	21" Pipe	4,200'	10-15'	17.10/ft	$ 71,820		
Gravity	Manholes	11	14'	1,885/ea	20,735		
Sewer	Excavation & Backfill	4,978cy	8'	10.19/cy	50,726		
	Rock Excavation	3,733cy	6'	66.19/cy	247,087		
	Site Restoration	1,867sy		33.75/sy	63,011		
	Sheeting & Shoring	117,600sf	14'	1.30/sf	$ 152,880		
					606,259		
				+15%	90,939		
					$ 697,198	$ 697,198	$ 92,032
Scottish	12" Force Main	4,500'	10'	27.00/ft	$ 121,500		
Highlands	Manholes	6	10'	1,465/ea	8,790		
Elimination	Excavation & Backfill	5,400cy	8'	10.19/cy	55,026		
	Rock Excavation	1,391cy	2'	66.19/cy	92,070		
	Site Restoration	2,025sy		33.75/sy	68,344		
	Pump Station				77,500		
	Generator Unit				29,400		
	Sheeting & Shoring	90,900sf		1.30/sy	118,170		
					$ 570,800		
				+15%	85,620		
					$ 656,420	$ 656,420	$ 70,421

EIS RECOMMENDED ALTERNATIVE (cont.)

Item	Description	Qty	Depth	Unit Cost	Total Cost	P.W. Capital	P.W. Salvage
Richmond	12" Pipe	2,000'	10-15'	9.25/ft	$ 18,500		
Park	Manholes	5	14'	1,885/ea	9,425		
Elimination	Excavation & Backfill	2,370cy	8'	10.19/cy	24,150		
	Rock Excavation	1,778cy	6'	66.19/cy	117,686		
	Site Restoration	889sy		33.75/sy	30,000		
	Sheeting & Shoring	56,000sf	14'	1.30/sf	72,800		
					$ 272,561		
				+15%	40,884		
					$ 313,445	$ 313,445	$ 41,376
Hickory	8" Force Main	8,800'	10'	17.05/ft	$ 150,040		
Hills	Manholes	11	10'	1,465/ea	16,115		
Elimination	Excavation & Backfill	10,497	8'	10.19/cy	106,964		
	Rock Excavation	2,667	2'	66.19/cy	176,529		
	Site Restoration	3,936		33.75/sy	132,840		
	Pump Station				41,400		
	Generator Unit				27,100		
	Sheeting & Shoring	352,000		1.30/sf	$ 457,600		
					1,108,588		
				+15%	166,288		
					$1,274,876	$1,274,876	$ 157,889
Wilson	42" Pipe	1,300'	22-30'	71/ft	$ 92,300		
Mills Rd	Manholes	4	28'	3,355/ea	13,420		
to Anderson	Excavation & Backfill	3,081cy	8'	10.19/cy	31,395		
along	Rock Excavation	7,704cy	20'	66.19/cy	509,928		
Richmond Rd	Surface Restoration	1,156sy	--	33.75/sy	39,015		
	Sheeting & Shoring	72,800sf	28'	1.30/sf	94,640		
					$ 780,698		
	Contingency			+15%	117,105		
					$ 897,803	$ 897,803	$ 118,510

EIS RECOMMENDED ALTERNATIVE (cont.)

Small Pump* Station Improvements	$ 65,714		
	73,929		
	61,607		
	$ 102,679		
	$ 303,929	$ 145,886	$ 33,432
TOTAL	$26,131,113	$25,973,070	$2,972,451

Annual O&M	Cost
Sewer & Force Main Maintenance	$ 49,600
Pump Station Costs	
Power	176,400
Labor	330,700
Misc.	16,500
	$573,200

Present Worth	Cost
PW Capital	$25,973,070
PW O&M	5,788,345
PW Salvage	2,972,451
NET PW	$28,788,964

* Assumed built 10 years into the planning period.

APPENDIX H

ANNUAL USER COST COMPUTATIONS

Table H-1. Flow and Dwelling Unit (DU) Estimates for the Hilltop Facility Planning Area Based on 1988 Population Projections

	Gates Mills	Highland Heights	Mayfield Village	Mayfield Heights	Richmond Heights	Willoughby Hills	Total FPA	NEORSD SD2
Total Acres in FPA	2,860	3,328	1,590	2,713	2,565	1,705	13,161	197,504
1988 Service Area Population	1,000	6,150	3,020	12,140	9,200	4,050	35,560	760,000
Persons Per Household	2.39	2.78	2.31	2	2	2	—	2.3
Number of Households (DUs)	418	2,214	1,310	5,968	4,598	2,024	16,532	330,400
Acres of Residential Development	883	738	437	1,017	1,533	675	5,510	110,133
Existing Commercial/ Industrial Establishments in Acres	50	310	150	610	460	200	1,780	36,711
Commercial/Industrial Equivalent Dwelling Units (EDUs)	469	2,906	1,406	5,719	4,313	1,875	16,688	344,166
Total DUs and EDUs	887	5,120	2,716	11,687	8,911	3,899	18,407	674,566

Table H-1. Flow and Dwelling Unit (DU) Estimates for the Hilltop Facility Planning Area Based on 1988 Population Projections (Continued)

	Gates Mills	Highland Heights	Mayfield Village	Mayfield Heights	Richmond Heights	Willoughby Hills	Total FPA	NEORSD SD2
Daily Residential Flows (in Gallons)	80,000	492,000	241,600	971,200	736,000	324,000	2,844,800	60,800,000
Daily Commercial/ Industrial Flows (in Gallons)	75,000	465,000	225,000	915,000	690,000	300,000	2,670,000	55,066,500
Total Daily Flows (in Gallons)	155,000	957,000	466,600	1,886,200	1,426,000	624,000	5,514,800	115,866,500

The following assumptions were used to prepare this Equivalent Dwelling Unit estimate (EDU):

1. The certified NEORSD population estimates would be the basis for all household and land use assumptions.
2. A straight line extrapolation of the 1980 and 2005 population estimates was made to determine the 1988 population.
3. The 1988 population was divided by the estimated household size to determine the number of household or dwelling units.
4. Average residential zoning was used to estimate the number of acres in residential use.
5. A standard ratio of 1 acre of residential land per 20 individuals was used to estimate the number of commercial and industrial acres. This category includes all non-residential land uses. This technique was used to make a gross estimate and does not reflect current zoning. Gates Mills does not have a commercial/industrial zoning category and Highland Heights is expected to have large commercial and industrial developments.
6. Based on current water use, standards used by Ohio EPA, and other trends, the following assumptions were used to estimate EDUs:

   - Average residential sewer use is estimated to be 80 gallons per person per day.
   - Average dwelling unit use was estimated to be 160 gallons per day.
   - Average commercial and industrial water use is estimated to be 1,500 gallons per acre per day.

Table H-2. Cost Analysis by Jurisdiction for the Hilltop Facility Planning Area (in present worth dollars)

EIS-3 With Full Local Sewer System (without Contract G)

	Total Costs	Highland Heights	Mayfield Village	Richmond Heights	Willoughby Hills	NEORSD SD2
Capital Costs	41,016,293	--	--	--	--	--
Construction of Regional Sewers	25,007,947	--	--	--	--	25,007,947
Construction of Local Sewers (including Elimination of Existing Facilities)	16,008,346	6,173,317[a]	3,422,120[b]	2,523,417[c]	3,889,492	16,008,346
Operation and Maintenance	5,788,345	--	--	--	--	5,788,345
Less Salvage Value	5,108,397	--	--	--	--	5,108,397
Net Costs	41,696,241	6,173,317[a]	3,422,120[b]	2,523,417[c]	3,889,492	25,687,895

[a]Elimination of Richmond Park plant costs $381,585, and the Williamsburg pump station costs $249,089.
[b]Elimination of Hickory Hills plant costs $799,120.
[c]Elimination of Scottish Highlands plant costs $462,176.

Table H-3. Cost Analysis by Jurisdiction for the Hilltop Facility Planning Area
(in present worth dollars)

Recommended Plan to Solve Existing Needs

	Total Costs	Highland Heights	Mayfield Village	Richmond Heights	Willoughby Hills	NEORSD SD2
Capital Costs	25,973,070	--	--	--	--	25,973,070
Construction of Regional Sewers	25,973,070	--	--	--	--	25,973,070
No Construction of Local Sewers	--	--	--	--	--	--
Operation and Maintenance	5,788,345	--	--	--	--	5,788,345
Less Salvage Value	2,972,451	--	--	--	--	2,972,451
Net Costs	28,788,964	--	--	--	--	28,788,964

Table H-4. Components of User Costs Analysis (in dollars)

	Gates Mills	Highland Heights	Mayfield Heights	Mayfield Village	Richmond Heights	Willoughby Hills	NEORSD SD2 Costs
Annual User Charge to Finance Operation and Maintenance	9	9	9	9	9	9	9
Annual User Cost to Finance Full Local Sewers	0	1,206	0	293	283	998	—
Annual User Cost to Finance Regional Construction of EIS-3 (without Contract G) without EPA Funding	37	37	37	37	37	37	37
Annual User Cost to Finance the Recommended Plan to Solve Existing Needs with 55% EPA Funding	17	17	17	17	17	17	17
Current Sewer Rate	181	181	181	181	181	181	181

APPENDIX I

ARTICLES FROM THE NEORSD NEWSLETTER: PIPELINE

9/85 Pipeline

Pilot projects are planned

Special conditions attached to EPA grants for the Heights/Hilltop Interceptors include construction of approximately $18.7 million worth of sewer rehabilitation work. (See glossary). The Northeast Ohio Regional Sewer District, noting that current rehabilitation techniques have not been sufficiently monitored to render them field-proven and time-tested (see glossary), negotiated with the U.S. Environmental Protection Agency to do a pilot study in lieu of plunging right into the recommended projects. Six communities from the District's service area will be invited to participate.

The pilot study will allow the District to implement and possibly improve on the latest, state-of-the-art rehabilitation techniques. Communities electing to participate in the program will pay for construction work, but the District will provide field work, engineering, flow monitoring and data evaluation services. Results will be shared with all area communities.

Participants will reap several benefits from the pilot program. First, the District will pay for initial studies and detailed engineering design. Second, communities will gain first-hand knowledge of how sewer rehabilitation helps solve their wastewater collection problems. Third, the projects will bring about a portion of EPA-mandated improvements which will reduce the community cost of the remaining improvements at future inflated dollars.

The results of the pilot rehabilitation study will be used to ensure that the recommended relief sewers will be sized to convey the amount of infiltration and inflow which cannot economically be removed.

The District is soliciting member communities who wish to volunteer in this important pilot project, and hopes to have a preliminary selection of study areas soon.

10/85 Pipeline

District Prepares For Pilot Projects

The District could not have gotten its $22 million federal grants to begin construction of the Southwest and Heights/Hilltop Interceptors without agreeing to develop a program to assure rehabilitation of existing wastewater collection systems. To test the cost-effectiveness of current rehabilitation techniques, the District will conduct six pilot projects before plunging into the mandated program. The six communities participating in this pilot project are yet to be determined.

In 1982 the District conducted the Sewer System Evaluation Survey in the Southwest and Heights/Hilltop Interceptor service areas, which disclosed 81 mini-systems (see glossary) where rehabilitation would be more cost-effective than continuing to transport and treat clearwater. These included 18 out of 229 mini-systems monitored in the Southwest Interceptor area and 63 out of 640 minisystems monitored in the Heights/-Hilltop Interceptor area. The District is now field monitoring to verify the results of the surveys.

The District will select areas containing a cross-section of sanitary sewer systems and problems to participate in the pilot projects. The selection will be made from sanitary systems in both common trench and separate trench areas (see glossary).

Common trench systems make up the majority of systems found in the older east side suburbs. The practice of putting the storm and sanitary sewer pipes in the same trench in a common trench system makes it easier for clearwater to seep from storm sewers into sanitary sewers. Today, most systems are built using the separate trench system. This is a better method, but problems still develop over the years.

In the pilot project the District will select three systems from the separate and common areas each. The rehabilitation methods will vary, and careful monitoring before and after the work will help the District evaluate the cost of each technique and its long-term effectiveness.

10/85 Pipeline

Local Basement Flooding Is Tragic But Correctable

Heavy rainstorms can leave scores of Greater Clevelanders with the distasteful task of cleaning up wastewater that has backed up through their basement floor drains or storm water that has seeped through footer drains. Flooding often damages basement floors, walls and anything else in the way. The solution may be complicated and expensive.

The culprits of stormwater flooding are usually storm sewers too small to accommodate runoff from parking lots and other non-absorbant surfaces built over the porous earth. Underground storage tanks or the installation of larger sewers can effectively keep offending storm water in its place. Also, if not cleaned regularly, storm sewers can become filled with debris and flooding can result.

Basement flooding caused by sanitary sewer backups has also been driving thousands of area residents to desperation. Construction of the Southwest and Heights/Hilltop Interceptors will somewhat alleviate the problem, but in some communities special relief sewer and sewer rehabilitation projects are also necessary to control flooding caused by sanitary sewers.

Sanitary sewer backups often result from flooded conditions caused by improperly connected downspouts and footer drains, cracked pipe, open-jointed pipe, and other deficiencies. The District's pilot rehabilitation project is aimed at testing ways to upgrade sanitary sewers and attacking the problems at their source. The pilot project will involve communities that can most benefit from it. (See rehabilitation story).

Sanitary sewer flooding can also be caused by clogged or blocked sewer lines. Depending on the type and location of blockages (tree roots, collapsed pipe, debris, etc.), the local community or homeowner is responsible for fixing the problem. Conscientious scheduled maintenance is the best insurance against such backups.

Through its pilot rehabilitation project, the District will test methods that can eliminate the source of many basement flooding problems caused by deficient sanitary sewers. The District wishes to work with community leaders toward the day when basement flooding is an occurrence far more rare than our inevitable heavy rainstorms.

2/86 Pipeline

Pilot Rehabilitation Projects Coming Up

Several municipalities have tentatively offered to participate in pilot projects which will help the District determine the most cost-efficient techniques to use in the EPA-mandated community rehabilitation program. The District is now doing flow monitoring, dyed water flooding and TV inspection (see glossary) in these communities to determine six appropriate sites for the pilot projects.

The pilot projects in the selected communities will give the District an opportunity to test a cross-section of rehabilitation techniques under varying field conditions. They include:

1. Grouting: TV inspection equipment is used to pull a grout packing unit through a sewer and align it with the sewer joint that is leaking. The grout is then pumped from a truck through hoses connected to the unit to seal the sewer joint.
2. Sliplining: A section of sewer is lined with polyvinyl chloride (PVC), a rigid plastic material which acts as the sewer, similar to having a pipe inside of a pipe.
3. Insituform: A flexible pipe-lining material impregnated with an adhering resin that hardens when heated to become part of the pipe.
4. Obvious measures such as grouting manhole walls and disconnecting catch basins and downspouts from sanitary sewers and hooking them up to storm sewers.

Work in each community will be completed in phases to give the District a chance to evaluate the success and cost-effectiveness of the rehabilitation techniques.

2/86 Pipeline

Shaker Heights Takes Initiative In Sewer System Improvements

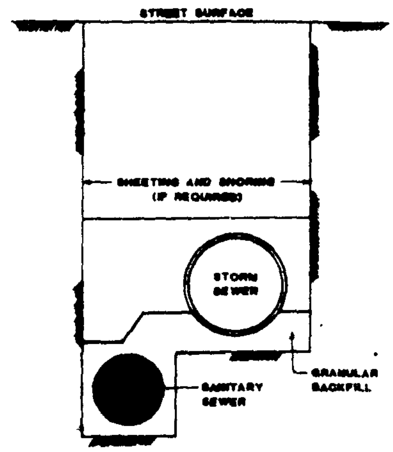
This is the first in a series of articles that present the types of local sewer maintenance and rehabilitation practices of member communities served by the District.

The City of Shaker Heights has long recognized the necessity for implementing a preventitive maintenance program for its sanitary sewer system.

For the past 30 years, Shaker has generated its own funds to upgrade its aging sewer system, which was developed between 1910 and 1930. At Shaker Heights' request, the Cleveland Water Department collects a surcharge on its sewer bills and then remits the revenue to the City to pay the cost of operating, maintaining, repairing, and replacing storm and sanitary sewer lines. Between 1976 and 1984, Shaker Heights spent $5.7 million on upgrading the sewer system. The improvements were aimed primarily at eliminating basement flooding and restoring water quality to nearby lakes and streams.

Sewer rehabilitation techniques in Shaker Heights have varied in many ways, from grouting and manhole rehabilitation (including separation of storm and sanitary manholes) to the installation of a retention basin and the total replacement of sanitary and storm sewers. The original sanitary sewers, built of vitrified clay pipe between 1910 and 1930, are a challenge to wastewater collection specialists who are becoming increasingly adept at rejuvenating the City's aging sewers.

The figure above illustrates the type of sewer construction that was common when sewers were first being built in Shaker Heights and many other communities. This type of construction, typically referred to as common trench sewers, consisted of placing both storm and sanitary sewers within the same excavated trench.



COMMON TRENCH SEWERS

The proximity of the two sewer results in subjecting the sanitar sewer to clearwater inflow from th adjacent storm sewer in those area where either sewer is deteriorated

Sewer separation to correct th problem takes the form of excavatin a new trench parallel to but as f away as possible from the existin common trench. Then, a new storm sanitary sewer is placed in the ne trench. Typically, the new trench co tains the type of sewer that h become the most deteriorated in t existing common trench.

Shaker Heights has found separ tion of sewers to be one of several s cessful rehabilitation methods for c trolling infiltration and inflow of cle water to the sanitary sewer. Oth communities facing similar proble in their wastewater collecti systems may wish to investigate t approach.

10/86 Pipeline

Communities Face Rehab Costs

Sixteen communities in the Heights/Hilltop and Southwest Interceptor service face local expenditures ranging from $100,000 to $12.5 million for sewer improvements or rehabilitation work to meet the requirements of their individual Community Discharge Permits.

No U.S. EPA construction grants are available for local sewer improvements in the Heights/Hilltop or Southwest areas. Therefore, the burden of costs for local work falls on the communities. This burden makes local evaluation of sewer improvement alernatives crucial to communities.

Some communities may already have financing vehicles for the required sewer improvements, but others will have to seek new financing. These financing sources could include revenue bonds, general obligation bonds, short-term notes, special property assessments and Ohio Water Development Authority loans.

Revenue sources that would pay for such financing could come from incremental local sewer use or sewer rental charges, or property, corporate or income taxes.

The Community Discharge Permit requires each of the sixteen communities to perform a financial planning strategy by September 30, 1986, which should include proposed timing and estimated costs for all projects. This permit requirment ensures that local financing of needed improvements is available for major capital expenditures that are, in some instances, several years off. Prudent financial planning in the early stages of such programs may lessen future burdens on local taxpayers.

12/86 Pipeline

Mayfield Heights Devises Workable Rehabilitation Plan

The City of Mayfield Heights has come up with a creative solution to its sewerage problems.

Mayfield Heights, located in the District's Easterly Separate Sewer Service Area, has more than 40 miles of sanitary sewers between 8 and 18 inches in diameter. Three-quarters of the city's sewers drain to the Beech Hill and Wilson Mills pumping stations; the remaining 25% drain to the Belvoir Area trunk sewer.

The Mayfield Heights sewer system is newer than that of many other District communities. Some of the city's sewers, however, were built as early as the 1920's. Generally, the sewers built before the 1960's in the city were constructed in a common trench style, with separate manholes, and those constructed since the 1960's were built in the separate trench style.

The closeness of storm and sanitary sewers in the older portions of the city, the settlement of sewer lines and the use of mortar joints in pre-1960's construction has led to substantial infiltration and inflow (I&I) of stormwater into sanitary sewers.

In 1982, the District recommended more than $2 million in repairs to existing sewers and the installation of relief sewers to curb sewage bypassing during wet weather.

Mayfield Heights has offered a workable alternative approach. In its Community Compliance Plan, submitted to the District as a requirement of the Community Discharge Permit, the city outlines a program of reconstruction and rehabilitation of selected sewers, expansion of retention basins and manhole grouting.

The city will start the program in 1987, and should complete it in the 1990's, when the District's Intercommunity Relief Sewers will be available.

Many of the improvements, such as the replacement of the Ridgebury Road and Mallard Avenue sewers, can be completed early in the program. Other work, such as installation of new, larger sewers under Mayfield Road, cannot be done until the District has provided an outlet for increased flows via an Intercommunity Relief Sewer (see figure on P.3).

To fund the program, City Council passed an ordinance in March, 1986, which provides for the collection of an incremental rate of $4.50 per 1000 cubic feet of water consumed as shown on each sewer bill. These funds are collected by the city of Cleveland which acts as the District's billing agent, remanded directly to the city, and are deposited in a sewer improvement fund. Mayfield Heights is now accumulating funds through this ordinance to pay for the program, and anticipates collection of $500,000 annually.

By combining several customized sewer improvement techniques, Mayfield Heights will be able to alleviate basement flooding as well as meet the requirements of its Community Discharge Permit.

12/86 Pipeline

Tests Continue For Pilot Rehab Sites In Local Areas

The District's Pilot Rehabilitation Project is progressing slowly but steadily. Engineers are still conducting tests to identify sewer problems that may respond to rehabilitation techniques available for the Pilot Project.

The Pilot Rehabilitation Project will help the District determine the most cost-effective techniques to use in the EPA-mandated rehabilitation program. Participating communities will receive sewer system evaluation, design recommendations and pre-and-post-construction monitoring, but they must finance actual construction costs.

Preliminary testing is being done in a wide range of communities on both sides of the Cuyahoga. So far, dyed water flooding, a method of sewer inspection in which dyed water helps identify leakage points, has been performed in main line sewers in sections of Parma, Parma Heights, Lyndhurst, Mayfield Heights, Garfield Heights, Shaker Heights, Cleveland and South Euclid. Testers have also done TV inspection, in which a small, water-tight, closed-circuit TV camera is pulled through sewers by cable, in Cleveland, Parma, Mayfield Heights, South Euclid and Lyndhurst.

In Mayfield Heights, dye testing is being performed on private property house laterals.

The construction phase of the pilot program will begin in 1987. The program presents an exciting opportunity for the District and member communities to work with the most advanced methods and materials now available for sewer system rehabilitation.

3/87 Pipeline

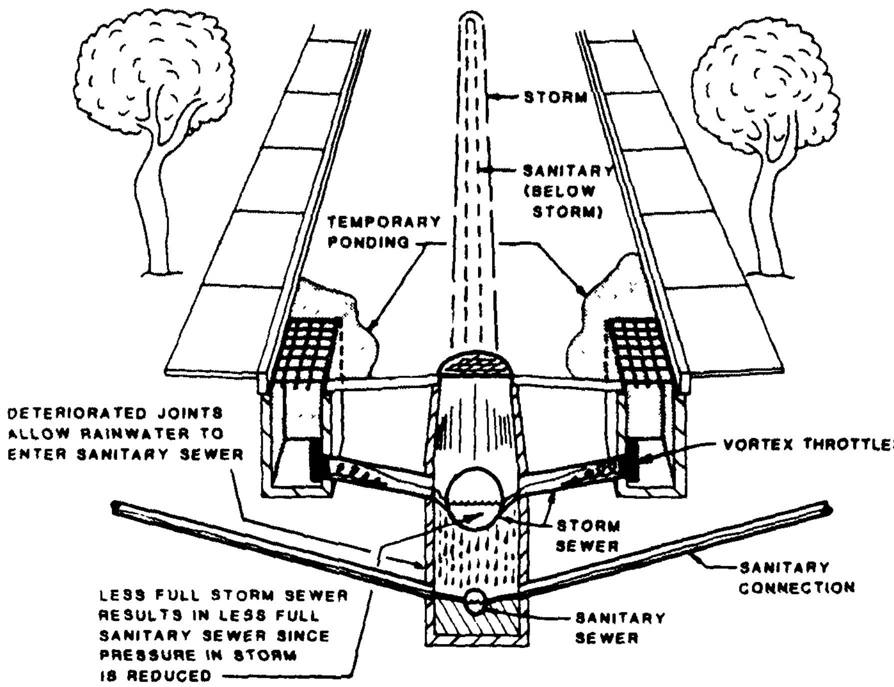
South Euclid Rehab Plan Accepted

When a 1983 evaluation of South Euclid's sewer system showed $6 million in capital needs, the city struggled to come up with a less costly alternative. The result is a resourceful, $2.1 million plan to deter basement flooding and wastewater overflows into Euclid Creek, which will enable the city to meet the requirements of its Community Discharge Permit.

South Euclid's sewer system contains more than 55 miles of separate sanitary sewer, from eight to 39 inches in diameter. Most of the city's sewers were built in the common trench style more than 60 years ago, and deterioration has aggravated infiltration and inflow (I/I) of rainwater into sanitary sewers. Although the District's intercommunity relief sewer program will provide an outlet for sewers in the Belvoir Blvd., Green Road and Warrensville Center areas, local repairs also are needed to satisfactorily upgrade South Euclid's sewer system.

The city proposes a program that combines installation of vortex throttle regulators, repairs to leaking manholes, spot replacement of failed pipe and construction of underground retention basins that can store excess I/I until downstream sewers can handle the load.

Vortex throttle regulators, modern devices that prevent deposition by controlling sewer flow velocities, have been used in various capacities throughout Northeast Ohio. In the figure, overloading of a storm sewer is prevented by vortex regulators installed in catchbasins. By reducing the overloading on the storm sewer, engineers expect to reduce pressure-induced inflow into the lower elevation sanitary sewer.



The figure above demonstrates how vortex throttles are used to control sewer flow. These devices will be used by South Euclid in its rehabilitation program.

South Euclid will begin its rehabilitation program in 1987 by systematically determining where vortex regulators should be installed. A site survey will help determine locations for underground retention facilities. The service department will employ a full time staff to oversee sewer maps and manhole and sewer line maintenance records, and will purchase flow monitors and other testing equipment to aid in sewer system investigations. The step-by-step approach to field monitoring followed by design and construction of improvements affords the greatest opportunity for the city to use past experience to guide future decisions.

The city has increased its sewer rental charge to residents, which is collected on the county tax duplicate, to help finance initial field work. It is estimated that the rehabilitation program will be completed in the early 1990s, around the same time the District has scheduled completion of Contract G of the Heights/Hilltop Interceptor.

Like other communities profiled in *Pipeline*, South Euclid has combined creativity and expertise to chart a better future for its underground byways.

* U S GOVERNMENT PRINTING OFFICE 1988 543-092