22. Other requirements - demonstrate compliance with the following:

b. For **wastewater** system acquisitions, provide a copy of the DEP-approved Act 537 Official Sewage Facilities Plans for the affected municipalities.

AMENDED RESPONSE:

b. See enclosed a copy of the DEP-approved Act 537 Official Sewage Facilities Plans for the Borough of Kane, amended to provide legible copies of pages 70 and 74. See also enclosed a copy of the DEP-approved Act 537 Official Sewage Facilities Plans for Wetmore Township, amended to include legible copies of the cover pages for Appendices I through V and to include Plates I through IV. Both Act 537 Plans are attached as **Amended Appendix A-22-b**.

BOROUGH OF KANE
MCKEAN COUNTY, PENNSYLVANIA

ACT 537
OFFICIAL SEWAGE PLAN

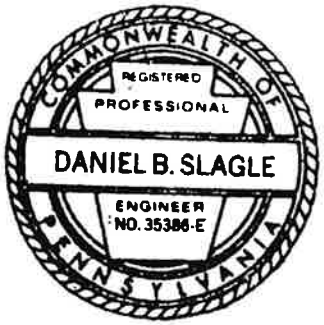
JULY 1990

PREPARED BY

JOHN F. RILEY, P.E.
PROJECT ENGINEER

APPROVED BY

DANIEL B. SLAGLE, P.E.
ASSISTANT VICE PRESIDENT



PLAN ADOPTED BY BOROUGH OF KANE AUGUST 6, 1990

RICHARD F. BLY
PRESIDENT OF COUNCIL

BCM ENGINEERS INC.
5777 BAUM BOULEVARD
PITTSBURGH, PENNSYLVANIA 15206
(412) 361-6000

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PLAN SUMMARY

A. Final Plan Recommendation

1. Alternatives of Choice

a. Wastewater Treatment

Alternative No. 1, Option B, has been selected as the method of choice to provide adequate wastewater treatment of flows from the Borough of Kane and portions of Wetmore Township. As outlined in Alternative No. 1, the Pine Street and Kinzua Road WWTPs will both be expanded and upgraded to treat tributary flows in accordance with permit effluent limits. Option B utilizes the sequential batch reactor process for removal of carbonaceous and ammonia loadings. Preliminary wastewater treatment unit layouts are shown on Exhibits 8 and 10. Construction Costs, Present Worth Analysis, and User fees are developed in Tables 8, 10, 20, 21, and 22.

b. Onlot Sewage Disposal Systems

Sewage flows from existing onlot sewage disposal systems will be connected to the existing public sewer system.

2. Service Areas

a. Borough of Kane

All portions of the Borough are in the Borough of Kane's service area.

b. Wetmore Township

The Borough of Kane is completely surrounded by Wetmore Township. Many developed portions of the Township near the Borough have inadequate existing onlot wastewater disposal systems. Wetmore Township is currently preparing an Official Sewage Plan which will recommend conveying sewage flows from portions of the Township to the Borough of Kane. The Borough is willing to accept sewage flows from Wetmore Township at selected points on the Borough sewerlines having sufficient hydraulic capacity. The Borough will provide wastewater treatment capacity for Wetmore Township in accordance with the flow projections included in this plan.

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3. Institutional Arrangements

A municipal sewage agreement must be developed between the Borough of Kane and Wetmore Township. This agreement will set forth the manner in which Wetmore Township will compensate the Borough of Kane for conveyance of Township sewage flows within the Borough and treatment of Township sewage flows.

B. Implementation

Adopt and Submit Act 537 Plan to PADER	August 1990
Begin Development of Storm Sewer/Sanitary Sewer Maps	October 1990
Submit Sludge Disposal Module 1 to PADER	October 1990
Initiate Monitoring of All Flows Tributary to WWTPs	November 1990
Receive Comments on Act 537 Plan from PADER	November 1990
Submit Revised Act 537 Plan to PADER	January 1991
Revise Sewer Use Ordinance to Prohibit Onlot Sewage Disposal Systems	January 1991
Begin Removal of Waste Sludge from WWTPs	February 1991
Receive Final Approval for Act 537 Plan	April 1991
Authorize Engineer to Design WWTP Expansion/Upgrade	May 1991
Present Municipal Service Agreement to Wetmore Township	July 1991
Submit Plans and Specifications to PADER for Review	January 1992
Submit PENNVEST Loan Application	February 1992
Receive Part 2 Permit for WWTP Construction	June 1992
PENNVEST Approval or Rejection	June 1992
Arrange Supplemental Funding, if Required	August 1992
Advertise Project for Bids	September 1992
Open Bids	November 1992
Close PENNVEST or Bond Issue	December 1992
Award Contract	January 1993
Issue Notice to Proceed	February 1993
Complete Construction	September 1994
Place WWTPs in Operation	October 1994
Connect All Onlot Disposal Systems to Public Sewers	April 1996
Correct Known Sewerline Capacity Problems	April 1996

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1.0 PLANNING OBJECTIVES AND NEEDS

1.1 PLANNING

1.1.1 Previous Planning Activities

(i) In 1969, a Comprehensive Plan for Water and Sewer Systems was developed for McKean County by PADER. This study anticipated stringent effluent standards for the Pine Street and Kinzua Road wastewater treatment plants (WWTP). Both facilities were recommended to be upgraded in the future. To meet these anticipated stringent effluent standards, portions of Wetmore Township will be served by the Borough of Kane's (Borough) WWTPs. Storm relief sewers may be required for the Borough to accommodate excessive inflow.

(ii) No planning has been performed under the Federal Construction Grants Program.

(iii) The Chapter 94 report submitted in March 1990 discussed the Borough's ongoing multi-year program of infiltration/inflow (I/I) detection, abatement, and flow reduction. This program will run concurrently with the Borough's planning, design, and construction program for wastewater collection and treatment system expansion and upgrading. The I/I Reduction Program is expected to include some areas of physical storm/sanitary sewer system separation and rehabilitation. Initial year tasks now in progress include the following:

- Field weiring of selected collector sewers to quantify wet/dry flow relationships and isolate excessive extraneous flows worthy of corrective actions through reduction/removal.

- Dye tracing of suspect storm sewer inlets to confirm direct connections or excessive flows. Remedial methods will then be taken as appropriate.

Chapter 94 states that an Act 537 Plan will be prepared and submitted.

The hydraulic loading at both the Pine Street and Kinzua Road WWTP facilities is approximately 1.1 mgd average daily flow for the peak month or months of record shown in the Chapter 94 Report.

(iv) Plan (COWAMP) of 1979 recommended expansion of the Pine Street WWTP to treat all Borough sewage flows, construction of a pump station and interceptor sewers to convey flows from the Kinzua Road WWTP to the Pine Street WWTP, and subsequent abandoning of the Kinzua Road WWTP. Following acceptance of the COWAMP Plan, it was determined by the Pennsylvania Department of Environmental Resources (PADER) that the Kinzua Reservoir had a greater ability to assimilate treatment plant effluent than originally believed without degradation of the stream. PADER designated Tionesta Creek as a high-quality fishery stream. Current effluent limits require a greater degree of treatment on West Run, a tributary of Tionesta Creek, than is required for Hubert Run. The environmental priorities and recent stream modeling by PADER have revised the previous position as stated in COWAMP.

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1.1.2 No specific implementation schedules were included in the plans listed above which have not been fulfilled. The recommendations of COWAMP were not fulfilled due to a change in PADER policy concerning the watersheds involved.

1.1.3 No future planning is anticipated beyond this Official Sewage Plan.

1.1.4 This Act 537 Plan is the first Official Sewage Plan for the Borough of Kane.

1.2 COUNTY AND MUNICIPAL LAND USE PLANNING

1.2.1 Plate No. 1 (attached) shows all available undeveloped land and zoning classifications in the Borough. The McKean County Planning Commission developed "Policies for the Future" in 1970, which serves as the Act 247 Plan for the County. Page IV-4 states:

> The provision of adequate public water and sewer systems to areas of development is one of the critical problems and priorities in McKean County. Adequate public water and sewer utilities should be provided for the elimination of health problems in existing built-up areas and as a guide and stimulus for future development activity.

Page IV-5 states:

> Future Needs and Policies
>
> In 1969 McKean County adopted a Comprehensive Plan for Water and Sewer Systems. Overall, the plan called for public sewer and water service to all areas with a concentration of development. This basic goal remains the same--that all concentrations of development be serviced by public water and sewer.
>
> The community utility plan recommends the upgrading and expansion of existing plants, and extension of mains to service nearby areas. Developed areas, particularly if a health hazard exists, should receive priority for new systems.

The 1978 "Comprehensive Plan for the Borough of Kane" complements the County's Act 247 Plan in regard to development of public sewers. Page 40 states:

> Subsequent to the reevaluation of the Borough sewage system, recommendations will be made to extend the sewage and water services to the densely settled areas of outlying municipalities, when feasible. Adoption of a zoning ordinance will allow the Borough Council to control the Borough land use regarding residential, commercial, and industrial development. The ordinance will help create a more attractive community for present residents and prospective residents and industries.

When the County's and the Borough's Act 247 Plans were developed, no zoning ordinance was in effect for the Borough. Subsequently, a zoning ordinance has been developed which is consistent with the objectives of the County's and the Borough's Act 247 Plans. Exhibit 1 shows the existing Borough land use as recorded in the Borough's Act 247 Plan.

1.2.2 No inconsistencies were found in the County's and the Borough's Act 247 Plans which effect proposed sewage service.

1.2.3 Existing sewage facility planning is consistent with the proposed land use.

1.2.4 The Borough enacted their Zoning Ordinance A-808 on October 17, 1980.

Residential District R-1 and R-2: New R-1 residential building lots shall not be less than 7,000 square feet per single or two-family dwelling. New R-2 residential building lots shall not be less than 9,000 square feet per single- or two-family dwelling. Apartments and certain classifications of commercial/institutional developments may be allowed in residential districts by special exception.

Commercial-Residential District C-R: All new C-R building lots shall not be less than 5,000 square feet. Land use is very flexible in these districts, allowing a wide range of residential, commercial, or industrial development.

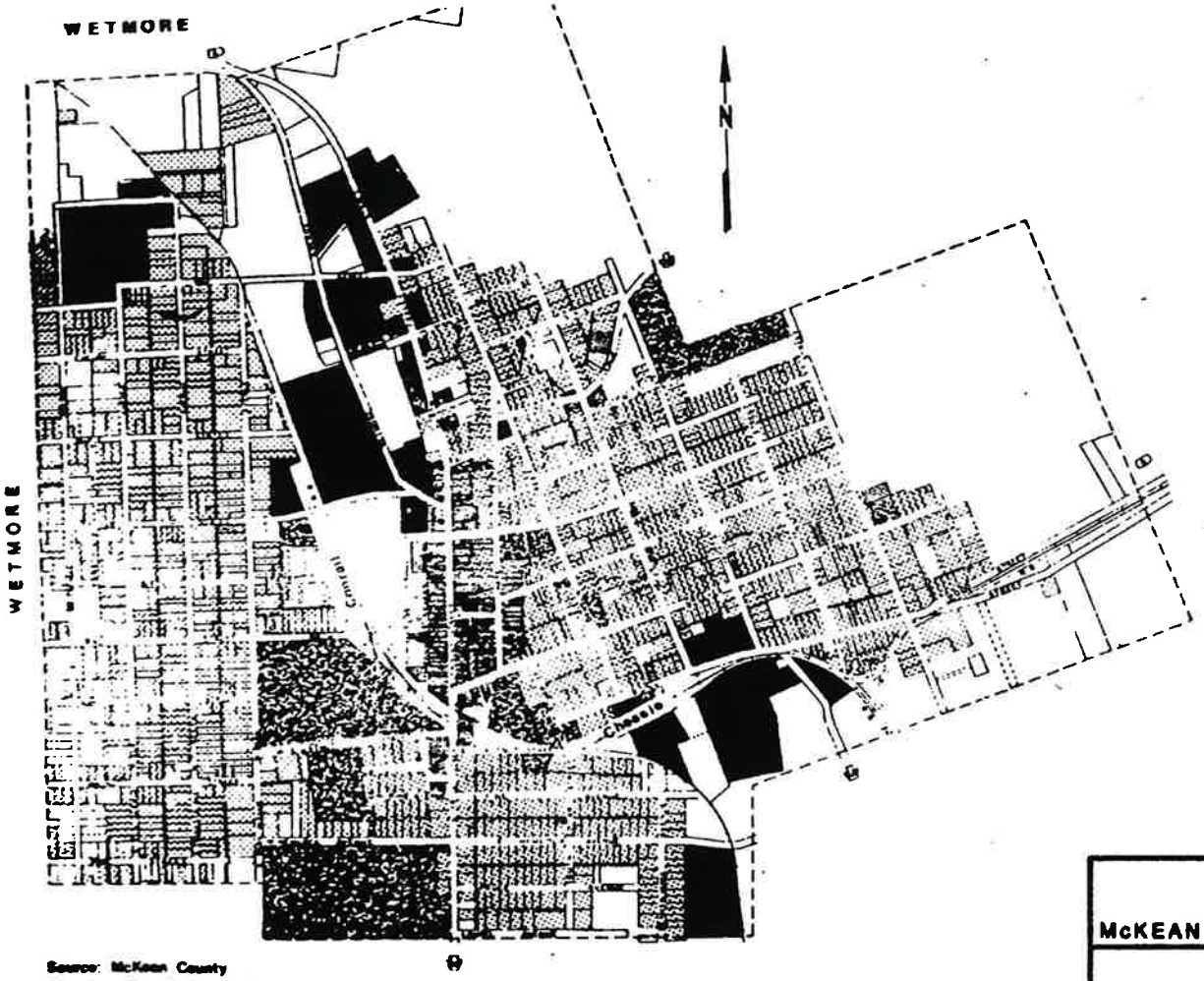
Central Business District C-1: All new C-1 building lots shall be 5,000 square feet or greater. This zoning classification allows for a wide range of commercial and institutional uses.

Industrial District I-1: Industrial building lots shall be at least 25,000 square feet. Industrial and some commercial and institutional functions are allowed. By special exception, almost any type of development may be permitted.

Industrial-Commercial District I-C: Each main building shall have a lot of at least 5,000 square feet. Development of all types allowed in C-1 or I-1 zoning and development allowed in I-1 areas by special exception will be allowed.

The Borough is currently planning to modify the existing Sewer Use Ordinance to require that sewage effluent from all new developments in the Borough be connected to the public sewers. Existing buildings not tied into the public sewers will be required to connect.

1.2.5 Undeveloped building lots within existing subdivisions and undeveloped land parcels are shown on Plate No. 1.



Kane Borough
Land Use

- Residential Areas
- Commercial Areas
- Industrial Areas
- Public / Recreation
- Vacant

0 400 800 1200
Scale in feet

BOROUGH OF KANE

McKEAN COUNTY PENNSYLVANIA

BOROUGH LAND USE

EXHIBIT 1

BCM Engineers
ENGINEERS, PLANNERS, SCIENTISTS and LABORATORY SERVICES

DRAWN BY: JP PROJECT NO: 00-3495-01
SCALE: AS SHOWN
DATE: JULY 1990 FILE NO: S-3495-01-7

1.2.6 Table 1 lists all available undeveloped residential lots. Tables 2 and 3 list available undeveloped acreage:

TABLE 1

Zoning Classification	Number of Unimproved Building Lots in Existing Subdivisions
R-1	31
R-2	16

Because of the small number of undeveloped lots and the demand for new residential development, we will consider that all existing undeveloped residential lots will be developed by the year 2000.

1.2.7 The Flood Hazard Boundary Maps for Wetmore Township and the Borough were reviewed. There were no special flood hazard areas noted in the entire planning area. There are no known wetland areas at the Kinzua Road WWTP site. Two possible manmade wetland areas exist at the Pine Street WWTP site which may prohibit future construction activities (see Exhibit 8).

1.2.8 No Stormwater Management Plan exists for the Borough. Due to the high elevation of the Borough, there are no development limitations due to flooding.

1.2.9 The proposed WWTP improvement project and restrictions to onlot sewage disposal systems within the Borough may benefit public water sources, recreational water use, groundwater recharge, and the availability of water for industrial use. Open space and recreational opportunities will not be negatively affected by expansion of the existing wastewater treatment facilities on Pine Street or Kinzua Road.

An alternate wastewater treatment site is adjacent to Glenwood Park on property owned by the Borough. Construction of a WWTP at that site would utilize land that could be potentially developed for recreational purposes. Suitable land owned by the Kane Estate and controlled by the Borough is available for recreational use. The construction of a wastewater facility adjacent to Glenwood Park should not be ruled out solely on the basis of potential loss of open space and recreational opportunities.

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1.2.10 Historical or Archeological Significance of Project Areas

On May 16, 1990, letters were sent to the Historical Society of Western Pennsylvania, Pittsburgh, Pennsylvania, and to the Historical and Museum Commission, Harrisburg, Pennsylvania, requesting determination of historical and archeological significance of the Pine Street, Kinzua Road, and Glenwood Park WWTP sites. On June 23, 1990, we received a response from the Historical Society of Western Pennsylvania stating that there was no historical significance of the project sites found in the literature search. As of July 25, 1990, we have not received a response from the Historical and Museum Commission.

1.2.11 Pennsylvania Natural Diversity Inventory (PNDI) Search

On May 11, 1990, a PNDI search request was sent to PADER to identify any species of concern which may be impacted by the proposed project. On July 6, 1990, search results were sent to the Borough. The search did not reveal any natural resources of specific concern.

1.2.12 There are no known areas of agricultural significance which will be impacted.

1.3 EXISTING WWTP PLANNING

1.3.1 COWAMP Plan of 1979 recommended expansion of the Pine Street WWTP to treat all Borough sewage flows, construction of a pump station and interceptor sewers to convey flows from the Kinzua Road WWTP to the Pine Street WWTP, and subsequent abandoning of the Kinzua Road WWTP. Following acceptance of the COWAMP Plan, it was determined by the Pennsylvania Department of Environmental Resources (PADER) that the Kinzua Reservoir had a greater ability than previously believed to assimilate treatment plant effluent without degradation of the stream. PADER designated Tionesta Creek as a high-quality fishery stream. Current effluent limits require a greater degree of treatment on West Run, a tributary of Tionesta Creek, than is required for Hubert Run. The environmental priorities and recent stream modeling by PADER have reduced the stringent discharge limits stated in COWAMP for Hubert Run.

1.3.2 The Borough has been informed by PADER that the effluent of the Pine Street plant is tributary to Tionesta Creek, a high-quality fishery stream. PADER will not permit any bypasses of combined sewage in this watershed. Effluent quality required in this watershed will be high.

1.3.3 The Chapter 94 Report states that an Act 537 Plan will be submitted to address wastewater treatment needs. Specifically, Chapter 94 also discusses the ongoing I/I Analysis and Flow Reduction Program currently underway. No other corrective work or scheduling is addressed in the Chapter 94 Report.

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1.3.4 The 1980 State Water Plan for the Upper Allegheny River states that the Western Pennsylvania Water Company, Kane District, utilizes 7 springs and 16 wells for existing water supply. The treatment capacity is listed as 1.0 mgd with 0.7 mg treated water storage. Safe yield of supply is listed as 1.14 mgd. The water plan projects yield, storage, and treatment deficiencies for the years 1990 and 2020. The company has since changed their name to the Pennsylvania American Water Company. The Water Company now utilizes 13 wells, 8 wet weather springs, and is developing 2 new wells. During certain times of the year, surface water is taken from Hubert Run. With development of the new wells, safe yield will be 1.5 mgd.

Safe yield of the existing wells is 1.14 mgd. The surface and spring supplies have no safe yield although they do supply about 60 percent of the water used annually. Plans are underway to expand the water treatment plant to 1.2 mgd. Existing treated storage consists of a 0.4 mg standpipe and 0.1 mg clearwell. Within the next five years, the Water Company plans to build an additional 0.8 mg treated water storage tank.

1.3.5 On May 16, 1990, a letter was sent to the PADER Mining Subsidence Regulation Section to determine if the Pine Street, Kinzua Road, or Glenwood Park WWTP site areas had been undermined. The Coal Status Report dated June 16, 1990, states that there are no mining records available for your site.

1.4 GROWTH AREAS AND PROJECTED WASTEWATER FLOWS

1.4.1a Expected increases in sewage flows within the Borough to the Pine Street WWTP are as follows:

TABLE 2

PINE STREET WWTP
PROJECTED SEWAGE FLOW INCREASES

Zoning Classification	Unimproved Bldg. Lots	Undeveloped Acreage	Lots/ Acre	Expected Number of EDUs	Average Sewage Flow/EDUs	Increased Sewage Flows Kane (gpd)
R-1 Lots	31			31	350	10,850
R-1 Acreage		5	3	15	350	5,250
R-2	8			8	350	2,800
C-R						
C-1						
I-1		0.7		3	350	1,050
I-C						
Onlot Systems				4	350	1,400
Total				61		22,000

Due to the small quantity of undeveloped land in the Borough, we will consider 100 percent development of these areas in the ten-year planning period.

The anticipated sewage flow from Wetmore Township tributary to the Pine Street WWTP, as reported by KLH Engineers, in the year 2000 for 213 EDUs is 75,000 gpd. The total projected increase in sewage flow to the Pine Street plant is 97,000 gpd. The design flow based on existing flow records is approximately 1,150,000 gpd. A projected design flow is estimated at 1,247,000 gpd. A preliminary design flow of 1.4 mgd will be used to account for the bypasses at Pine Street and the limited flow monitoring information.

1.4.1b Expected increases in sewage flows within the Borough to the Kinzua Road WWTP are as follows:

TABLE 3

KINZUA STREET WWTP
PROJECTED SEWAGE FLOW INCREASES

Zoning Classification	Unimproved Bldg. Lots	Undeveloped Acreage	Lots/ Acre	Expected Number of EDUs	Average Sewage Flow/EDUs	Increased Sewage Flows Kane (gpd)
R-1						
R-2 Lots	8			8	350	2,800
R-2 Acreage		138	3	414	350	144,900
C-R						
C-1		0.10		1	350	350
I-1		4.8		20	350	7,000
I-C						
Onlot Systems				2	350	700
Total				445		156,000

The anticipated design year sewage flow from Wetmore Township tributary to the Kinzua Road WWTP, as reported by KLH Engineers, in the year 2000 for 138 EDUs is 49,000 gpd. The total projected increase in sewage flow to the Kinzua Road WWTP is 205,000 gpd. The design flow based on existing flow records is approximately 1,130,000 gpd. Projected design flow is estimated at 1,335,000 gpd, or 1.4 mgd.

1.4.2 Due to the small quantity of undeveloped land, we will consider 100 percent development of these areas in the ten-year planning period. A flow increase of 75 percent is expected within five years and 100 percent is expected within ten years. Population projections for the Borough of Kane are as follows:

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TABLE 4

BOROUGH OF KANE POPULATION PROJECTIONS

Year	Persons
1970	5,001
1980	4,993 Estimated
1990	5,078 Projected
2000	5,175 Projected

Source: 1978 Comprehensive Plan for the Borough of Kane

The proposed WWTP expansion project will be sufficient to accommodate sewage flows at least to the year 2005.

2.0 PHYSICAL DESCRIPTION OF THE PLANNING AREA

2.1 PHYSICAL DESCRIPTION

The Borough is located in southwestern McKean County. Wetmore Township completely surrounds the Borough. A ridge runs north to south, passing through the Borough. Runoff flows on the east side of town are tributary to Hubert Run and the Kinzua Creek. Runoff flows from the west side of the Borough are tributary to West Run and Tionesta Creek. (See Exhibit 2.) The Borough and the Kane Borough Authority have the responsibility of providing sewage service to customers within the Borough. Approximately 65 sewer customers in Wetmore Township are currently served by the Borough. Borough boundaries, stream information, and a drainage basin breakdown are illustrated in Exhibit 2. The recommendations of this Official Sewage Plan will be implemented by the Borough and the Kane Borough Authority.

2.2 SOIL CONDITIONS

At present, there are only six known onlot sewage disposal systems within the Borough. We have been informed by Mr. John Wester, the sewage disposal officer for the Borough, that soil conditions within the Borough are unsuitable for onlot disposal of sewage. A soil map of the Borough is attached as Exhibit 3. This map was developed from the "Soil Survey of McKean County" prepared by the U.S. Department of Agriculture Soil Conservation Service.

An inspection of the soils map for the Borough (Exhibit 3) shows the following soils:

- Brinkerton Silt Loam: 0 to 8 percent and 3 to 8 percent slopes. These soils are fine--silty, mixed, mesic Typic Fragiaqualfs. They are very deep, poorly drained, and located in drainageways, bases of steeper slopes, and in concave basins in broad, upland areas. The seasonal high water table and slow or moderately slow permeability in the fragipan are limitations of this soil for onsite waste disposal.

- Buchanan Series: These soils are fine--loamy, mixed, mesic Aquic Fragiudults. These soils are very deep and moderately well drained to somewhat poorly drained. Their slopes range from 0 to 25 percent. They are located in broad valleys and drainageways. The seasonal high water table and slow permeability in the fragipan and the substratum are limitations for onsite waste disposal.

- Cookport Series: These soils are fine--loamy, mixed, mesic Aquic Fragiudults. These soils are deep and very deep, moderately well drained soils on uplands. Their slopes range from 0 to 25 percent. The seasonal high water table and slow permeability in the fragipan are limitations for onsite waste disposal.

- Hartleton Series: These soils are loamy--skeletal, mixed, mesic Typic Hapluducts. These soils are deep and well drained. They are on hillsides, benches, and hilltops. Their slopes range from 3 to 60 percent. Slopes and large stones on the surface are limitations of this soil. Locating absorption fields for onsite waste disposal systems on nearby, less steep soils would be more suitable than these soils.

- Hazleton Series: These soils are loamy--skeletal, mixed, mesic Typic Dystrochrepts. These soils are deep and well drained. They are on nearly level to moderately steep, convex hillsides and hilltops. Slopes range from 0 to 25 percent. If this soil is used for onsite waste disposal systems, the moderately rapid to rapid permeability causes a hazard of groundwater contamination.

Upon investigation of these soils, we would recommend prohibition of onlot wastewater disposal systems in the Borough. The above soils prove to be unsatisfactory for onlot systems.

The Borough will modify their Sewer Use Ordinance to prohibit any future onlot systems. Property owners utilizing existing onlot systems will be required to connect to the public sewer system.

2.3 GEOLOGIC CONDITIONS

- Pottsville Group--Mostly sandstones and conglomerate with thin shales and coals.
- Allegheny Group--Cyclic sequences of sandstone, shale, limestone, and coal.
- Pocono Group--Predominantly gray, hard, massive, cross-bedded sandstone, and conglomerate with some shale.

There are no known geological features which prohibit onlot waste disposal systems.

2.4 POPULATION PROJECTIONS

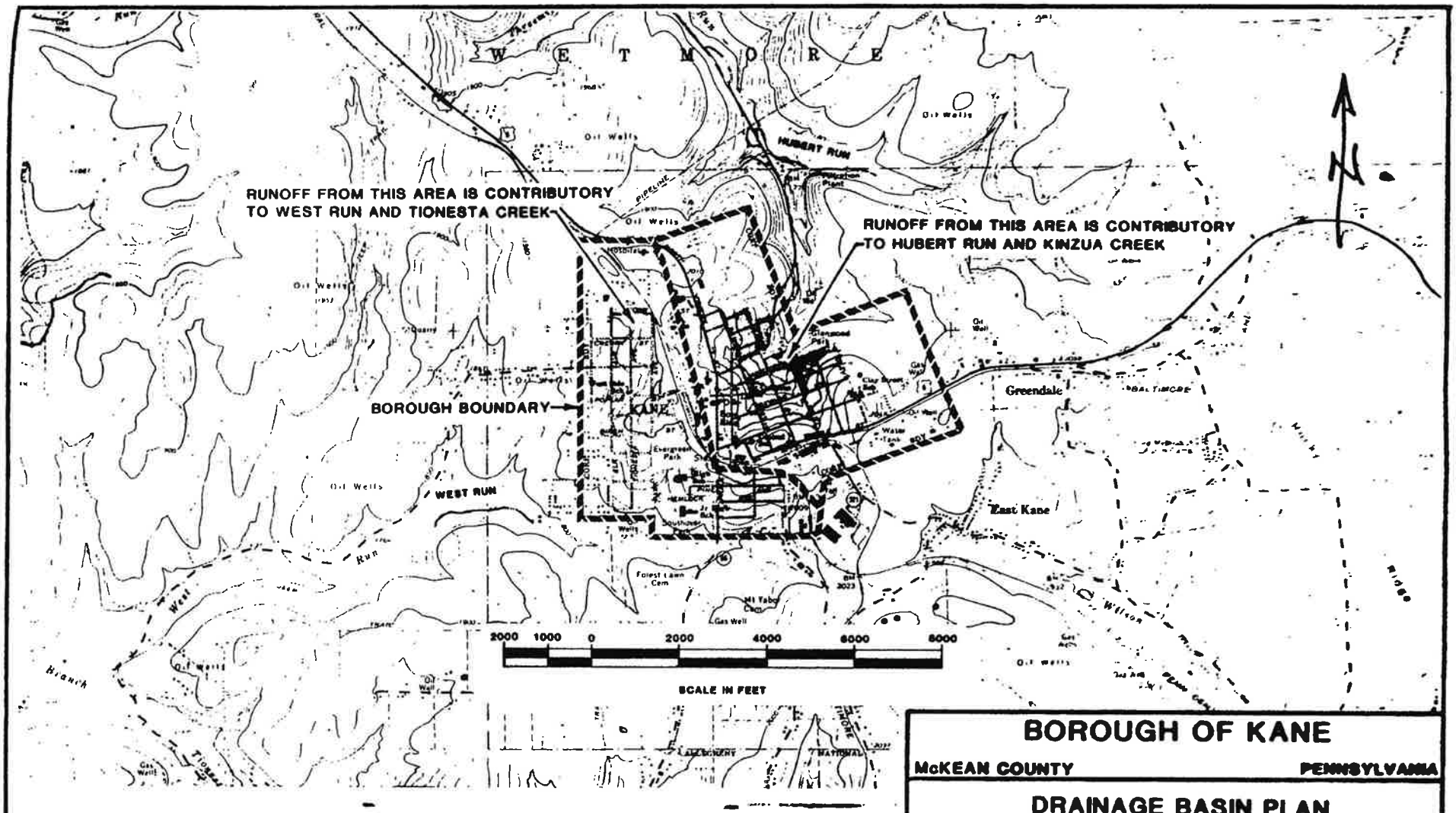
Population projections for the Borough are presented as follows:

TABLE 5

BOROUGH OF KANE POPULATION PROJECTIONS

Year	1978 Comprehensive Plan	PADER
1960	-	5,380
1970	5,001	5,001
1980	4,993 Projected	4,916
1990	5,078 Projected	4,536 Projected
2000	5,175 Projected	4,203 Projected
2020	-	3,776 Projected
2030	-	3,635 Projected

Borough population projections are far more optimistic than PADER projections. Modest economic growth being experienced in the area indicates that the Borough's projections are more accurate. The difference between the Borough and PADER population projections is insignificant in terms of changing projected sewage flows. Expansion of the existing WWTPs will be dictated more by the existing flow of the Borough than by flows resulting from modest growth in the Borough and proposed Wetmore Township flows. According to the McKean County Planning Commission, there are no County population projections. Available data is insufficient to determine if growth patterns in recent years have varied significantly from population projections. Data related to available land for development was used to develop projected sewage flow increases within the Borough (see Tables 2 and 3).



BOROUGH OF KANE

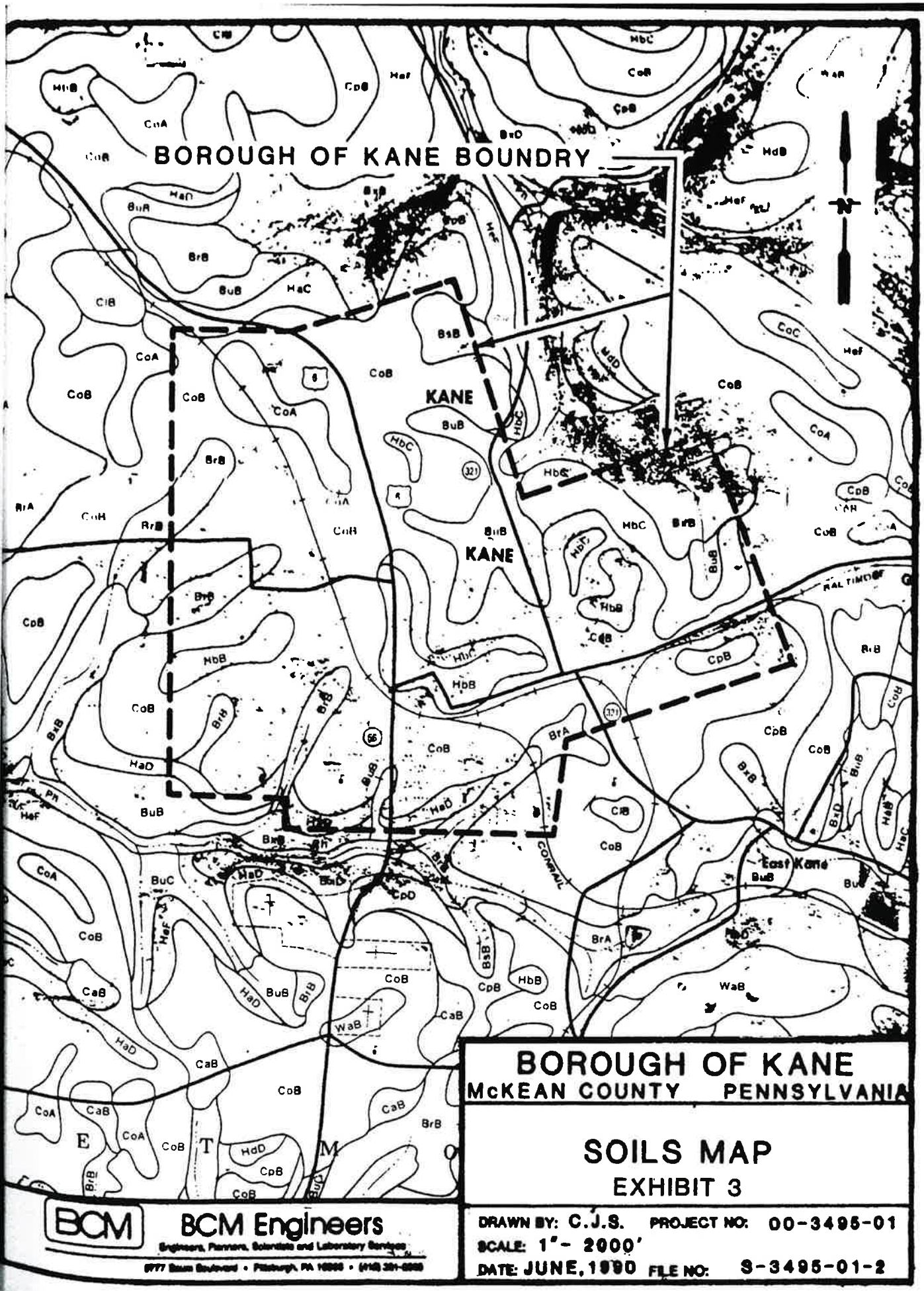
McKEAN COUNTY PENNSYLVANIA

DRAINAGE BASIN PLAN

EXHIBIT 2

BCM Engineers
ENGINEERS, PLANNERS, SCIENTISTS and LABORATORY SERVICES

DRAWN BY: JP PROJECT NO: 00-3496-01
SCALE: AS SHOWN
DATE: JULY 1990 FILE NO: B-3496-01-8


BOROUGH OF KANE BOUNDRY
KANE
KANE
East Kane
CONRAIL
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
SOILS MAP
EXHIBIT 3
BCM Engineers
Engineers, Planners, Scientists and Laboratory Services
DRAWN BY: C.J.S. PROJECT NO: 00-3495-01
SCALE: 1"- 2000'
DATE: JUNE, 1990 FILE NO: S-3495-01-2

BCM

3.0 EVALUATION OF EXISTING WASTEWATER TREATMENT AND CONVEYANCE SYSTEM

3.1 DESCRIPTION OF EXISTING MUNICIPAL SEWAGE FACILITIES

3.1.1 See Plate No. 2 for the locations of the existing Pine Street and Kinzua Road WWTPs, which are owned by the Kane Borough Authority.

3.1.2 Wastewater discharges from the two WWTPs are also shown on Plate No. 2. The Pine Street WWTP discharges to a tributary of West Run, and Kinzua Road WWTP discharges to Hubert Run.

3.1.3 Both discharge locations are eventually tributary to the Allegheny River.

3.1.4 Effluent limits and sample results for the existing facility are attached as Exhibit 4. The Borough has been unable to meet effluent limits for Ammonia, $CBOD_5$, and suspended solids on many occasions. The existing facilities are not capable of continuously meeting effluent limits. Based on discussions with PADER, effluent limits will remain at current levels for both plants if the Kinzua Road WWTP is expanded and upgraded and if the Pine Street WWTP is upgraded or abandoned. More stringent effluent limits are expected if the Pine Street WWTP is expanded (see Exhibit 5).

3.1.5 The Pine Street and Kinzua Road WWTPs are essentially identical. Each facility has one comminutor, one primary clarifier, one rock trickling filter, one secondary clarifier, chlorine contact tank, and one sludge digester. Flow recirculation pumping, grit pumping, sludge pumping, and digester heating facilities are also provided. A schematic drawing of the existing WWTPs is included as Exhibit 6.

3.1.6 The permitted hydraulic capacity for each plant is 0.80 mgd. Continuous flow monitoring data of reported bypasses tributary to the existing WWTPs is unavailable. Large quantities of flow are believed to be bypassed during significant rainfall events. The Kane WWTPs are not technically hydraulically overloaded, but continuous flow monitoring proposed prior to design may reveal a hydraulic overload condition. The Chapter 94 Report projects that both the Pine Street and Kinzua Road WWTPs will be hydraulically overloaded in the planning period.

The permitted organic loading in BOD based on the original design report for each WWTP is 680 lbs/day. According to the 1989 Chapter 94 Report, neither facility is organically overloaded. The Pine Street WWTP is projected to surpass the 680 lbs/day in 1994. The Kinzua Road WWTP is not projected to exceed the 680 lbs/day organic loading in the planning period.

3.1.7 The Chapter 94 Report does not include a schedule for the upgrading or expansion of either the Pine Street or Kinzua Road WWTP facilities. There are no WWTP improvement projects underway.

3.1.8 There is no preallocated wastewater treatment capacity.

3.1.9 The most significant operational problem of both the Pine Street and Kinzua Road WWTP facilities is the lack of any sludge wasting from mid-winter 1989 to the present time.

In May 1985 a tornado caused extensive damage to the Pine Street WWTP. Most damage was limited to structures, and although some treatment capability was interrupted, the mechanical system was not damaged significantly. Tornado damage has been repaired.

Interviewing the Pine Street WWTP operator, Mr. Fred Siggins, resulted in the following list of recommended maintenance items:

- The clarifier drive mechanisms, though functional, have never been rebuilt and may require service.
- The grit removal system, though functional, should be overhauled.
- Trickling filter distributors should be replaced.
- Recirculation pump from the secondary clarifier effluent to the primary clarifier effluent has never been functional due to hydraulic problems.
- Digester floating cover should be inspected.

Interviewing the operator, Mr. David Wedow, for the Kinzua Road WWTP resulted in the following list of maintenance items:

- The clarifier drive mechanisms, though functional, have never been rebuilt and may require service.
- Comminutor should be rebuilt.
- Trickling filter distributors should be replaced.
- Digester floating cover should be inspected.

EXHIBIT 4
PINE STREET TREATMENT PLANT

EFFLUENT LIMITS

Parameter	Monthly Average	Monthly Maximum Average	Monthly Minimum
$CBOD_5$ mg/l (5/1 - 10/31)	20.0	30.0	
$CBOD_5$ mg/l (11/1 - 4/30)	25.0	40.0	
TSS mg/l	30.0	45.0	
NH_3 - N mg/l (5/1 - 10/31)	2.0	3.0	
NH_3 - N mg/l (11/1 - 4/30)	6.0	9.0	
D.O. mg/l			7.0
Fecal Coliform/100 ml (5/1 - 9/30)	200.0		
Fecal Coliform/100 ml (10/1 - 4/30)	2150.0		
pH Standard Units	9.0		6.0

SAMPLE RESULTS

	$CBOD_5$ mg/l (5/1 - 10/31)		$CBOD_5$ mg/l (11/1 - 4/30)		TSS mg/l		NH_3 - N mg/l (5/1 - 10/31)		NH_3 - N mg/l (11/1 - 4/30)	
	Monthly Average	Maximum	Monthly Average	Maximum	Monthly Average	Maximum	Monthly Average	Maximum	Monthly Average	Maximum
A	N/A	N/A	11.4	17.5	10.5	14	N/A	N/A	6.7	10.8
M	9.4	11.3	N/A	N/A	15.2	20	3.2	5.2	N/A	N/A
J	7.8	10.8	N/A	N/A	22.5	29	1.6	2.6	N/A	N/A
J	13.5	21.0	N/A	N/A	33.8	44	5.2	6.7	N/A	N/A
A	16.7	22.2	N/A	N/A	40.8	56	7.5	10.4	N/A	N/A
S	16.9	24.0	N/A	N/A	36.5	48	4.7	6.8	N/A	N/A
O	34.6	102.0	N/A	N/A	37.6	46	7.1	11.8	N/A	N/A
N	N/A	N/A	41.7	51	39.5	76	N/A	N/A	4.6	5.2
D	N/A	N/A	43.1	88.5	38.5	62	N/A	N/A	11.8	18.0
J	N/A	N/A	16.9	28.0	18.8	36	N/A	N/A	4.6	7.0
F	N/A	N/A	17.0							
M	N/A	N/A	25							
TOTAL	98.9	191.3								
AVERAGE	16.48	31.9								

	D.O.	
	6.	
N		
D		
J		
F		
M		
TOTAL	76.6	
AVERAGE	6.38	

EXHIBIT 4 (Continued)
KINZUA ROAD TREATMENT PLANT

EFFLUENT LIMITS

Parameter	Monthly Average	Monthly Maximum Average	Monthly Minimum
$CBOD_5$ mg/l	25.0	40.0	
TSS mg/l	30.0	45.0	
NH_3 - N mg/l (5/1 - 10/31)	3.0	4.5	
NH_3 - N mg/l (11/1 - 4/30)	9.0	14.0	
D.O. mg/l			6.0
pH Standard Units		9.0	6.0
Fecal Coliform/100 ml (5/1 - 9/30)	200.0		
Fecal Coliform/100 ml (10/1 - 4/30)	2500.0		

SAMPLE RESULTS

$CBOD_5$ mg/l		TSS mg/l		NH_3 - N mg/l (5/1 - 10/31)		NH_3 - N mg/l (11/1 - 4/30)	
Monthly Average	Maximum	Monthly Average	Maximum	Monthly Average	Maximum	Monthly Average	Maximum
9.5	11.2	14.5	24	N/A	N/A	4.4	7.6
9.5	14.0	20.7	38	2.0	3.4	N/A	N/A
8.2	9.4	30.5	38	1.6	2.5	N/A	N/A
12.8	23.0	46.8	74	2.6	3.0	N/A	N/A
12.8	16.0	36.4	44	4.2	5.6	N/A	N/A
14.0	16.0	55.5	68	4.4	5.2	N/A	N/A
17.7	28.0	54.4	78	4.0	4.8	N/A	N/A
47.2	73.0	93.5	104	N/A	N/A	4.9	7.4
50.1	71.5	47.5	66	N/A	N/A	16.7	24.0
26.4	46.0	51.5	102	N/A	N/A	7.0	12.0
23.9	30.3	39.6	56	N/A	N/A	5.3	7.4
34.0	43.7	56.5	92	N/A	N/A	9.7	11.6
AL 266.10	382.10	547.40	784	18.8	24.5	48	70
RAGE 22.2	31.84	45.62	65.33	3.13	4.08	8	11.67

D.O. mg/l	Fecal Coliform/100 ml (5/1 - 9/30)	Fecal Coliform/100 ml (10/1 - 4/30)	pH Standard Units	
Monthly Minimum	Monthly Average	Monthly Average	Monthly Minimum	Monthly Maximum
6.3	N/A	52	6.6	7.4
6.2	94	N/A	6.4	7.1
7.4	20	N/A	6.3	7.1

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
1012 Water Street
Meadville, Pennsylvania 16335
Telephone: A. C. 814/332-6942

May 22, 1990

Subject: Kane Borough, McKean County
537 Update-Preliminary Limits

John F. Riley, P.E.
Project Engineer
BCM Engineers
5777 Baum Boulevard
Pittsburgh, PA 15206

Dear Mr. Riley:

We have evaluated the treatment options you requested during our May 7, 1990 meeting. Assuming flow equalization would be provided, the following limits would be necessary:

Kinzua Road (1.5 MGD, 2.2 MGD and 3 MGD)

Parameter	Monthly Average	Weekly Average	Instantaneous Maximum
$CBOD_5$	25	40	50
TSS	30	45	60
NH_3-N (5/1-10/31)	2	3	4
NH_3-N (11/1-4/30)	6	9	12
DO	Minimum 6 mg/l at all times.		
pH	Minimum 6.0; Maximum 9.0		
Fecal Coliform			
(5/1-9/30)	200/100 ml as a geometric average.		
(10/1-4/30)	2,200/100 ml as a geometric average. (1.5 MGD)		
	2,100/100 ml as a geometric average. (2.2 MGD)		
	2,100/100 ml as a geometric average. (3 MGD)		

Pine Street (1.5 MGD)

Parameter	Monthly Average	Weekly Average	Instantaneous Maximum
$CBOD_5$ (5/1-10/31)	10	15	20
(11/1-4/30)	20	30	40
TSS	30	45	60
NH_3-N (5/1-10/31)	2	3	4
NH_3-N (11/1-4/30)	6	9	12
DO	Minimum 7 mg/l at all times.		
Phosphorus (4/1-10/31)	2	3	4
NO_2-NO_3	10	15	20
pH	Minimum 6.0; Maximum 9.0		
Fecal Coliform			
(5/1-9/30)	200/100 ml as a geometric average.		
(10/1-4/30)	2,200/100 ml as a geometric average.		

The Pine Street plant discharges to West Run. This stream is part of the East Branch Tionesta Creek watershed, which is classified as a High Quality - Cold Water Fishery. High Quality waters are to be protected as they exist. The water quality can only be lowered if the discharge is a result of necessary social or economic development which is of signficant public value. This proposal would require submission of a Social and Economic Justification (SEJ) statement. Part of this statement would have to prove land disposal alternatives (i.e., spray irrigation, overland flow cluster, on-lot system, etc.) are not economically feasible or environmentally sound. SEJ approval by the Department would be needed prior to allowing an increased discharge to this watershed.

Effluent limits for the 0.8 MGD flow option would be the same as the ones contained in the Pine Street plants' current permit.

I have also attached the applicable COWAMP Report pages pertaining to Kane Borough and Wetmore Township. If you need anything else or have additional questions, feel free to call me.

Sincerely,

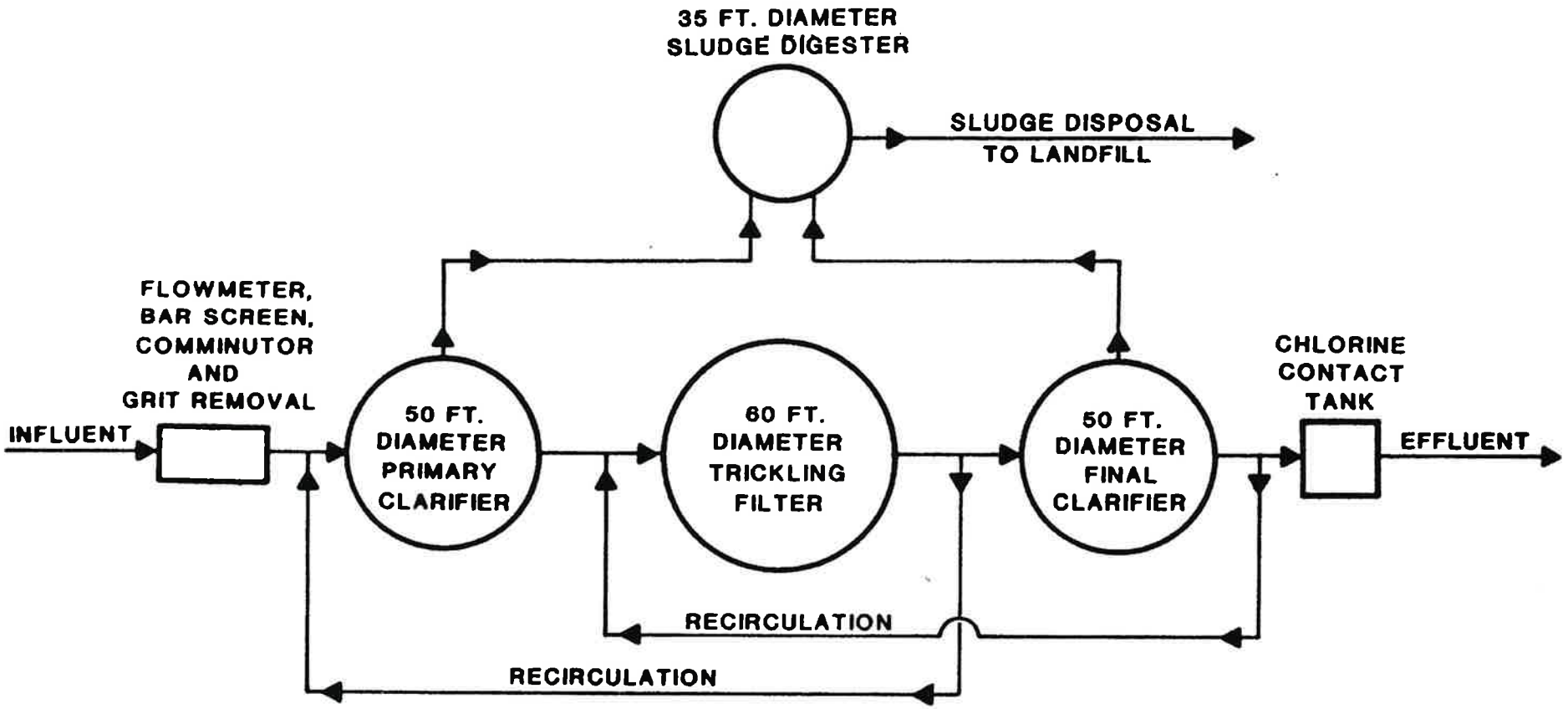
Robert P. Hutchinson

Robert P. Hutchinson
Sanitary Engineer
Bureau of Water Quality Management

RPH/jb

Attachment

cc: Ms. Laura J. Andrusis



BOROUGH OF KANE

McKEAN COUNTY PENNSYLVANIA

EXISTING WASTEWATER TREATMENT PLANT FLOW SCHEMATIC

EXHIBIT 6

JUN 28 1990

BCM Engineers
ENGINEERS, PLANNERS, SCIENTISTS and LABORATORY SERVICES

DRAWN BY: JP PROJECT NO: 00-3495-01
SCALE: NONE
DATE: JUNE 1990 FILE NO: S-3495-01-3

BCM

3.2 SEWAGE COLLECTION AND TRANSMISSION SYSTEM

3.2.1 All sewer collection and interceptor sewerlines are owned by the Borough. Line locations are shown on Plate No. 2. There are no wastewater pumping facilities.

3.2.2 There are no known permitted capacities on the sewage collection system. Borough personnel have reported a sewage backup during heavy rainfalls in an area tributary to the Pine Street WWTP near the intersection of Elk and Cherry Streets. It is believed that there is insufficient hydraulic capacity in the 10-inch sewer on Cherry Street between Elk and Smithfield and the 12-inch sewer on Smithfield between Cherry and Maple to carry all tributary flows.

3.2.3 The Chapter 94 Report addresses the efforts currently underway to identify significant sources of infiltration/inflow and the Borough's general plan to institute a multi-year flow reduction plan.

3.2.4 There are no known allocations of sewage conveyance capacity for future use.

3.2.5 Sewage collection system operation and maintenance is the responsibility of the Borough Street Department. Moderately steep pipeline gradients exist over the sewage system serving to minimize the plugging or stopping of collector sewers. The Borough's ongoing preventive maintenance program involves water flushing of certain areas of the sewer system every three weeks. In addition, certain areas receive regular visual inspections at manholes and the addition of chemicals to aid in control of grease and other potential blockages. Where a partial or complete blockage occurs that cannot be cleared by flushing or chemical addition, power rodding is performed.

3.3 EXISTING ONLOT SYSTEMS

3.3.1 There are believed to be only six existing individual onlot systems within the Borough. Because soil conditions in the Borough are not suitable for the use of onlot disposal systems, no additional onlot systems will be allowed and all existing onlot systems will be abandoned within the planning period. Homes or businesses with existing onlot systems will be required to connect to the existing collection system. The locations of the existing onlot systems are shown on Plate No. 1.

In 1985, Mr. John Wester was called to investigate a malfunctioning septic tank at 400 Birch Street. Sewage was being discharged to the lawn surface of 402 Birch Street. Soils were not suitable to allow onsite disposal of septic tank effluent. No modification of the existing onlot system was recommended. A pipeline was installed to relocate the discharge point to a wooded area nearby in accordance with Mr. Wester's recommendation.

3.3.2 There are no existing community onlot systems, and no future systems of this type will be allowed.

3.3.3 There are no known existing sewage holding tanks in the Borough.

3.4 WILDCAT SEWERS OR BOREHOLE DISPOSAL OF SEWAGE

There are no known wildcat sewers or borehole disposal of sewage in the Borough according to the Sewage Enforcement Officer, Mr. John Wester.

3.5 SLUDGE GENERATION, TRANSPORT, AND DISPOSAL

3.5.1 The sources of wastewater sludge are the Pine Street and Kinzua Road WWTPs and the existing onlot disposal septic tanks. All of these facilities are shown on Plate No. 2.

3.5.2 Liquid sludge disposal records for the Pine Street and Kinzua Road WWTPs are presented as follows:

TABLE 6

LIQUID SLUDGE DISPOSAL

Year	Liquid Sludge (Gallons)
1985	144,000
1986	-
1987	210,000
1988	150,000
1989	99,000

Actual percentage of solids was unavailable, but we estimate 1 to 2 percent solids. We have been informed by the treatment plant operators that adequate sludge wasting has not been accomplished for several years.

3.5.3 There are currently no permitted sludge disposal methods. The Borough has applied for, but has not yet received, permits for landfill disposal of dewatered sludge.

Sludge will be dewatered by belt filter press equipment and hauled by truck for landfill disposal. The Borough is currently making arrangements for sludge dewatering and transporting services by an independent company or by a nearby municipality.

3.5.4 The Borough is currently entering into an arrangement which will utilize an independent company or a nearby municipal system for transporting all sewage sludge.

3.5.5 The choice of a sludge disposal site is uncertain at this time.

3.5.6 The choice of a sludge disposal site is uncertain at this time. The Borough is responsible for arranging an environmentally acceptable method of disposing sewage sludge.

BCM

4.0 EVALUATION OF WASTEWATER NEEDS

4.1 AREAS DEPENDENT UPON SUBSURFACE SEWAGE DISPOSAL

4.1.1 There are six onlot sewage disposal systems in the Borough which rely on subsurface disposal. These account for an estimated 1,800 gpd of sewage. There are approximately 280 existing homes in Wetmore Township which may be connected to the Kane sewerage system. These homes may contribute an estimated 124,000 gpd of sewage. Some of these are existing onlot systems.

4.1.2 All soil types listed in the Borough of Kane are severely restricted for subsurface sewage disposal use. Both West Run, a tributary of Tionesta Creek, and Hubert Run, a tributary of Kinzua Creek, could be adversely affected by continued use of subsurface disposal methods in the area.

4.1.3 Sewage collection lines are available within a reasonable distance to all existing subsurface sewage disposal systems (onlot) within the Borough.

4.2 MALFUNCTIONING ONLOT SYSTEMS

4.2.1 The septic tank serving 400 Birch Street is known to discharge water to the surface in an area tributary to West Run. According to Mr. John Wester, Sewage Enforcement Officer, this is the only system known to be malfunctioning.

4.2.2 There are no onlot systems known to discharge directly to a stream.

4.2.3 The presence of soils in the Borough with poor filtering qualities indicates that raw or partially treated sewage may be entering the groundwater.

4.2.4 There are no systems documented as contributing to public health-associated problems or waterborne disease outbreaks.

4.3 SOIL CONDITIONS CAUSING MALFUNCTIONING ONLOT SYSTEMS

The septic tank at 400 Birch Street was malfunctioning because of unsuitable soils. Soils in the Borough are generally not suitable for onlot disposal.

4.4 MALFUNCTIONING ONLOT SYSTEMS WITH SUITABLE SOILS

There are no known septic tanks malfunctioning in areas suitable for onlot sewage systems.

BCM

4.5 IDENTIFY ILLEGAL SEWAGE DISPOSAL SYSTEMS

4.5.1 According to Mr. Wester, there are no known wildcat sewers.

4.5.2 There are no known borehole sewage disposal systems according to Mr. Wester.

4.5.3 The septic tank at 400 Birch Street is malfunctioning. Soil conditions prevent correcting the problem by modifying the onlot system. The onlot system malfunctions by allowing partially treated sewage to come to the ground surface. This surface discharge has been directed to a wooded area near the property.

4.6 FEDERAL CONSTRUCTION GRANTS PROGRAM NEEDS ANALYSIS

No work was completed to establish sewage needs under the Federal Construction Grants Program.

4.7 INSTITUTIONAL EFFECT ON SEWAGE NEEDS AREAS

The management structure of the Borough is not causing sewage problems. The new Borough policy requires that all new and existing sewer service lines be connected to the sewer collection system tributary to the WWTPs. Existing onlot sewage disposal systems will be systematically abandoned.

5.0 PLANNING AND FACILITIES ALTERNATIVES, TREATMENT FACILITIES, AND RECOMMENDATIONS

5.1 IDENTIFY AND ANALYZE ALTERNATIVES

5.1.1 Alternatives, Collection, Conveyance, and Treatment

(i) The service area will include the Borough of Kane and portions of Wetmore Township identified in their Act 537 Plan for proper conveyance and treatment by the Kane sewerage system.

(ii) The Borough is willing to construct treatment facilities with reserve capacity to accommodate projected flows from Wetmore Township.

(iii) The only non-municipal treatment facilities within the Borough are six onlot sewage disposal systems. Soil conditions are not suitable for the use of onlot systems within the Borough. These onlot systems will be abandoned and connected to the public sewer system. No future onlot systems will be allowed within the Borough limits.

(iv) The Borough will provide sewer collection lines within a reasonable distance of each existing onlot system to receive their flows. Treatment capacity will be provided for flows from existing onlot systems, growth areas within the Borough, and projected sewage flows from Wetmore Township.

BCM

(v) & (vi) Treatment System Upgrade/Expansion

The Borough will evaluate four major wastewater treatment and alternatives; these are described as follows:

Alternative 1

Expand and upgrade the Pine Street and Kinzua Road wastewater treatment facilities to treat tributary sewage flows. The Pine Street WWTP design flow is 1.4 mgd and has a peak flow of 6 mgd. The Kinzua Road design flow is 1.4 mgd and has a peak flow of 3.5 mgd. Diluted peak flows in excess of this amount will be bypassed to Hubert Run. No peak flows will be bypassed by the Pine Street plant to the tributary of West Run.

Alternative 2

Construct a pump station at the Pine Street WWTP with a capacity of 6 mgd. Install 6,800 LF of 18-inch force main and 4,400 LF of 18-inch interceptor sewer to convey sewage flows tributary to the Pine Street WWTP for treatment at an expanded Kinzua Road WWTP. Kinzua Road WWTP design flow is 2.8 mgd and has a peak flow of 7.0 mgd. Diluted peak flows in excess of 7.0 mgd will be bypassed to Hubert Run. The Pine Street WWTP would be abandoned.

Alternative 3

Upgrade the Pine Street WWTP to adequately treat the current permit design flow of 0.8 mgd and peak flow of 1.5 mgd. Construct a pump station at the Pine Street site to pump peak flows in excess of 1.5 mgd to the Kinzua Road WWTP for treatment. Install 6,800 LF of 16-inch force main and 4,400 LF of 15-inch interceptor sewer to convey peak flows to the Kinzua Road WWTP. Upgrade and expand the Kinzua Road WWTP to a design flow of 2.0 mgd and peak flow of 5.0 mgd. Infrequent diluted peak flows in excess of 5.0 mgd would be bypassed to Hubert Run.

Alternative 4

Replace the Kinzua Road WWTP with a new facility adjacent to Glenwood Park. Low head pumping would be required to transport all sewage flow from the existing 24-inch interceptor sewer to the proposed treatment facility. All new facilities would be required. The effluent discharge point would be near the existing Kinzua Road plant downstream of the Pennsylvania American Water Co. water treatment plant raw water reservoir. The existing Kinzua Road WWTP is located just downstream from the water treatment plant.

The existing sewage interceptor could be utilized as an outfall sewer. Diluted peak flows would be bypassed through this outfall discharging downstream of the water treatment plant. This option may be utilized if sufficient land is not available at the Kinzua Road WWTP site.

Glenwood Park WWTP design flow is 2.8 mgd and has a peak flow of 7.0 mgd. Infrequent diluted peak flows in excess of 7.0 mgd will be bypassed to Hubert Run near the existing Kinzua Road WWTP site.

General Wastewater Treatment Design Considerations

The Pine Street and Kinzua Road WWTPs are presently unable to consistently remove $CBOD_5$, suspended solids, and ammonia nitrogen to the permit effluent limits in effect. The existing Pine Street and Kinzua Road facilities are nearly identical. Each contains a bar screen, grit removal, one primary clarifier, one rock media trickling filter, one secondary clarifier, chlorine contact tank, and one sludge digester. (See Exhibit 5.) Some units may require covers due to extended periods of sub-zero temperatures experienced in the area and past experience of units freezing. Significant infiltration/inflow may also contribute to depressed sewage flow temperatures. Ambient air and sewage temperatures are an important consideration during WWTP design. Alternatives 1, 2, and 3 will utilize the existing operation buildings, laboratory, and digester of the WWTPs being utilized. (See Plate No. 2 for proposed force main location.) Phosphorus removal will be required only for an expanded Pine Street WWTP.

Alternative 1--Pine Street WWTP will require phosphorus removal. Chemical addition (aluminum sulfate or alum) and chemical mixing will be provided before flow enters the secondary clarifiers. The secondary clarifiers should be equipped with flocculation capability to assure proper floc formation and adequate phosphorus removal.

One sludge digester will be added to the expanded Kinzua Road WWTP, Alternative 2 only. Sludge handling and disposal will be discussed later in this report.

Several treatment methods were considered for use. Two options will be evaluated in detail.

Option A

Expand the treatment facilities in parallel. Modify the existing trickling filters and increase their height. Replace rock media with plastic media, approximately 20 feet high to become bio-towers. Add parallel primary and secondary clarifiers. Replace preliminary treatment, bar screen, and grit removal. Replace chlorine contact tank. Chemical addition will be required.

The general description of the plastic media bio-tower is as follows:

The process consists of a fixed bed of plastic media over which wastewater is applied for aerobic biological treatment. Zooglea slimes form on the media which assimilate and oxidize the wastewater. The bed is dosed by a distributor system, and the treated wastewater is collected by an underdrain system.

The rotary distributor has become the standard because of its reliability and ease of maintenance. Plastic media is comparatively light with a specific weight 10 to 30 times less than rock media. Its high void space (approximately 95 percent) promotes better oxygen transfer during passage through the filter than rock media with its approximate 50 percent void space. Because of its light weight, plastic media containment structures are normally constructed as elevated towers 20 to 30 feet high. Existing rock media containment structures can sometimes serve as a foundation for elevated towers converting an existing facility to plastic media.

The organic material present in the wastewater is degraded by a population of microorganisms attached to the filter media. As the microorganisms grow, the thickness of the slime layer increases. Periodically, the slime layer washes off the media and a new slime layer starts to grow. This phenomenon of losing the slime layer is called sloughing and is primarily a function of the organic and hydraulic loadings on the filter. Filter effluent recirculation is vital with plastic media trickling filters to ensure proper wetting of the media and to promote effective sloughing control compatible with the high organic loadings. This process is radically affected by temperature. Particular attention must be taken during design to account for decreased ammonia nitrogen removal during low temperatures.

Option B

Expand and upgrade the treatment facilities utilizing Sequential Batch Reactors (SBR). Replace preliminary treatment, install fine bar screen, grit removal, and comminutor.

Following the preliminary treatment, flow would enter one of two parallel SBRs for biological activated sludge treatment. Flow discharge decanted from the SBRs would flow directly to the new chlorine contact tank for disinfection and discharge. Waste sludge from the SBR will flow to an integral sludge thickening tank. The sludge digester will be modified for aerobic sludge digestion.

Phosphorus removal at the Pine Street WWTP (Alternative 1) will require provisions for chemical addition, mixing, flocculation, and final clarification following the SBR. Waste sludge from the flocculating clarifiers will flow to the SBR sludge thickening tank area.

BCM

A general description of the SBR process is as follows:

A SBR is a form of the activated sludge treatment process. A SBR facility typically consists of parallel reactor tanks, with aeration/mixing systems, decanters, and sludge withdrawal systems. The SBR treatment process occurs in a five-stage cycle in a reactor tank. The five stages are Fill, React, Settle, Draw, and Idle. During the "Fill" stage, wastewater fills the tanks and mixes with the mixed liquor suspended solids during the last cycle. The tank is typically mixed during the fill stage, and as an option, can be aerated. Organic and nitrogenous oxidation occur primarily during the "React" stage under aerated conditions. Aeration and mixing are stopped during the "Settle" stage to allow solids to settle. Effluent is decanted from the tank during the "Draw" stage followed by periodic solids withdrawal from the bottom of the tank during the "Idle" stage. This stage accounts for the time in which one reactor has finished its cycle and the other reactor(s) has not finished filling.

The following tables and exhibits provide more detailed information of the development of major alternatives and Options A and B:

Description	Cost Analysis Table Number	Preliminary Layout Exhibit Number
Alternative No. 1, Option A--Pine Street	7	7
Alternative No. 1, Option B--Pine Street	8	8
Alternative No. 1, Option A--Kinzua Road	9	9
Alternative No. 1, Option B--Kinzua Road	10	10
Alternative No. 2, Options A & B--Pine Street	11	11
Alternative No. 2, Option A--Kinzua Road	12	12
Alternative No. 2, Option B--Kinzua Road	13	13
Alternative No. 3, Option A--Pine Street	14	14
Alternative No. 3, Option B--Pine Street	15	15
Alternative No. 3, Option A--Kinzua Road	16	16
Alternative No. 3, Option B--Kinzua Road	17	17
Alternative No. 4, Option B--Pine Street	18	11
Alternative No. 4, Option B--Glenwood	19	**
Cost Summary	20	
Present Worth Analysis	21	
Projected User Fees	22	

*These costs were taken from the "EPA Innovative and Alternative Technology Assessment Manual Publication CD-53" fact sheet cost curves, and were adjusted to an anticipated ENR index of 5,000 at time of bidding. The O & M costs taken from the fact sheet curves were adjusted based on our engineering experience to 80 percent of the value shown on the curve and to the ENR index of 5,000.

**The flow schematic for the Glenwood Park WWTP site will be similar to Exhibit 13.

BCM

TABLE 7

ALTERNATIVE 1
OPTION A
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment 2.4 mgd (Construction) 1.4 mgd (O & M)	$ 161,600*	$ 16,600*
2. Primary Clarifiers Rehabilitate Existing Unit and Build 60' Diameter Tank 1.4 mgd (O & M)	197,700	13,000*
3. Bio-Towers Modify Existing Tank and Build One New Unit--1.4 mgd	690,000*	10,000
4. Final Clarifiers Build Two 70' Diameter Tanks--1.4 mgd 1.4 mgd (O & M)	506,100	13,000*
5. Chlorination--1.4 mgd	121,200	25,900*
6. Anaerobic Digester--1.4 mgd	-	21,100*
Subtotal	$1,676,600	$ 99,600
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 251,500	$ -
2. Electrical (10%)	167,700	-
Subtotal	$ 419,200	$ -

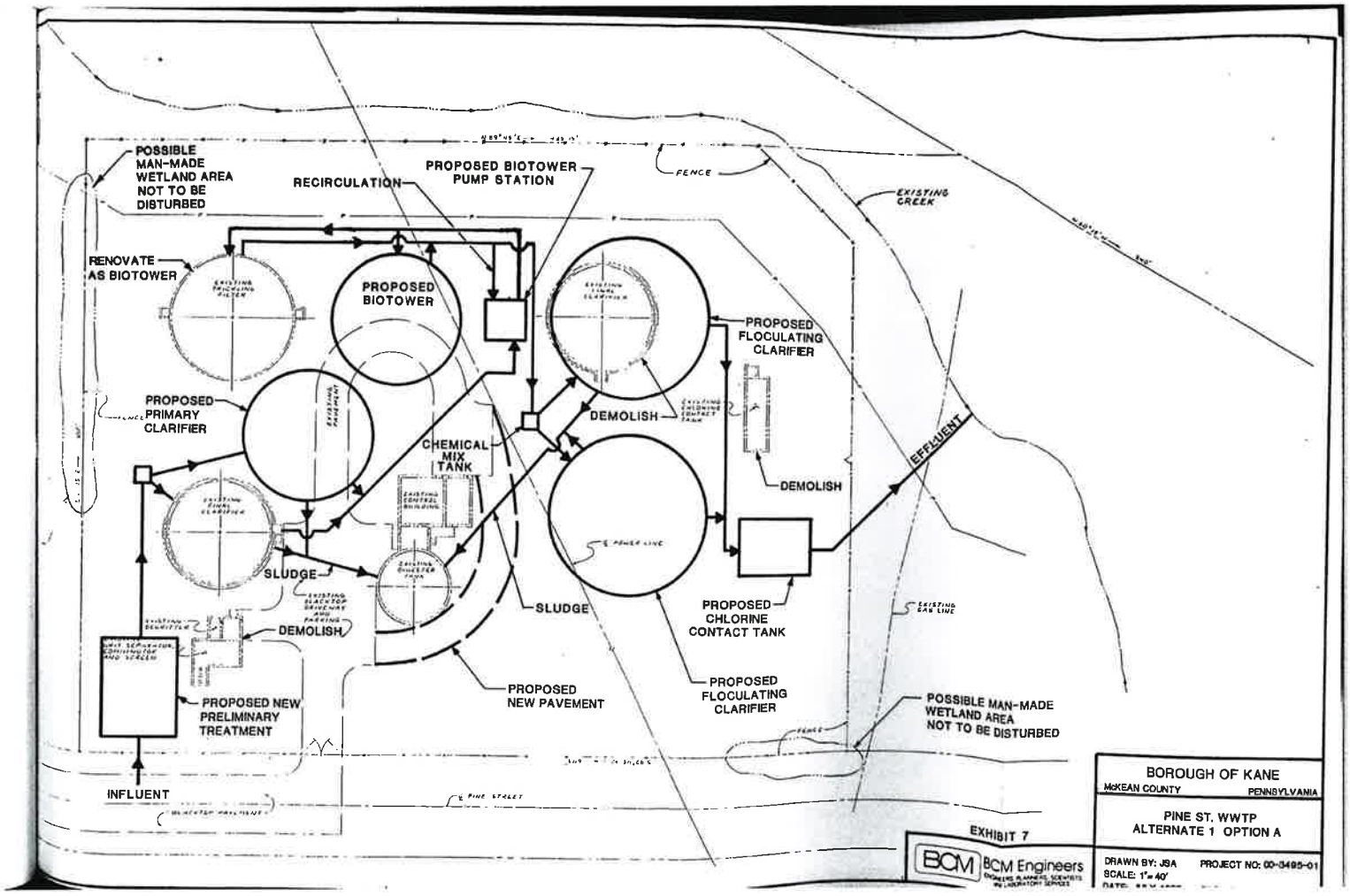
BCM

TABLE 7 (CONTINUED)

ALTERNATIVE 1
OPTION A
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Sludge Disposal		
1. Landfill	$ -	$ 25,000
2. Sludge Tank Truck	50,000	4,000
Subtotal	$ 50,000	$ 29,000
Demolition		
1. 50' Diameter Final Clarifiers	$ 10,000	$ -
2. Preliminary Treatment Building	10,000	-
3. Chlorine Contact Tank	5,000	-
Subtotal	$ 25,000	$ -
Total Costs	$2,170,800	$128,600
Administrative, Engineering & Legal (20%)	434,200	-
Construction Contingencies (10%)	217,100	-
TOTAL PROJECT COSTS	$2,822,100	$128,600


POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
RECIRCULATION
PROPOSED BIOTOWER PUMP STATION
FENCE
EXISTING CREEK
RENOVATE AS BIOTOWER
PROPOSED BIOTOWER
PROPOSED FLOCULATING CLARIFIER
PROPOSED PRIMARY CLARIFIER
DEMOLISH
CHEMICAL MIX TANK
DEMOLISH
EFFLUENT
SLUDGE
SLUDGE
PROPOSED CHLORINE CONTACT TANK
DEMOLISH
PROPOSED NEW PRELIMINARY TREATMENT
PROPOSED NEW PAVEMENT
PROPOSED FLOCULATING CLARIFIER
POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
INFLUENT
E PINE STREET
EXHIBIT 7
BCM Engineers
BOROUGH OF KANE
McKEAN COUNTY
PENNSYLVANIA
PINE ST. WWTP
ALTERNATE 1 OPTION A
DRAWN BY: JSA
SCALE: 1" = 40'
PROJECT NO: 00-3495-01

BCM

TABLE 8

ALTERNATIVE 1
OPTION B
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment 2.4 mgd (Construction) 1.4 mgd (O & M)	$ 161,600*	$ 16,600*
2. SBR Tank	612,000	36,500
3. Flocculating Clarifiers Two 70' Diameter Tanks 1.4 mgd (O & M)	506,100	13,000*
4. Chlorination 2.8 mgd (Construction) 1.4 mgd (O & M)	181,800*	25,900*
5. Modify Digester 1.4 mgd (O & M)	20,000	21,000*
Subtotal	$1,481,500	$113,000
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 222,200	$ -
2. Electrical (10%)	148,200	-
Subtotal	$ 370,400	$ -
Sludge Disposal		
1. Landfill	$ -	$ 25,000
2. Sludge Tank Truck	50,000	4,000
Subtotal	$ 50,000	$ 29,000

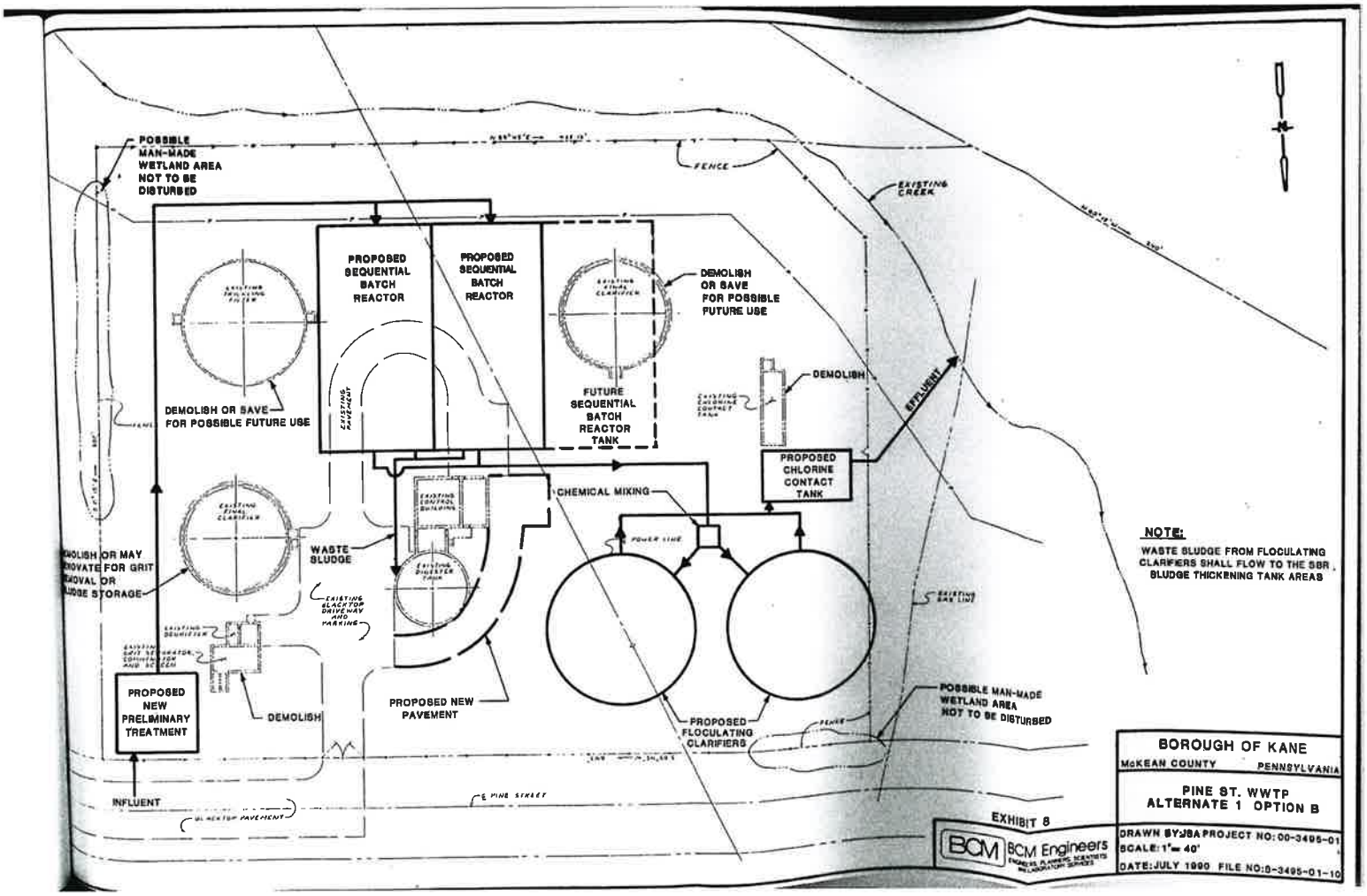
BCM

TABLE 8 (CONTINUED)

ALTERNATIVE 1
OPTION B
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Demolition		
1. Primary Tank	$ 10,000	$ -
2. Trickling Filter	15,000	-
3. Final Clarifier	10,000	-
4. Chlorine Contact Tank	5,000	-
5. Preliminary Treatment Building	10,000	-
Subtotal	$ 50,000	$ -
Total Costs	$1,951,900	$142,000
Administrative, Engineering & Legal (20%)	390,400	-
Construction Contingencies (10%)	195,200	-
TOTAL PROJECT COSTS	$2,537,500	$142,000


POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
FENCE
EXISTING CREEK
PROPOSED SEQUENTIAL BATCH REACTOR
PROPOSED SEQUENTIAL BATCH REACTOR
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
FUTURE SEQUENTIAL BATCH REACTOR TANK
DEMOLISH
EFFLUENT
PROPOSED CHLORINE CONTACT TANK
CHEMICAL MIXING
WASTE SLUDGE
DEMOLISH OR MAY RENOVATE FOR GRIT REMOVAL OR SLUDGE STORAGE
PROPOSED NEW PRELIMINARY TREATMENT
DEMOLISH
PROPOSED NEW PAVEMENT
PROPOSED FLOCULATING CLARIFIERS
POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
INFLUENT
E PINE STREET
NOTE:
WASTE SLUDGE FROM FLOCULATING CLARIFIERS SHALL FLOW TO THE SBR, SLUDGE THICKENING TANK AREAS
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
PINE ST. WWTP
ALTERNATE 1 OPTION B
EXHIBIT 8
BCM Engineers
DRAWN BY: JSA PROJECT NO: 00-3495-01
SCALE: 1" = 40'
DATE: JULY 1990 FILE NO: 0-3495-01-10

BCM

TABLE 9

ALTERNATIVE 1
OPTION A
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment--1.4 mgd	$ 120,000*	$ 16,600*
2. Primary Clarifiers Rehabilitate Existing Unit and Build 50' Diameter Tank 1.4 mgd (O & M)	168,500	13,000*
3. Bio-Towers--1.4 mgd	690,000*	10,000
4. Final Clarifiers--Build 60' Diameter Tank 1.4 mgd (O & M)	197,700	13,000*
5. Chlorination--1.4 mgd	121,200*	25,900*
6. Anaerobic Digester 1.4 mgd (O & M)	-	21,100*
7. Belt Filter Press	318,000	10,000
Subtotal	$1,615,400	$109,600
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 242,300	$ -
2. Electrical (10%)	161,500	-
Subtotal	$ 403,800	$ -

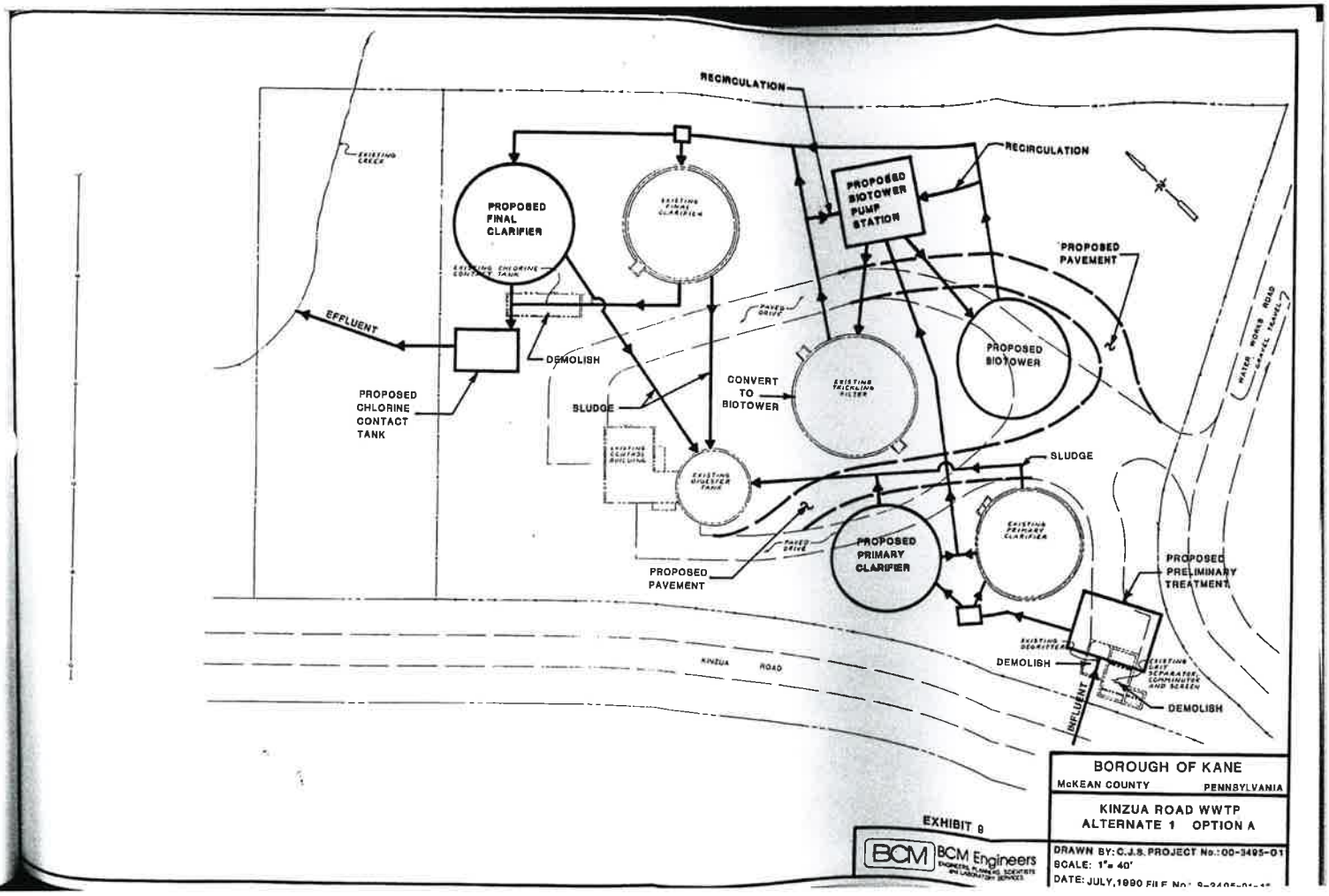
BCM

TABLE 9 (CONTINUED)

ALTERNATIVE 1
OPTION A
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Sludge Disposal		
1. Landfill	$ -	$ 25,000
Subtotal	$ -	$ 25,000
Demolition		
1. Preliminary Treatment Building	$ 10,000	-
2. Chlorine Contact Tank	5,000	-
Subtotal	$ 15,000	$ -
Total Costs	$2,034,200	$134,600
Administrative, Engineering & Legal (20%)	406,800	-
Construction Contingencies (10%)	203,400	-
TOTAL PROJECT COSTS	$2,644,400	$134,600


RECIRCULATION
RECIRCULATION
PROPOSED FINAL CLARIFIER
PROPOSED BIOTOWER PUMP STATION
PROPOSED PAVEMENT
EFFLUENT
DEMOLISH
PROPOSED CHLORINE CONTACT TANK
SLUDGE
CONVERT TO BIOTOWER
PROPOSED BIOTOWER
SLUDGE
PROPOSED PRIMARY CLARIFIER
PROPOSED PAVEMENT
PROPOSED PRELIMINARY TREATMENT
DEMOLISH
DEMOLISH
INFLUENT
KINZUA ROAD
WATER ROSES ROAD
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
KINZUA ROAD WWTP
ALTERNATE 1 OPTION A
EXHIBIT 8
BCM Engineers
DRAWN BY: C.J.S. PROJECT No.: 00-3495-01
SCALE: 1"= 40'
DATE: JULY, 1990

BCM

TABLE 10

ALTERNATIVE 1
OPTION B
KINZUA ROAD WWTP

COST ANALYSIS

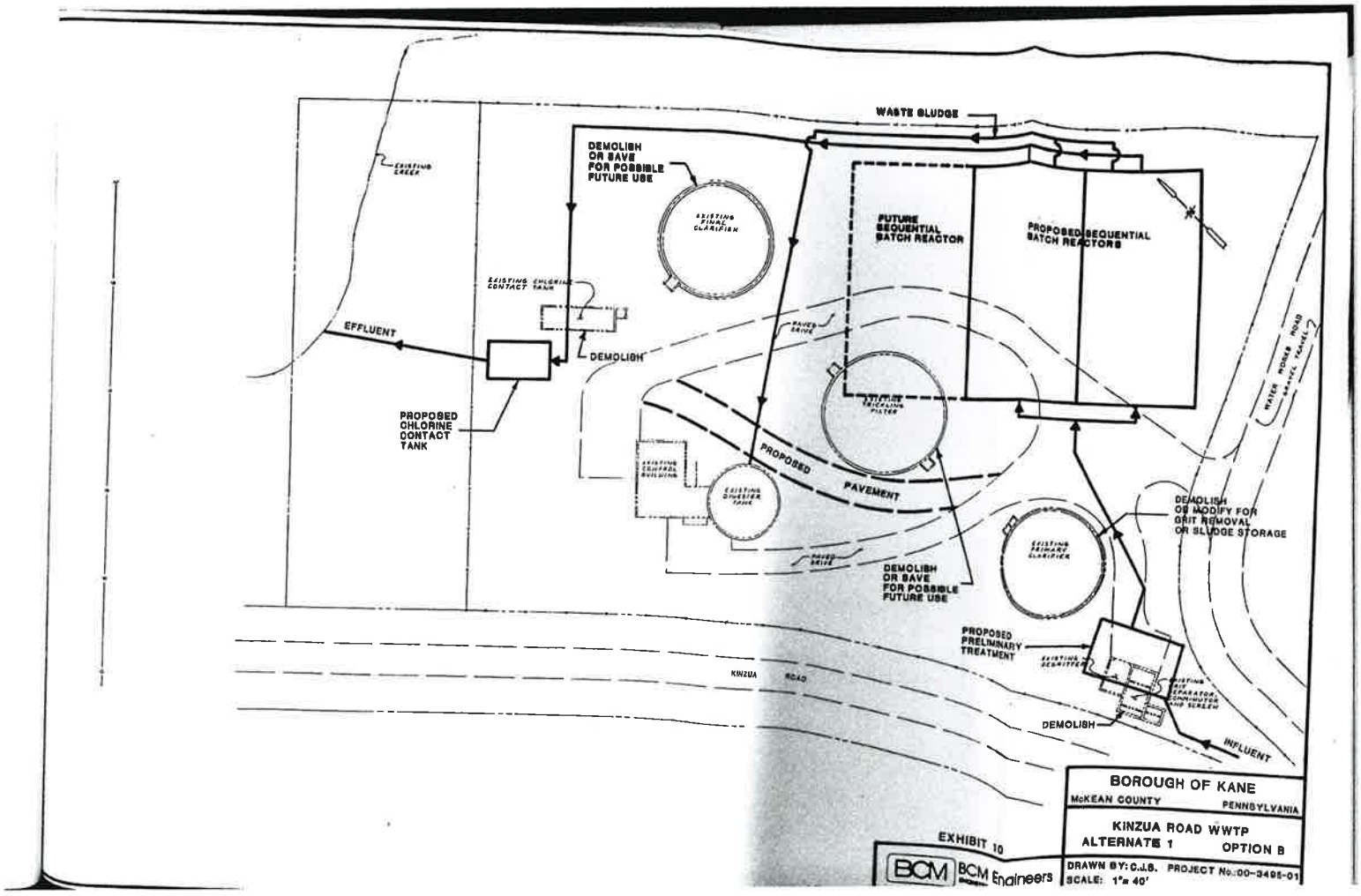
Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment--1.4 mgd	$ 30,300*	$ 16,600*
2. SBR Tank	612,000	36,500
3. Chlorination 2.8 mgd (Construction) 1.4 mgd (O & M)	181,800*	25,900*
4. Modify Digester 1.4 mgd (O & M)	20,000	21,000*
5. Belt Filter Press	318,000	10,000
Subtotal	$1,162,100	$110,000
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 174,300	$ -
2. Electrical (10%)	116,200	-
Subtotal	$ 290,500	$ -
Sludge Disposal		
1. Landfill	$ -	$ 25,000
Subtotal	$ -	$ 25,000

TABLE 10 (CONTINUED)

ALTERNATIVE 1
OPTION B
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Demolition		
1. Primary Tank	$ 10,000	$ -
2. Trickling Filter	15,000	-
3. Final Clarifier	10,000	-
4. Chlorine Contact Tank	5,000	-
5. Preliminary Treatment Building	10,000	-
Subtotal	$ 50,000	$ -
Total Costs	$1,502,600	$135,000
Administrative, Engineering & Legal (20%)	300,500	-
Construction Contingencies (10%)	150,300	-
TOTAL PROJECT COSTS	$1,953,400	$135,000


WASTE SLUDGE
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
EXISTING CREEK
EXISTING FINAL CLARIFIER
FUTURE SEQUENTIAL BATCH REACTOR
PROPOSED SEQUENTIAL BATCH REACTORS
EXISTING CHLORINE CONTACT TANK
EFFLUENT
DEMOLISH
PROPOSED CHLORINE CONTACT TANK
PAVED DRIVE
EXISTING TRICKLING FILTER
WATER POWER ROAD
GRAVEL TRAVEL
PROPOSED PAVEMENT
EXISTING CONTROL BUILDING
EXISTING DIGESTER TANK
DEMOLISH OR MODIFY FOR GRIT REMOVAL OR SLUDGE STORAGE
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
EXISTING PRIMARY CLARIFIER
PROPOSED PRELIMINARY TREATMENT
EXISTING SCREENING
EXISTING GREASE SEPARATOR, COMMINUTOR AND SCREEN
KINZUA ROAD
DEMOLISH
INFLUENT
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
KINZUA ROAD WWTP
ALTERNATE 1 OPTION B
DRAWN BY: C.J.S. PROJECT No.:00-3495-01
SCALE: 1"= 40'
BCM Engineers
EXHIBIT 10

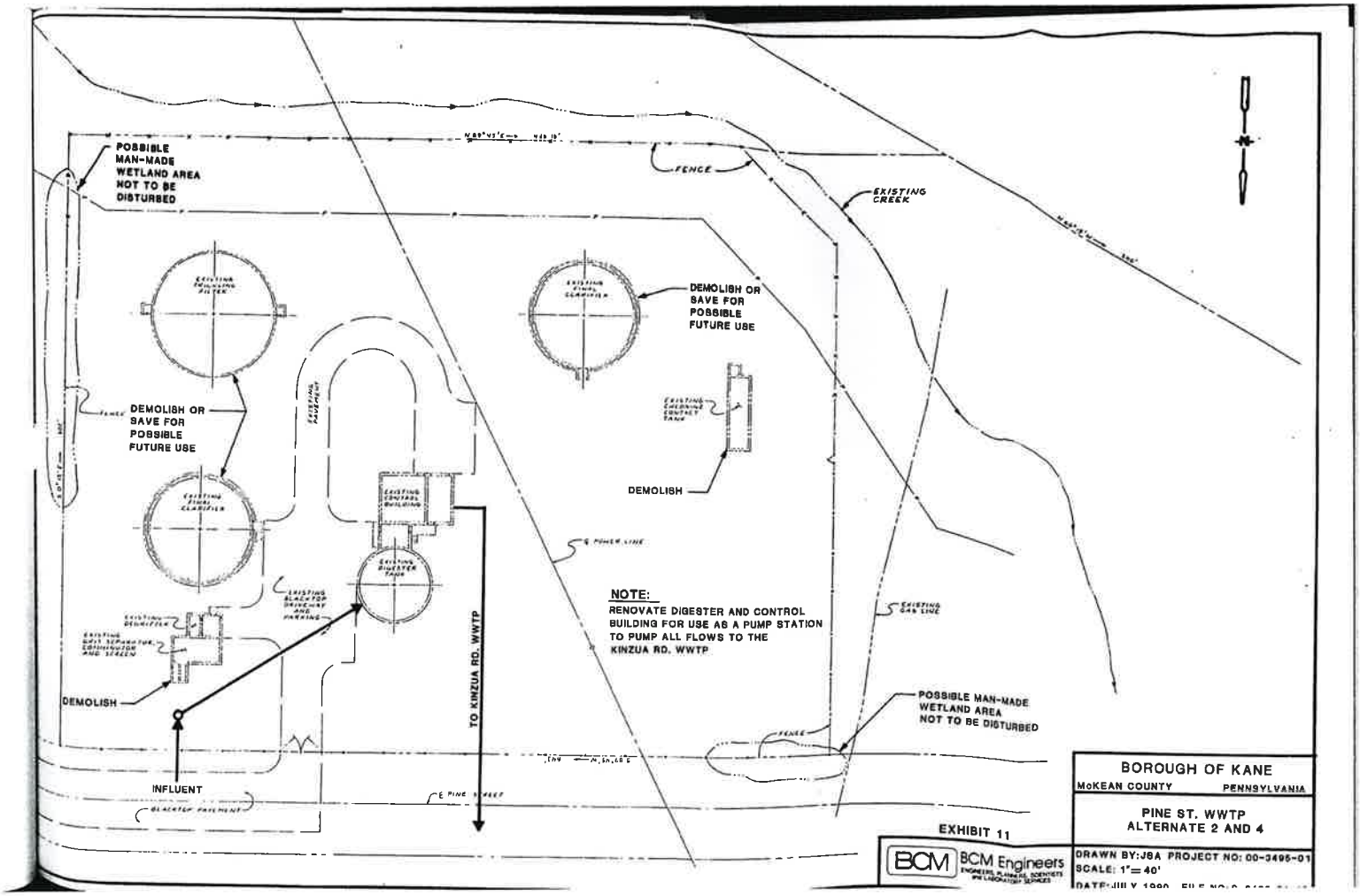
BCM

TABLE 11

ALTERNATIVE 2
OPTIONS A & B
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Raw Wastewater Conveyance		
1. Pump Station--6.0 mgd	$ 600,000	$ 35,000
2. Force Main--6,800 LF of 18" @ $70/LF	476,000	3,000
3. Interceptor Sewer--4,400 LF of 18" @ $60/LF	264,000	3,000
Subtotal	$1,340,000	$ 41,000
Demolition		
1. Preliminary Treatment Building	$ 10,000	$ -
2. Primary Clarifier	10,000	-
3. Trickling Filter	15,000	-
4. Final Clarifier	10,000	-
5. Chlorine Contact Tank	5,000	-
6. Modify/Demolish Oper. Bldg. & Digester	20,000	-
Subtotal	$ 70,000	$ -
Total Costs	$1,410,000	$ 41,000
Administrative, Engineering & Legal (20%)	282,000	-
Construction Contingencies (10%)	141,000	-
TOTAL PROJECT COSTS	$1,833,000	$ 41,000


POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
FENCE
EXISTING CREEK
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
DEMOLISH
DEMOLISH
TO KINZUA RD. WWTP
INFLUENT
NOTE:
RENOVATE DIGESTER AND CONTROL BUILDING FOR USE AS A PUMP STATION TO PUMP ALL FLOWS TO THE KINZUA RD. WWTP
POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
FENCE
E PINE STREET
EXISTING GAS LINE
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
PINE ST. WWTP
ALTERNATE 2 AND 4
EXHIBIT 11
BCM Engineers
DRAWN BY: JSA PROJECT NO: 00-3495-01
SCALE: 1"= 40'

BCM

TABLE 12

ALTERNATIVE 2
OPTION A
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment--2.8 mgd	$ 179,800*	$ 24,200*
2. Primary Clarifiers Rehabilitate Existing Unit and Build New 60' Diameter Tank 2.8 mgd (O & M)	197,700	22,600*
3. Bio-Towers Modify Existing Trickling Filter & One New Bio-Tower--2.8 mgd	1,364,500*	15,000
4. Final Clarifiers Build Two 70' Diameter Tanks 2.8 mgd (O & M)	506,100	22,600*
5. Chlorination--2.8 mgd	181,800*	40,400*
6. Anaerobic Digester--1.4 mgd (Construction) 2.8 mgd (O & M)	464,600*	28,300*
7. Belt Filter Press	318,000	10,000
Subtotal	$3,212,500	$163,100
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 481,900	$ -
2. Electrical (10%)	321,300	-
Subtotal	$ 803,200	$ -

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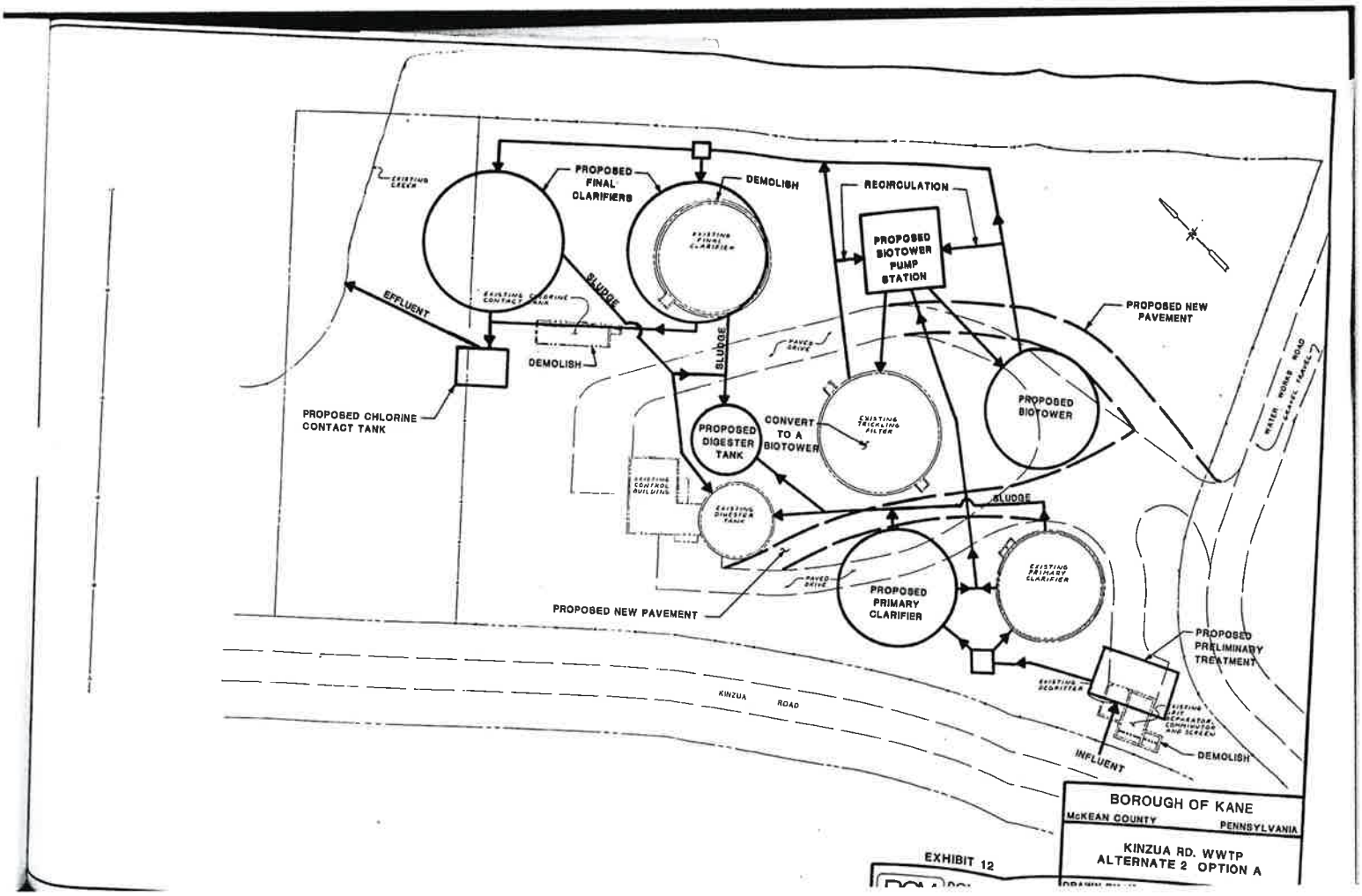
TABLE 12 (CONTINUED)

ALTERNATIVE 2
OPTION A
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Sludge Disposal		
1. Landfill	$ -	$ 50,000
Subtotal	$ -	$ 50,000
Demolition		
1. Preliminary Treatment Building	$ 10,000	-
2. Final Clarifier	10,000	-
3. Chlorine Contact Tank	5,000	-
Subtotal	$ 25,000	$ -
Total Costs	$4,040,700	$213,100
Administrative, Engineering & Legal (20%)	808,100	-
Construction Contingencies (10%)	404,100	-
TOTAL PROJECT COSTS	$5,252,900	$213,100


PROPOSED FINAL CLARIFIERS
DEMOLISH
RECIRCULATION
PROPOSED BIOTOWER PUMP STATION
EFFLUENT
SLUDGE
DEMOLISH
PROPOSED NEW PAVEMENT
PROPOSED CHLORINE CONTACT TANK
PROPOSED DIGESTER TANK
CONVERT TO A BIOTOWER
PROPOSED BIOTOWER
PROPOSED NEW PAVEMENT
PROPOSED PRIMARY CLARIFIER
PROPOSED PRELIMINARY TREATMENT
KINZUA ROAD
INFLUENT
DEMOLISH
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
KINZUA RD. WWTP
ALTERNATE 2 OPTION A
EXHIBIT 12

BCM

TABLE 13

ALTERNATIVE 2
OPTION B
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment--2.8 mgd	$ 179,800*	$ 24,200*
2. SBR Tank--2.8 mgd	1,179,000	54,800
3. Chlorination 5.6 mgd (Construction) 2.8 mgd (O & M)	262,600*	40,400*
4. Aerobic Digester 1.4 mgd (Construction) 2.8 mgd (O & M)	282,800*	28,300*
5. Belt Filter Press	318,000	10,000
Subtotal	$2,222,200	$157,700
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 333,300	$ -
2. Electrical (10%)	222,200	-
Subtotal	$ 555,500	$ -
Sludge Disposal		
1. Landfill	$ -	$ 50,000
Subtotal	$ -	$ 50,000

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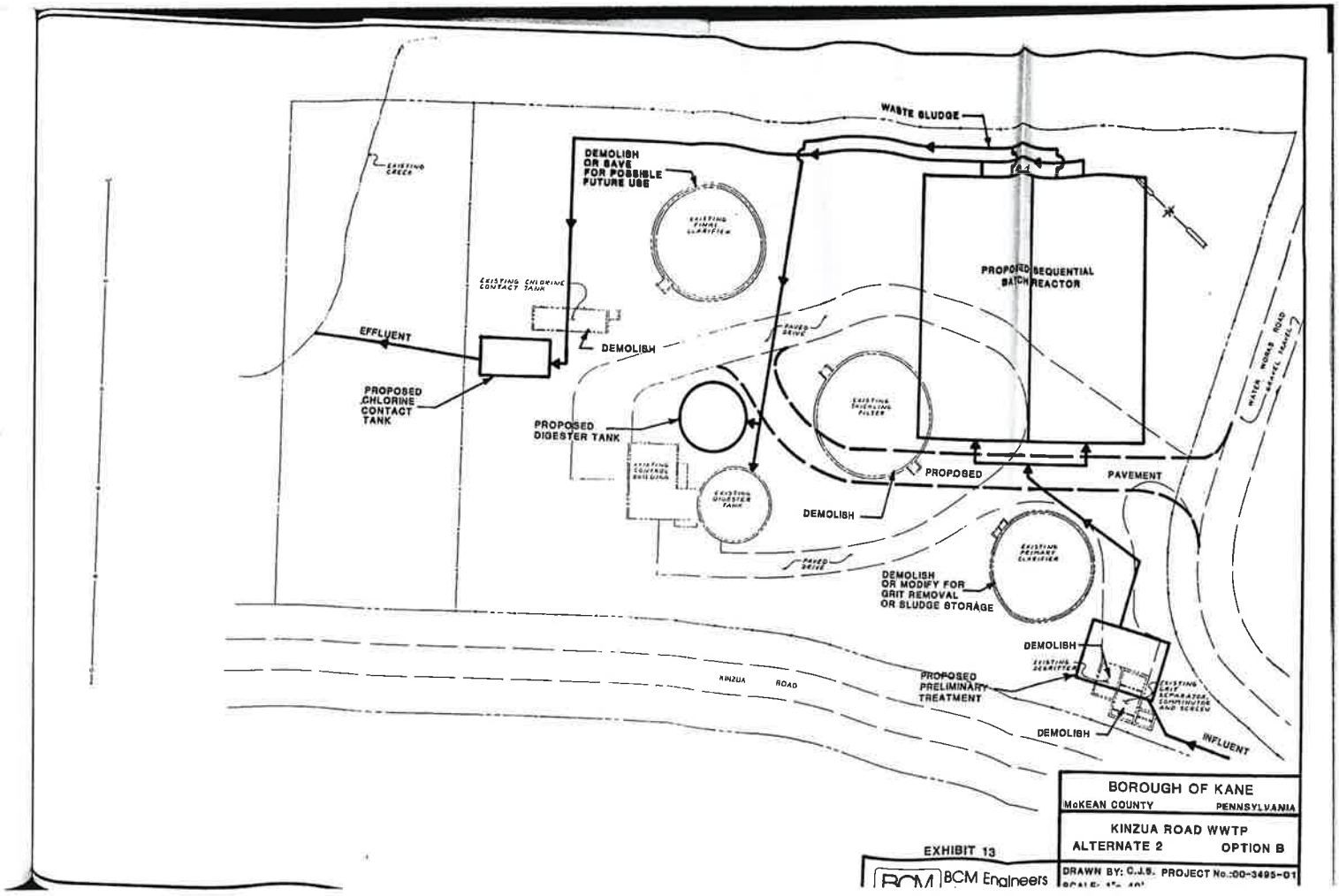
TABLE 13 (CONTINUED)

ALTERNATIVE 2
OPTION B
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Demolition		
1. Preliminary Treatment	$ 10,000	$ -
2. Primary Clarifier	10,000	-
3. Trickling Filter	15,000	-
4. Final Clarifier	10,000	-
5. Chlorine Contact Tank	5,000	-
Subtotal	$ 50,000	$ -
Total Costs	$2,827,700	$207,700
Administrative, Engineering & Legal (20%)	565,500	-
Construction Contingencies (10%)	282,800	-
TOTAL PROJECT COSTS	$3,676,000	$207,700


WASTE SLUDGE
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
EXISTING CREEK
EXISTING CHLORINE CONTACT TANK
EFFLUENT
DEMOLISH
PROPOSED CHLORINE CONTACT TANK
PROPOSED DIGESTER TANK
PROPOSED SEQUENTIAL BATCH REACTOR
PAVED DRIVE
PROPOSED PAVEMENT
DEMOLISH
DEMOLISH OR MODIFY FOR GRIT REMOVAL OR SLUDGE STORAGE
DEMOLISH
PROPOSED PRELIMINARY TREATMENT
DEMOLISH
INFLUENT
KINZUA ROAD
WATER WORKS ROAD
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
KINZUA ROAD WWTP
ALTERNATE 2 OPTION B
DRAWN BY: C.J.S. PROJECT No.:00-3495-01
EXHIBIT 13
BCM Engineers

BCM

TABLE 14

ALTERNATIVE 3
OPTION A
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment Rehabilitate Existing Units 0.8 mgd (O & M)	$ 20,000	$ 16,300*
2. Primary Clarifiers Rehabilitate Existing Unit and Build 50' Diameter Tank 0.8 mgd (O & M)	168,500	9,700*
3. Bio-Towers Modify Existing Tank and Build One New Bio-Tower--0.8 mgd	341,700	7,400
4. Final Clarifiers Rehabilitate Existing Unit and Build 50' Diameter Tank 0.8 mgd (O & M)	168,500	9,700*
5. Chlorination Renovate Existing Tank 0.8 mgd (O & M)	5,000	19,400*
6. Anaerobic Digester 0.8 mgd (O & M)	-	19,400*
Subtotal	$ 703,700	$ 81,900
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 105,600	$ -
2. Electrical (10%)	70,400	-
Subtotal	$ 176,000	$ -
Sludge Disposal		
1. Landfill	$ -	$ 50,000
Subtotal	$ -	$ 50,000

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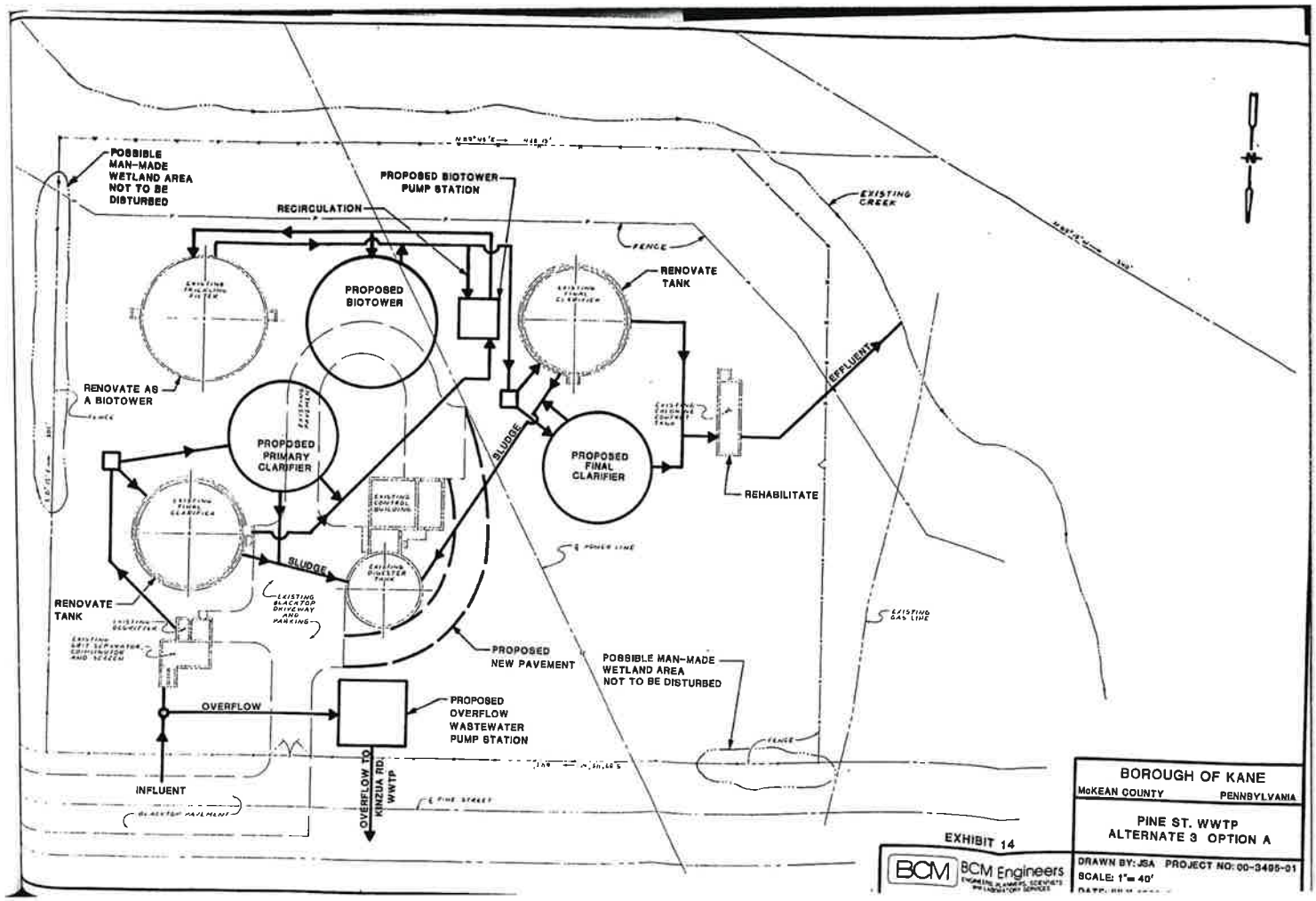
TABLE 14 (CONTINUED)

ALTERNATIVE 3
OPTION A
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Raw Wastewater Conveyance		
1. Pump Station--4.5 mgd	$ 800,000	$ 21,000
2. Force Main--6,800 LF of 16" @ $60/LF	408,000	2,000
3. Interceptor Sewer--4,400 LF of 15" @ $50/LF	220,000	2,000
Subtotal	$1,428,000	$ 25,000
Total Costs	$2,357,700	$130,900
Administrative, Engineering & Legal (20%)	471,500	-
Construction Contingencies (10%)	235,800	-
TOTAL PROJECT COSTS	$3,065,000	$130,900


POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
PROPOSED BIOTOWER PUMP STATION
RECIRCULATION
EXISTING CREEK
FENCE
RENOVATE TANK
PROPOSED BIOTOWER
RENOVATE AS A BIOTOWER
PROPOSED PRIMARY CLARIFIER
SLUDGE
PROPOSED FINAL CLARIFIER
EFFLUENT
REHABILITATE
RENOVATE TANK
EXISTING BLACKTOP DRIVEWAY AND PARKING
PROPOSED NEW PAVEMENT
POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
OVERFLOW
PROPOSED OVERFLOW WASTEWATER PUMP STATION
INFLUENT
OVERFLOW TO KINZUA RD. WWTP
EXISTING GAS LINE
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
PINE ST. WWTP
ALTERNATE 3 OPTION A
EXHIBIT 14
BCM Engineers
DRAWN BY: JSA PROJECT NO: 00-3495-01
SCALE: 1"= 40'

BCM

TABLE 15

ALTERNATIVE 3
OPTION B
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment Rehabilitate Existing Units 0.8 mgd (O & M)	$ 20,000	$ 16,300*
2. SBR Tank--0.8 mgd	628,000	25,600
3. Chlorination Renovate Existing Tank 0.8 mgd (O & M)	5,000	19,400*
4. Modify Aerobic Digester 0.8 mgd (O & M)	20,000	11,000*
Subtotal	$ 673,000	$ 72,300
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 101,000	$ -
2. Electrical (10%)	67,300	-
Subtotal	$ 168,300	$ -
Sludge Disposal		
1. Landfill	$ -	$ 20,000
2. Sludge Tank Truck	50,000	4,000
Subtotal	$ 50,000	$ 24,000

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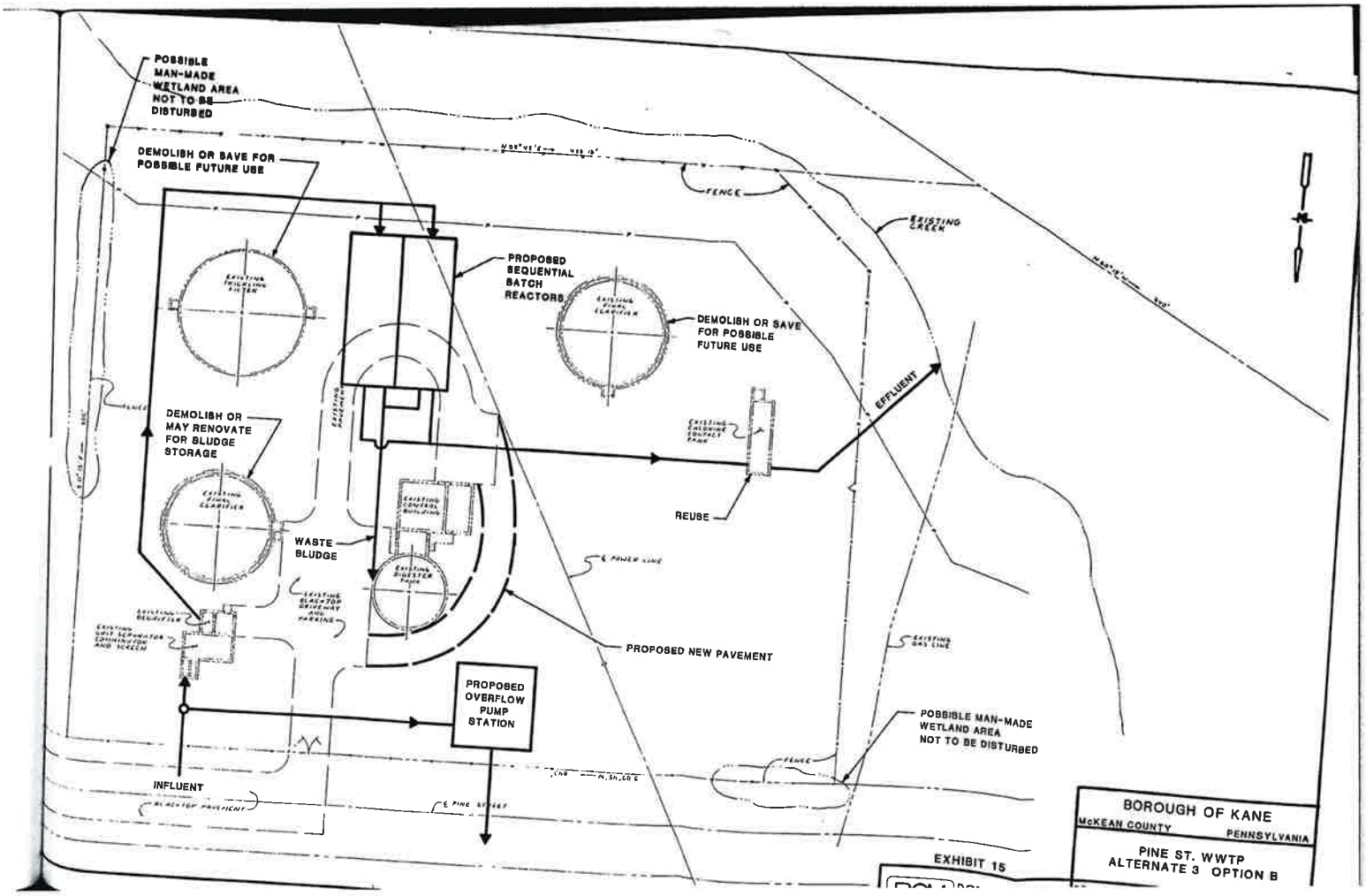
TABLE 15 (CONTINUED)

ALTERNATIVE 3
OPTION B
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Demolition		
1. Primary Tank	$ 10,000	$ -
2. Trickling Filter	15,000	-
3. Final Clarifier	10,000	-
Subtotal	$ 35,000	$ -
Raw Wastewater Conveyance		
1. Pump Station--4.5 mgd	$ 800,000	$ 21,000
2. Force Main--6,800 LF of 16" @ $60/LF	408,000	2,000
3. Interceptor Sewer--4,400 LF of 15" @ $50/LF	220,000	2,000
Subtotal	$1,428,000	$ 25,000
Total Costs	$2,354,300	$121,300
Administrative, Engineering & Legal (20%)	470,900	-
Construction Contingencies (10%)	235,400	-
TOTAL PROJECT COSTS	$3,060,600	$121,300


POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
PROPOSED SEQUENTIAL BATCH REACTORS
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
DEMOLISH OR MAY RENOVATE FOR SLUDGE STORAGE
EFFLUENT
REUSE
WASTE SLUDGE
PROPOSED NEW PAVEMENT
PROPOSED OVERFLOW PUMP STATION
INFLUENT
POSSIBLE MAN-MADE WETLAND AREA NOT TO BE DISTURBED
FENCE
EXISTING CREEK
E PINE STREET
BOROUGH OF KANE
McKEAN COUNTY
PENNSYLVANIA
PINE ST. WWTP
ALTERNATE 3 OPTION B
EXHIBIT 15

BCM

TABLE 16

ALTERNATIVE 3
OPTION A
KINZUA ROAD WWTP

COST ANALYSIS

Stage Unit Costs	Construction Costs	O & M Costs
1. Preliminary Treatment--2.0 mgd	$ 141,400	$ 22,600*
2. Primary Clarifiers Rehabilitate Existing Unit and Build 50' Diameter Tank 2.0 mgd (O & M)	168,500	17,800*
3. Bio-Towers Modify Existing Tank and Build One New Bio-Tower--2.0 mgd	929,300	12,000
4. Final Clarifiers Rehabilitate Existing Unit and Build 60' Diameter Tank 2.0 mgd (O & M)	197,700	17,800*
5. Chlorination--2.0 mgd	141,400	32,300*
6. Anaerobic Digester 2.0 mgd (O & M)	-	22,600*
7. Belt Filter Press	318,000	10,000
Subtotal	$1,896,300	$135,100
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 265,100	$ -
2. Electrical (10%)	176,700	-
Subtotal	$ 441,800	$ -

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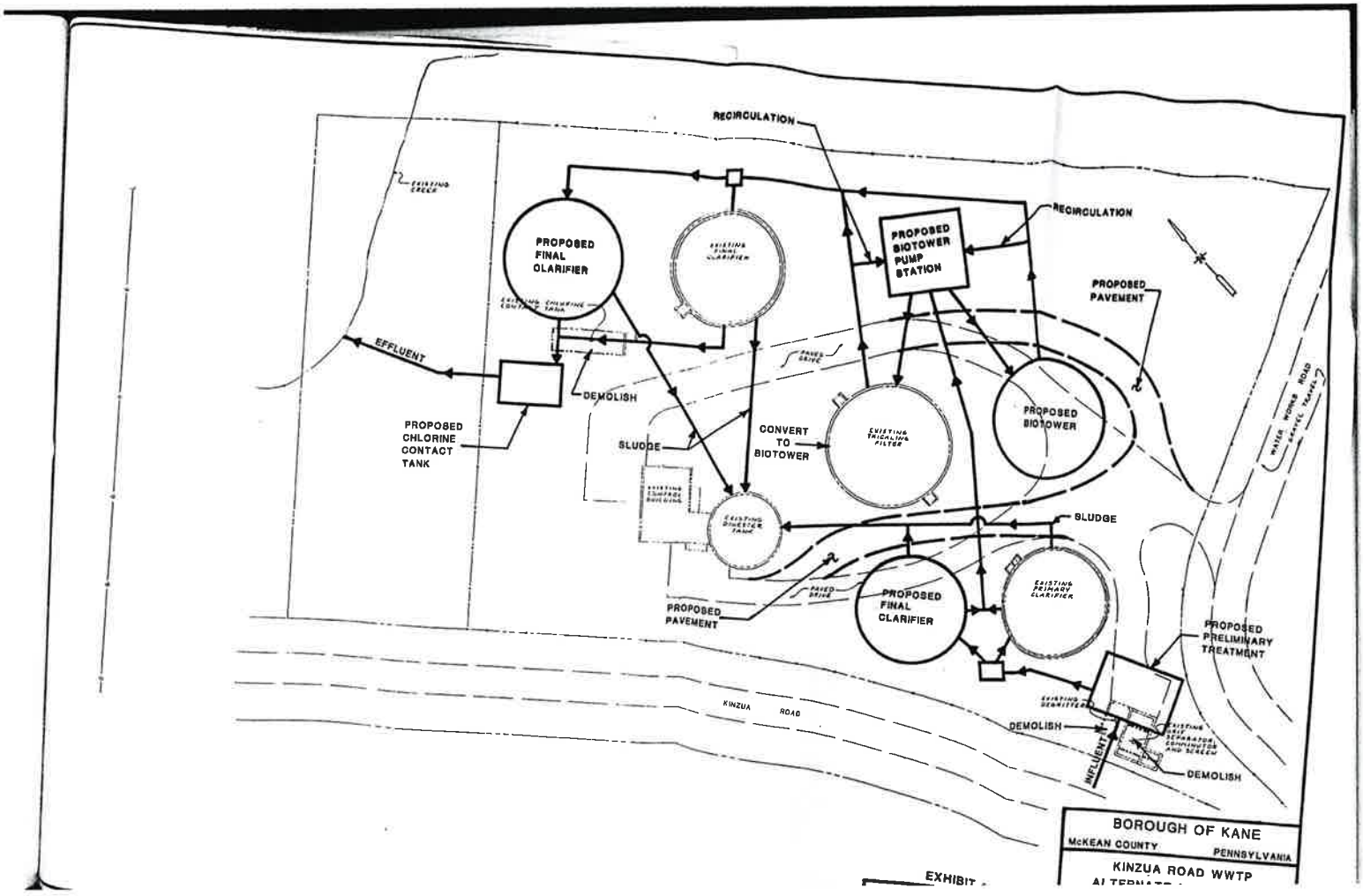
TABLE 16 (CONTINUED)

ALTERNATIVE 3
OPTION A
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Sludge Disposal		
1. Landfill		
Subtotal	$ -	$ 30,000
	$ -	$ 30,000
Demolition		
1. Preliminary Treatment Building	$ 10,000	$ -
2. Chlorine Contact Tank	5,000	-
Subtotal	$ 15,000	$ -
Total Costs	$2,353,100	$165,100
Administrative, Engineering & Legal (20%)	470,600	-
Construction Contingencies (10%)	235,300	-
TOTAL PROJECT COSTS	$3,059,000	$165,100


RECIRCULATION
EXISTING CREEK
PROPOSED FINAL CLARIFIER
EXISTING FINAL CLARIFIER
EXISTING CHLORINE CONTACT TANK
PROPOSED BIOTOWER PUMP STATION
RECIRCULATION
PROPOSED PAVEMENT
EFFLUENT
PAVED DRIVE
DEMOLISH
PROPOSED CHLORINE CONTACT TANK
SLUDGE
CONVERT TO BIOTOWER
EXISTING TRICKLING FILTER
PROPOSED BIOTOWER
WATER WORKS ROAD
EXISTING CHEMICAL BUILDING
EXISTING DIGESTER TANK
SLUDGE
PAVED DRIVE
PROPOSED FINAL CLARIFIER
EXISTING PRIMARY CLARIFIER
PROPOSED PAVEMENT
PROPOSED PRELIMINARY TREATMENT
KINZUA ROAD
EXISTING DEWATERING
DEMOLISH
EXISTING GRIT SEPARATOR, COMMINUTOR AND SCREEN
INFLUENT
DEMOLISH
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
KINZUA ROAD WWTP
EXHIBIT

BCM

TABLE 17

ALTERNATIVE 3
OPTION B
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment--2.0 mgd	$ 141,400*	$ 21,000*
2. SBR Tank--2.0 mgd	960,000	42,000
3. Chlorination 4.0 mgd (Construction) 2.0 mgd (O & M)	222,200*	32,300*
4. Modify Aerobic Digester 2.0 mgd (O & M)	20,000	21,000*
5. Belt Filter Press	318,000	10,000
Subtotal	$1,661,000	$126,300
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 249,200	$ -
2. Electrical (10%)	166,200	-
Subtotal	$ 415,400	$ -
Sludge Disposal		
1. Landfill	$ -	$ 30,000
Subtotal	$ -	$ 30,000

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TABLE 17 (CONTINUED)

ALTERNATIVE 3
OPTION B
KINZUA ROAD WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Demolition		
1. Preliminary Treatment Building	$ 10,000	$ -
2. Primary Clarifier	10,000	-
3. Trickling Filter	15,000	-
4. Final Clarifier	10,000	-
5. Chlorine Contact Tank	5,000	-
Subtotal	$ 50,000	$ -
Total Costs	$2,126,400	$156,300
Administrative, Engineering & Legal (20%)	425,400	-
Construction Contingencies (10%)	212,700	-
TOTAL PROJECT COSTS	$2,764,500	$156,300

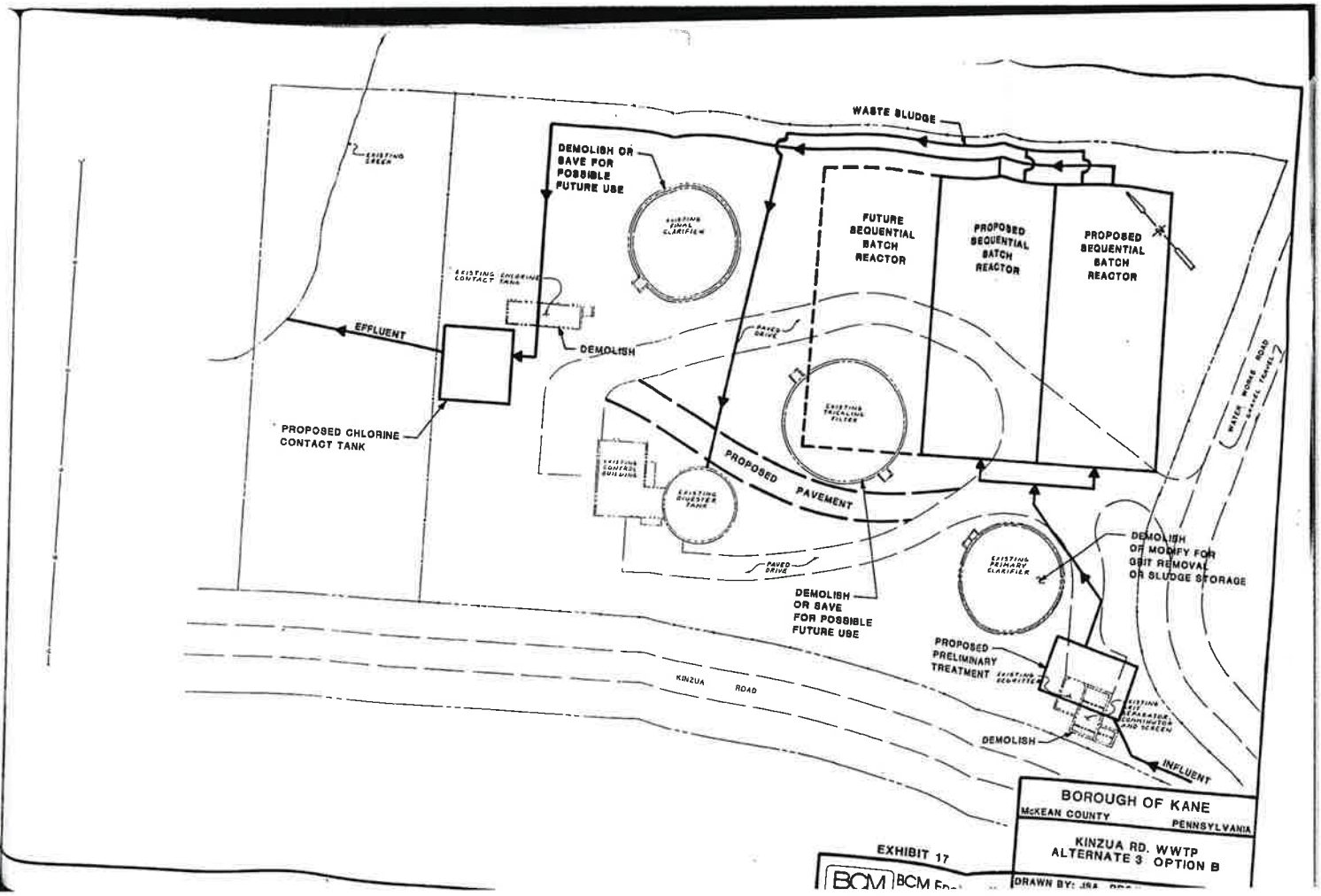
WASTE SLUDGE
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
EXISTING FINAL CLARIFIER
FUTURE SEQUENTIAL BATCH REACTOR
PROPOSED SEQUENTIAL BATCH REACTOR
PROPOSED SEQUENTIAL BATCH REACTOR
EXISTING CHLORINE CONTACT TANK
EFFLUENT
DEMOLISH
PROPOSED CHLORINE CONTACT TANK
PAVED DRIVE
EXISTING TRICKLING FILTER
EXISTING CONTROL BUILDING
EXISTING DIGESTER TANK
PROPOSED PAVEMENT
WATER WORKS ROAD
GRAVEL TRAVEL
DEMOLISH OR MODIFY FOR GRIT REMOVAL OR SLUDGE STORAGE
EXISTING PRIMARY CLARIFIER
DEMOLISH OR SAVE FOR POSSIBLE FUTURE USE
PROPOSED PRELIMINARY TREATMENT
EXISTING SCREENING
EXISTING GRIT REMOVAL COMPACTOR AND SCREEN
DEMOLISH
INFLUENT
KINZUA ROAD
BOROUGH OF KANE
McKEAN COUNTY PENNSYLVANIA
KINZUA RD. WWTP
ALTERNATE 3 OPTION B
EXHIBIT 17
BCM
DRAWN BY:

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TABLE 18

ALTERNATIVE 4
OPTION B
PINE STREET WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Raw Wastewater Conveyance		
1. Pump Station--6.0 mgd	$ 600,000	$ 35,000
2. Force Main--4,700 LF of 18" @ $70/LF	329,000	3,000
3. Interceptor Sewer--3,900 LF of 18" @ $60/LF	234,000	3,000
Subtotal	$1,163,000	$ 41,000
Demolition		
1. Preliminary Treatment Building	$ 10,000	$ -
2. Primary Clarifier	10,000	-
3. Trickling Filter	15,000	-
4. Final Clarifier	10,000	-
5. Chlorine Contact Tank	5,000	-
6. Modify/Demolish Oper. Bldg. & Digester	20,000	-
Subtotal	$ 70,000	$ -
Total Costs	$1,233,000	$ 41,000
Administrative, Engineering & Legal (20%)	247,000	-
Construction Contingencies (10%)	123,000	-
TOTAL PROJECT COSTS	$1,603,000	$ 41,000

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TABLE 19

ALTERNATIVE 4
OPTION B
GLENWOOD PARK WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Unit Costs		
1. Preliminary Treatment--2.8 mgd	$ 171,700*	$ 24,200*
2. SBR Tank--2.8 mgd	1,179,000	54,800
3. Chlorination 5.6 mgd (Construction) 2.8 mgd (O & M)	262,600*	38,800*
4. Aerobic Digester--2.8 mgd	424,200*	29,100*
5. Belt Filter Press--2.8 mgd	318,000	10,000
6. Operations Building	300,000	-
Subtotal	$2,655,500	$156,900
Noncomponent Costs		
1. Site Pumping and Junction Boxes (15%)	$ 398,300	$ -
2. Electrical (10%)	265,600	-
Subtotal	$ 663,900	$ -
Sludge Disposal		
1. Landfill	$ -	$ 50,000
Subtotal	$ -	$ 50,000

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TABLE 19 (CONTINUED)

ALTERNATIVE 4
OPTION B
GLENWOOD PARK WWTP

COST ANALYSIS

Stage	Construction Costs	O & M Costs
Demolition		
1. Kinzua Road WWTP	$ 70,000	$ -
Subtotal	$ 70,000	$ -
Raw Wastewater Conveyance		
1. Site Lift Station--6.0 mgd	$ 500,000	$ 13,000*
2. Force Main--800 LF of 18" @ $70/LF	56,000	1,000
3. Interceptor Sewer--800 LF of 18" @ $60/LF	48,000	1,000
Subtotal	$ 604,000	$ 15,000
Total Costs	$3,993,000	$221,900
Administrative, Engineering & Legal (20%)	798,700	-
Construction Contingencies (10%)	399,300	-
TOTAL PROJECT COSTS	$5,191,000	$221,900

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TABLE 20

SUMMARY OF PRELIMINARY COST ANALYSIS

	Pine Street Construction	Pine Street O&M	Kinzua Road Construction	Kinzua Road O&M	Glenwood Park Construction	Glenwood Park O&M
Alternative 1--Option A	$2,822,100	$128,600	$2,644,400	$134,600	-	-
Option B	2,537,500	142,000	1,953,400	135,000	-	-
Alternative 2--Option A	1,833,000	41,000	5,252,900	213,100	-	-
Option B	1,833,000	41,000	3,676,000	207,700	-	-
Alternative 3--Option A	3,065,000	132,900	3,059,000	165,100	-	-
Option B	3,060,000	127,900	2,765,100	1156,30	-	-
Alternative 4--Option B	1,603,000	41,000	-	-	$5,191,000	$221,900

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TABLE 21

PRESENT WORTH ANALYSIS

		Total Construction	Total O&M	Present Worth
Alternative 1	Option A	$5,466,500	$263,200	$ 8,485,000
	Option B	4,490,900	277,000	7,668,000
Alternative 2	Option A	7,085,900	254,100	10,001,000
	Option B	5,509,000	248,700	8,362,000
Alternative 3	Option A	6,124,000	298,000	9,542,000
	Option B	5,825,700	284,200	9,085,000
Alternative 4	Option B	6,794,000	262,900	9,809,000

Present Worth Analysis based on interest rate of 6 percent and 20-year life of project (f = 11.4699).

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TABLE 21

PRESENT WORTH ANALYSIS

	Total Construction	Total O&M	Present Worth
Alternative 1 Option A	$5,466,500	$263,200	$ 8,485,000
Option B	4,490,900	277,000	7,668,000
Alternative 2 Option A	7,085,900	254,100	10,001,000
Option B	5,509,000	248,700	8,362,000
Alternative 3 Option A	6,124,000	298,000	9,542,000
Option B	5,825,700	284,200	9,085,000
Alternative 4 Option B	6,794,000	262,900	9,809,000

Present Worth Analysis based on interest rate of 6 percent and 20-year life of project (f = 11.4699).

Several additional treatment processes were considered but not evaluated in detail due to the reasons expressed as follows:

Treatment Process	Reason Detailed Evaluation Not Made
Land Application of Sewage	Insufficient land available.
Aerated Lagoon	Insufficient land available.
Conventional Activated Sludge Single- or Two-Stage Systems	Insufficient land available at Kinzua Road site; process generally more expensive than SBR.
Oxidation Ditch	Insufficient land available at Kinzua Road site; process generally more expensive than SBR.
Rotating Biological Contactor	This type of treatment is generally much more expensive than SBRs. Rotating biological contactors have been plagued with O&M problems.
Break Point Chlorination (Ammonia Removal)	This process is difficult to control and may require an additional dechlorination stage.
tiary Filtration (Phosphorus Removal)	This process is more expensive than installing a flocculating clarifier for phosphorus removal.
Biological Phosphorus Removal	This process is not practical for Kane because wastewater is very dilute during wet weather.

Sludge Handling and Disposal

The existing Pine Street and Kinzua Road WWTPs are equipped with a sludge centrifuge for dewatering sewage sludge. Dewatered sludge was then disposed of by land application. The Borough has discontinued the use of this system and has relied on landfill disposal of sludge in recent years. The vacuum filters are no longer operated. As of July 1990, there are no approved permits for disposal of sewage sludge. Borough officials have applied for a permit to have dewatered sewage sludge disposed of by landfilling. This work will be performed by a private contractor or another municipality utilizing their own sludge dewatering equipment. This action is seen as a temporary solution to the Borough's sludge disposal problem.

Permanent Sludge Disposal Options

Option S-1

Purchase one belt filter press to be installed at one of the two treatment plant sites to dewater sewage sludge for landfill disposal. Sewage sludge from the other WWTP with no belt filter press will be hauled by truck to the belt press for dewatering then hauled by truck for landfill disposal.

Option S-2

Haul liquid sludge to a nearby community, such as St. Marys, Warren, or Bradford, for belt press sludge dewatering and landfill disposal; or have sludge dewatered and landfill disposal by a private company.

Option S-3

Install sludge drying beds at the WWTPs and dispose of dewatered sludge by landfilling. This option is not viable due to adverse temperature constraints and inadequate space at the treatment plant sites.

Option S-4

Disposal of liquid sludge by land application--This option is not viable due to long periods of frozen soil conditions and snow cover in the area. Sludge cannot be disposed of by land application when the ground is wet, frozen, or snow covered.

Option S-1 offers greater operator flexibility to control sludge wasting. Option S-2 is generally less costly for a facility of this size. Options S-3 and S-4 are not viable.

(vii) Repair/Replacement of Collection System Components

Very limited information is currently available on the integrity of the sewage collection system. The proposed sewer system mapping and ongoing I/I study will provide data needed to determine where sewer collection system components require rehabilitation.

(viii) Reduction of Organic or Hydraulic Loading

The existing sewer collection system is classified as a combined sewer system conveying both storm runoff and sanitary flows. Available sewer system maps are dated 1936 and vaguely describe the lines as they exist within the system. No maps exist showing storm sewer connections to the system. Very limited flow monitoring information is available for the collection system. Hill Engineers is currently performing flow monitoring work to evaluate the collection system's integrity, quantify peak flows, and isolate bottlenecks. Their recommendations have not been received.

Peak wet weather flows tributary to the Pine Street and Kinzua Road WWTPs are over ten times the average annual recorded flow. Obviously, if all storm sewers connected to the public sewer system were removed and sewerlines contributing excessive infiltration/inflow were repaired or replaced, the quantity of flow requiring treatment would be significantly reduced.

Removal of french drains and downspouts would also reduce flows to the WWTPs. The cost of removing all I/I is beyond the financial means of the community. An evaluation must be made to determine the cost-effectiveness of removing or treating excessive I/I. At this time insufficient mapping and flow monitoring information is available to begin this evaluation. Where judged cost-effective, I/I removal activities should be initiated.

Following I/I removal activities, continuous flow monitoring data of flows tributary to the WWTPs is required to revise design and peak hydraulic flow rates at the WWTPs. The stringent time schedule mandated by PADER to upgrade/expand the Pine Street or Kinzua Road WWTPs will prohibit a thorough evaluation of I/I, sewer system rehabilitation, flow verification prior to starting, and new flow monitoring of design of the treatment facilities.

Collection System Improvements and I/I Removal Options

Option C-1

Monitor sewage flows tributary to the existing WWTP to finalize design flows. Base design on conveying all flows to the Pine Street WWTP for treatment and discharge to West Run. Treat all flows tributary to Hubert Run at the Kinzua Road WWTP except for occasional very high flows. Perform only remedial work necessary to correct the backup of flows near the intersection of Cherry and Elk Streets.

Option C-2

Perform in-depth mapping of the storm and sanitary sewer systems and flow monitoring within the collection system to determine the cost-effectiveness of performing I/I removal activities. Monitor sewage flows tributary to the existing WWTPs to establish preliminary design flows. Perform construction activities with the greatest potential to remove I/I. Monitor flows tributary to the WWTPs to establish revised design flows before beginning WWTP design, if possible, without delaying the proposed schedule. Perform remedial work necessary to correct the backup of flows near the intersection of Cherry and Elk Streets.

Option C-2 is initially more costly than Option C-1 but has the potential to reduce both construction and O & M costs.

(ix) Use of Alternative Collection/Conveyance to Serve Need Areas Using Existing Sewage Treatment

The need areas within the Borough are limited to the existing onlot disposal systems. Conventional gravity collection will be required to serve all existing properties now served by onlot systems. The Borough will review requests by property owners in the need areas on a case-by-case basis regarding the use of a grinder pump and pressure sewer to tie into the gravity sewer system. The use of vacuum sewers will not be considered because the six properties in the need area are spread out and the high maintenance costs associated with this type of system.

The continual and future use of individual and community subsurface sewage disposal systems will not be permitted in the Borough of Kane. These systems are no longer allowed due to soil insuitability.

There are no areas within the Borough with existing onlot systems where the soil is suitable for their continued use.

The high density of existing homes and businesses within the Borough of Kane prohibits the use of small flow sewage treatment facilities, land treatment alternatives, or package treatment facilities to serve individual homes or clusters of homes. There are no clusters of homes within the Borough which are not connected to the public sewer system.

Use of sewage retaining tanks to contain sewage flows from a property is not necessary since sewers are available to all developed portions of the Borough.

No-Action Alternative

(i) PADER has determined that sewage bypasses at the Pine Street WWTP to a tributary of West Run are causing degradation to West Run, a tributary to Tionesta Creek. Tionesta Creek is a high-quality stream and is extensively used for recreational purposes. The No-Action Alternative is not viable based on water quality and public health considerations.

(ii) Growth potential is limited in the Borough of Kane and Wetmore Township because of inadequate sewage treatment capacity. The No-Action Alternative is not viable.

(iii) Community economic conditions have improved in recent years as the Borough is experiencing a modest economic growth rate. Available sewage treatment capacity is required to sustain economic growth in the Borough. The No-Action Alternative is not viable.

(iv) Recreational opportunities on streams below the Borough WWTPs may be negatively impacted by inadequately treated wastewater. The present facilities cannot adequately treat Borough sewage flows.

(v) Potential use of Hubert Run and West Run as drinking water sources may be negatively impacted by inadequately treated wastewater.

In conclusion, the no-action alternative is not viable.

5.2 EVALUATION OF SEWAGE MANAGEMENT PROGRAMS

5.2.1- Regular inspection or maintenance of onlot sewage disposal
5.2.2 systems within the Borough is not necessary since existing onlot systems are being discontinued.

There are no nonmunicipal treatment facilities within the Borough except for onlot septic systems.

5.2.3 Municipal ownership or management of onlot disposal systems is not necessary because onlot systems will no longer be permitted.

5.2.4 Enforcement of ordinances which require proper operation and maintenance of onlot systems to prohibit malfunctioning will be enforced in cooperation with the sewage enforcement officer and other department officials.

5.2.5 Onlot systems shall be repaired, replaced, or upgraded to prevent continuation of any malfunction which may be discovered.

5.2.6 The establishment of a joint municipal sewage management program is not necessary because the use of nonmunicipal sewage disposal systems is being discontinued.

5.3 NONSTRUCTURAL COMPREHENSIVE PLANNING NECESSARY TO ASSIST IN MEETING EXISTING AND FUTURE SEWAGE DISPOSAL NEEDS

5.3.1 Existing comprehensive planning within the Borough is adequate to develop projections for future sewage disposal needs. Development within the Borough service area is proceeding slowly, and land available for development is limited. Additional planning may be necessary in Wetmore Township. This matter should be addressed in the Wetmore Township Official Sewage Plan.

5.3.2 The Borough has a comprehensive plan to assist in producing sound economic and consistent development.

5.3.3 Municipal ordinances will be revised to prohibit the use of onsite sewage disposal systems.

5.3.4 The Borough subdivision ordinance does not regulate sewage disposal. The Borough will consider modifying subdivision regulations as related to sewage disposal.

5.4 EXISTING LOCAL AGENCY PROGRAM

5.4.1 The Borough of Kane and the Kane Borough Authority have chosen to maintain ownership of the Pine Street and Kinzua Road WWTPs and are willing to upgrade and expand treatment capacity to serve the sewage disposal needs of the Borough and adjacent areas of Wetmore Township, as is economically feasible. Sewerlines constructed by Wetmore Township to convey sewage to the Kane sewage disposal system will not be owned or maintained by the Borough. The Borough will prepare a sewage service agreement to be entered into with Wetmore Township. The Borough will also prepare a sewer use ordinance to be adopted by Wetmore Township.

The option of a joint municipal sewage authority with board members appointed by the Borough of Kane and Wetmore Township has been discussed and rejected by Borough officials.

Administration of the sewage disposal system on the County level is not practical because of the distance from Kane to Smethport and because there are large distances between population centers within McKean County.

5.4.2 It is anticipated that operator training will be necessary to enable current or new WWTP operators to proficiently operate the new wastewater treatment equipment and processes. Administrative personnel should participate in operator training to understand new treatment processes.

5.5 ECONOMIC EVALUATION OF THE ALTERNATIVES

5.5.1-5.5.4 Tables 7 through 19 list project costs and O & M costs for each of the alternatives and options evaluated. Tables 20 and 21 summarize these results and develop a present worth analysis for each option.

5.5.5 Table 22 lists anticipated user fees for each alternative evaluated. This analysis assumes a PENNVEST loan for 100 percent of the project cost of 2 percent for a 20-year term. Grant funding may result in lower user fees; while failure to obtain low interest loans or grants may result in high user fees. Alternative 1, Option B, is least costly and will represent an average user fee of $25.30 per month. Alternative 2, Option A, is the most expensive at an average user fee of $30.00 per month.

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TABLE 22

PROJECTED USER FEES
(MONTHLY COST PER CUSTOMER)

	Administration, Line Maintenance, and Existing Debt Service	WWTP O&M	Debt Service WWTP Projects	Monthly User Fee
Alternative 1 Option A	$6.00	$ 9.20	$11.70	$26.90
Option B	6.00	9.70	9.60	25.30
Alternative 2 Option A	6.00	8.90	15.10	30.00
Option B	6.00	8.70	11.80	26.50
Alternative 3 Option A	6.00	10.40	13.10	29.50
Option B	6.00	9.90	12.40	28.30
Alternative 4 Option B	6.00	9.20	14.50	29.70

Average user fees are based on 2,110 Borough customers and 280 projected customers in Wetmore Township. We are assuming that the financial contribution from Wetmore customers to the Kane system will equal Kane system's customer contribution.

Debt service is based on a 2 percent PENNVEST loan for a 20-year term (f=0.0612).

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5.5.6 Funding Sources Available

The upward spiraling of construction costs and interest rates has made it exceedingly difficult for small municipalities to construct major capital improvements. It is recognized that the proposed improvements discussed herein cannot proceed without obtaining substantial aid in the form of grants or loans from government agencies. Brief descriptions of various financing methods which may apply to the Borough of Kane's improvement projects are set forth in the following sections.

(i) Grants-in-Aid

The first method of financing available to alleviate partial construction costs is grants-in-aid. A grant is a monetary award to a project without provision for reimbursement. The grant programs which may apply to the Borough are discussed below.

a. McKean County Community Development Block Grant

Community Development Block Grants are awarded to communities within the County for various public works projects. These grants are awarded on an individual project basis to service areas of low and moderate income based on review.

b. Business Infrastructure Development (BID) Program

The Pennsylvania Department of Commerce has recently established several new economic development programs under Pennsylvania's Economic Revitalization Fund. The BID Program provides grants and loans to assist with construction of public and private infrastructure to stimulate employment opportunities through private sector industrial development. The wastewater improvements must be linked to an industrial development project providing employment expansion to acquire this funding.

c. Community Facilities Grant

The Pennsylvania Community Facilities Act (Act 552) provides for the distribution of revenues obtained from a tax on harness racing parimutual wagering in the form of grants for the construction, rehabilitation, alteration, expansion, or improvement to public water and sewage facilities (except treatment plants). At present, grants are provided in the amount of 50 percent of the total project costs, including engineering, administrative, and legal costs up to a maximum award of $50,000. Letters of intent and applications are submitted annually from January to April. These funds may be utilized for the extension of sewerlines to serve properties served by onlot systems or for I/I removal projects.

(ii) Loans

The second method of financing a project is through loans. Loans are repaid at an agreed upon rate of return over a stipulated time period. The loan programs which may apply to private as well as public facilities are discussed below.

a. Commercial or Bank Loans

Bank financing is readily accessible and requires a much shorter time lag from project start to construction. This loan option requires less administrative costs than with a bond issue. The largest disadvantage to a bank loan is that the term usually does not extend beyond 15 years.

b. PENNVEST

PENNVEST (Pennsylvania Infrastructure Investment Authority) has been capitalized by State and Federal funds to provide an innovative approach to financing local infrastructure in Pennsylvania. The revolving loan program will allow financing of over $2.5 billion of new construction within 25 years. The Authority will be managed by a 13-Member Board chaired by the Governor. In May 1988, the voters of Pennsylvania approved a referendum to set in place a $300,000,000 bond issue to provide low-interest loans for the construction of water and sewage projects in the Commonwealth. The interest rates for this program are determined based on prevailing economic conditions. This program has also awarded a number of grants.

(iii) Bond Issues

Bond issues are a common method by which municipalities and authorities obtain money to fund projects. Revenue bond issues are normally calculated to achieve a level annual payment for each year of the issue and are presently issued for a maximum term of 30 years at prevailing interest rates. The annual payment for debt service (interest and principal) is made from annual operating revenues. A disadvantage of bond issues is that investment bankers normally require 10 to 20 percent coverage on top of the average annual debt service cost.

The fixed costs of legal services and printing of bonds are substantial. As a rule, bond issues may be considered for total project costs in excess of $500,000.

Water quality in the streams receiving discharge from the Pine Street and Kinzua Road WWTPs is expected to improve significantly as a result of the proposed projects.

The impact on groundwater in the area is uncertain since no direct effect of current POTW sewage discharge or onlot sewage disposal system discharge has been measured.

The alternatives evaluated in detail are each capable of meeting the requirements of the consent order and agreement, State and Federal laws, and violation notices.

Sludge Management

(i) The current sludge management practices are hindering the effective operation of the Pine Street and Kinzua Road WWTPs because of inadequate sludge wasting.

(ii) Arrangements must be made to remove sludge from the digesters. Dewater and dispose of the sludge in an approved landfill.

(iii) The short-term sludge disposal Option S-2 is to arrange for sludge dewatering and disposal services to be performed by an independent company or a nearby municipality. At this time, none of the municipalities contacted have been willing to enter into this arrangement with the Borough.

The long-term sludge disposal Option S-1 is to install a belt filter press at the Kinzua Road WWTP and to haul liquid sludge from Pine Street to that site. All waste sludge would then be dewatered and disposed of in a landfill.

(iv) The Borough currently needs to arrange for landfill disposal of dewatered sludge and a contract sludge dewatering service.

(v) Sludge disposal equipment required:

Pine Street WWTP

A. Sludge Piping Modifications
B. Sludge Pumps
C. Tank Truck for Hauling Liquid Sludge

Kinzua Road WWTP

A. Sludge Piping Modifications
B. Sludge Pumps
C. Belt Filter Press and Appurtenances
D. Dewatered Sludge Holding Container to be Supplied by Landfill or Contract Hauler

(vi) Sludge Disposal Plan Modification

Short-Term Solution (February 1991-October 1995)

Arrange for landfill disposal of dewatered sludge. Belt filter press sludge dewatering to be done by a nearby municipality or contractor.

Long-Term Solution (October 1995)

Install a belt filter press at the Kinzua Road WWTP. Purchase a liquid sludge tank truck for the Pine Street WWTP. Modify WWTPs as necessary. Continue landfill disposal of dewatered sludge.

6.0 INSTITUTIONAL EVALUATION AND RECOMMENDED ALTERNATIVE

IDENTIFY WASTEWATER TREATMENT PROVIDER

The Borough of Kane owns and manages the sewage collection system. The Kane Borough Authority owns the Pine Street and Kinzua Road WWTPs. The WWTPs are operated by the Borough. Financing for the upgrade and expansion of the sewage facilities will be performed by the Kane Borough Authority or the Borough.

EXISTING BOROUGH CAPABILITIES TO IMPLEMENT OFFICIAL SEWAGE PLAN

1. The existing Pine Street and Kinzua Road WWTPs were constructed in the early 1960s. Annual debt service paid for these facilities is approximately $50,000. The average sewer user pays about $2 per month for existing debt service.

2. The Pine Street WWTP is operated by Mr. Fred Siggins. Kinzua Road WWTP is operated by Mr. David Wedow. Both operators are state-certified and have been WWTP operators for many years. With a reasonable amount of training, these men are capable of operating the expanded and upgraded WWTPs. To provide seven days per week, eight hours per day operator coverage, one additional certified operator should be hired. At present, some routine laboratory analysis work is performed by an independent laboratory owned by Hill Engineers. The addition of a third operator should result in the Borough no longer needing to have routine tests performed as an outside service. The WWTP operators report to Mr. Paul Kreckel, Borough Manager. Mr. Kreckel is experienced as a municipal manager overseeing wastewater treatment operations and coordinating sludge disposal activities. No additional administrative staff is necessary to implement this sewage plan.

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2.3 The Borough of Kane is responsible for implementing wastewater planning recommendations.

2.4 The Borough of Kane is responsible for implementing operational, maintenance, inspection, and testing activities related to wastewater treatment.

2.5 The Borough is responsible for setting sewer rates, maintaining offices, and purchasing necessary equipment and supplies.

2.6 The Borough of Kane is responsible for restraining violations of adopted sewer use ordinances and regulations and to revise such ordinances and regulations when necessary.

2.7 The Borough is responsible for negotiating agreements with other municipalities.

2.8 The Borough is responsible for raising capital for construction projects included in this Official Sewage Plan.

INSTITUTIONAL ALTERNATIVES

Alternative 1--Maintain Current Institutional Arrangement

The Borough of Kane will continue to operate the sewage disposal system. The Kane Borough Authority will function as directed to acquire financing of some projects, while the Borough may choose to finance some projects directly. Wetmore Township will be a contract customer. A service agreement will be negotiated with Wetmore Township for conveyance and treatment of sewage flows within the Borough.

Alternative 2--Management by Kane Authority

The Kane Borough Authority would have an expanded role to operate and manage the wastewater treatment and conveyance facilities. Wetmore Township will be a contract customer with a role as outlined in Alternative 1.

Alternative 3--Kane/Wetmore Joint Sewage Authority

This arrangement will have an Authority Board with representatives appointed by Kane Borough Council and the Wetmore Township Supervisors. Representation on the Board will be proportional to the number of sewer customers in the Borough and the Township. The initial arrangement could be four members from Kane and one from Wetmore Township. The Joint Sewage Authority will be responsible to finance projects, set rates, and manage all sewage treatment facilities within the Township and Borough.

Advantages and Disadvantages of Each Municipal Arrangement

Alternative 1 would not require duplication of administrative staff, as may be required by Alternatives 2 and 3. Alternative 1 will be suitable from an environmental standpoint because the Borough Council has expressed the commitment to raise sewage rates and construct necessary improvements as outlined in this plan. Alternative 1 will result in significantly lower sewer rates for Borough residents than Alternative 3 because of the large capital cost to serve customers in the Township and the small number of additional customers expected. The cost to install sewage conveyance systems within Wetmore Township's need areas is greater than 50 percent of the cost of the improvements required in Kane, yet only about 13 percent more customers would be added. Significant popular opposition currently exists to the installation of sewers within Wetmore Township. If Alternative 3 is adopted, correction of sewage disposal and conveyance problems within the Borough may be hindered by public opposition in the Township.

The advantage of Alternatives 2 or 3 is that a municipal authority functions independently from the elected political structure and can implement public works improvements without requiring elected officials to raise sewer rates.

.1 The Borough of Kane has decided to maintain the existing institutional arrangement as outlined in Alternative 1. The Borough will be responsible for the implementation of this Official Sewage Plan.

.2 No new authorities will be created.

.3 Alternative 1 will result in the lowest cost of administration because the sewage disposal system will be managed by the existing Borough administrative staff. No additional staff will be required due to these projects.

This Official Sewage Plan can be implemented by the Kane Borough Council. The Council has expressed willingness to raise sewage rates as needed. This administrative arrangement can be responsive to environmental needs.

A joint municipal authority would have the greatest flexibility to react to future demands; however, this advantage is outweighed by the other advantages of Alternative 1. Alternative 1 can react adequately to future demands. The service agreement between the Borough and Wetmore Township must be drafted in such a manner that the Borough has flexibility to react to future demands such as more restrictive effluent limits or growth in the service area beyond projections.

6.4 CHOSEN INSTITUTION ALTERNATIVE

The Borough has chosen implementation of Alternative 1. This alternative will result in the lowest sewer rates for the customers of the Borough and is a practical alternative for fulfilling the implementation of this Official Sewage Plan.

6.5 ADMINISTRATION AND LEGAL ACTIVITIES REQUIRED

This Official Sewage Plan must be adopted by the Borough of Kane and reviewed by the McKean County Planning Commission.

6.5.1 No new authorities will be created.

6.5.2 The sewer use ordinance will be revised to prohibit the installation of any new onlot sewage disposal systems and to require that all existing onlot sewage disposal systems be abandoned within five years of the approval of this plan by PADER.

6.5.3 A sewer service agreement must be entered into between the Borough of Kane and Wetmore Township if the Township chooses the alternative of conveying their need areas' sewage flows to the Borough for conveyance and treatment.

6.5.4 No right-of-way utility easement or land transfers are required.

7.0 SELECTED WASTEWATER TREATMENT AND INSTITUTIONAL ALTERNATIVES

7.1 SEWAGE NEEDS

7.1.1 Onlot Disposal Needs

The Borough will prohibit the construction of new onlot sewage disposal systems and require that all existing onlot disposal systems be connected to the public sewer system within five years of approval of this plan by PADER.

7.1.2 Conveyance Needs

The Borough will begin a multi-year program of flow reduction by removing storm sewer flows from their sewer system, where cost-effective, or where required to provide adequate conveyance capacity. This will be done in accordance with conveyance Option C-2.

1.3 Wastewater Treatment Needs

(i) Technical and Environmental Evaluation

The Borough will implement Alternative 1, Option B. The Pine Street and Kinzua Road WWTPs will both be expanded and upgraded. Both facilities will utilize sequential batch reactor treatment processes. The Pine Street WWTP, which is tributary to a high-quality stream, will be upgraded and expanded to treat all tributary flows based on the new effluent limits developed by PADER. The Pine Street WWTP's design flow is 1.4 mgd and the peak flow is 6.0 mgd. The Kinzua Road WWTP will be expanded and upgraded to treat a design flow of 1.4 mgd and a peak flow of 3.5 mgd. Peak flows in excess of 3.5 mgd will be bypassed to Hubert Run. The treatment units will be arranged in such a manner that additional treatment units can be added to treat all flows tributary to the facility if Kinzua Creek is also upgraded to a high-quality stream in the future. The possibility of Kinzua Creek being upgraded to a high-quality stream in the future is a significant disadvantage to Alternatives 2 and 3. The installation of pumping facilities, force main, and interceptor sewers to transport flows tributary to the Pine Street WWTP and convey them to the Kinzua Road WWTP for treatment and discharge is environmentally sound based on protecting the quality of Tionesta Creek. If Kinzua Creek is upgraded to a high-quality stream, land limitations at the Kinzua Road WWTP will make it impossible to treat all flows tributary to both WWTPs at the Kinzua WWTP to the effluent limits expected. The environmental impact to Kinzua Creek would then be unsuitable. Current wastewater treatment technology can provide for the protection of Tionesta Creek and Kinzua Creek if the two existing WWTPs are upgraded and expanded. The best use of Borough funds is to treat sewage flows contributory to each WWTP to the effluent limits set by PADER for discharge at each facility.

(ii) Economic Evaluation

Alternative 1, Option B, will result in the lowest capital project cost, the lowest sewer rates, and least expense when considering capital and O&M costs on a present worth basis. (See Tables 8, 10, 20, 21, and 22.)

TECHNICAL AND ADMINISTRATIVE NEEDS

A. Technical Needs

The Borough will need one additional certified WWTP operator. Operator training will be required for all new equipment installed and for process control and operation of the sequential batch reactor and belt filter press.

B. Administrative Needs

Sludge disposal and one additional employee will put an additional work load on the administrative staff but will not require additional personnel.

INSTITUTIONAL ARRANGEMENTS

The Borough of Kane will continue to operate the Pine Street and Kinzua Road WWTPs and the sewage collection system. Personnel responsible for the sewage collection and treatment facilities will report to the Borough Manager.

FINANCING PLAN

The Borough is looking to the PENNVEST Program as the principal funding source for construction of the upgraded and expanded wastewater treatment facilities. Community Development Block grants, Department of Community Affairs grants, and Department of Commerce grants will be sought for funding storm sewer separation projects and sewerline extensions to serve existing onlot sewage disposal systems. Collection system improvements and storm sewer separation projects will be performed on a multi-year basis. We recommend that sewer rates be increased prior to construction of the WWTP facilities to pay for some collection system improvement projects and to finance design and permitting phases of the WWTP improvement projects.

FIVE-YEAR PLAN

All need aspects of this plan will be completed within five years of approval of the plan by PADER. The following projects will be performed:

A. Pine Street and Kinzua Road WWTPs expansion and upgrade

B. Abandoning of existing onlot sewage disposal systems and connection to the public sewer system

C. Correction of sewer system capacity problems on Cherry Street and Smithfield Street. Storm sewer separation in this area may be necessary to provide adequate conveyance capacity.

D. Selected storm sewer separation projects are expected in areas that are cost-effective to perform or as may be required to correct inadequate sewer capacity.

7.6 TEN-YEAR PLAN AND GROWTH AREAS

A. Perform selective cost-effective storm sewer/sanitary sewer separation projects.

B. Correct sewer system conveyance problems which may be discovered.

8.0 IMPLEMENTATION

Adopt and Submit Act 537 Plan to PADER	August 1990
Begin Development of Storm Sewer/Sanitary Sewer Maps	October 1990
Submit Sludge Disposal Module 1 to PADER	October 1990
Initiate Monitoring of All Flows Tributary to WWTPs	November 1990
Receive Comments on Act 537 Plan from PADER	November 1990
Submit Revised Act 537 Plan to PADER	January 1991
Revise Sewer Use Ordinance to Prohibit Onlot Sewage Disposal	January 1991
Begin Removal of Waste Sludge from WWTPs	February 1991
Receive Final Approval for Act 537 Plan	April 1991
Authorize Engineer to Design WWTP Expansion/Upgrade	May 1991
Present Municipal Service Agreement to Wetmore Township	July 1991
Submit Plans and Specifications to PADER for Review	January 1992
Submit PENNVEST Loan Application	February 1992
Receive Part 2 Permit for WWTP Construction	June 1992
PENNVEST Approval or Rejection	June 1992
Arrange Supplemental Funding if Required	August 1992
Advertise Project for Bids	September 1992
Open Bids	November 1992
Close PENNVEST or Other Financing	December 1992
Award Contract	January 1993
Issue Notice to Proceed	February 1993
Complete Construction	September 1994
Place WWTPs in Operation	October 1994
Connect All Onlot Disposal Systems to Public Sewers	April 1996
Correct All Known Sewerline Capacity Problems	April 1996

TOWNSHIP OF WETMORE
McKean County, Pennsylvania

ACT 537 PLAN

COMPREHENSIVE SEWAGE FACILITIES PLANNING STUDY

October 1990

Revised June 1991

Revised January 1992

Revised April 1992

Revised August 1992

Revised April 1993

KLH ENGINEERS, INC.
Pittsburgh, PA 15106

PLAN SUMMARY

Alternative of Choice

The recommended Alternative to correct the sewage problems within the Wetmore Township planning area is Alternative B. This Alternative utilizes conventional gravity sewers and a small number of grinder pump units and low pressure sewers in the six sewer districts with conveyance by gravity or pumping into the Kane Borough sewer system for treatment. The total construction cost for this option is $3,795,000 and total project cost of $4,764,500, and approximately 397 existing equivalent dwelling units within the Township planning area will be serviced by the proposed facilities.

The funding for this project will come in the form of PENNVEST and Farmers Home Administration grants and loans. Wetmore Township as a whole or specific Sewer Districts does not qualify for FmHA grant funding but when coupled with Kane Borough the Township becomes eligible. The funding package as described previously in the text or as described in the BCM Engineers letter in Appendix VII, will create approximately a $30 average monthly user fee with an approximate one time $500 tap-in fee/customer in the Township. This is a cost effective project considering these user fees.

A summary of all project costs and the proposed funding package is as follows:

Kane Facilities Project Costs	$ 9,700,000
Wetmore Facilities Project Costs	4,800,000
Total Project Costs	$14,500,000
Local Funding Share	200,000
Balance to Finance	$14,300,000
Funding Breakdown	
PENNVEST Loan (1% for 20 yrs.)	$ 5,000,000
FmHA Grant	4,000,000
FmHA Loan (5.0% for 40 yrs.)	5,300,000
Annual Debt Service Payments and O & M Costs	
PENNVEST Loan	$ 277,000
FmHA Loan	309,000
Annual Operation and Maintenance	386,000
TOTAL ANNUAL COSTS	**$ 972,000**
Total Equivalent Customers 397 Wetmore + 2345 Kane	2742
Average Monthly User Fee/EDU	Approximately $30/month

The project will be financed through the Kane Borough Authority and initially will be operated and maintained by Kane Borough employees. Kane Borough will handle the billing of all new sewer customers in the Township. All debt service payments will be made by the Kane Borough Authority with proceeds from Township and Borough sewer service revenues.

Wetmore Township Supervisors have sought and obtained equitable representation on the Kane Borough Authority. Representation on the Authority and Committee will ensure that the residents of the Township are treated equitably when it comes to making decisions regarding sewage matters.

Service Areas

As described in the body of the study, the planning area was broken down into six sewer districts. The Wetmore Township Area is unique in that it is at the headwaters of several watersheds and therefore all gravity flow is directed away from the existing wastewater treatment plant's in Kane Borough and facilitates the need for several pumping stations located throughout the planning area to pump sewage collected in the planning area into the Kane Borough system.

The planning area was broken into six sewer districts as listed below:

District 1	West Kane
District 2	Ten Commandments JoJo Road
District 3	Old Mill Road West Wind Road Grandview Estates Carlson Heights
District 4	East Kane
District 5	Greendale
District 6	Route 6 Corridor/North Kane

Institutional Arrangements

The Township must adopt and enforce the Holding Tank Ordinance in Appendix IV.

Funding Source

The funding for this project will come in the form of PENNVEST and Farmers Home Administration grants and loans. Wetmore Township is ineligible for FmHA grants standing alone but when combined with the Kane Borough population the median income level is reduced to a level where Wetmore Township becomes eligible. The proposed average monthly user fee for Wetmore and Kane customers will be $30/month/EDU, with a one time $500 tap in fee for Township customers.

Implementation Schedule

DATE	TASK
August 1992	Prepare and enter into intermunicipal agreement between Kane Borough Authority and Kane Borough to finance, maintain and operate sewerage facilities within Wetmore Township.
August 1992	Commence preparation of Contract Documents for construction of collector sewers and pump stations to serve all six Sewer Districts.
November 1992	Assist Kane Borough Authority in securing $5,000,000 PENNVEST Loan 1% for 20 yrs. secured at July 1992 PENNVEST Board Meeting.
April 1993	Receive Commitment from FmHA for funding package for joint Kane/Wetmore Project.
May 1993	Adopt and Submit Final Act 537 Plan to DER.
June 1993	Receive approval on Act 537 Plan from DER.
June 1993	Submit Part II Application and contract documents to DER for review.
July 1993	DER review comments received on submitted Part II Permit Application and contract documents.
July 1993	Submit final contract documents to DER for approval.

August 1993	Receive Water Quality Management Permit, Part II.
August 1993	Advertise for construction bids for proposed facilities in Sewer District Nos. 1 through 6.
September 1993	Receive construction bids.
October 1993	Award contracts for collector sewer lines and pump stations construction to serve all six Sewer Districts.
December 1994	Adopt zoning ordinances in accordance with recommendations of the overall Township Planning Study.
December 1994	Commence Facility operation.

MUNICIPAL ADOPTION OF PLAN AND ASSOCIATED ORDINANCES

The adopted ordinances governing on-lot management and use of holding tanks is included in Appendix IV. The resolution for adoption of this Act 537 Planning Study is included in this report in Appendix V.

REVIEW OF PRIOR FEASIBILITY AND RELATED STUDIES AND PLANS

Introduction

Role of Sewage Facilities Plan in Community Development

The collection of wastewater and its treatment is a vital function in the community planning. Todays rules and regulations promulgated by the various governmental bodies, allow no growth to occur legally without addressing wastewater collection and treatment. Rules and regulations of governmental bodies, mountainous terrain and the soil conditions in this part of the State make conventional on-lot treatment and disposal systems use questionable in areas of dense population. Unregulated developer construction of collector sewers and treatment plants result in poorly constructed sewers and treatment facilities which discharge inadequately treated effluents to adjacent streams. In most treatment systems owned by private developers, the emphasis on the

profit motive results in neglect of the facilities resulting in further degradation of the receiving stream. Without planning, developers sewers and treatment facilities are sometimes not sized adequately to account for future development.

With a sewage facilities plan, provisions can be made in development construction to accommodate future needs. Regardless of whether a community desires development or wishes to discourage development makes no difference in the need for such sewage facilities planning. The purpose of this plan is to identify present problems and address their correction and to set forth various alternatives for future plans. It also recommends the necessary management actions that must be taken to implement the plan.

Comprehensive Water Quality Management Plan - Upper Allegheny River Basin. Study Area 8 (COWAMP)

This report was prepared for the Commonwealth of Pennsylvania Department of Environmental Resources by; North Central Pennsylvania Regional Planning and Development Commission, Ridgway, PA; Northwest Pennsylvania Regional Planning and Development Commission, Franklin, PA; and Green International, Inc., Sewickley, PA. This broad based study evaluated water quality management planning for an eleven county area in northwest Pennsylvania. The existing problems outlined in this study included mine drainage from strip mining, industrial discharges, complete lack of or inadequate or outdated sewage treatment facilities, poor soil suitability for on-lot disposal systems resulting in malfunctioning systems, oil and gas extraction contaminants; siltation from lumbering operations, agricultural runoff; and lack of enforcement of existing water quality laws and regulations.

This report is very general in nature and does not detail site specific improvements that should be undertaken by individual areas or communities in the study area. The summary of alternatives portion of this report states that secondary treatment will be sufficient for most treatment plant alternatives for McKean County. The report also states that conventional or alternative on-lot systems will be adequate for most of the smaller communities such as East Kane. This report did not recommend any one alternative over another for specific areas within McKean County.

Sewerage Feasibility Study, Wetmore Township, McKean County Pennsylvania, August 1969

This report was prepared by Northwest Engineering sponsored by the Pennsylvania Department of Health and the Supervisors of Wetmore Township. Financing was provided by the Supervisors of Wetmore Township (50%) and by the Commonwealth of Pennsylvania Department of Health, Sewage Facilities Assistance Program (50%).

This study indicated a need for concern by the citizens of Wetmore Township to deal with the problems of sewerage, not only regarding the areas in the study, but for those other areas that would be affected by problems relating to waste disposal as more land is developed in the future. This study outlined the need for community collection and treatment systems in the more densely populated areas of the Township. This study also pointed out the importance of properly installed on-lot sewerage systems in areas where public sewer systems are not economically feasible. This report emphasized the need to control future development in the Township so that pollution problems can be addressed before they become a nuisance or public health problem. This Feasibility Study proposes the use of several small package wastewater treatment plants located through out the Township to serve the several densely populated areas spread throughout the Township.

McKean County Official Plan - 1968

This report was prepared by Gannett Fleming Cordory and Carpenter, Inc. for the McKean County Planning Commission. This report address the water and sewer problems existing in the entire McKean County study area and provides recommendation for the abatement of some problems. The recommendation for sewerage improvements outlined for Wetmore Township in this report are; sewage collection and treatment facilities to serve the East Kane Village area; sewage collection and treatment facilities to serve the Ten Commandments area; and the construction of the Tionesta sewage treatment plant and collection sewers to serve the Wetmore Township area west of Kane. This report states that the immediate needs of the Township would be to collect and treat sewage in the East Kane and Ten Commandments areas. The estimated cost associated with the immediate needs was approximately $425,000. The projected needs of the Township outlined in this report include collecting sewage in the West Kane and Ten Commandments areas and constructing a wastewater treatment plant on the Tionesta Creek to treat this sewage. The estimated costs associated with the projected needs was approximately $730,000.

Policies for the Future, McKean County, Pennsylvania

This report was prepared by the McKean County Planning Commission in June 1977. The sewage needs portion of this report references the 1969 McKean County Comprehensive Plan. This report states that the basic goal for McKean County is that all concentrations

of development be serviced by public sewers and wastewater treatment facilities. The report does not recommend specific improvements that need to be undertaken in each area of the County.

Summary of Existing Studies and Plans

Of the four existing studies evaluated, only the Sewerage Feasibility Study, Wetmore Township, McKean County, August 1969 addresses and evaluates site specific problems and concerns for Wetmore Township. This report describes the action that was needed to be undertaken in the Township to address the existing and future pollution problems. None of the recommendations in this report were ever implemented and the Department of Environmental Resources has qualified this report as inadequate to serve as the Official Plan of the Township.

The "Comprehensive Water Quality Management Plan - Upper Allegheny River Basin Study Area 8" is very broad based and is not site specific enough to provide pertinent information for the Wetmore Township Act 537 Plan. The one point in this report which is pertinent is the statement that alternative or conventional on-lot systems will probably be adequate for most smaller communities in the County such as East Kane.

The McKean County Official Plan - 1968 and Policies for the Future - McKean County Plans are outdated and inadequate as Official Sewage Plans and very general in nature. The studies do point out the need for centralized collection and treatment of sewage generated in the most densely populated areas of the Township. The four existing studies available for the Wetmore Township area are all consistent in their analysis of sewage problems but most of the recommendations have not been implemented.

None of the existing plans recommend zoning or subdivision regulations for Wetmore Township and to date there are no adopted zoning or subdivision regulations in the Township. The Grandview Estates subdivision was approved by the Township Supervisors and a permit to construct a sewage treatment lagoon was issued to the developers by DER. The sewers and lagoon for the subdivision were installed and 12 houses constructed and connected to the sewage system. The lagoon provided inadequate treatment for the sewage generated in the subdivision and the permit to operate the lagoon was revoked by DER. The 12 houses presently connected to this collection system continue to discharge to the lagoon. An additional 70 lots in this plan that are presently undeveloped have sewer service that would discharge to this same lagoon, but due to the unpermitted waste stabilization pond, no additional building permits can be issued.

The McKean County Planning Commission and the Commonwealth of Pennsylvania Department of Environmental Resources Storm Water Management Section were contacted regarding any information relevant to any existing Storm Water Management Plans for Wetmore

Township. Both parties responded stating that there is no approved Storm Water Plan for the referenced area (see Appendix I) but DER stated that all land development activities in the Township must be conducted in a manner consistent with Section 13 of the Storm Water Management Act.

McKean County and more specifically Wetmore Township is located on a high plateau containing extensive fairly level areas which are deeply cut by streams. Within the boundaries of Wetmore Township are the headwaters of the East Branch of Tionesta Creek, Two Mile Run, Wilson Run and the South Branch of Kinzua Creek. Because of this elevation of Wetmore Township and the location of the headwaters the U.S. Department of Housing and Urban Development has not located any flood hazard areas within the planning area. Due to this condition there are no limitations to development within the Township based on flood hazard or special protection areas. The recreational use of water resources in the township is limited to fishing due to the sizes of the streams at the headwaters.

The soils mapping for the planning area has been reviewed and there are very few land development limitations due to the occurrence of wetlands within the study area. A copy of the soils maps and soils classifications including a list of hydric soils which indicate the presence of wetlands is included in Appendix II. The limited amount of wetlands in the Township are located along the streams and creeks and due to the deeply cut stream channels in this area wetlands along the streams are limited because of the slope of the existing ground surface and the associated drainage characteristics.

The McKean County Official Plan - 1968 states that a majority of the population in Wetmore Township acquires its water supply from personal wells and springs. Several homes in Wetmore Township are served by the Pennsylvania American Water Company which supplies Kane Borough. To date there have been no reports of contaminated wells or springs caused by malfunctioning on-lot subsurface sewage treatment systems. The McKean County Plan does recommend that the filtered water supply furnished by the Pennsylvania American Water Company be extended to serve the most densely populated areas of Wetmore Township in the future. There are no major industrial water users presently located within Wetmore Township.

The McKean County Conservation District was contacted regarding the occurrence of prime agricultural farmland that is located in Wetmore Township. The information was reviewed and several mapping units designated as prime farmland were found within the planning area. A copy of the soils maps and mapping units designated as prime farmland are attached in Appendix II. The prime farmland soils within the Township are located on the elevated plateaus and any land development should be directed away

from these areas. The soils types found in the planning area that have been designated as prime farmland are; Cookport loam, 0 to 3 percent slopes; Cookport loam, 3 to 8 percent slopes; and Wharton silt loam, 3 to 8 percent slopes.

The Commonwealth of Pennsylvania Department of Environmental Resources Bureau of Forestry was contacted and requested to perform a Pennsylvania Natural Diversity Inventory (PNDI) search for the planning area. A specific search of the current PNDI locational data files in comparison with the project site did not reveal any natural resources of special concern.

A review of the State Water Plan, Subbasin No. 16 as it relates to the Kane/Wetmore Township Areas was completed. The Kane/Wetmore Township Area, according to the State Water Plan, is expected to experience a raw water yield deficiency in 1990 and 2020. The recommended feasible solution for the yield deficiency is the development of additional ground water sources and the allocation of the additional water supply should not be a concern. The State Water Plan does not foresee a water allocation deficiency but water storage capacity deficiency of 0.18 MGD can be expected by the year 2020. The plan projects a water filtration capacity deficiency of 0.478 MGD in 1990 and 0.865 MGD in 2020. The present capacity of the treatment facility of the Pennsylvania American Water Company plant in Kane is 1.0 MGD.

The State Water Plan shows that bituminous coal reserves do exist in the Wetmore Township area. The Lower Kittanning coal seam is located in McKean County and is a relatively poor quality coal with a sulfur content greater than one percent. The majority of coal mining in this area is accomplished by the surface (strip) mining process. Surface mining produces large areas of disturbed land that is highly erodible, and if techniques for sediment control are not used, large quantities of sediment are contributed to surface streams. Coal reserves that are near the water table can have a large influence on groundwater quantity as evidenced by acid mine drainage. Where the water table must be lowered to continue mining activity, large cones of depression will develop that may adversely affect local groundwater availability. The mining industry in the planning area must be regulated so that there is not irreparable damage to the groundwater resource which supplies a majority of this area with potable water.

The rate of growth for the residential, commercial and industrial sectors of the Township have been and are expected to be very small. The 1980 population for Wetmore Township was 1,924. The 1990 population is 1,745 and the projected year 2000 population is 2,066. As can be seen from this population data, the Township is expected to grow at a rate less than 2% over the next 10 years. Any sewage planning that is presently being undertaken will not be drastically impacted by such moderate growth. A growth rate of this magnitude is very manageable. The only concern with residential growth within Wetmore Township is directing the development toward the areas of the Township that have the public

facilities to handle the growth. There is little or no growth expected in the commercial and industrial sectors of the Township. The population data for this study came from the McKean County Statistical Profile completed in 1983 by the McKean County Board of Commissioners.

Physical Description of Planning Area

This Official Sewage Plan reviews Wetmore Township and more specifically the area outlined by the Department of Environmental Resources, said area being located around Kane Borough including the Greendale, East Kane, Ten Commandments, West Kane and Route 66 Corridor areas. This planning area designation as outlined by DER included the most densely populated areas of Wetmore Township. The planning area has been slightly modified to include some areas outside that delineated by DER at the request of the home owners and the funding agency Farmers Home Administration. These additional areas can be seen on Plate IV. The areas of Wetmore Township outside the planning area are very sparsely inhabited.

Plate I (inserted in the folder at the rear of this report) is a map of the study area. Indicated on the map is the following information:

1. Watershed Limits
2. Municipal Boundaries
3. Streams
4. Flood Plains
5. Development Sites
6. Planning Area as Delineated by PADER

The potential development areas were identified by reviewing the topography of the land and outlining the most desirable areas, such factors included availability of utilities, slope of land, soils conditions, transportation access, proximity to commercial and industrial areas, etc. Presently, Wetmore Township has no zoning ordinances, therefore, development of any kind at any location is presently a possibility. Large scale development is not expected to be a concern in the Wetmore Township area during the life of this planning study. The population projections are for very limited increases in the near future. The State Water Plan projects a 6.5% population growth for McKean County. This population increase is expected to be realized more in the industrial and commercial areas of the County such as Bradford and Port Allegheny. The population increase expected in Wetmore Township is more likely to be in the area of 2% or less.

Plate II (inserted in the folder at the rear of this report) is a map of the study area and associated watershed outlining wastewater collection and treatment systems and water treatment and distribution systems. Areas which are not indicated as being sewered are assumed to be served by on-lot sewage disposal systems. All information depicted on this map came from published data, information furnished by the municipalities or authorities involved or actual site visits.

Appendix II contains the soils maps and designations for Wetmore Township. It was prepared from a soils survey of McKean County developed by the U.S. Department of Agriculture, Soil Conservation Service. The soils mapping for the planning area has been reviewed and there are very few land development limitations due to the occurrence of wetlands within the study area. A National Wetlands Inventory Map prepared by the United States Department of the Interior is also included in Appendix II. This map indicates the location and type of wetlands located within the planning area. In addition a letter from the McKean County Soils Conservation District is included in Appendix II. This letter includes list of soils classifications that are considered prime farmlands and wetlands. The limited amount of wetlands in the Township are located along the streams and creeks are due to the deeply cut stream channels in this area, wetlands along the streams are limited because of the slope of the existing ground surface and associated drainage characteristics.

A list of soils mapping units that qualify as prime farmland are included in Appendix II. As can be seen from the maps in Appendix II, the locations of the wetlands and prime agricultural lands will have little to no impact on the installation of community collection and treatment systems. The use of on-lot subsurface sewage disposal is not acceptable and must be prohibited on the lands designated as wetlands, flood plains, and prime agricultural.

On Monday, July 2, 1990, a tour of the planning area as outlined by DER was conducted with representatives of the Township, Engineer, and local Sewage Enforcement Officer. The purpose of the tour was to evaluate the effectiveness of all existing on-lot sewage disposal systems and gather information regarding the use of on-lot sewage disposal systems for the developable vacant lots throughout the Township. A copy of this letter summarizing the tour is included herein, in Appendix III. A summary of this letter indicates that most, but not all, existing on-lot subsurface sewage disposal systems are malfunctioning to some extent. According to the sewage enforcement officer, soil conditions on most vacant developable lots within the planning area are not acceptable for conventional on-lot systems. However, there are isolated areas within the planning area where soil conditions are acceptable for the use of advanced on-lot systems such as elevated sand mounds. In general, the use of on-lot subsurface sewage disposal systems for future development within the planning area is unacceptable.

In addition to the field reconnaissance conducted in July 1990 a tour of the planning area was conducted by representatives of Wetmore Township, DER and the local SEO in April 1991. This tour of the area revealed similar results as the tour conducted in July 1990. A comprehensive house by house survey of the existing on-lot subsurface sewage disposal systems was not conducted.

Geologically, Wetmore Township is located within the Pennsylvanian Appalachian Plateau - Pottsville Group. The Pottsville Group is formed of predominantly sandstones and conglomerates with thin shales and coals. This group is considered a good aquifer but it may not yield large quantities of ground water because of its high topographic position. The base of the Pottsville is marked by the Connoquenessing sandstone where it is present. This sandstone is porous and produces moderate yields. In general, the Pottsville group has many sandy units and is a good aquifer especially where faults, fractures and joints are present. The median yield for a well located in this group is 42 gallons per minute. Wells located in this group may contain salt when found below major drainage levels. Yields may exceed 300 gpm. Yields are generally sufficient for small communities. High iron content is a common problem of ground water supplies in this area.

A portion of the population in the planning area has its water supplied by a public system, the American Water Works Company, but there are many residents that have private wells. To date, there have been no complaints of private wells being contaminated by improperly operating or malfunctioning on-lot subsurface sewage disposal systems. Presently there are no areas within the study zone that have geologic features that would adversely influence the use of on-lot sewage disposal systems. Land application of treated wastewater and wastewater sludge and the use of on-lot subsurface sewage disposal systems is limited by soils quality more than geologic features.

Both the State Water Plan and the McKean County Statistical Profile project a moderate 6% to 8% population increase for McKean County in the next decade. The population increase in Wetmore Township is expected to be much less than the County increase due to the facts that Wetmore is a very rural Township and there are no proposed industrial or commercial developments in the foreseeable future that would attract people to this area. The existing sewage systems within the Township are presently inadequate, therefore, any population increase and associated development would create additional sewage problems within the planning area.

Presently the Township is under a moratorium on new development within the delineated planning area and the sewage enforcement officer is prohibited from issuing any on-lot sewage disposal permits until an approved Act 537 Plan is adopted by the Township. This factor along with poor soil suitability for on-lot sewage disposal and lack of a calatyst such as industry to draw people to Wetmore Township will discourage development for the near future.

EVALUATION OF EXISTING WASTEWATER TREATMENT AND CONVEYANCE SYSTEMS

Description of Wastewater Systems in Township

Plate II outlines the existing community collector sewers and treatment facilities located within the planning area. The existing collector sewer systems are confined to two small areas within the Township. One area served by collector sewers is the Grandview Estates development that has collector sewers installed to serve a maximum of 75 lots, but the system currently serves only 12 existing houses in this development. The Grandview Estates collector sewer system discharges to a lagoon located at the headwaters of Dump Run. This lagoon is presently not permitted. The other area served by collector sewers are those houses on Pine Street, Walnut Street, Spring Avenue and Pennsylvania Avenue in Wetmore Township adjacent to Kane Borough that discharge into the Pine Street WWTP. There are approximately 26 existing houses in Wetmore Township that discharge sewage into the Kane Borough sewer system and ultimately into the Pine Street WWTP. The Pine Street WWTP is owned and operated by the Borough of Kane. The remainder of the Township residents are served by on-lot systems or cesspools or discharge raw sewage directly to adjacent ditches, streams, ponds, etc. The majority of the homes in the planning area have conventional on-lot systems with a minority having elevated sand mound systems.

From 1980 Census data, there are approximately 674 housing units in the entire Township that are occupied year round. Of the 674 units, approximately 397 unsewered housing units are located within the planning area. Of the units within the planning area, 38 units are connected to public sewer systems, 12 discharge into the unpermitted Grandview Estates Lagoon and 26 discharge into the permitted Pine Street WWTP. There are approximately 397 units in the planning area that are served by some type of on-lot sewage disposal system. The Township is considered a rural municipality, and hence, it is not surprising that on-lot sewage systems prevail.

There are areas within the Wetmore Township planning area that utilize on-lot sewage systems where development densities are rather high. These areas are listed as follows:

East Kane
Ten Commandments/JoJo Road Area
West Kane
Greendale
Route 6 Corridor - North of Kane
Old Mill/West Wind Road

In the balance of the Township there are some areas where clusters of residences have been built along the Township road network, but still the development densities are relatively low, and the opportunities to even consider community sewage collection and treatment systems does not exist. All throughout the Township one finds aging on-lot sewage systems that are failing. Plate I, which shows existing land uses in Wetmore Township, conveys the pattern of development that can be expected in this essentially rural Township.

Existing Wastewater Treatment Plants

There are two existing wastewater treatment plants located within the delineated planning area. The two facilities are the Pine Street WWTP and the Kinzua Creek WWTP. Both of these publicly owned treatment works are owned by the Borough of Kane Authority and leased to the Borough of Kane for day to day operation and maintenance. These two publicly owned treatment works are located in Wetmore Township within the planning area but specifically serve Kane Borough and a very small area of Wetmore. The Borough of Kane is quite unique in that two treatment plants are needed to serve a population that could easily be served by one facility. Kane is located at a rather high elevation which is the dividing point of several watersheds, therefore one WWTP is located on the west side of the Borough (Pine Street WWTP) and one is located on the east side of the Borough (Kinzua Creek WWTP). Table 1 is an inventory of wastewater treatment facilities located within the planning area.

The Borough of Kane wastewater treatment plants were constructed in 1966. The treatment and facilities are operated and financed by the Borough of Kane. The Borough directly employs personnel to maintain and operate the treatment plants and collection system. This sewage system is financially self sufficient. The Pine Street treatment plant discharges into the headwaters of West Run while the Kinzua Creek facility discharges effluent into the headwaters of Hubert Run which is a tributary of Kinzua Creek. Table 2 contains a summary of the NPDES permit conditions for each facility. Presently these effluent limits are being exceeded.

Inventory of Wastewater Treatment Facilities in Planning Area
TABLE 1

Plant Name	Kinzua Creek WWTP	Pine Street WWTP
Location	N. East of Kane Borough	S. West of Kane Borough
Permit No.	PA0023175	PA0026167
Permitee	Borough of Kane Auth. Leased to Borough of Kane	Borough of Kane Auth. Leased to Borough of Kane
Municipalities Served	Borough of Kane	Borough of Kane and small area of Wetmore Township
Type	Public	Public
Design Flow	0.80 MGD	0.80 MGD
Adequate No. of Certified Operators	Yes	Yes
Receiving Streams Drainage Basin	Hubert Run	West Run
Sludge Disposal	None	None
DER Assessment of Effluent	Unacceptable	Unacceptable

TABLE 2

Summary of NPDES Permit Conditions

Treatment Facility	Kinzua Creek WWTP	Pine Street WWTP
Flow - MGD	0.80	0.80
BOD_5 Avg. (mg/l)	25	25
BOD_5 Max. (mg/l)	40	40
SS Avg. (mg/l)	30	30
SS Max. (mg/l)	45	45
NH_3 N Summer		
Avg.	10	10
Max.	15	15
NH_3 N Winter		
Avg.	--	--
Max.	--	--
pH	6 to 9	6 to 9
Dissolved O_2	6.0	6.0

EXISTING MUNICIPAL AND NON-MUNICIPAL SEWER SYSTEM COMPONENTS

The sewer systems located within the Wetmore Township Planning Area include the gravity collector sewers in the Grandview Estates Plan installed by the developer to ultimately serve 75 lots. Presently 12 homes are connected into this system that discharge into the unpermitted lagoon that is located east of the plan. The only other area of the Township that has collection sewers are the 26 homes located on Pine Street, Walnut Street, Spring Street and Pennsylvania Avenue adjacent to Kane Borough. These 26 homes discharge into the Pine Street WWTP. See Plate II for a map of the study area that outlines the existing community collector sewers and treatment facilities located within the planning areas.

The homes in Kane Borough are served by a completely gravity combined sewer system that discharges into the two POTW's listed previously. This sewer system has marginal capacity for the existing amount of connections.

The remainder of the existing homes in the Wetmore Township planning area are not sewered and dispose of their sewage through the use of some type of on-lot sewage disposal system. There are no community on-lot systems presently operating in Wetmore Township.

Sludge Generation, Transport and Disposal

All sludge generated in the planning area comes from on-lot sewage disposal systems. The average on-lot septic system for a single family dwelling should be pumped every three years and, on the average 300 to 1000 gallons are pumped from each dwelling unit. However, residents tend to call for pumping only when a system is plugged. This means that the average system is pumped less frequently than every three years.

There are approximately 397 dwelling units located within the Wetmore Township planning area that depend on some type of on-lot septic system. Assuming that each of these systems was pumped on the average of every four years and that an average 650 gallons is pumped from each system, 64,512 gallons of sludge would be generated in the planning area each year.

In Wetmore Township, two septic tank pumpers serve approximately 90% of the Township. The sludge is transported by tank truck and disposed of by discharging into the Johnsonburg Municipal Authority WWTP. This facility has all permits necessary to accept this septic system sludge. All septage generated and collected in Wetmore Township will be delivered to and treated at the upgraded Kane Borough STPs once all construction of the expanded and upgraded facilities is complete. An agreement should be executed between Kane Borough and the Wetmore Township Supervisors to guarantee that both parties are protected in this matter.

The sludge generated by the 12 single family dwelling units connected to the gravity sewer system in the Grandview Estates Plan discharge into the unpermitted lagoon as described earlier in this study. This sludge has accumulated in this lagoon since the sewer system was installed. The lagoon has never been drained and cleaned.

The sludge that is generated at the two wastewater treatment plants located in the planning area originates in Kane Borough. Presently the Borough of Kane has no sludge disposal program.

EVALUATION OF WASTEWATER TREATMENT NEEDS

Most of the existing dwelling units in the Wetmore Township Planning Area utilize some type of on-lot sewage disposal systems. On Monday, July 2, 1990 a tour of the planning area was conducted with the local sewage enforcement officer. The purpose of the tour was to evaluate all existing on-lot sewage disposal systems and gather information regarding the use of on-lot sewage disposal systems for developable vacant lots throughout the Township (see Appendix III for description of field reconnaissance). The following is a summary of the information gathered during that visit:

East Kane Area - 82 Dwelling Units

The estimated total volume of sewage generated in this area on an average day is: 82 EDU's x 100 gallons/person day x 3.5 persons/EDU = 28,700 gallons per day. The estimated total volume of sewage generated in this area on a peak day is 82 EDU's x 250 gallon/person day x 3.5 persons/EDU = 71,750 gallons per day.

Presently all houses in this area rely on on-lot sewage disposal systems. Most existing on-lot subsurface sewage disposal systems are malfunctioning and discharging raw or partially treated sewage to surface drainage courses. Most gray water generated in this area is discharged directly to the ground surface or area storm sewers. According to the local sewage enforcement officer, soils in this area are unacceptable for conventional subsurface sewage disposal but the use of elevated sand mounds may be acceptable.

The East Kane area is located on the headwaters of Wilson Run. Partially treated or raw sewage from malfunctioning on-lot systems in this area may adversely affect Wilson Run if the problems with the malfunctioning on-lot systems are not corrected. The wastewater treatment facility located closest to this area is the Pine Street WWTP which is owned and operated by Kane Borough.

Greendale Area - 42 Dwelling Units

The estimated total volume of sewage generated in this area on an average day is: 42 EDU's x 100 gallons/person day x 3.5 persons/EDU = 14,700 gallons per day. The estimated total volume of sewage generated in this area on a peak day is 42 EDU's x 250 gallons/person day x 3.5 persons/EDU = 36,750 gallons per day.

Presently all houses in this area rely on on-lot sewage disposal systems. Most existing on-lot subsurface sewage disposal systems appear to be operating properly. There have been no complaints to the Township Supervisors from residents of this area regarding sewage discharges. The local sewage enforcement officer stated that on-lot elevated sand mound sewage systems may be acceptable in this area and that subsurface systems would be unacceptable due to soils conditions.

The Greendale area is located on the dividing line between the Wilson Run and Hubert Run watersheds and may be adversely affected by inadequate wastewater treatment in this area. The wastewater treatment facility located closest to this area is the Kinzua Creek WWTP which is owned and operated by Kane Borough.

Route 6 Corridor, North of Kane Borough - 35 Dwelling Units

The estimated total volume of sewage generated in this area on an average day is 35 EDU's x 100 gallons/person day x 3.5 persons/EDU = 12,230 gallons per day. The estimated total volume of sewage generated in this area on a peak day is 35 EDU's x 250 gallons/person day x 3.5 persons/EDU = 30,625 gallons per day.

Presently all houses in this area rely on on-lot sewage disposal systems. Many of the subsurface systems are presently malfunctioning and discharging raw or partially treated sewage to the ground surface or drainage ditches. Soils conditions in this area prohibit the use of conventional on-lot subsurface sewage disposal but the use of elevated sand mounds may be acceptable according to the local sewage enforcement officer.

The majority of the population in this area is located within the Hubert Run watershed and this watershed may be adversely affected by inadequate wastewater treatment in this area. The wastewater treatment facility located closest to this area is the Kinzua Creek WWTP which is owned and operated by Kane Borough.

West Kane Area - 56 Dwelling Units

The estimated total volume of sewage generated in this area on an average day is 56 EDU's x 100 gallons/person day x 3.5 persons/EDU = 19,600 gallons per day. The estimated total volume of sewage generated in this area on a peak day is 56 EDU's x 250

gallons/person day x 3.5 persons/EDU = 49,000 gallons per day. In addition to the 56 dwelling units listed above that utilize on-lot sewage disposal, there are 12 houses that are presently connected into the Kane Borough sewer system and Pine Street WWTP.

Presently all houses in this area not connected to the Kane Borough sewer system utilize some type of on-lot sewage disposal. All existing houses along Maple Street utilize on-lot subsurface sewage disposal systems and most are malfunctioning and discharging raw or partially treated sewage to drainage ditches. The reason for the malfunctioning is the poor soil conditions that prevail in this area. Several homes along West Kane Road have on-lot subsurface sewage disposal systems that operate properly. The sewage enforcement officer stated that soils conditions along West Kane Road may be acceptable to subsurface disposal systems and that elevated sand mounds would also work under the existing soils conditions. One existing house trailer on West Kane Road discharges raw sewage directly to surface water.

The population within the West Kane Area is located on the West Run watershed and this watershed may be adversely affected by inadequate wastewater treatment in this area. The wastewater treatment facility located closest to this area is the Pine Street WWTP which is owned and operated by Kane Borough.

Ten Commandments/JoJo Road Area - 101 Dwelling Units

The estimated total volume of sewage generated in this area on an average day is 101 EDU's x 100 gallons/person day x 3.5 persons/EDU = 35,350 gallons per day. The estimated total volume of sewage generated in this area on a peak day is 101 EDU's x 250 gallons/person day x 3.5 persons/EDU = 88,375 gallons per day.

All existing homes along JoJo Road utilize on-lot subsurface sewage disposal systems and most are malfunctioning and discharging raw or partially treated sewage to drainage ditches. The local sewage enforcement officer has tested property along JoJo Road and has found the soils conditions acceptable for the use of on-lot elevated sand mound sewage disposal system. #162 JoJo Road discharges raw sewage directly to an adjacent drainage ditch.

In the Ten Commandments/Route 66 areas all existing houses utilize on-lot subsurface sewage disposal methods. Most on-lot systems in this area are rather old and are malfunctioning, discharging raw or partially treated sewage to drainage ditches and the ground surface. The soils conditions in this area are totally unacceptable for conventional on-lot sewage systems and marginal at best for elevated sand mound disposal systems.

Most of the population living in this area is located on the East Branch, Tionesta Creek watershed. A minority of the population in this area is located on the West Run watershed. These watersheds may be adversely affected by inadequate wastewater treatment in this area. The wastewater treatment facility located closest to this area is the Pine Street WWTP which is owned and operated by Kane Borough.

Old Mill/West Wind Road Area/Grandview Estates - 81 Dwelling Units

The estimated total volume of sewage generated in this area on an average day is 81 EDU's x 100 gallons/person day x 3.5 persons/EDU = 28,350 gallons per day. The estimated total volume of sewage generated in this area on a peak day is 81 EDU's x 250 gallons/person day x 3.5 persons/EDU = 70,900 gallons per day.

All existing houses in the Old Mill Road area utilize on-lot subsurface sewage disposal. Most existing on-lot systems are malfunctioning, discharging raw or partially treated sewage to drainage ditches or the ground surface. The local sewage enforcement officer has performed some analyses on unoccupied parcels in this area and has found the lots acceptable for on-lot elevated sand mound sewage disposal. All the existing houses in the West Wind Road area presently utilize on-lot subsurface sewage disposal. Most of these on-lot systems are rather old and are malfunctioning. The local sewage enforcement officer has not analyzed any property in this area for the capability of utilizing on-lot subsurface sewage disposal systems. It can be assumed that on-lot subsurface systems would not be acceptable in this area due to poor soil conditions and the use of advanced on-lot systems would be marginal for the same reason.

Most of the population living in these areas is located on the East Branch Tionesta Creek watershed and this watershed may be adversely affected by inadequate wastewater treatment in this area. The wastewater treatment facility located closest to this area is the Pine Street WWTP which is owned and operated by Kane Borough.

In summary, it can be seen from the foregoing that many existing dwellings in the planning area utilize on-lot sewage disposal techniques and that a majority of these systems are malfunctioning to some degree. Most of the malfunctions are caused by poor soils conditions and/or inadequate maintenance. The malfunctioning on-lot systems were identified during the tour of the planning area with the local sewage enforcement officer. All malfunctions were confirmed visually or from information provided by the local sewage enforcement officer. Most discharges caused by malfunctioning on-lot systems are to adjacent drainage ditches. During the tour of the planning area only two raw sewage

discharges to surface waters was observed on West Kane Road. To date there have been no documented cases of health associated problems caused by malfunctioning on-lot systems. In addition, there have been no confirmed water or vector borne disease outbreaks caused by malfunctioning on-lot sewage disposal systems.

The following is a tabulation of estimated total sewage flows for the portion of the population in the planning area that presently utilize on-lot disposal systems for the areas described previously:

Area	# of EDU's	Average Day Sewage Flows	Peak Day Sewage Flows
East Kane	82	28,700 gals./day	71,750 gal./day
Greendale	42	14,700	36,750
Rt. 6/N. Kane	35	12,250	30,625
West Kane	56	19,600	49,000
Ten Commandments/ JoJo Road	101	35,350	88,375
Old Mill/West Wind/ Grandview Estates	81	28,400	70,900
TOTALS	397	139,000 gal./day	347,400 gal./day

From visual inspection of the malfunctioning on-lot systems and discussions with the local sewage enforcement officer, the reason for most failures is due to poor soils conditions in most cases and lack of maintenance or poor siting for a minority of the failed systems. Most of the existing development within the planning area is located on the level plateaus or the relatively flat valley bottoms. The slope of the land where most failing on-lot systems are located is not the reason for the systems malfunctioning. A review of the soils survey of McKean County prepared by the USDA Soil Conservation Service indicates that all soils within the planning area have severe limitations as septic tank absorption fields. The limitations are due to slow percolation and wetness of soils. For mapping of the soils and classifications see Appendix II.

Most conventional on-lot subsurface sewage disposal systems that are failing are doing so because the soil does not have the capability of absorbing the volume of sewage being generated. The soils percolate slowly and therefore the sewage takes the route of least resistance and surfaces in nearby drainage ditches. The elevated sand mound on-lot sewage disposal system is better suited for this area because an adequate leach field is provided for treatment and absorption of the sewage. Many areas within the planning area are also unsuitable for elevated sand mounds because

of soils that percolate so slowly that the volume of sewage cannot be absorbed beyond the leach field and the septic tank effluent surfaces in nearby drainage ditches.

Some on-lot systems may have failed due to hydraulic overloading, improper design, poor installation or siting. Most of the failing systems are rather old and the size of the septic tank and leach fields are unknown. An under sized septic tank and leach field may be the cause of on-lot failures. In addition to these problems many of the older on-lot systems may have been adequate in the past, but have now reached the end of their functional lives. Of all the possible problems explored for malfunctions the most obvious is the poor soil conditions as described in the McKean County Soils Survey Table 12 - Sanitary Facilities included in Appendix II.

Illegal Sewage Disposal Systems

The Grandview Estates Development within the planning area presently has 12 homes connected to a gravity sanitary sewer installed by the developer that discharges to an unpermitted waste stabilization pond for treatment and overflows to Dump Run. This waste stabilization pond was permitted initially but the permit was revoked when the process did not provide adequate treatment for the sewage.

The estimated total volume of sewage generated in the Grandview Estates area on an average day is 12 EDU's x 100 gallons/person day x 3.5 persons/EDU = 4,200 gallons per day. The estimated total volume of sewage generated in this area on a peak day is 12 EDU's x 250 gallons/person day x 3.5 persons/EDU = 10,500 gallons per day.

In addition to the unpermitted waste stabilization pond that serves the Grandview Estates subdivision, there are two other properties within the planning area that were observed disposing of sewage illegally. One house trailer on West Kane Road discharges raw sewage directly to surface water and #162 JoJo Road discharges raw sewage directly to a drainage ditch.

A visual inspection of the planning area and discussions with Township Supervisors indicated that the only illegal sewage disposal systems within the study area are those previously listed. An evaluation of the malfunctioning on-lot sewage disposal systems was completed previously in this study.

Local Municipal Agency Programs

The Local Municipal Agency that presently has control of sewage needs and problems in Wetmore Township is the Township Supervisors. Presently there are no zoning or minimum lot size ordinances to control the use of on-lot sewage disposal systems. At the present time the Township Supervisors defer all on-lot sewage requests and concerns to the local sewage enforcement officer. The local sewage enforcement officer evaluates all requests for on-lot sewage disposal permits and advises the Supervisors regarding complaints received regarding malfunctioning and nuisance on-lot sewage disposal systems.

SUMMARY OF WASTEWATER NEEDS

Population Projections

The COWAMP Study prepared in 1979 lists the year 2000 estimated population for McKean County at 58,179 but does not breakdown the population projections into specific areas such as Wetmore Township.

The 1980 Census data was obtained from the McKean County Planning Commission. The following are populations as listed in the 1990 Census for the entire Township.

Community	Population	Year	Households	Average Household Size
Wetmore Twp.	1924 1745	1980 1990	674	2.85

The projected population for McKean County based on Pennsylvania Department of Environmental Resources projections is:

Year	Population
1990	55,393
2000	58,993

The population is projected to increase at approximately 6.5% for the next 10 years for the entire County. The larger population increases can be expected in the industrial areas of the County such as Bradford, Smethport and Port Allegheny. The rural areas within the county such as Wetmore Township are expected to have much lower population increases due to the fact that there is no catalyst such as industrial or commercial development expected in the Township in the foreseeable future. There are no areas within the planning area where large scale development is expected.

Plate I shows the most densely populated areas in the planning area. These areas; East Kane, Greendale, West Kane, Ten Commandments, etc., may possibly have a customer base large enough to support the capital cost associated with sewage collection/treatment construction costs. Because of this population base, these above noted areas will be the focus point of the proposed sewage facilities alternatives to be evaluated later in this report. Table 3 is a summary of the population data and anticipated flows and organic and solids load that was developed from existing mapping, population data and actual house counts. Population data for the planning area is unavailable so the population projections and flows for this area will be based on actual house counts using an average of 3.5 persons per house. This will provide conservative wastewater loadings due to the fact that published population data indicates that the average household size in the planning area is 2.85.

No matter what the conclusion of this study recommends, a conservative approach to estimating flows and loadings should be utilized. These conservative estimates can be used to assure that sewer line and other wastewater facilities can be properly sized to accommodate existing and future flows.

Table 3 is the most conservative of the population estimates. The data in Table 3 will be used in the development of a sewage facilities plan that will be presented later in this report.

Table 3
Estimate of Wastewater Loadings

Area	Dwelling Units	Average GPD	Peak GPD	BOD_5 lbs./Day	SS lbs./Day
East Kane	82	28,700	71,750	49	57
Greendale	42	14,700	36,750	25	30
Rte. 6/N. Kane	35	12,250	30,625	22	27
West Kane	56	19,600	49,000	33	39
Ten Commandments/ JoJo Road	101	35,350	88,375	60	71
Old Mill/W. Wind/ Grandview Estates	81	28,350	70,875	49	57
TOTALS	**397**	**139,000**	**347,400**	**238**	**281**

The areas listed in Table 3 are the most densely populated areas of the Wetmore Township planning area. The remainder of the planning area is sporadically developed. Collection and treatment of sewage from the sparsely inhabited areas of the Township is expected to be cost prohibitive.

NPDES Permit Effluent Limitations

The degree or level of treatment that must be maintained by a wastewater treatment facility is determined on the basis of the water quality of the stream into which it discharges, the quantity of pollutants anticipated in the discharge and any other contributors of pollutants up or down stream of the discharge point. Specific design parameters for the Wetmore Township Planning Area were requested from DER. The effluent limits listed below are for treatment facilities located in the same watersheds in close proximity to the proposed Wetmore Township facilities. For process analysis and associated construction costs, these parameters listed on Table 4 will be sufficient. The DER develops effluent criteria on the basis of a computer model of the affected stream.

TABLE 4
East Branch Tionesta Creek

PARAMETER	MONTHLY AVERAGE	WEEKLY AVERAGE	INSTANTANEOUS MAXIMUM
$CBOD_5$ (5/1-10/31)	10	15	20
(11/1-4/30)	20	30	40
TSS	30	45	60
NH_3-N (5-1-10/31)	2	3	4
NH_3-N (11/1-4/30)	6	9	12
DO	**Minimum 7 mg/l at all times.**		
Phosphorus (4/1-10/31)	2	3	4
NO_2-NO_3	10	15	20
pH	**Minimum 6.0; Maximum 9.0**		
Fecal Coliform (5/1-9/30)	200/100 ml as a geometric average.		

WILSON RUN

PARAMETER	MONTHLY AVERAGE	WEEKLY AVERAGE	INSTANTANEOUS MAXIMUM	
$CBOD_5$	25	40	50	
TSS	30	45	60	
NH_3-N (5/1-10/31)	2	3	4	
NH_3-N (11/1-4/30)	6	9	12	
DO	**Maximum 6 mg/l at all times.**			
pH	**Minimum 6.0; Maximum 9.0**			
Fecal Coliform (5/1-9/30)	200/100 mg as a geometric average.			
(10/1-4/30)	2,200/100 ml as a geometric average.			(1.5 MGD)
	2,100/100 mg as a geometric average.			(2.2 MGD)
	2,100/100 ml as a geometric average.			(3 MGD)

WEST RUN

PARAMETER	MONTHLY AVERAGE	WEEKLY AVERAGE	INSTANTANEOUS MAXIMUM
$CBOD_5$ (5/1-10/31)	10	15	20
(11-1/4-30)	20	30	40
TSS	30	45	60
NH_3-N (5/1-10/31)	2	3	4
NH_3-N (11/1-4/30)	6	9	12
DO	Maximum 7 mg/l at all times.		
Phosphorus (4/1-10/31)	2	3	4
NO_2-NO_3	10	15	20
pH	Minimum 6.0; Maximum 9.0		
Fecal Coliform (5/1-9/30)	200/100 ml as a geometric average.		

West Run is part of the East Branch Tionesta Creek watershed which is classified as a High Quality - Cold Water Fishery. This is the reason for the stringent effluent parameters for this watershed. High Quality waters are to be protected as they presently exist. The water quality can only be lowered if the discharge is a result of necessary social or economic development which is of significant public value. Placement of a new treatment facility on this watershed would require submission of a Social and Economic Justification statement. Part of this statement would have to prove land disposal alternative (i.e., spray irrigation, overland flow cluster, on-lot system, etc.) are not economically feasible or environmentally sound.

IMMEDIATE HEALTH RELATED PROBLEMS

Many of the on-lot systems in the planning area are not functioning properly as detailed previously. The local sewage enforcement officer has located some malfunctioning systems in the Township, however, in addition to those identified there are probably many more homes which, if tested, would be found to be failing. The main reasons for system malfunctioning is due to soils types or lack of maintenance. Most soils in the Township exhibit slow to very slow permeability and are unsuitable for conventional on-lot sewage treatment. The major environmental impact caused by these failing systems is the contamination of surface waters.

All existing on-lot sewage disposal systems are installed, operated and maintained by the home owner. There is presently no municipal involvement in their permitting and/or operation.

PLANNING AND FACILITIES ALTERNATIVES AND RECOMMENDATIONS

The following are alternative strategies for solving the sewage problems in the study area outlined previously. The main areas of concern of this plan are the problems caused by discharges of raw or partially treated sewage to the ground surface or surface waters caused by malfunctioning on-lot sewage disposal systems.

The Wetmore Township Planning Area is peculiclar in that the populated areas to be addressed in this study are spread out around the Kane Borough and located in several different watersheds. The watersheds all flow away from the two existing wastewater treatment facilities owned and operated by Kane Borough which creates a difficult set of circumstances if this area is to subscribe to the idea of regionalized collection and treatment. To preface the alternatives that will be evaluated in this section, the Borough of Kane has recently completed and submitted a new Act 537 Comprehensive Sewage Facilities Planning Study to DER. In this Act 537 Study it is recommended that the two existing wastewater treatment facilities owned by Kane Borough be upgraded and expanded. In this proposal the WWTP's will each be expanded from a design capacity of 0.80 MGD to 1.4 MGD. This expansion will provide enough excess capacity to treat the sewage generated in the Wetmore Township planning area.

For the convenience of referring to different areas within the planning area that will be described in the following Alternatives, distinct sewer districts will be used as follows:

District 1	West Kane	56 EDUs
District 2	Ten Commandments JoJo Road	101 EDUs
District 3	Old Mill Road West Wind Road Grandview Estates Carlson Heights	81 EDUs
District 4	East Kane	82 EDUs
District 5	Greendale	42 EDUs
District 6	Route 6 Corridor/North Kane	55 EDUs

ALTERNATIVE STRATEGIES

ALTERNATIVE A

This Alternative includes the construction of a gravity collection sewer system to serve the six Sewer Districts. These sewer districts are the most densely populated areas within the delineated planning area. The sewage in the six Districts would be collected by gravity sewers and conveyed to a packaged wastewater treatment plant located in the respective watersheds to serve each sewer district. For a layout of the gravity sewers and approximate treatment plant locations see Plate III.

The proposed facilities in Sewer District No. 1 will consist of approximately 9,600 linear feet of 8" PVC gravity collector sewer to serve the Township portion of Maple Street, West Kane Road and several side streets. A packaged type treatment facility will be located on and discharge effluent to West Run. West Run is tributary to the East Branch Tionesta Creek which is classified as a High Quality - Cold Water Fishery and therefore will require advanced treatment processes to meet the strict effluent parameters listed earlier in this report. The use of advanced treatment processes adds considerably to the cost of the proposed WWTP to serve this sewer district.

There are presently 56 dwelling units in Sewer District No. 1 that can be served by gravity sewers. The treatment facility must be sized to handle the peak day hydraulic loading that would be expected in this area. The proposed treatment facility would be required to handle a hydraulic loading of: 56 existing EDU's x 3.5 persons/EDU x 250 gallons/person day = 49,000 gallons per day.

This area (Sewer District No. 1) has limited potential for future development. It is estimated that up to 20 additional EDUs could be expected in this Sewer District in the next 10 years which would add 17,500 gpd to this area for a design hydraulic loading of 66,500 gpd.

The proposed facilities in Sewer District No. 2 under this alternative will consist of approximately 12,100 linear feet of 8" gravity collector sewers to serve the Ten Commandments and JoJo Road. See Plate III for the sewer system layout for Sewer District No. 2. The sewage collected in District No. 2 will be conveyed to a proposed wastewater treatment plant located along Route 66 on an unnamed tributary of the East Branch Tionesta Creek. Advanced treatment processes will be required at this facility also due to the fact that the effluent will be discharged into the same watershed as the proposed WWTP for Sewer District No. 1. The necessity for using advanced treatment processes in this sewer district will considerably increase the cost of the proposed WWTP.

There are presently 101 dwelling units in Sewer District No. 2 that can be served by gravity sewers. The treatment facility must be sized to accommodate the peak day hydraulic loading that would be expected in this area. The proposed treatment facility would be required to treat a hydraulic loading of: 101 existing EDU's x 3.5 persons/EDU x 250 gallons/person day = 88,375 gallons per day from Sewer District No. 2.

Sewer District No. 3 which includes Old Mill Road, West Wind Road, Highland Road, Grandview Estates and Carlson Heights will also discharge to the proposed WWTP in Sewer District No. 2, therefore the facility must be sized to handle the existing development in both sewer districts along with any future development. These two sewer districts are expected to see limited development in the next 10 years. Possibly an additional 30 dwelling units could be expected in this area therefore the WWTP must be sized to handle the 101 existing dwellings in Sewer District No. 2, the 81 existing dwelling in Sewer District No. 3, and the 30 potential future dwellings. The WWTP must be sized to treat the 185,500 gpd of sewage generated by 212 dwelling units. The cost of the WWTP to serve Sewer Districts 2 and 3 will need to be shared by the respective districts accordingly with the benefit each district receives from the facility.

The proposed facilities in Sewer District No. 3 under Alternative A will consist of approximately 19,700 linear feet of 8" gravity collector sewers to serve the West Wind, Highland, Old Mill, Grandview Estates and Carlson Heights areas. A small pump station located at the southern end of West Wind Road will be required to pump sewage collected along the southern portions of West Wind and Highland Roads. A 4" force main, approximately 2200 LF in length, will be needed to convey the sewage from the small pump station to the gravity sewer on West Wind Road that flows north to Old Mill Road.

The proposed facilities in Sewer District No. 4 under Alternative A will consist of approximately 19,000 linear feet of 8" PVC collector sewer to serve the East Kane and Route 321 Corridor area. This entire area as shown on Plate III can be collected by gravity without the need for any pump stations. The sewage collected in District No. 4 will be conveyed to a proposed wastewater treatment plant that will be located along Route 321 with the effluent being discharged to Wilson Run. A secondary treatment packaged plant will be required to treat sewage adequately for discharge to Wilson Run. The effluent parameters that would be imposed on this treatment facility are listed on Table 4. These parameters are not excessively restrictive but would require secondary treatment as a minimum.

There are presently 82 dwelling units in Sewer District No. 4 that can be served by gravity sewers. The treatment plant to serve this sewer district will also serve Sewer District No. 5 (Greendale). The plant must be adequately sized to handle the sewage generated by the existing dwellings in Sewer Districts 4 and 5 as well as any future development. There is considerable land tributary to Sewer Districts No. 4 and 5 that is prime development property but the lack of a catalyst to drive the housing market makes large scale development unlikely. Possibly 30 additional equivalent dwelling units could be expected in this area in the next decade.

The WWTP must be sized to handle the 82 existing dwelling units in Sewer District No. 4, the 42 existing dwelling units in Sewer District No. 5 and the 30 potential future units. The plant must be capable of handling sewage from 154 equivalent dwelling units or 134,750 gpd.

The proposed facilities in Sewer District No. 5 under Alternative A will consist of 6000 linear feet of 8" gravity collector sewers to serve the Greendale area. This entire area as shown on Plate III can be collected by gravity without the need for any pump stations. The sewage collected in District No. 5 will be conveyed to the proposed WWTP that will be located along Route 321.

The proposed facilities in Sewer District No. 6 under Alternative A will consist of 5000 linear feet of 8" gravity collector sewers to serve the Route 6 Corridor north of Kane. This entire area as shown on Plate III can be collected by gravity without the need for any pump stations. An additional 35 EDUs can be served in this area with the proposed WWTP. These 35 EDUs are located along Route 6 west of the DER delineated planning area. These residents have requested that the Township Supervisors include them in the Act 537 Plan. These additional 35 EDUs will need to be serviced by grinder pump stations and a small diameter force main. This will require the installation of 5000 L.F. of 3" diameter pressure sewer and 35 grinder pump stations that will be purchased by the Township/Authority and installed by the home owner. The sewage collected in District No. 6 will be conveyed by gravity to a proposed wastewater treatment plant that will be located at the headwaters of an unnamed run tributary to Hubert Run. An advanced treatment plant will be required to attain the effluent limits established by DER for Hubert Run.

A considerable amount of land tributary to this proposed system is prime development property. Again, a calatyst to promote development must be present before the units are constructed and this is not expected to be the case. Possibly an additional 15 equivalent dwelling units could be expected in the next decade in this area. The 15 future dwelling units along with the 35 existing EDU's in this area will generate approximately 43,750 gallons of sewage on a peak day, therefore the proposed advanced treatment plant must be sized accordingly.

Several sewage treatment processes are currently available that would provide adequate treatment for these proposed facilities. The process that appears to be most cost effective for these installations would be extended aeration packaged treatment units. With the extended aeration process sludge generation is minimized, secondary treatment is easily attainable, operation and maintenance labor costs are minimized and installation costs are minimized due to the nature of packaged processes. For the treatment units in Sewer District Nos. 1 and 2 where advanced treatment would be required, additional process units could be added to the end of the packaged units that would provide the required advanced treatment.

The estimated construction cost for this option, Alternative A, is as follows:

Sewer District No. 1 - 56 EDU's	
Gravity Collector Sewers 9600 L.F. 8" PVC @ $40/L.F.	$384,000
Treatment Plant Advanced Treatment Package Unit Lump Sum	$280,000
Sewer District No. 1 Subtotal	**$664,000**
Sewer District No. 2 - 101 EDU's	
Gravity Collector Sewers 12,100 L.F. 8" PVC @ $40/L.F.	$ 484,000
Treatment Plant * Advanced Treatment Package Unit Lump Sum (0.55 x 600,000)	$ 330,000
Sewer District No. 2 Subtotal	**$ 814,000**
District No. 3 - 81 EDU's	
Gravity Collector Sewers 19,700 L.F. 8" PVC @ $40/L.F	$ 788,000
Treatment Plant * Advanced Treatment Package Unit Lump Sum (0.45 x 600,000)	$ 270,000
Small Pump Station & Emergency Generator Unit Lump Sum	$ 45,000

Force Main 2200 L.F. 4" PVC @ $20/L.F.	$ 44,000
Sewer District No. 3 Subtotal	**$1,147,000**

District No. 4 - 82 EDU's

Gravity Collector Sewers 19,000 L.F. 8" PVC @ $40/L.F.	$ 760,000
Treatment Plant * Secondary Treatment Plant Package Unit Lump Sum (0.66 x $400,000)	264,000
Sewer District No. 4 Subtotal	**$1,024,000**

District No. 5 - 42 EDU's

Gravity Collector Sewers 6000 L.F. 8" PVC @ $40/L.F.	$ 240,000
Treatment Plant* Secondary Treatment Plant Package Unit Lump Sum (0.34 x $400,000)	136,000
Sewer District No. 5 Subtotal	**$ 376,000**

District No. 6 - 35 EDU's

Gravity Collector Sewers 5000 L. F. 8" PVC @ $40/L.F.	$ 200,000
Treatment Plant Advanced Treatment Plant Package Unit Lump Sum	165,000
Sewer District No. 6 Subtotal	**$ 365,000**
Alternative A Total Construction Cost	**$4,390,000**

For a preliminary layout of the facilities proposed under Alternative A see Plate IV.

* Sewer District Nos. 2 and 3 will share one treatment plant and Sewer District Nos. 4 and 5 will share one treatment plant. The cost will be shared proportionally, based on the number of existing EDUs to be served per district.

ALTERNATIVE A

Advantages

- Elimination of malfunctioning on-lot sewage disposal systems within the service areas of the proposed collector sewers.
- Majority of collection system is made up of low maintenance gravity sewers.
- Capability of handling future development within the respective watersheds.
- Sewage doesn't have to be conveyed long distances to regional treatment facilities.

Disadvantages

- Operation and Maintenance of four Publicly Owned Treatment Works.
- Sludge disposal problems.
- The Township or Operating Authority is subject to considerable regulatory agency surveillance.
- Property must be acquired for the community treatment facilities and collection system.
- The Department of Environmental Resources objects to the use of many satellite treatment facilities and prefers regionalization.

ALTERNATIVE B

This Alternative includes the construction of a mostly conventional gravity collection sewer system to serve the sewer districts previously listed. The gravity sewer collection system will be similar to that proposed under Alternative A. Under this Alternative the sewage collected in the gravity sewer system in each district, will be conveyed to a pump station located where the WWTP's were located in Alternative A. These proposed pump stations will convey the sewage through a force main into the existing Borough of Kane sewer system for treatment at the existing Pine Street or Kinzua Creek WWTP's. In the Act 537 Planning Study recently completed by the Borough of Kane and submitted to DER, an adequate amount of excess treatment plant capacity was allocated for the volume of sewage generated in the Wetmore Township Planning Area.

Sewer District No. 1 will consist of approximately 9600 linear feet of 8" PVC gravity collector sewer, a duplex submersible pump station and approximately 2900 linear feet of 4" PVC force main as shown on Plate IV. The force main for this sewer district will connect into the Borough of Kane interceptor just upstream of the Pine Street WWTP. Under this alternative, 56 existing dwelling units on Maple Street, West Kane Road and several side streets will be connected to a community collection and treatment system.

As proposed under this Alternative, a peak hydraulic loading of 66,500 gallons of sewage per day can be expected to be conveyed into Pine Street WWTP on the Kane system for treatment from Sewer District No. 1.

The proposed improvements in Sewer District No. 2 will consist of approximately 12,100 linear feet of 8" PVC gravity collector sewers, 3000 L.F. of small diameter pressure sewer and 15 grinder pump units to serve JoJo Road and the Ten Commandments Area. A large duplex pump station on Route 66, 4,500 linear feet of 6" PVC force main to pump the sewage to the top of the hill on Route 66 and an additional 3,500 linear feet of 10" gravity interceptor to tie into the existing Kane Borough 12" sanitary interceptor sewer near the intersection of Cedar and Fraley Streets will be needed in this area.

Under this Alternative, 101 existing dwelling units in Sewer District No. 2, and 81 EDU's in Sewer District No. 3 will be connected to a community collection system. This sewage will be conveyed through the existing Kane Borough sewer system and treated at the Pine Street WWTP. As proposed under this Alternative, a peak hydraulic loading of 185,500 gallons of sewage per day including 30 future EDUs can be expected to be conveyed into the Pine Street WWTP on the Kane system.

The proposed improvements in Sewer District No. 3 will consist of approximately 19700 linear feet of 8" PVC gravity collection sewers, one small duplex pump station to serve the southern end of West Wind and Highland, and 2,200 linear feet of 4" PVC force main for the small West Wind Road Pump Station. The sewage from District No. 3 will be conveyed to District No. 2 and then pumped into the Kane Borough system for treatment. The costs for the Route 66 Pump Station, 6" force main and 10" interceptor sewer must be split accordingly between Districts No. 2 and No. 3. There are 81 existing dwelling units in Sewer District No. 3.

The proposed improvements in Sewer District No. 4 (East Kane) will consist of approximately 11,400 linear feet of 8" PVC gravity collection sewers, one duplex pump station and 8,000 linear feet of 6" PVC force main to tie into the existing Kane Borough Sewer system near Clay and Biddle Streets. The sewage from the 82 existing dwelling units in District No. 4 will be conveyed through

the existing Kane gravity sewer system and treated at the Kinzua Creek WWTP. There is a potential for 50 additional EDUs in this area therefore a peak discharge of 115,500 gpd could be expected to be discharged from this area into the Kane system.

The proposed facilities in Sewer District No. 5 under Alternative B will consist of 9,000 linear feet of 8" gravity collector sewers to serve the Greendale area. The sewage collected in District No. 5 will be conveyed to the proposed pump station that will be located as shown on Plate IV and from there will be conveyed through the force main to a proposed gravity sewer serving Township residents along Route 6.

There is very limited growth expected in Sewer District No. 5 therefore an additional 10 EDUs along with the existing 42 EDUs would convey approximately 45,500 gallons of sewage on a peak day to the Kane system.

The proposed facilities in Sewer District No. 6 under Alternative B will consist of 2800 L.F. of 8" gravity collector sewers, one low head pump station, 3000 L.F. of force main from the pump station to the discharge point on the Kane system. The existing and future dwelling units in this sewer district will contribute approximately 43,750 gallons of sewage on a peak day to the Kane Borough system for treatment.

Under Alternative B all sewage collected in the Wetmore Township Planning Area will be pumped into the existing Kane Borough sewer system for ultimate treatment at the existing Pine Street and Kinzua Creek WWTP's. With expected future EDUs, approximately 474,500 gallons of sewage on a peak day or 189,700 gallons of sewage on an average day will be conveyed to the Kane Borough WWTP's.

The estimated construction cost for Alternative B is as follows:

<u>Sewer District No. 1</u> - 56 EDU's

Gravity Collector Sewers	
9600 L.F. 8" PVC @ $40/L.F.	$384,000
Pump Station & Emergency Generator Unit*	
Lump Sum	$ 60,000
Force Main	
2900 L.F. 4" PVC @ $20/L.F.	$ 58,000
Sewer District No. 1 Subtotal	**$502,000**

* DER requires back-up emergency power generating equipment for all pump stations.

Sewer District No. 2 - 86 EDU's

Gravity Collector Sewers 10,000 L.F. 8" PVC @ $40/L.F.	$ 400,000
Large Pump Station & Emergency Generator Unit* Lump Sum (0.55 x $140,000)	$ 77,000
Force Main 4,500 L.F. 6" PVC @ $25/L.F. = $112,500 Lump Sum (0.55 x $112,500)	$ 61,875
Gravity Interceptor Sewers 3,000 L.F. 10" PVC @ $40/L.F. = $140,000 Lump Sum (0.55 x $140,000)	$ 66,000
Small Diameter Pressure Sewer 3,000 L.F. @ $21/L.F.	$ 63,000
Grinder Pump Assemblies 15 @ $2500/ea.	37,500
Sewer District No. 2 Subtotal	**$ 705,375**

Sewer District No. 3 - 81 EDU's

Gravity Collector Sewers 19,700 L.F. 8" PVC @ $40/L.F.	$ 788,000
Small Pump Station & Emergency Generator Unit* Lump Sum	$ 60,000
Large Pump Station & Emergency Generator Unit* Lump Sum	$ 63,000
Force Main 2,200 L.F. 4" PVC @ $20/L.F.	$ 44,000
Gravity Interceptor Sewers 3000 L.F. 10" PVC @ $40/L.F. = $120,000 Lump Sum (0.45 x $140,000)	$ 54,000
Force Main 4500 L.F. 6" PVC @ $25/L.F. = $112,500 Lump Sum (0.45 x $12,500)	$ 50,625
Sewer District No. 3 Subtotal	**$1,059,625**

Sewer District No. 4 - 82 EDU's

Gravity Collector Sewers 11,400 L.F. 8" PVC @ $40/L.F.	$ 456,000
Pump Station & Emergency Generator Unit* Lump Sum	$ 140,000
Force Main 10000 L.F. 6" PVC @ $25/L.F.	$ 250,000
Sewer District No. 4 Subtotal	**$ 846,000**

Sewer District No. 5 - 42 EDU's

Gravity Collector Sewers 9000 L.F. 8" PVC @ $40/L.F.	$ 360,000
Pump Station & Emergency Generator Unit Lump Sum (0.34 x $140,000)	$ 50,000
Force Main 2500 L.F. 4" PVC @ $20/L.F.	$ 50,000
Sewer District No. 5 Subtotal	**$ 460,000**

Sewer District No. 6 - 35 EDU's

Gravity Collector Sewers 2800 L.F. 8" PVC @ $40/L.F.	$ 112,000
Low Head Pump Station & Emergency Generator Unit Lump Sum	$ 50,000
Small Diameter Force Main 3000 L.F. 4" PVC @ $20/L.F.	$ 60,000
Sewer District No. 6 Subtotal	**$ 222,000**
Alternative B Total Construction Cost	**$3,795,000**

For a layout of the facilities proposed under Alternative B see Plate IV.

ALTERNATIVE B

Advantages

- Elimination of malfunctioning on-lot sewage disposal systems within the service areas of the proposed collector sewers.
- No operation and maintenance costs associated with a publicly owned wastewater treatment plant.
- No Sludge disposal problems.
- Minimal regulatory agency surveillance.
- Capability of handling future development within the respective watersheds.
- Lower capital costs than wastewater treatment alternative.
- Ability to serve any future development in the Route 66 corridor between JoJo Road and Kane Borough by gravity collection.
- No National Pollutant Discharge Elimination System Permit required.
- This is the alternative of choice for the Department of Environmental Resources.

DISADVANTAGES

- Operation and Maintenance of several remote pump stations.
- Property acquisition required for gravity sewers, force mains and pump stations.
- Lack of control over treatment costs.

ALTERNATIVE C

This Alternative includes the use of innovative and advanced collection techniques. Under this option the use of a small diameter gravity collection system will be evaluated. The gravity collection system layouts will be very similar to those described in Alternative A except that the diameter of the sewer will be reduced to 4" and the need for manholes will be eliminated, therefore, construction costs will be reduced. Cleanouts will be used in place of conventional manholes. The use of small diameter sewers is permitted due to the fact that only effluent from septic tanks will be conveyed. A majority of the solids seen in a conventional gravity system will be eliminated in this type of system.

The small diameter gravity system requires the use of septic tanks for each dwelling. The effluent from these individual septic tanks will be conveyed to the small diameter gravity collector sewer installed in the road in front of each house. The houses and septic tanks that are located above the road and sewer will discharge from the septic tank to the collector sewer by gravity. The houses or septic tanks that are located below the road and sewer will have the effluent from the septic tank pumped into the small diameter collector sewer.

For the small diameter gravity system to operate properly all septic tanks in the system must be in good working conditions. All floatables, scum and solids must be retained in the septic tank and not allowed into the small diameter gravity sewers, to eliminate the possibility of blockage due to solids accumulation. Most of the existing on-lot sewage disposal systems in the Wetmore Township Planning Area are rather old, 20 years old or older, and the condition of the existing septic tanks is unknown. It can be assumed that the baffles in most existing septic tanks have deteriorated or have been damaged and permit scum or solids to leave the tank. Because of this problem this study will recommend the replacement of all existing septic tanks in the community sewer service areas with new septic tanks.

From review of Alternatives A and B it can be seen that the capital construction costs are very similar for each Alternative. The determination of the most cost effective option cannot be determined from these construction costs, the total project and operation and maintenance costs must be evaluated before a most cost effective option is chosen. Because of this unknown, the small diameter gravity sewer alternative will be evaluated using both satellite WWTPs in the respective areas and pumping the septic tank effluent into the Kane Borough system for treatment. Alternative C will evaluate the use of small diameter gravity sewers with satellite WWTPs located in the respective sewer

districts. The satellite WWTPs will need to be sized the same as in Alternative A as the hydraulic loading will be the same. In addition the satellite WWTPs will need to be able to handle the septage from the septic tanks when they are pumped clean on a periodic basis.

In Sewer District No. 1 the small diameter gravity collection system will consist of approximately 9600 linear feet of 4" PVC gravity collector sewers, 56 new septic tanks (one for each existing dwelling unit), 30 septic tank effluent pumping units to pump the effluent into the gravity sewer from the houses located below the road, one advanced treatment package pump, an average of 100 L.F. of 2" PVC effluent pump force main for each house located below the road and an average of 50 L.F. of 4" PVC effluent gravity lateral from the septic tank to the collector sewer for houses located above the road.

The proposed facilities in Sewer District No. 2 under this Alternative will consist of approximately 12,000 linear feet of small diameter gravity collector sewers, 101 new septic tanks, 40 septic tank effluent pumping units, an average of 100 L.F. of 2" PVC effluent pump force main for each house with effluent pumping units and an average of 50 L.F. of 4" PVC effluent gravity lateral from each of the septic tanks that can be served by gravity, to serve the Ten Commandments and JoJo Road area. The sewage collected in District No. 2 will be conveyed to a proposed wastewater treatment plant located along Route 66 on an unnamed tributary of the East Branch of Tionesta Creek. Advanced treatment will be required at this facility due to the fact that the effluent will be discharged into a high quality stream. There are presently 86 dwelling units in Sewer District No. 2 that will be served by this proposed system.

The proposed facilities in Sewer District No. 3 under Alternative C will consist of approximately 19,700 linear feet of small diameter gravity collector sewers, 66 new septic tanks, 26 septic tank effluent pumping units, an average of 100 L.F. of 2" PVC effluent pump force main for each house with effluent pumping units and an average of 50 L.F. of 4" PVC effluent gravity lateral from the septic tanks that can be served by gravity, to serve the West Wind, Highland, Old Mill, Grandview Estates and Carlson Heights areas. A small pump station located at the southern end of West Wind Road will be required to pump sewage collected along the southern portions of West Wind and Highland Roads. A 4" PVC force main, approximately 2200 linear feet in length, will be needed to convey the sewage from the small pump station to the gravity sewer on West Wind Road that flows north to Old Mill Road.

Sewer District No. 3 will discharge all septic tank effluent into the proposed WWTP in Sewer District No. 2. The cost of the WWTP to serve Sewer Districts 2 and 3 will need to be shared by the respective districts accordingly with the benefit each district receives from the facility.

The proposed facilities in Sewer District No. 4 under Alternative C will consist of approximately 19,000 linear feet of small diameter gravity sewers, 82 new septic tanks, 46 septic tank effluent pumping units, an average of 100 L.F. of 2" PVC effluent pump force main for each house with effluent pumping units and an coverage of 50 LF of 4" PVC effluent gravity lateral from each of the septic tanks that can be serviced by gravity, to serve the East Kane and Route 321 Corridor area. This entire area as shown on Plate IV can be collected by gravity without the need for any pump stations. The sewage collected in District No. 4 will be conveyed to a proposed wastewater treatment plant that will be located along Route 321 with the effluent being discharged to Wilson Run. A secondary treatment packaged plant will be required to treat sewage adequately for discharge to Wilson Run. The effluent parameters that would be imposed on this treatment facility are listed on Table 4. These parameters are not excessively restrictive but would require secondary treatment as a minimum.

There are presently 82 dwelling units in Sewer District No. 4 that can be served by the small diameter gravity sewers. The treatment plant to serve this sewer district will also serve Sewer District No. 5 (Greendale) the plant must be adequately sized to handle the sewage generated by the existing dwellings in Sewer Districts 4 and 5 as well as any future development. There is considerable land tributary to Sewer Districts 4 and 5 that is prime development property but the lack of a catalyst to drive the housing market makes large scale development unlikely. Possibly 30 additional equivalent dwelling units could be expected in this area in the next decade.

The WWTP must be sized to handle the 82 existing dwelling units in Sewer District No. 4, the 42 existing dwelling units in Sewer District No. 5 and the 30 potential future units. The plant must be capable of handling sewage from 154 equivalent dwelling units or 134,750 gpd.

The proposed facilities in Sewer District No. 5 under Alternative C will consist of 6,000 linear feet of 8" gravity collector sewers, 42 new septic tanks, 24 septic tank effluent pumping units, an average of 100 L.F. of 2" PVC effluent pump force main for each house with effluent pumping units and an average of 50 L.F. of 4" PVC effluent gravity lateral from each of the septic tanks that can be serviced by gravity, to serve the Greendale

area. This entire area as shown on Plate IV can be collected by gravity without the need for any pump stations. The sewage collected in District No. 5 will be conveyed to the proposed WWTP that will be located along Route 321.

The proposed facilities in Sewer District No. 6 under Alternative C will consist of 5,000 linear feet of 4" small diameter gravity collector sewers, 35 new septic tanks, 11 septic tank pumping units and associated force main and gravity lateral for the tanks that can be served by gravity, to serve the Route 6 Corridor north of Kane. This entire area as shown on Plate IV can be collected by gravity without the need for any pump stations excluding the septic tank effluent pumping units. The sewage collected in District No. 6 will be conveyed by gravity to a proposed wastewater treatment plant that will be located at the headwaters of an unnamed run tributary to Hubert Run. An advanced treatment plant will be required to attain the effluent limits established by DER for Hubert Run.

A considerable amount of land tributary to this proposed system is prime development property. Again, a calatyst to promote development must be present before the units are constructed and this is not expected to be the case. Possibly an additional 15 equivalent dwelling units could be expected in the next decade in this area. The 15 future dwelling units along with the 20 existing EDU's in this area will generate approximately 30,625 gallons of sewage on a peak day, therefore the proposed advanced treatment plant must be sized accordingly.

The estimated construction cost of Alternative C is as follows:

<u>Sewer District No. 1</u> - 56 EDU's

Gravity Collector Sewers	
9,600 L.F. 4" PVC @ $25/L.F.	$240,000
Septic Tank Effluent Pumping Units	
Septic Tank & Pump Well 30 @ $2100/ea.	$ 63,000
Pumping Unit & Controls 30 @ $1600/ea.	$ 48,000
2" PVC Force Main 30 @ 100 lf/ea. x $14/lf	$ 42,000
Septic Tank Effluent Gravity Units	
Septic Tanks 26 @ $1900/ea.	$ 49,400
4" PVC Gravity Lateral 26 @ 50 lf/ea.x $20/lf	$ 26,000
Treatment Plant	
Advanced Treatment Package Unit	
Lump Sum	<u>$280,000</u>
Sewer District No. 1 Subtotal	**$748,400**

Sewer District No. 2 - 101 EDU's

Gravity Collector Sewers	
12,100 L.F. 4" PVC @ $25/L.F.	$ 302,500
Septic Tank Effluent Pumping Units	
Septic Tank and Pump Well 40 @ $2100/ea.	$ 84,000
Pumping Unit & Controls 40 @ $1600/ea.	$ 64,000
2" PVC Force Main 40 @ 100 lf/ea.x$14/lf	$ 56,000
Septic Tank Effluent Gravity Units	
Septic Tanks 61 @ $1,900/ea.	$ 115,900
4" PVC Gravity Lateral 101 @ 50 lf/ea.x$20/lf	$ 101,000
Treatment Plant	
Advanced Treatment Package Unit	
Lump Sum (0.55 x 600,000)	$ 330,000
Sewer District No. 2 Subtotal	**$1,053,400**

Sewer District No. 3 - 81 EDU's

Gravity Collector Sewers	
19,700 L.F. 4" PVC @ $25/L.F.	$ 492,500
Small Pump Station & Emergency Power Unit	
Lump Sum	$ 45,000
Force Main	
2200 L.F. 4" PVC @ $20/L.F.	$ 44,000
Septic Tank Effluent Pumping Units	
Septic Tank & Pump Well 26 @ $2100/ea.	$ 54,600
Pumping Unit & Controls 26 @ 100 LF x $14/LF	41,600
2" PVC Force Main 26@ 100 LF/ea. x $14/LF	36,400
Septic Tank Effluent Gravity Units	
Septic Tanks 40 @ $1900/ea.	$ 76,000
4" PVC Gravity Lateral 40 @ 50 LF/ea. x $20/LF	40,000
Treatment Plant	
Advanced Treatment Package Unit	
Lump Sum (0.45 x $600,000)	270,000
Sewer District No. 3 Subtotal	**$1,100,100**

Sewer District No. 4 - 82 EDU's

Gravity Collector Sewers	
19000 L.F. 4" PVC Collector Sewers @ $25/L.F.	$ 475,000
Septic Tank Effluent Pumping Units	
Septic Tank & Pump Well 46 @ $2100/ea.	$ 96,600
Pumping Unit & Controls 46 @ $1600/ea.	73,600
2" PVC Force Main 46 @ 100 LF/ea. x $14/LF	64,400
Septic Tank Effluent Gravity Units	
Septic Tanks 36 @ $1900/ea.	$ 68,400
4" PVC Gravity Lateral 36 @ 50 LF/ea. x $20/LF	36,000
Treatment Plant	
Secondary Treatment Plant Package Unit	
Lump Sum (0.66 x $400.00)	$ 264,000
Sewer District No. 4 Subtotal	**$1,078,000**

Sewer District No. 5 - 42 EDU's

Gravity Collector Sewers	
6000 L.F. 4" PVC Collector Sewers @ $25/L.F.	$ 150,000
Septic Tank Effluent Pumping Units	
Septic Tank & Pump Well 24 @ $2100/ea.	$ 50,400
Pumping Unit & Controls 24 @ $1600/ea.	38,400
2" PVC Force Main 24 @ 100 LF/ea. x $14/LF	33,600
Septic Tank Effluent Gravity Units	
Septic Tanks 18 @ $1900/ea.	$ 34,200
4" PVC Gravity Lateral 18 @ 50 LF/ea. x $20/LF	18,000
Treatment Plant	
Secondary Treatment Plant Package Unit	
Lump Sum (0.34 x $400,000)	$ 136,000
Sewer District No. 5 Subtotal	**$ 460,600**

Sewer District No. 6 - 20 EDU's

Gravity Collector Sewers		
5000 L. F. 4" PVC @ $25/L.F.	$	125,000
Septic Tank Effluent Pumping Units		
Septic Tank & Pump Well 11 @ $2100/ea.	$	23,100
Pumping Unit & Controls 11 @ $1600/ea.		17,600
2" PVC Gravity Lateral 11 @ 100 LF/ea. x $14/LF		15,400
Septic Tank Effluent Gravity Units		
Septic Tanks 24 @ $1900/ea.	$	45,600
4" PVC Gravity Lateral 24 @ 50 LF/ea. x $20/LF		24,000
Treatment Plant		
Advanced Treatment Plant Package Unit Lump Sum	$	165,000
Sewer District No. 6 Subtotal	**$**	**415,700**
Alternative C Total Construction Cost		**$4,855,800**

For a layout of the facilities proposed under Alternative C see Plate III.

ALTERNATIVE C

Advantages

- Elimination of all malfunctioning on-lot sewage disposal systems within the service areas of the proposed sewer improvements.
- The installation of small diameter sewers at shallow depths will minimize disturbance to improved areas.
- Majority of collection system is made up of low maintenance gravity sewers.
- Capability of handling future development within the respective watersheds.
- Sewage doesn't have to be conveyed long distances to regional treatment facilities.

Disadvantages

- Operation and maintenance of four publicly owned treatment facilities.
- Property acquisition required for the installation of gravity sewers, septic tanks, wastewater treatment plants.
- Maintenance associated with septic tank effluent pumping units.
- Costs and problems associated with disposal of septage from septic tanks.
- Higher capital construction costs than the conventional gravity sewer system evaluated under Alternative A.

ALTERNATIVE D

This Alternative includes the use of innovative and advanced collection techniques. Under this option the use of a small diameter gravity collection system will be evaluated. The gravity collection system layouts will be very similar to those described in Alternatives A, B and C except that the diameter of the gravity sewer will be reduced to 4" and the need for manholes will be eliminated, therefore, construction costs will be reduced. Cleanouts will be used in place of conventional manholes. The use of small diameter sewers is permitted due to the fact that only effluent from septic tanks will be conveyed. A majority of the solids seen in a conventional gravity system will be eliminated in this type of system.

The small diameter gravity system requires the use of septic tanks for each dwelling. The effluent from these individual septic tanks will be conveyed to the small diameter gravity collector sewer installed in the road in front of each house. The houses and septic tanks that are located above the road and sewer will discharge from the septic tank to the collector sewer by gravity. The houses or septic tanks that are located below the road and sewer will have the effluent from the septic tank pumped into the small diameter collector sewer.

For the small diameter gravity system to operate properly all septic tanks in the system must be in good working conditions. All floatables, scum and solids must be retained in the septic tank and not allowed into the small diameter gravity sewers, to eliminate the possibility of blockage due to solids accumulation. Most of the existing on-lot sewage disposal systems in the Wetmore Township Planning Area are rather old, 20 years old or older, and the condition of the existing septic tanks is unknown. It can be

assumed that the baffles in most existing septic tanks have deteriorated or have been damaged and permit scum or solids to leave the tank. Because of this problem this study will recommend the replacement of all existing septic tanks in the community sewer service areas with new septic tanks.

From review of Alternative A and B it can be seen that the capital construction costs are very similar for each Alternative. The determination of the most cost effective option cannot be determined from these construction costs, the total project and operation and maintenance costs must be evaluated before a most cost effective option is chosen. Because of this unknown, the small diameter gravity sewer alternative will be evaluated using both satellite WWTPs in the respective areas and pumping the septic tank effluent into the Kane Borough system for treatment. Alternative D will evaluate the use of small diameter gravity sewers with pump stations in each area similar to Alternative B. The pump stations will convey the collected septic tank effluent into the Kane Borough system for treatment.

In Sewer District No. 1 the small diameter gravity collection system will consist of approximately 9600 linear feet of 4" PVC gravity collector sewers, 56 new septic tanks (one for each existing dwelling unit), 30 septic tank effluent pumping units to pump the effluent into the gravity sewer from the houses located below the road, one pump station, an average of 100 L.F. of 2" PVC effluent pump force main for each house located below the road and an average of 50 L.F. of 4" PVC effluent gravity lateral from the septic tank to the collector sewer for houses located above the road.

The proposed facilities in Sewer District No. 2 under this Alternative will consist of approximately 12,100 linear feet of small diameter gravity collector sewers, 40 new septic tanks effluent pumping units with associated force main, 61 new septic tanks with associated gravity sewer lateral, a pump station located along Route 66, 4500 linear feet of 6" PVC force main and 3500 linear feet of 10" PVC interceptor sewer to tie into the existing Kane Borough system, to serve the Ten Commandments and JoJo Road area. The sewage collected in District No. 2 will be conveyed to the existing Kane Borough, Pine Street WWTP.

The proposed facilities in Sewer District No. 3 under Alternative D will consist of approximately 19,700 linear feet of small diameter gravity collector sewers, 81 new septic tanks, 26 septic tank effluent pumping units, and associated service sewer to serve the West Wind, Highland, Old Mill, Grandview Estates and Carlson Heights areas. A small pump station located at the southern end of West Wind Road will be required to pump sewage collected along the southern portions of West Wind and Highland Roads. A 4" PVC

force main, approximately 2200 linear feet in length, will be needed to convey the sewage from the small pump station to the gravity sewer on West Wind Road that flows north to Old Mill Road.

Sewer District No. 3 will discharge all septic tank effluent into the proposed Route 66 Pump Station in Sewer District No. 2 and from there into the Kane Borough System. The cost of the pump station to serve Sewer Districts 2 and 3 will need to be shared by the respective districts accordingly with the benefit each district receives from the facility.

The proposed facilities in Sewer District No. 4 under Alternative D will consist of approximately 11,400 linear feet of small diameter gravity collector sewer, 82 new septic tanks, 46 septic tank effluent pumping units, associated service sewer and pump station located along Route 321 to serve East Kane and Route 321 Corridor area. This entire area as shown on Plate IV can be collected by gravity. The sewage collected in District No. 4 will be conveyed to the proposed Route 321 pump station. The sewage collected in this area will be conveyed into the Kane Borough system for ultimate treatment at the Kinzua Creek WWTP.

There are presently 82 dwelling units in Sewer District No. 4 that can be served by the small diameter gravity sewers. The pump station to serve this sewer district will also serve Sewer District No. 5 (Greendale) the pump station must be adequately sized to handle the sewage generated by the existing dwellings in Sewer Districts 4 and 5 as well as any future development. There is considerable land tributary to Sewer District 4 and 5 that is prime development property but the lack of a catalyst to drive the housing market makes large scale development unlikely. Possibly 30 additional equivalent dwelling units could be expected in this area in the next decade.

The proposed facilities in Sewer District No. 5 under Alternative D will consist of 9000 linear feet of 8" gravity collector sewers, 42 new septic tanks, 24 septic tank effluent pumping units and associated service sewer to serve the Greendale area. This entire area as shown on Plate IV can be collected by gravity without the need for any community pump stations. The sewage collected in District No. 5 will be conveyed to a proposed pump station as shown on Plate IV. The pump station will pump the collected sewage through a 2500 L.F. 4" PVC force main to a proposed small diameter gravity sewer.

The proposed facilities in Sewer District No. 6 under Alternative D will consist of 2800 L.F. of 4" small diameter collector sewers, 35 new septic tanks, 11 septic tank pumping units and associated service sewer, one low head pump station, 3000 L.F. of force main from the proposed pump station to the discharge point on the Kane system, 35 grinder pump units and 11,500 L.F. of small diameter pressure sewers service the 35 grinder units.

The following are cost estimates for each Sewer District:

Sewer District No. 1 - 56 EDU's

Gravity Collector Sewers	
9,600 L.F. 4" PVC @ $25/L.F.	$240,000
Pump Station & Emergency Generator Unit	
Lump Sum	60,000
Force Main	
2,900 L.F. 4" PVC @ $20/L.F.	58,000
Septic Tank Effluent Pumping Units	
Septic Tank & Pump Well 30 @ $2100/ea.	$ 63,000
Pumping Unit & Controls 30 @ $1600/ea.	$ 48,000
2" PVC Force Main 30 @ 100 lf/ea. x 14/lf	$ 42,000
Septic Tank Effluent Gravity Units	
Septic Tanks 26 @ $1900/ea.	$ 49,400
4" PVC Gravity Lateral 26 @ 50 lf/ea.x$20/lf	$ 26,000
Sewer District No. 1 Subtotal	**$586,400**

Sewer District No. 2 - 101 EDU's

Gravity Collector Sewers	
12,100 L.F. 4" PVC @ $25/L.F.	$ 302,500
Large Pump Station & Emergency Generator Unit	
Lump Sum (0.55 x $140,000)	77,000
Force Main	
4,500 L.F. 6" PVC @ $25/LF = $112,500	
Lump Sum (0.55 x $112,500)	61,875
Septic Tank Effluent Pumping Units	
Septic Tank and Pump Well 40 @ $2100/ea.	$ 84,000
Pumping Unit & Controls 40 @ $1600/ea.	$ 64,000
2" PVC Force Main 40 @ 100 lf/ea.x$14/lf	$ 56,000
Septic Tank Effluent Gravity Units	
Septic Tanks 60 @ $1,900/ea.	$ 114,000
4" PVC Gravity Lateral 60 @ 50 lf/ea.x$20/lf	$ 60,000
Gravity Interceptor Sewer	
3,000 L.F. 10" PVC @ $40/L.F. = $120,000	
Lump Sum (0.55 x $120,000)	$ 66,000
Sewer District No. 2 Subtotal	**$ 885,375**

Sewer District No. 3 - 81 EDU's

Gravity Collector Sewers	
19,700 L.F. 4" PVC @ $25/L.F.	$ 492,500
Small Pump Station & Emergency Power Unit	
Lump Sum	$ 45,000
Force Main	
2200 L.F. 4" PVC @ $20/L.F.	$ 44,000
Septic Tank Effluent Pumping Units	
Septic Tank & Pump Well 26 @ $2100/ea.	$ 54,600
Pumping Unit & Controls 26 @ 100 LF x $14/LF	41,600
2" PVC Force Main 26@ 100 LF/ea. x $14/LF	36,400
Septic Tank Effluent Gravity Units	
Septic Tanks 40 @ $1900/ea.	$ 76,000
4" PVC Gravity Lateral 40 @ 50 LF/ea. x $20/LF	55,000
Route 66 Pump Station	
Lump Sum (0.45 x $140,000)	$ 63,000
Force Main - Route 66 Pump Station	
Lump Sum (0.45 x $112,500)	$ 50,625
Gravity Interceptor Sewer - Route 66 Pump Station	
Lump Sum (0.45 x $120,000)	$ 54,000
Sewer District No. 3 Subtotal	**$1,012,725**

Sewer District No. 4 - 82 EDU's

Gravity Collector Sewers	
11400 L.F. 4" PVC Collector Sewers @ $25/L.F.	$ 285,000
Septic Tank Effluent Pumping Units	
Septic Tank & Pump Well 46 @ $2100/ea.	$ 96,600
Pumping Unit & Controls 46 @ $1600/ea.	73,600
2" PVC Force Main 46 @ 100 LF/ea. x $14/LF	64,400
Septic Tank Effluent Gravity Units	
Septic Tanks 36 @ $1900/ea.	$ 68,400
4" PVC Gravity Lateral 36 @ 50 LF/ea. x $20/LF	36,000
Pump Station & Emergency Generator Unit	
Lump Sum	$ 140,000
Force Main	
10,000 L.F. 6" PVC @ $25/L.F.	$ 250,000
Sewer District No. 4 Subtotal	**$1,014,000**

Sewer District No. 5 - 42 EDU's

Gravity Collector Sewers		
9000 L.F. 4" PVC Collector Sewers @ $25/L.F.	$	225,000
Septic Tank Effluent Pumping Units		
Septic Tank & Pump Well 24 @ $2100/ea.	$	50,400
Pumping Unit & Controls 24 @ $1600/ea.		38,400
2" PVC Force Main 24 @ 100 LF/ea. x $14/LF		33,600
Septic Tank Effluent Gravity Units		
Septic Tanks 18 @ $1900/ea.	$	34,200
4" PVC Gravity Lateral 18 @ 50 LF/ea. x $20/LF		18,000
Low Head Pump Station & Emergency Generator Unit		
Lump Sum	$	50,000
Force Main		
2500 LF 4" PVC @ $20/LF	$	50,000
Sewer District No. 5 Subtotal	**$**	**499,600**

Sewer District No. 6 - 55 EDU's

Gravity Collector Sewers		
2,800 L. F. 4" PVC @ $25/L.F.	$	70,000
Septic Tank Effluent Pumping Units		
Septic Tank & Pump Well 11 @ $2100/ea.	$	23,100
Pumping Unit & Controls 11 @ $1600/ea.		17,600
2" PVC Gravity Lateral 11 @ 100 LF/ea. x $14/LF		15,400
Septic Tank Effluent Gravity Units		
Septic Tanks 24 @ $1900/ea.	$	45,600
4" PVC Gravity Lateral 24 @ 50 LF/ea. x $20/LF		24,000
Low Head Pump Station & Emergency Generator Unit		
Lump Sum	$	50,000
Small Diameter Force Main		
3000 L.F. 4" PVC @ $20/L.F.	$	60,000
Sewer District No. 6 Subtotal	**$**	**305,700**
Alternative D Total Construction Cost		**$4,303,800**

For a layout of the facilities proposed under Alternative D see Plate IV.

ALTERNATIVE D

Advantages

- Elimination of all malfunctioning on-lot sewage disposal systems within the service areas of the proposed sewer improvements.
- The installation of small diameter sewers at shallow depths will minimize disturbance to improved areas.
- No operation and maintenance costs associated with a publicly owned wastewater treatment plant.
- No NPDES Permit required.
- Minimal regulatory agency surveillance.

Disadvantages

- Operation and maintenance of pump stations.
- Property acquisition required for the installation of gravity sewers, pump stations and force mains.
- Lack of control over treatment costs.
- Maintenance associated with septic tank effluent pumping units.
- Costs and problems associated with disposal of septage from septic tanks.
- Higher capital construction costs than the conventional gravity sewer system evaluated under Alternative B.

ALTERNATIVE E

This Alternative will be the no action Alternative. The no action Alternative in the planning area would mean that all existing malfunctioning on-lot sewage disposal systems would continue to discharge partially treated or raw sewage to the ground water, ground surface or surface waters. The existing homes in the Grandview Estates subdivision that are connected to the gravity sewer system that discharges to the unpermitted waste stabilization pond would continue to pollute Dump Run.

Under this Alternative the number of malfunctioning on-lot system within the planning area will continue to increase as the systems age. The degradation to ground water and surface waters will also increase as the number of failing on-lot systems increases. All on-lot systems have a useful life expectancy and regardless of maintenance procedures utilized, will fail at some time. The soils conditions throughout the planning area are unacceptable for all on-lot subsurface sewage disposal systems and marginal for using advanced on-lot sewage disposal systems. Because of the present number of malfunctioning on-lot systems, life expectancy of the properly operating existing on-lot systems and poor soils conditions in the planning area, the "no action" alternative is unacceptable. The Department of Environmental Resources will not accept the no action alternative for the Wetmore Township Planning Area. The potential for degradation of ground water and surface waters due to the malfunctioning on-lot system is too great. The possibility of public health problems and water or vector borne disease out breaks due to improper sewage treatment is a genuine concern. Because of all the preceding concerns, the option of utilizing the "no action" alternative for this planning area is not recommended.

OTHER ALTERNATIVES EVALUATED

Several other options for addressing the sewage disposal problems in the Wetmore Township Planning Area were evaluated but discounted due to technical concerns, high capital construction costs, inadequate corrective capability, etc..

Another option that was evaluated and found to be unacceptable was the upgrading of all malfunctioning on-lot subsurface systems to elevated sand mound sewage disposal systems. From conversations with the local sewage enforcement officer, review of McKean County Soils mapping and visual inspection of existing elevated sand mound systems in the planning area this option is deemed unacceptable. The local sewage enforcement officer stated that some areas are marginal and other areas are unacceptable for the use of elevated sand mound sewage disposal systems. The soils mapping indicates that a majority of the planning area has severe limitations for the use of on-lot sewage disposal systems and the remaining small percentage of the planning area has moderate limitations. A visual inspection of existing elevated sand mound systems within the planning area indicated that most appear to be operating properly but there were several malfunctions observed.

In summary, the alternatives presented herein can all technically solve the problem of sewage collection and treatment. What must be closely evaluated is the total project and perpetual operation and maintenance costs of each option. As can be seen from Plates III and IV, the six sewer districts previously evaluated are able

to be served entirely by gravity collector sewers which would provide for the lowest operation and maintenance costs. Further evaluation of all alternatives and a recommendation of a single alternative will follow in this report.

EVALUATION OF SPARSELY INHABITED AREAS

A portion of the Wetmore Township Planning Area is rural and sparsely inhabited. Outside of the six evaluated sewer districts the population densities are not great enough to support the capital expenditures associated with community collection and centralized treatment of the generated sewage. Therefore, the continued use of on-lot sewage systems is essential in the continued performance of sewage treatment in Wetmore Township. This situation is unfavorable because of the number of properties in Wetmore Township that will inevitably have to continue to depend on effective on-lot sewage systems because they are the only economically feasible systems for a rural township.

A large portion of land in the planning area is undevelopable due to steep slopes and the associated inaccessibility. This same land is deemed very poor for on-lot treatment systems due to slope of land or soil type. This factor will work in favor of township planning because new development will be directed to the areas shown on Plate I that are designated proposed development areas.

These proposed development areas can eventually be sewered and conveyed into the public treatment facilities in Kane as detailed previously under Alternative B.

In the areas of the Township that will continue to be served by on-lot treatment facilities, the Township Supervisors must install an effective on-lot management, operation and permitting program that can evaluate the options and implement the appropriate sewage control measures. The evaluation of management alternatives for on-lot facilities will be addressed later in the plan.

PROJECT COST ESTIMATES

Introduction

To properly evaluate the economics of a project, the total project costs must be considered - not just the construction costs. The cost components of a project are as follows:

Construction The costs to be paid to the contractors who will build the required facilities. In addition to the estimated costs, a contingency of 10% is added to the construction cost to account for omissions and unexpected construction costs.

Engineering The costs to be paid to professional engineers to design the facilities, observe construction and provide other required services such as to assist in operations and financing. The major costs were determined utilizing a standard engineer's fee curve. Engineering services include:

Grant/Loan Assistance - To file grant and loan applications.

Topographic Survey - Topographic and property surveys will be required of the WWTP, pump station, sewers and force main. The survey for the collector sewers is included in the design fee.

Service Contract - A service agreement will need to be developed with the Borough of Kane if treatment in the Kane Borough System is the chosen option.

Rights of Way - Where the construction infringes on private property, agreements will need to be obtained from the land owners. The indicated fee is based on general right of way descriptions.

Design - Preparation of documents (drawings and specifications) on which bids for construction will be received. DER, Labor and Industry and other regulatory agencies will need to review and approve the documents. The design fee includes the completion of these applications.

General Project Services - Engineering assistance during construction consisting of:

a. Approving Contract Payments
b. Answering Questions
c. Approving Construction Submittals
d. Periodic Site Visits
e. Attending Meetings
f. Preparing Routine Change Orders

Financing Report - Prepared for the investment advisors in support of the bond issue. This is done after bids are received if bond financing is utilized.

Resident Observation - A full time individual on site to observe if the contractor is proceeding per the construction documents.

Construction Drawings - Revising the bid documents to reflect changes made during construction.

Administrative - Assistance in starting the WWTP process,pump stations, training the operator and advising the Township on other administrative matters (billing, rules and regulations,etc.).

Financing/Administrative/Legal The costs to be paid attorneys and financial consultants for professional services relating to financing the project and development of service agreement, rights of way, etc.

Financial, Administrative and Legal Services include:

Township/Authority Expense	Costs to advertise bids, postage, etc.
Bond Counsel	Specialized attorney to assist in sale of Township revenue bonds.
Local Counsel	Authority solicitor to assist in sale of bonds, agreements, rights of way, etc.
Bond Discount	A fee to the investment company which will buy and resell the Revenue Bonds.
Printing of Bonds	To print bonds.
Bond Rating Service	To secure financial strength rating.
Construction Interest	A sum of money to pay the interest portion of an interim loan during the time of construction when no revenue is available. This sum of money may also be required to be applied to a Debt Service Reserve Fund if not used for construction interest.

Contingency
A sum of money set aside for unexpected legal suits, land purchases, purchases of existing facilities, etc.

Estimated Total Project Cost
The total of the above costs are termed the "Estimated Total Project Costs." In this report they are based on estimates and are presented in April 1990 dollars.

The following tables present the estimated project costs for the alternatives.

ALTERNATIVE A

Sewer District No. 1
Conventional Gravity Collector Sewers & Advanced WWTP

Estimated Project Costs

Construction Costs	
Construction Contracts	$4,390,000
Contingency	439,000
Estimated Construction Cost	$4,829,000
Engineering	
Grant/Loan Assistance	4,000
Topographic Survey	30,000
Design of Facilities	160,000
General Project Services	50,000
Rights-of-Way	30,000
Resident Inspection	100,000
Construction Drawings	80,000
Total Engineering	$ 382,000
Financing/Administration/Legal	
Township Expense	$ 20,000
Bond/Loan Counsel	28,000
Local Counsel	6,000
Interest During Construction	75,000
Total Financing/Administration/Legal	$ 129,000
Project Contingency	100,000
Estimated Total Project Costs	**$5,440,000**

ALTERNATIVE B

Conventional Gravity Sewers & Pump to Kane Borough

Estimated Project Costs

Construction Costs	
Construction Contracts	$3,795,000
Contingency	379,500
Estimated Construction Cost	$4,174,500
Engineering	
Grant/Loan Assistance	$ 4,000
Topographic Survey	30,000
Design of Facilities	160,000
General Project Services	50,000
Rights-of-Way	30,000
Resident Inspection	100,000
Construction Drawings	8,000
Total Engineering	$ 382,000
Financing/Administration/Legal	
Township Expenses	$ 18,000
Bond/Loan Counsel	25,000
Local Counsel	5,000
Interest During Construction	70,000
Total Financing/Administration/Legal	$ 118,000
Project Contingency	90,000
Estimated Total Project Costs	**$4,764,500**

ALTERNATIVE C

Small Diameter Gravity Sewers & Advanced WWTP

Estimated Project Cost

Construction Costs	
Construction Contract	$4,855,800
Contingency	485,600
Estimated Construction Cost	$5,341,400
Engineering	
Grant/Loan Assistance	$ 4,500
Topographic Survey	32,000
Design of Facilities	170,000
General Project Services	52,000
Rights-of-Way	30,000
Resident Inspection	105,000
Construction Drawings	80,000
Total Engineering	$ 401,500
Financing/Administration/Legal	
Township Expenses	$ 22,000
Bond/Loan Counsel	30,000
Local Counsel	6,000
Interest During Construction	80,000
Total Financing/Administration/Legal	$ 138,000
Project Contingency	100,000
Estimated Total Project Costs	**$5,980,900**

ALTERNATIVE D

Sewer District No. 1
Small Diameter Gravity Sewers & Pump to Kane Borough

Estimated Project Cost

Construction Costs	
Construction Contract	$4,303,800
Contingency	430,400
Estimated Construction Cost	$4,734,200
Engineering	
Grant/Loan Assistance	$ 4,500
Topographic Survey	32,000
Design of Facilities	165,000
General Project Services	52,000
Rights-of-Way	32,000
Resident Inspection	100,000
Construction Drawings	8,500
Total Engineering	$ 394,000
Financing/Administration/Legal	
Township Expenses	$ 18,000
Bond/Loan Counsel	27,000
Local Counsel	6,000
Interest During Construction	70,000
Total Financing/Administration/Legal	$ 121,000
Project Contingency	100,000
Estimated Total Project Costs	**$5,349,200**

Summary - Construction Costs & Total Project Costs

Sewer District No.	Alternative A Convention Sewers & Satellite WWTPs	Alternative B Conventional Sewers & Pump to Kane Borough	Alternative C Small Dia. Gravity Satellite WWTPs	Alternative D Small Dia. Gravity & Pump to Kane Borough
1	$ 664,000	$ 502,000	$ 748,400	$ 586,400
2	814,000	705,375	1,053,400	885,375
3	1,147,000	1,059,625	1,100,100	1,012,735
4	1,024,000	846,000	1,076,000	1,014,000
5	376,000	460,000	460,600	499,600
6	365,000	222,000	415,700	305,700
TOTAL CONSTRUCTION COST	**$4,390,000**	**$3,795,000**	**$4,855,800**	**$4,303,800**
TOTAL PROJECT COSTS	**$5,440,000**	**$4,764,500**	**$5,980,900**	**$5,349,200**

User Cost Estimates

Introduction

As can be seen from the preceding summary of total project costs, the capital required to construct a sewage system to serve the entire delineated area is excessive and beyond the capability of the Township unless a considerable amount of grant monies are available. It is evident that the Township needs some type of subsidized funding to move forward with this project. Bond financing at open market interest rates will not allow the Township to complete this system and maintain acceptable user rates.

Along with any grant monies that are available the Township will be required to borrow funds to pay for initial project costs such as engineering and legal for the construction contracts. The only means to repay the borrowed money and for the operational and maintenance cost to keep the sewage system operating is by collecting service charges from the customers served by the system. The user costs analysis is based upon the Equivalent Dwelling Units (EDU) served by the project.

An EDU is determined to be a customer generating 350 gallons per day (gpd) based on a house count and an assumption of 3.5 people per dwelling, using 100 gallons per day per person. Thus, a user such as a restaurant who used 3500 gallons of water per day was determined to be 10 EDU's (3500 gpd/350 gpd/EDU). This EDU concept will be utilized in the development o fuser fees. To properly establish the number of EDU's an investigation was made of the service area of the project. The EDU's are indicated on each user cost analysis that will be presented.

Factors which must be addressed in the user fee analysis and which are used in the Project Costs Analysis are as follows:

Term of Loan Issue - Over how many years will the money borrowed have to be repaid?

Interest Rate - What is the cost of the borrowed money?

Number of EDU's - How many customers will help pay for the cost of the system?

Delinquency Rate - How many of the customers will not pay their sewer service bill?

Total Project Cost - How much will the Project cost?

Sewer Tap-in Fees - Money can be collected from the user and used by the Township/Authority in a similar manner as a cash down payment on a house. One method to collect this money is to assess each user of the system a one time tap-in fee. The concept being the sewer increases the value of the property. Tap-in fees range between $500 and $3000 per Equivalent Dwelling Unit.

Capital Contributions - Will any special interest groups (industry, schools, etc.) help by contributing money to the project?

Other Contributions - A means to deduct and/or add capital contributions.

Annual Administration - The yearly costs to operate (utility, and O & M - labor, billing, insurance, salary, etc.) and maintain the WWTP pump stations(s) and sewer system must be budgeted. This cost is in addition to the annual payment for the bond issue.

Eligible Act 339 Costs - The Commonwealth of Pennsylvania will pay annually to the Township/Authority a sum of money equivalent to 2% of the costs associated with that portion of the construction costs associated with treating sewage. This payment from the state is refundable if the capital to construct the facilities comes from a bank loan or bond issue. If grant monies or PENNVEST funding are used, the Township/Authority is not eligible under this program.

The Capital Contribution shown on the following Project Cost Analyses is based on a one time tap-in fee to be assessed for each Equivalent Dwelling Unit. Other options available to raise capital would include a front foot assessment where each property owner would be assessed for the amount of sewer adjacent or on that property or a benefit assessment that would be based on the benefit the sewer provides to each property. For the user cost estimates it will be assumed that a tap-in fee of $2,000/EDU will be charged to the units that will be served by the proposed sewerage facilities. This fee can be increased or decreased accordingly but if it is decreased the monthly user fee (debt service charge) will correspondingly be increased.

Sources of financing these proposed capital additions such as grants or low interest loans that the Township/Authority should pursue in relationship to financing the project will be discussed later in this study. The Township/Authority will be expected to fund the engineering fees up front before the project financing is in place.

The first user cost analyses will evaluate each alternative in its entirety, addressing each of the six sewer districts. It will be assumed that an open market bond would be too costly therefore PENNVEST financing will be evaluated. Under the PENNVEST Program the interest rate varies from 0% to 6%. The interest rate for the first five years of the loan is usually under 2% per annum and the interest rate for the last 15 years is usually over 2%. For this study an average interest of 3% is assumed for the ease of calculating the debt service charges.

The PENNVEST program does offer grants in aid up to $500,000 for projects that otherwise could not be completed at reasonable tap-in fees and acceptable monthly service charges. If a Municipality/Authority qualifies for a grant, PENNVEST will provide low interest loan financing for the life of the loan (20 years).

Using this premise the first user cost analyses will evaluate each alternative individually and in their entirety. The following User Cost Analyses will evaluate each alternative individually assuming the use of low interest PENNVEST financing.

USER COST ANALYSIS
Alternative A - PENNVEST Loan
Conventional Gravity Sewer System with 4 Satellite WWTPS

Project Financing

Total Project Costs	$5,440,000
Less: Sewer Tap-in Fees	794,000
Required PENNVEST Loan	4,646,000
Annual Debt Service Payment	312,200

Annual Financing

Administration, Operation & Maintenance	$ 81,500
Annual Debt Service Payment	312,200
Total Annual Revenue Requirement	$ 393,700

Cost per Equivalent Dwelling Unit ($/month)	$ 82.64/month

Factors Utilized in the Analysis

Term of PENNVEST Loan (years/#payment)	20/240
Interest Rate of PENNVEST Loan	3.00%
Number of Equivalent Dwelling Units	397
Sewer Tap-in Fees @ $2000/EDU	$794,000
Annual Administration, Operation & Maintenance	$ 81,500

- One full time Operator @ $22,000/yr.
- One full time Administrator, Billing Clerk Secretary @ $16,000/yr.
- Office Space & Equipment $8,000/yr.
- WWTPs Operation & Maintenance Expense electricity, chemicals etc., @ $20,000/yr.
- Annual sewer system and pump station operation & maintenance @ $7,500/yr.
- One part time employee to assist operator @ $8,000/yr.

USER COST ANALYSIS
Alternative B - PENNVEST Loan
Conventional Gravity Sewers & Pump to Kane Borough

Project Financing

Total Project Costs	$4,764,500
Less: Sewer Tap-in Fees	794,000
Required PENNVEST Loan	3,970,500
Annual Debt Service Payment	266,800

Annual Financing

Administration, Operation & Maintenance	$ 149,000
Annual Debt Service Payment	266,800
Total Annual Revenue Requirement	$ 415,800

Cost per Equivalent Dwelling Unit ($/month)	$ 87.28/month

Factors Utilized in the Analysis

Term of PENNVEST Loan (years/#payment)	20/240
Interest Rate of PENNVEST Loan	3.00%
Number of Equivalent Dwelling Units	397
Sewer Tap-in Fees @ $2000/EDU	$794,000
Annual Administration, Operation & Maintenance	$149,000

- Page 74 of the Approved Kane Borough Act 537 Study outlines treatment costs to be charged Wetmore Township as $19.10/EDU/Month x 397 EDUs x 12 months = $91,000*
- One full time Administrator, Biller Clerk, Secretary @ $16,000/yr.
- Office space and equipment @ $8,000/yr.
- Pump Station Operation & Maintenance @ $12,000/yr.
- One full time employee to operate and maintain pump stations and collection system @ $22,000/yr.

* The $19.10/EDU/Month is the fee to be charged to Wetmore Township to treatment costs per EDU in the Kane WWTPs. This cost was included in the approved Kane Act 537 Plan.

USER COST ANALYSIS
Alternative C - PENNVEST Loan
Small Diameter Gravity Sewers & Satellite WWTPS

Project Financing

Total Project Costs	$5,980,900
Less: Sewer Tap-in Fees	794,000
Required PENNVEST Loan	5,186,900
Annual Debt Service Payment	348,600

Annual Financing

Administration, Operation & Maintenance	$ 81,500
Annual Debt Service Payment	348,600
Total Annual Revenue Requirement	$ 430,100

Cost per Equivalent Dwelling Unit ($/month)	$ 90.28/month

Factors Utilized in the Analysis

Term of PENNVEST Loan (years/#payment)	20/240
Interest Rate of PENNVEST Loan	3.00%
Number of Equivalent Dwelling Units	397
Sewer Tap-in Fees @ $2000/EDU	$794,000
Annual Administration, Operation & Maintenance	$ 81,500

- One full time Operator @ $22,000/yr.
- One full time Administrator, Billing Clerk Secretary @ $16,000/yr.
- Office Space & Equipment $8,000/yr.
- WWTPs Operation & Maintenance Expense electricity, chemicals etc., @ $20,000/yr.
- Annual sewer system and pump station operation & maintenance @ $7,500/yr.
- One part time employee to assist operator @ $8,000/yr.

USER COST ANALYSIS
Alternative D - PENNVEST Loan
Small Diameter Gravity Sewers & Pump to Kane Borough

Project Financing

Total Project Costs	$5,349,200
Less: Sewer Tap-in Fees	794,000
Required PENNVEST Loan	4,555,200
Annual Debt Service Payment	306,100

Annual Financing

Administration, Operation & Maintenance	$ 149,000
Annual Debt Service Payment	306,100
Total Annual Revenue Requirement	$ 455,100

Cost per Equivalent Dwelling Unit ($/month)	$ 95.52/month

Factors Utilized in the Analysis

Term of PENNVEST Loan (years/#payment)	20/240
Interest Rate of PENNVEST Loan	3.00%
Number of Equivalent Dwelling Units	397
Sewer Tap-in Fees @ $2000/EDU	$794,000
Annual Administration, Operation & Maintenance	$149,000

- Treatment fees to Kane Borough
  $19.10/EDU/month x 397 EDUs x 12 months - $91,000*
- One full time Administrator, Billing Clerk, Secretary @ $16,000/yr.
- Office Space and Equipment @ $8,000/yr.
  -Pump Station Operation & Maintenance @ $12,000/yr.
- One full time operations employee @ $22,000/yr.

* $19.10/EDU/Month from approved Kane Act 537 Plan.

As can be seen from the four preceding user costs analyses the project is not feasible under this funding scenario. User costs of $1200 to $1300 per year are unheard of and the customers can not be expected to pay this high rate for sewer service. Under the PENNVEST program this area would be eligible for a grant-in-aid not to exceed $500,000 and a low interest loan to fund the remainder of the project costs. The following analyses will evaluate the user costs for each alternative in their entirety assuming that a $500,000 PENNVEST Grant and low interest loan is available. Appendix VI contains a letter from Mr. Brion Johnson, PENNVEST Project Specialist for Northwest Pennsylvania, stating Wetmore Township's eligibility for a grant-in-aid and low interest loan to assist in completing the sewerage projects contained herein.

USER COST ANALYSIS
Alternative A - PENNVEST Grant-in-Aid & Loan
Conventional Gravity Sewer System with 4 Satellite WWTPs

Project Financing

Total Project Costs	$5,440,000
Less: Sewer Tap-in Fees *	794,000
Less PENNVEST Grant-in-Aid	500,000
Required PENNVEST Loan	4,146,000
Annual Debt Service Payment	229,700

Annual Financing

Administration, Operation & Maintenance	$ 81,500
Annual Debt Service Payment	229,700
Total Annual Revenue Requirement	$ 311,200

Cost per Equivalent Dwelling Unit ($/month)	$ 65.32/month

Factors Utilized in the Analysis

Term of PENNVEST Loan (years/#payment)	20/240
Interest Rate of PENNVEST Loan	1.00%
Number of Equivalent Dwelling Units	397
Sewer Tap-in Fees @ $2000/EDU	$794,000
Annual Administration, Operation & Maintenance	$ 81,500

- One full time Operator @ $22,000/yr.
- One full time Administrator, Billing Clerk Secretary @ $16,000/yr.
- Office Space & Equipment $8,000/yr.
- WWTPs Operation & Maintenance Expense electricity, chemicals etc., @ $20,000/yr.
- Annual sewer system and pump station operation & maintenance @ $7,500/yr.
- One part time employee to assist operator @ $8,000/yr.

USER COST ANALYSIS

Alternative B - PENNVEST Grant-in-Aid & Loan
Conventional Gravity Sewers & Pump to Kane Borough

Project Financing

Total Project Costs	$4,764,500
Less: Sewer Tap-in Fees	794,000
Less PENNVEST Grant-in-Aid	500,000
Required PENNVEST Loan	3,470,500
Annual Debt Service Payment	192,300

Annual Financing

Administration, Operation & Maintenance	$ 149,000
Annual Debt Service Payment	192,300
Total Annual Revenue Requirement	$ 341,300

Cost per Equivalent Dwelling Unit ($/month)	$ 71.64/month

Factors Utilized in the Analysis

Term of PENNVEST Loan (years/#payment)	20/240
Interest Rate of PENNVEST Loan	1.00%
Number of Equivalent Dwelling Units	397
Sewer Tap-in Fees @ $2000/EDU	$794,000
Annual Administration, Operation & Maintenance	$149,000

- Page 74 of the Approved Kane Borough Act 537 Study outlines treatment cost to be charged Wetmore Township as $19.10/EDU/month x 397 EDUs x 12 months = $91,000*
- One full time Administrator, Billing clerk, Secretary @ $16,000/yr.
- Office space and equipment @ $8,000/yr.
- Pump Station Operation & Maintenance @ $12,000/yr.
- One full time employee to operate and maintain pump stations and collection system @ $22,000/yr.

* $19.10/EDU/Month from approved Kane Act 537 Plan.

USER COST ANALYSIS
Alternative C - PENNVEST Grant-in-Aid & Loan
Small Diameter Gravity Sewers & Satellite WWTPs

Project Financing

Total Project Costs	$5,980,900
Less: Sewer Tap-in Fees	794,000
Less PENNVEST Grant-in-Aid	500,000
Required PENNVEST Loan	4,686,900
Annual Debt Service Payment	259,700

Annual Financing

Administration, Operation & Maintenance	$ 81,500
Annual Debt Service Payment	259,700
Total Annual Revenue Requirement	$ 341,200

Cost per Equivalent Dwelling Unit ($/month)	$ 71.62/month

Factors Utilized in the Analysis

Term of PENNVEST Loan (years/#payment)	20/240
Interest Rate of PENNVEST Loan	1.00%
Number of Equivalent Dwelling Units	397
Sewer Tap-in Fees @ $2000/EDU	$794,000
Annual Administration, Operation & Maintenance	$ 81,500

- One full time Operator @ $22,000/yr.
- One full time Administrator, Billing Clerk Secretary @ $16,000/yr.
- Office Space & Equipment $8,000/yr.
- WWTPs Operation & Maintenance Expense electricity, chemicals etc., @ $20,000/yr.
- Annual sewer system and pump station operation & maintenance @ $7,500/yr.
- One part time employee to assist operator @ $8,000/yr.

USER COST ANALYSIS
Alternative D- PENNVEST Grant-in-Aid & Loan
Small Diameter Gravity Sewers & Pump to Kane Borough

Project Financing

Total Project Costs	$5,349,200
Less: Sewer Tap-in Fees	794,000
Less PENNVEST Grant-in-Aid	500,000
Required PENNVEST Loan	4,055,200
Annual Debt Service Payment	224,700

Annual Financing

Administration, Operation & Maintenance	$ 149,000
Annual Debt Service Payment	224,700
Total Annual Revenue Requirement	$ 373,700

Cost per Equivalent Dwelling Unit ($/month)	$ 78.44/month

Factors Utilized in the Analysis

Term of PENNVEST Loan (years/#payment)	20/240
Interest Rate of PENNVEST Loan	1.00%
Number of Equivalent Dwelling Units	397
Sewer Tap-in Fees @ $2000/EDU	$794,000
Annual Administration, Operation & Maintenance	$149,000

- Treatment fees to Kane Borough $19.10/EDU/month x 397 EDU's x 12 months = $91,000*
- One full time Administrator, Billing Clerk, Secretary @ $16,000/yr.
- Office space & equipment @ $8,000/yr.
- Pump Station operation & maintenance @ $12,000/yr.
- One full time operations employee @ $22,000/yr.

* $19.10/EDU/Month from approved Kane Act 537 Plan

As can be seen from the preceding user cost analyses utilizing a $500,000 PENNVEST Grant and a low interest loan to fund the remainder of the project, the sewerage facilities as proposed is not a feasible project. The lowest cost project is Alternative A with an $64.85/month service charge which is totally unacceptable.

SUMMARY - USER COST ANALYSES

FINANCING PACKAGE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
PennVest Loan @ 3% for 20 yrs.	$82.64	$87.28	$90.28	$95.53
$500,000 PennVest Grant & PennVest Loan @ 1% for 20 yrs.	$65.32	$71.64	$71.62	$78.44

Another source of grant monies that may provide funding for the sewage facilities proposed for Wetmore Township is through the Farmers Home Administration. The following is a description of the FmHA program:

Farmers Home Administration (From PA Handbook on FmHA Financing)

The Farmers Home Administration (FmHA) a rural credit agency of the United States Department of Agriculture is authorized to provide financial assistance for water and waste disposal systems and other essential community facilities in rural areas.

Facilities financed by FmHA must primarily serve rural residents. For water or waste disposal facilities the terms "rural" and "rural area" will not include any area in any city or town with a population in excess of 10,000 inhabitants according to the latest decennial census of the United States. For essential community facilities the terms "rural" and "rural area" will not include any area in any city of town with a population in excess of 20,000 inhabitants according to the latest decennial census of the United States. Facilities must be located in rural areas except for

utility-type services, such as water, sewer, natural gas, or hydroelectric, serving both rural and non-rural areas. In such cases FmHA funds may be used to finance only that portion serving rural users, regardless of facility location. Loans for water or waste disposal facilities will not be made to any city or town with a population in excess of 10,000. Areas or communities adjacent to, or closely associated with, non-rural areas are given low priority.

To be eligible to receive FmHA assistance, the applicant must be a public entity such as a municipality, county, special purpose authorities, or non-profit corporation. Applicants must also:

1. Be able to obtain needed funds from other sources at reasonable rates and terms.

2. Have legal authority to borrow and repay loans and be financially sound.

3. Be able to operate and maintain the facility or services.

4. Be consistent with any development plans of the State, County, or local municipality in which the proposed project is located.

Funds may be used to acquire, construct, expand, or otherwise improve rural water supplies and waste disposal systems and other essential community facilities. Other reasonable project costs, such as, land and rights of way, legal and engineering fees, and equipment are eligible for funding when related to the development of the facility.

The maximum term on all loans is 40 years. However, no repayment will exceed the useful life of the improvement or facility to be financed. The interest rate charged is adjusted quarterly and is assigned when funds are obligated for the project. The rate will vary in accordance with the average of the Bond Buyers Index. However, after funds are obligated for a project, the rate will remain unchanged for the term of the loan.

All loans will be secured by bonds or notes pledging taxes, assessments or revenue as security. A mortgage may also be taken on the facility when State laws permit.

FmHA does have grant funds available for projects serving the most financially needy communities with a median household income of less than $13,400 for the development of water and waste disposal facilities to reduce user costs to a reasonable level. Ordinarily, a grant will be considered only when the debt service

portion of the user costs exceeds one percent of the median household income for the area based on the most recent and reliable data available. Lower interest rates are also available to communities which meet the aforementioned income criteria for water and waste disposal systems and community facilities.

The State Office Community and Business Programs staff is responsible for the overall program management and provides support functions to the District Offices. Engineers, architects, and loan specialist are available to assist the District Office employees in helping applicants and their consultants plan and develop cost effective community facilities.

Farmers Home current funding levels are as follows:

Poverty Level	-	Median household income less than $25,198
	-	Eligible for up to 75% grant and/or loan at 5% interest
Intermediate Level	-	Median household income between $25,198 and $31,498
	-	Eligible for up to 55% grant and/or loan at 5.25% interest.
Market Level	-	Median household income over $15,198
	-	Not eligible for grant, loan at 7-1/4% interest.

The blended median household income in the Wetmore Township/Kane Borough sewer service area is $21,617. This blended median household income qualifies the Wetmore Township/Kane Borough area for a poverty level Farmers Home Administration Program Funding Package.

Another funding source would be the Department of Commerce - Community Facilities Grant Program. A description of this program is as follows:

Department of Commerce (Community Facilities Grant)

Eligibility

A. Eligible Applicants

BOROUGH - Any borough of the Commonwealth having a population of less than 12,000 as determined by the latest available United States census data.

TOWNSHIP- Any township of the Commonwealth having a population of less than 12,000 as determined by the latest available United States census data.

CITY - Any city of the Commonwealth having a population of less than 12,000 as determined by the latest available Untied States census data.

MUNICIPAL AUTHORITY - Any authority created by an eligible borough of township or city.

COUNTY AUTHORITY - Any county authority authorized to service an eligible borough or township.

B. Eligible Projects

Grants may be made to eligible applicants for projects that will provide for the construction, rehabilitation, alteration, expansion, or improvement of the following:

WATER FACILITIES - including but not limited to pumping stations, distribution and treatment facilities, and reservoir rehabilitation projects;

SANITARY SEWAGE DISPOSAL FACILITIES - including all facilities related to collection lines (excluding sewage treatment facilities or storm sewers);

ACCESS ROADS - to serve a public water or sanitary sewer facility.

C. Eligible Project Costs

Construction, Design and Engineering, and Legal expenses as may be necessary or incidental to the construction of the Community Facilities project.

Ineligible expenses include, but are not limited to the following: Administrative costs, grant preparation fees; fees for securing other financing; sign services; interest charges on borrowed funds; repairs made to municipal equipment; rights-of-way; and easement.

Grant Parameters:

<u>Total Project Cost</u>

Grants are limited to projects with a total project cost of $2 million or less.

Amount

Grants are generally limited to $50,000 or 50% of the total project cost, whichever is less.

Community designated as distresses are eligible to receive grants to a maximum of $75,000 or 75% of the total project cost, whichever is less.

Term

Grants are awarded for a period of one (1) year or until the end of the Commonwealth's Fiscal Year in which the grant is awarded, whichever is sooner.

If the entire project were to be undertaken, Wetmore Township would not be eligible for this program as the total project costs are in excess of $2,000,000. If Wetmore Township were eligible for this program, the $50,000 limit for grants would be such a small amount when compared to the total project costs that the grants effect on monthly user fees would be negligible.

Based on the preceding information and analyses it is quite apparent that Wetmore Township can not financially undertake the construction of sewage facilities to serve all six previously described sewer districts. The total project costs and associated monthly user fees, as detailed in the previous analyses, are excessive and are beyond the financial capability of the Township and its residents.

To summarize the preceding user fee analyses, the proposed improvements in all six sewer districts are not considered feasible under the funding programs presently available to the residents of Wetmore Township. The monthly user fees developed for this study indicate that the proposed improvements can not be completed for what is presently considered an acceptable user fee.

Under the alternative to provide satellite WWTPs to serve the sewer districts in the planning area, the annual operation and administration expenses are, when converted into monthly user fees, in excess of the industry standard of $30 to $35/month/EDU.

Under the Alternative that evaluated pumping Wetmore Township sewage into the Kane Borough System for treatment, the monthly treatment charge by Kane Borough is $19.10/EDU as described on page 74 of the approved Kane Borough Act 537 Study leaves little funding available to cover debt service if the monthly user fee is expected to not exceed $30/month. This $19.10/EDU/month fee to be

charged by Kane Borough for treatment of Wetmore Township sewage is for treatment only. This fee does not include billing, administration, operation, maintenance, debt service etc., that are all costs Wetmore must add-on to the $19.10/EDU/month treatment fee to be charged by Kane Borough.

Recently (March 1992) an additional funding scenario has become available to the Wetmore Township Supervisors for undertaking the proposed sewerage facilities outlined herein. Representatives of Kane Borough and the Kane Borough Authority along with the funding agencies - PENNVEST and FmHA have contacted Wetmore Township representatives. Kane Borough qualifies for PENNVEST and FmHA grants and low interest loans. Wetmore Township has a median income that excludes them from eligibility for funding from these agencies. It was agreed to by the funding agencies that if the Kane and Wetmore project area residents were combined, the entire project area would qualify for both PENNVEST and FmHA grants and low interest loans. This joint eligibility creates a funding package that will permit Wetmore Township to construct sewers and pump stations to convey the sewage into the Kane Borough system for treatment for all needs areas within the planning zone.

Under this proposed funding package Kane Borough would be willing to eliminate the $19.10/month/EDU charge for treatment of Wetmore Township resident sewage at the Kane WWTPs. Under the new funding package both Kane and Wetmore customers would be charged the same monthly user fee for sewage collection and treatment.

From the preceding construction and total project cost estimates it is apparent that Alternative B has the lowest costs of all options with an estimated construction cost of $3,795,000 and an estimated total project cost of $4,764,500. Appendix VII contains a letter from BCM Engineers Inc. detailing the funding scenario for the joint project. Also, contained in Appendix VII is Resolution No. 61 passed by the Township Supervisors committing to the joint project with Kane Borough and a copy of the recently executed intermunicipal agreement between Kane Borough, Kane Authority and Wetmore Township.

In addition to the information contained in the body and appendices of this Plan, Mr. Richard Kaintz, PADER Planning, was in attendance at a meeting in Kane, PA. At this meeting were representatives from the Kane Borough, Kane Authority, Wetmore Township and Farmers Home Administration (Harrisburg and Meadville). The topic of discussion at this meeting was to determine the scope of the projects, both Kane and Wetmore, that Farmers Home Administration was capable of funding. The scope of the project for Wetmore Township, agreed to by all parties in attendance, are those proposed facilities (Alternative B) shown on Plate IV attached hereto.

Alternative B is the option utilizing conventional gravity collector sewers with pump stations located throughout the Township to pump the sewage into the Kane system for treatment at the two Kane WWTPs. In addition to using conventional gravity collector sewers, there is a need to use individual grinder pump units and small diameter pressure sewers at two locations within the planning area. It is proposed to use 15 grinder units in Sewer District No. 2 and 35 grinder units in Sewer District No. 6 along with the associated small diameter pressure sewers.

Under the joint project scenario with Kane Borough the funding plan would be as follows:

Kane Facilities Project Costs	$ 9,700,000
Wetmore Facilities Project Costs	4,800,000
Total Project	**$14,500,000**
Local Funding Share	$ 200,000
Balance to Finance	$14,300,000
PENNVEST Loan (1% for 20 yrs.)	5,000,000
FmHA Grant	4,000,000
FmHA Loan (5.00% for 40 yrs.)	5,300,000
Annual Debt Service Payment	
PENNVEST Loan	$ 277,000
FmHA Loan	309,000
Annual Operation & Maintenance (Developed by FmHA for Kane Borough)	386,000
TOTAL ANNUAL COSTS	**$ 972,000**
Total Equivalent Customers 397 Wetmore + 2345 Kane	2,742
Average Monthly User Fee/EDU	Approximately $30/month

This $30 average monthly domestic user fee would be charged to both Borough and Township residents connected to the community sewer system. The local funding share for Wetmore Township of $200,000 could be generated through tap fees. A $500/tap fee could be levied to generate this local share amount.

Both PENNVEST and FmHA have been involved with the creation of a joint Kane - Wetmore project and have assisted in putting together the funding package previously described.

Under the above described funding scenario all needs area (Sewer Districts 1-6) would receive conventional gravity collector sewers and pump stations and one small pocket of grinder pumps and low pressure sewers that would discharge into the Kane Borough system for treatment.

POSSIBLE FUNDING SOURCES UTILIZED IN FINANCIAL ANALYSES

The Pennsylvania Infrastructure Investment Authority Act 16 of 1988

Description: The free standing act creates a statewide authority to provide for financing of water and sewage projects in the Commonwealth. The criteria for obtaining assistance are:

- Whether the project will improve the health, safety, welfare or economic well being of the people of this Commonwealth.
- Whether the project will lead to an effective or complete solution to problems being experienced including compliance with State and Federal laws, regulations or standards.
- The cost effectiveness compared with other institutional, financial and physical alternative.
- Consistency of the project with other state and regional resource management and economic development plans.
- Whether the project encourages consolidation of sewer systems.

The Board has established a program of assistance to sewage disposal systems serving communities with a population of 12,000 or less or systems with 1000 or fewer hookups.

Eligibility: Municipalities, Municipal Authorities and private organizations.

Administrative Agency: Pennsylvania Infrastructure Investment Authority, P.O. Box 1344, Harrisburg PA 17105, Attention Mr. Paul K. Marchetti, Executive Director (717) 787-8137.

Where to Apply: Administrative Agency.

Community Facilities

Description: Provides state grant-in-aid assistance for needed public facilities to strengthen the income-producing capability, improve the health and safety and alleviate financial hardship of Pennsylvania's communities. Eligible projects include water facilities, sewage facilities related to collection lines (excluding sewage treatment plants and storm sewers) and access roads. Grant limits are $50,000 or 50 percent of the eligible project cost, whichever is less. The program is limited to projects with a total cost of $2 million or less. All approved projects should be completed within one year from approval. Letters of intent for this program are accepted from January 1 through April 15.

Eligibility: Cities, boroughs and townships of less than 12,000 population and municipal and county authorities servicing these areas.

Administrative Agency: Bureau of Appalachian Development and State Grants, Department of Commerce, 402 South Office Building, Harrisburg, PA 17120, (717) 787-7120.

Where to Apply: Administrative Agency.

Water and Waste Disposal Systems for Rural Communities

The Farmers Home Administration provides loans and grants to rural communities for sewer systems. The purpose of the program is to provide basic human amenities, remove health hazards and promote the orderly growth of rural areas by meeting the need for new and improved rural sewer systems, including the collection and treatment of sanitary wastes.

Applicants must be units of local government with populations of less than 10,000. They must also show that they cannot receive credit financing through other means.

The Agriculture Credit Act of 1979 increased the maximum allowable grant for FmHA projects from 50 percent to 75 percent of grant eligible project development costs. This change will enable FmHA to provide higher levels of assistance to the most financially needy communities.

Information of the program can be obtained from the county office of the Farmers Home Administration or from the state office:

Farmers Home Administration
Federal Building
228 Walnut Street
P.O. Box 905
Harrisburg, PA 17108
(717) 782-4476

EVALUATION OF MANAGEMENT ALTERNATIVES

Introduction

The proper installation, operation and maintenance of an on-lot sewage system is essential in the continued performance of the sewage system. The failures of systems are caused by one or a combination of four factors. These are: (1) a faulty design for the system, (2) the installation of the systems in an inadequate manner (3) the improper maintenance of the systems and (4) poor soil conditions. The failure of a system can cause unnecessary financial burdens on a household. Failing systems lead to pollution of ground and surface waters. On-lot sewage system owners should have a personal economic interest in, and a sense of public responsibility in, taking care that their on-lot systems are operating efficiently and effectively. This situation is unfavorable because the number of properties in Wetmore Township that will inevitably have to continue to depend on effective on-lot sewage systems because they are the only economically feasible systems for a rural township.

There has been considerable research into the use of on-lot systems in the last 10 to 20 years, through this research a renewed respectability for on-lot systems has developed. This newly-found respectability, however, is grounded in an educative process among systems users and in a full realization that on-lot systems must be continually on "someone's mind" that is, they must be continually maintained.

The sewerage systems proposed in this report clearly will have to be owned and maintained by a public/semipublic agency. This automatically will involve a public commitment to management and maintenance. However, the continuing use of on-lot systems is integral to this plan.

Current Management of On-Lot Sewage Program

The on-lot sewage program in Wetmore Township is just like it is organized in most other rural Townships in Pennsylvania. It is almost entirely in the hands of a part-time sewage enforcement officer who is retained by the Township Supervisors chiefly to issue on-lot sewage permits based on citizen demand. His salary is paid out of the proceeds of the permit costs, one-half of which comes from the state. The sewage enforcement office (SEO) is a private professional entrepreneur. He sells a portion of his time and expertise to the Township to handle building permit applications where on-lot sewage systems are proposed. Occasionally, the Township Supervisors may request their SEO to check sewage complaints.

All new homes constructed in the Township require a building permit under the Township's ordinances. The Township's ordinances also require a sewage permit prior to the issuance of the building permit. The Township thus regulates the construction of on-lot systems. The SEO administers the on-lot permitting for the Township. The Township has the power to impose fines on homeowners pursuant to Chapter 73 of state regulations governing on-lot systems for building a home without a sewage permit.

PROPOSAL FOR TOWNSHIP ASSUMING STRONGER MANAGEMENT RESPONSIBILITY

Introduction

Wetmore Township Supervisors presently have jurisdiction over sewage enforcement in the Township. There are two wastewater treatment plants located in the Township. These two WWTP's are owned, operated and serve the residents of Kane Borough. Only approximately 26 homes in Wetmore Township are connected into the Kane Borough Sewer System. On-lot disposal regulation is governed by the Commonwealth and the local SEO.

The area of sewage enforcement which the Township must address are as follows:

1. Resolution of documented sewage problems in densely populated areas.

2. Management of future dense development.

3. Management of present and future on-lot disposal systems.

Administrative/Funding Recommendations

The construction estimates discussed previously in this report suggest that financing may be a problem with the present political organization due to the Township Supervisors limited borrowing capacity. The Pennsylvania Local Government Unit Debt Act limits the borrowing capacity of the Township. The Township must seek legal counsel's advice on its borrowing capacity. Further, any Township sponsored project financed either through a bank loan and/or general obligation bond issue must be secured by the taxing power of the Township. Under this scenario, tax dollars collected from all residents of the Township will be used to fund a project benefiting only a portion of the Township and this is not acceptable.

A Township funded project also requires the Township to operate and maintain the system. The Township may decide that its present duties relating to the Township road system, residential and business development, public safety, etc. may be too demanding. A separate Board, such as the formation of an Authority which would deal solely with the wastewater problem could be considered.

Under the combined Kane - Wetmore project, the funding in the form of PENNVEST and FmHA grants and loans would be administered by the Kane Borough Authority. Presently, the Kane Borough Authority is a funding Authority only. The Kane Borough Authority will own all facilities in the Township and Borough when the work is complete. The operation and maintenance of the Borough and Township facilities will be controlled by existing Kane Borough employees. There has been some recent discussion of converting the Kane Borough Authority to an operating Authority. Under this type of arrangement, the Kane Borough Authority would own, operate and maintain the sewerage facilities in both the borough and township.

Whether the Kane Borough Authority remains a financing entity or becomes an operating Authority, Wetmore Township must request equitable representation on the Board. If the Borough of Kane continues to operate and maintain the sewerage system, Wetmore Township must request equitable representation on the Kane Borough Sewerage Committee. This committee makes recommendations to the Borough Council regarding sewer use rates, capital improvements, operational concerns, etc.

Once the sewerage facilities are complete all operation, maintenance, billing, administration, etc. will be handled by the Kane Borough Authority, Kane Borough and the Kane Borough Sewerage Committee. For all practical purposes the Wetmore Township Supervisors will be out of the sewerage business in the areas within the planning zone that are receiving community sewerage service. The supervisors will retain responsibility for all on-lot sewerage systems throughout the remainder of the Township.

Management of Future Dense Population

The management of future dense population by private developers must be addressed by the Township. The Township must avoid the unorderly construction of small privately owned wastewater treatment plants. The Township must develop the proper regulations governing such development within the Township to avoid environmental problems, future costly legal encounters, future ownership of poorly constructed facilities, etc. The Township Planning Commission or the Authority would be responsible for development of uniform rules and regulations and review of developer plans for consistency with this plan. Costs for engineering and legal advice to develop this system to monitor and

regulate development would be assessed by charging developers for plan review. A large increase in development in the Township in the next 20 years is not expected. Wetmore Township is in the process of securing the services of a professional planner to prepare a township wide development plan and draft the proper zoning regulations/ordinances that will be adopted by the Township.

The administrating body must exercise care in negotiating agreements with Developers. A function of the administrating body should be to develop a set of guidelines for developer agreements and fees. The construction of sewage facilities in the Township will be related to the capital contributions of developers. Agreements must be equitable - not only between the municipality and/or Authority and the developer - but to future developers as well. The Authority and Township must develop policies which fairly compensate a developer for extending sewage facilities into an area where another developer benefits.

The Authority and Township should establish 8" sewers as the minimum size to be constructed by developers. The ultimate goal should be to convey as much sewage as possible to existing POTWs.

To avoid developers waiting for a "free ride" by having competitive developers extend sewers, the administrating body must institute strict and consistent policies. A policy of an Authority or Municipality reimbursing a developer for tap-ins desired by a competitive developer is common. The competitive developer will then pay the Authority or Township for the tap-in fees at the time he proceeds. The developer who constructs the sewer never receives more money than the sewer line capacity. The Authority and Township should obtain all rights-of-way. All developers who construct after the initial developer are charged tap-in fees.

All developers should pay the governing Authority in cash for treatment plant capacity. The cash amount will need to be negotiated. This cash can be used to expand the Kane Facilities in the event those facilities reaches their hydraulic or organic capacity or construct a POTW in another watershed in Wetmore Township if development so warrants. The Authority and Township should be totally responsible for the design, construction and operation of any new small WWTP's in the respective watersheds. In the event this policy seems objectionable, all developers who will own and operate a facility should submit plans for review and approval and sign an agreement to properly abandon private WWTP's and to connect to public sewers as they become available. All facilities are to become the property of the Authority.

New project revenues would be raised as projects are developed. These revenues would come from assessments/taps. It could also mean raising the existing sewer rates. Once the individual projects are constructed, additional customers would become

available for revenue for the Authority. Projects could be financed by options listed previously. An Authority may come under the pressure of the Pennsylvania Department of Environmental Resources to proceed with certain projects.

Explanation of Comprehensive Planning Techniques That Can Be Undertaken to Meet Sewage Disposal Needs

The facility alternatives discussed above are based on the following propositions:

- Common sewerage collection facilities will be required in the six densely populated sewer districts, with the sewage being conveyed to Kane for treatment.

- All other areas of the Township excluding the proposed development areas shown on Plate I are proposed for only on-lot sewage systems. The density of development throughout the remainder of the Township planning area is relatively light. The terrain, being very steep and largely undevelopable, dictates against much future development. A township zoning ordinance should be developed and adopted requiring 40,000 square feet for each new development and minimum lot widths of 200 feet to minimize future problems created by malfunctioning on-lot sewage systems. It is not expected much future development will occur in these areas.

All of the alternatives in this study area are based generally on the Township experiencing little or very modest future growth. This seems to be justified after evaluating recent growth trends and the overall state of McKean County's economy.

Environmental Impact Concerns

There are various regulatory agencies that have jurisdiction over various environmental concerns. As required by Act 537 these agencies have been contacted and requested to comment on the proposed project. The following narrative will list the regulatory agency contacted during the preparation of this plan, the environmental concern that falls under their jurisdiction and the measures to be taken to mitigate the impact of the proposed project.

McKean County Soils Conservation Service - This regulatory agency was contacted regarding the Prime Agricultural Lands and Wetlands (hydric soils) that exist within the project area. Their response is attached in Appendix II.

This proposed project will avoid all designated prime agricultural soils. If warranted, during the design stage, a wetlands delineation study will be conducted. All proper permits will be applied for or all wetlands of value will be avoided.

McKean County Planning Commission - This agency was contacted regarding the impact of this project on any storm water planning that may be outlined in the McKean County Storm Water Management Plan (see Appendix I). The Commission responded stating that there is no plan in the County.

PADER - BDWM - This agency was also contacted regarding an adopted Act 167 Storm Water Management Plan in McKean County and the response (see Appendix I) states that there is no such plan. In addition this agency will receive the GP-5 permit applications for any and all stream crossings that will be needed to complete the proposed sanitary sewer project.

PADER - Bureau of Forestry - This agency was contacted regarding the Pennsylvania Natural Diversity Inventory System. A review of PNDI in comparison with the proposed project site did not reveal any natural resources of special concern (see Appendix I).

Pennsylvania Historical and Museum Commission - This agency was contacted regarding the existence of an significant historical or archaeological resources that may be impacted by the proposed project. They responded that there is a high probability that archaeological resources are located in the project area (see Appendix I). As part of the detailed design a Phase I Survey has been conducted in areas that have a high probability of containing archaeological resources. The report has been submitted to the Pennsylvania Historical and Museum Commission for review and comment. The Commission has given approval for construction of the proposed facilities.

In addition to the responses contained herein regarding environmental impact of the proposed project, all other regulatory agencies that have jurisdiction will be contacted during the design phase and all necessary permits will be acquired. All Chapter 93-95 and 102 Anti-Degradation concerns will be addressed during the detailed design phase of the project.

RECOMMEND ALTERNATIVE AND SUMMARY

The recommended Alternative to correct the sewage problems within the Wetmore Township planning area is Alternative B. This Alternative is conventional gravity collector sewers in the six sewer districts with conveyance by gravity or pumping into the Kane Borough sewer system for treatment, see Plate IV. The total project cost for this option is $4,764,500 and approximately 397 existing equivalent dwelling units will be serviced by the proposed facilities.

The funding for this project will come in the form of PENNVEST and Farmers Home Administration grants and loans. Wetmore Township as a whole or for specific Sewer Districts does not qualify for FmHA grant funding but when coupled with Kane Borough the Township becomes eligible. The funding package as described previously in the text or as described in the BCM Engineers letter in Appendix VII will create a $30 average monthly user fee with a one time $500 tap-in fee/customer in the Township. This is a cost effective project considering these user costs.

The project will be financed through the Kane Borough Authority and initially will be operated and maintained by Kane Borough employees. Kane Borough will handle the billing of all new sewer customers in the Township. All debt service payments will be made by the Kane Borough Authority with proceeds from Township and Borough sewer service revenues.

Wetmore Township Supervisors should have been granted equitable representation on the Kane Borough Authority. Representation on the Authority will ensure that the residents of the Township are treated equitably when it comes to making decisions regarding present and future sewage matters.

The topic of future growth within the planning area was discussed previously in the report. All facilities proposed to be constructed in this report are sized to handle future growth and development assuming total build out in the respective area. Total build out is not expected in any of the sewer districts, as growth in this area is expected to be very slight. Over the past decade McKean County has lost 6% and Wetmore Township lost 9.3% of its total population and this can be used as a barometer to gauge future growth. For growth to occur in an area such as Wetmore Township there needs to be a catalyst. The catalyst in this area must be in the form of employment opportunities. Presently there are no new employment opportunities, nor are there any expected in the near future, in the Wetmore Township area. Based on this premise, growth in the planning area will be in the form of several single family dwelling units sporadically located throughout the planning area.

If growth does occur in the future in the form of large scale development, the added dwelling units may create a density high enough to permit the construction of the proposed facilities. Before any large scale development is approved, all sewage related issues must be addressed. The Authority and Township should draft and adopt a set of rules and regulations outlining the requirements for extension of sewage collection systems and construction of satellite WWTPs by developers. By doing so the Township will be prepared for any future development within the Township and can control the development through these rules and regulations.

As discussed previously, the Wetmore Township Supervisors are in the process of securing the services of a professional planner to develop an overall Township Plan. This plan will need to satisfy all the requirements of Act 247 as they apply to the local zoning ordinance planning needs of the Township. In the preparation of this overall Township Plan the lot size requirement must be evaluated while considering the future expansion of sewage facilities.

In constructing the sewage facilities proposed within this study, the Township Supervisors should give some consideration to utilizing the sewer line rights-of-way for some type of recreational facility such as a walking/biking trail, fitness loop with workout stations, etc. These types of facilities can be added at very little cost to the Township but will provide recreational opportunities for the entire community.

SCHEDULE

This study must be submitted to the proper regulatory agencies for review and approval. A resolution adopting the study as the official sewage facilities plan must be enacted by the Township. A resolution for this purpose is included as Appendix V. Once the agencies review and approve the study, the Township can submit an application to DER for 50% reimbursement for the eligible costs of the study.

The Township should move forward immediately in accordance with the following generalized schedule.

DATE	TASK
August 1992	Prepare and enter into intermunicipal agreement between Kane Borough Authority and Kane Borough to finance, maintain and operate sewerage facilities within Wetmore Township.

August 1992	Commence preparation of Contract Documents for construction of collector sewers and pump stations to serve all six Sewer Districts.
November 1992	Assist Kane Borough Authority in securing $5,000,000 PENNVEST Loan 1% for 20 yrs. secured at July 1992 PENNVEST Board Meeting.
April 1993	Receive Commitment from FmHA for funding package for joint Kane/Wetmore Project.
May 1993	Adopt and Submit Final Act 537 Plan to DER.
June 1993	Receive approval on Act 537 Plan from DER.
June 1993	Submit Part II Application and contract documents to DER for review.
July 1993	DER review comments received on submitted Part II Permit Application and contract documents.
July 1993	Submit final contract documents to DER for approval.
August 1993	Receive Water Quality Management Permit, Part II.
August 1993	Advertise for construction bids for proposed facilities in Sewer District Nos. 1 through 6.
September 1993	Receive construction bids.
October 1993	Award contracts for collector sewer lines and pump stations construction to serve all six Sewer Districts.
December 1994	Adopt zoning ordinances in accordance with recommendations of the overall Township Planning Study.
December 1994	Commence Facility operation.

DEPARTMENT OF ENVIRONMENTAL RESOURCES STANDARDS

The contents of this report must be submitted to DER's office in Meadville for approval as an Act 537 Plan Revision. All design criteria will meet DER standards.

ACKNOWLEDGMENTS

KLH wishes to acknowledge the cooperation of the officials and the staff of the Township of Wetmore. We also wish to thank all of the regulatory agency officials who reviewed and provided input for this study.

APPENDIX I

Contain Herein: - Storm Water Management Review Letters from McKean County Planning Commission and Department of Environmental Resources

- Pennsylvania Natural Diversity Inventory Review Letter

- Historical & Archaeological Review Letter

McKean County Planning Commission

Courthouse, Smethport, PA 16749
Phone: (814) 887-5571

May 31, 1990

Craig Bauer
KLH Engineers, Inc.
555 North Bell Avenue
Pittsburgh, PA. 15106

Dear Mr. Bauer:

We are in receipt of your correspondence pertaining to Wetmore Township's Act 537 Official Sewage Plan. There are no adopted storm water management plans or ordinances in Wetmore Township at this time.

McKean County has undertaken only one Phase I Storm Water Plan for the Tunungwant Creek Watershed surrounding the Bradford Area. We have not initiated the Phase II process at present for this watershed but hope to be able to do this within a year.

There are no current plans to begin any other storm water studies until the first Phase II is complete. If you need further information, feel free to contact our office.

Sincerely,

Deborah L. Lunden

Deborah L. Lunden
Director

DLL/jmb

CC Wetmore Township

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Post Office Box 8554
Harrisburg, Pennsylvania 17105-8554

June 22, 1990

Bureau of Dams and Waterway Management

717-541-7903

Mr. Craig J. Bauer
KLH Engineers, Inc.
555 North Bell Avenue
Pittsburgh, PA 15106

Re: DER File No. SWM 42:0

Dear Mr. Bauer:

This is in reference to your letter dated May 23, 1990, concerning Act 537 official sewage plan for Wetmore Township, McKean County. You have requested that the Department check for consistency with the Storm Water Management Act.

Please be advised that at present there is no Department approved watershed storm water plan for McKean County in effect. All land development activities must be conducted in a manner consistent with Section 13 of the Storm Water Management Act (copy enclosed). Further, all activities should also comply with the local township regulations. If you have any questions concerning this, please contact me at 717-541-7903.

Sincerely,

Durla N. Lathia

Durla N. Lathia, Chief
Storm Water Management Section
Division of Waterways and
Storm Water Management

Enclosure

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 1467
Harrisburg, Pennsylvania 17120

Bureau of Forestry

717/787-3444

July 6, 1990

Mr. Craig J. Bauer
KLH Engineers, Inc.
555 North Bell Avenue
Pittsburgh, PA 15106

Dear Mr. Bauer:

Re: PNDI Review of a wastewater treatment plant in Wetmore Township, McKean County.

Your request of May 22, to review locations within the Kane Quadrangle for the presence of natural resources of special concern was processed by using the computer data files of the Pennsylvania Natural Diversity Inventory (PNDI). A specific search of the current PNDI locational data files in comparison with the project site did not reveal any natural resources of special concern.

Please remember that legal authority for Pennsylvania's biological resources resides with three administrative agencies. The enclosure titled, "PNDI Species List," outlines which species groups are managed by these agencies. Although, PNDI functions solely as an information system for natural resources of concern, the Pennsylvania Game Commission maintains the Fish and Wildlife Data Base which can provide data descriptive of all mammals and birds common to Pennsylvania.

PNDI is a site specific information system which describes significant natural resources of Pennsylvania. PNDI includes data descriptive of plant and animal species of special concern, exemplary natural communities and unique geological features. The information system is coordinated and maintained by the Department of Environmental Resources with technical assistance from The Nature Conservancy and the Western Pennsylvania Conservancy. This response represents the most up-to-date summary of the PNDI data files. However, the data is not intended to be a conclusive compilation of the special concern resources at the project site. Only on-site biological surveys can provide a total assessment of the natural resources present in any specific area.

The PNDI project is funded largely through contributions to the Wild Resource Conservation Fund. This fund was established in 1982 by the Pennsylvania Legislature to provide support for the

research and conservation of significant natural resources within the Commonwealth. I trust that you will find our response to your request for site specific information to be of value to your business. Therefore, please consider making a contribution to the Fund.

Please phone this office if you should have questions pertinent to this response, PNDI or the Department of Environmental Resources plant program.

Sincerely,

Kathy A. McKenna

Kathy A. McKenna, Botanist
Forest Advisory Services
Bureau of Forestry

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION
BUREAU FOR HISTORIC PRESERVATION
BOX 1026
HARRISBURG, PENNSYLVANIA 17108-1026

July 23, 1991

CRAIG J BAUER
KLH ENGINEERS INC
555 NORTH BELL AVENUE
PITTSBURGH PA 15106

Re: ER# 91-3339-083-A
DER 537 Program:
Wetmore Township Comprehensive Plan, Wetmore Township, Cumberland County

Dear Mr. Bauer:

The Bureau for Historic Preservation has reviewed this State funded, assisted or licensed project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 507 et seq. (1988). This review includes comments on the project's potential effect on both historic and archaeological resources.

Our review of Wetmore Township indicates that there are no recorded archaeological sites within the township, but that it does includes many areas that have a high probability of containing as yet undiscovered archaeological resources. Sensitive archaeological areas include relatively flat areas near streams and springs, especially stream and spring junctions and areas with fertile well-drained soils. Potential resources in Wetmore Township range from the Paleo-Indian period to the historic period. Projects should be submitted to this office on a case by case basis so that their effect on archaeological resources can be assessed.

There is also a potential for historic resources (standing historic structures) in Wetmore Township. A survey of structures older than 40 years should be conducted to assess the historic significance of all such structures.

If you need further information regarding archaeological resources, please consult the Section of Archaeology at (717) 783-9900. If you need more information regarding historic structures, please contact Susan Zacher at (717) 793-9920.

Sincerely,

Kurt W. Carr, Chief
Division of Archaeology & Protection

KWC/DAH

APPENDIX II

Contained Herein:

- Soils Map of Planning Area
- Classification of the Soils
- List of Prime Farmland Soils
- List of Wetlands (Hydric Soils)
- Wetlands Map
- Soils Classification for Use as Sanitary Facilities

Copied From: United States Department of Agriculture
Soil Conservation Service
Soil Survey of McKean County Pennsylvania

For soil type locations see Planning Area Soils Mapping - Appendix II

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*10*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udults*, the suborder of the Ultisols that have an udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*7*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*10*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Albrights Series

The soils of the Albrights series are fine-loamy, mixed, mesic Aquic Fragiudalfs. These soils are very deep and moderately well drained and somewhat poorly drained. They are in broad valleys and in drainageways. They formed in colluvium from red, acid shale and sandstone. Slope is 3 to 15 percent.

Albrights soils are adjacent on the landscape to deep, well drained Leck Kill and Meckesville soils and deep, poorly drained Brinkerton soils.

Typical pedon of Albrights silt loam, 3 to 8 percent slopes, in Norwich Township, 4 miles south of Crosby, in

Sackett Hollow, 300 yards east of Pennsylvania Route 46, 20 feet north of Township Route 373, in a cultivated field:

Ap—0 to 8 inches; dark brown (7.5YR 4/4) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; 5 percent rock fragments; strongly acid; abrupt smooth boundary.

BE—8 to 13 inches; reddish brown (5YR 5/4) silt loam; weak medium subangular blocky structure; friable, sticky and plastic; 5 percent rock fragments; strongly acid; clear wavy boundary.

Bt—13 to 19 inches; reddish brown (5YR 5/4) silt loam; moderate medium subangular blocky structure; friable, sticky and plastic; 5 percent rock fragments; common faint clay films on faces of peds and lining pores; 5 percent rock fragments; strongly acid; gradual wavy boundary.

Btx1—19 to 35 inches; reddish brown (5YR 5/4) loam; common medium distinct gray (5YR 5/1) mottles; moderate coarse prismatic structure; firm and brittle, slightly sticky and slightly plastic; 5 percent rock fragments; common faint gray (10YR 5/1) clay films on pores and faces of peds; strongly acid; gradual wavy boundary.

Btx2—35 to 48 inches; reddish brown (5YR 5/4) loam; common medium distinct gray (N5/0) mottles; moderate very coarse prismatic structure; firm and brittle, slightly sticky and slightly plastic; 10 percent rock fragments; common faint gray (10YR 5/1) clay films on faces of peds; moderately acid; clear wavy boundary.

C—48 to 70 inches; reddish brown (2.5YR 4/4) channery clay loam; massive; firm, slightly sticky and slightly plastic; 25 percent rock fragments; moderately acid.

The solum ranges from 40 to 65 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 18 to 30 inches. Rock fragments make up 0 to 30 percent of the upper part of the solum and 5 to 30 percent of the lower part and the C horizon. In unlimed areas reaction ranges from extremely acid to strongly acid in the upper part of the solum and from very strongly acid to moderately acid in the lower part and the C horizon.

The Ap horizon has hue of 7.5YR to 5YR, value of 3 or 4, and chroma of 2 to 4.

The BE and Bt horizons have hue of 5YR to 2.5YR, value of 4 or 5, and chroma of 3 to 6. Fine earth texture ranges from silt loam to clay loam.

The Bt horizon has hue of 5YR to 2.5YR, value of 4 or 5, and chroma of 2 to 6. Fine earth texture ranges from loam to clay loam.

The C horizon has hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 2 to 6. Fine earth texture is loam to clay loam.

Atkins Series

The soils of the Atkins series are fine-loamy, mixed, acid, mesic Typic Fluvaquents. These soils are very deep and poorly drained. They are on flood plains. These soils formed in alluvium from acid sandstone and shale. Slope ranges from 0 to 3 percent.

Atkins soils are adjacent on the landscape to very deep, well drained Barbour and Pope soils, very deep moderately well drained Philo soils, very deep, moderately well drained and somewhat poorly drained Basher soils, and very deep, very poorly drained Palms soils.

Typical pedon of Atkins silt loam, in Foster Township, 1.8 miles east of Bradford city line, 500 feet downstream from the junction of the stream draining Totten Hollow and Kendall Creek, in a cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak fine granular structure; friable, nonsticky and nonplastic; moderately acid; abrupt smooth boundary.

Bg1—7 to 14 inches; dark gray (10YR 4/1) silt loam; many medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable, nonsticky and nonplastic; strongly acid; gradual wavy boundary.

Bg2—14 to 35 inches; dark gray (10YR 4/1) loam; many medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable, nonsticky and nonplastic; strongly acid; clear wavy boundary.

Cg—35 to 65 inches; gray (10YR 5/1) gravelly sandy loam; massive; loose, nonsticky and nonplastic; 30 percent gravel; strongly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 20 percent in the solum and from 0 to 30 percent in the C horizon. In unlimed areas reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2.

The B horizon is neutral or has hue of 10YR or 2.5Y; value is 4 to 6, and chroma is 0 or 1. Fine earth texture is dominantly silt loam or loam, but the range is silty clay loam to fine sandy loam.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 6. Fine earth texture ranges from silty clay loam to sandy loam.

Barbour Series

The soils of the Barbour series are coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluventic Dystrochrepts. These soils are very deep, well drained

soils. They are on flood plains. They formed in alluvium from red sandstone and shale. Slope ranges from 0 to 3 percent.

Barbour soils are adjacent on the landscape to very deep, moderately well drained and somewhat poorly drained Basher soils and very deep, poorly drained Atkins soils.

Typical pedon of Barbour loam, in Annin Township, 4.1 miles east of Sartwell, along Annin Creek, 0.7 mile west of the junction of Township Routes 422 and 430, 201 feet south of Township Route 422, in a pasture:

Ap—0 to 7 inches; dark reddish brown (5YR 3/3) loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; moderately acid; clear wavy boundary.

Bw—7 to 21 inches; reddish brown (5YR 5/4) loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; moderately acid; clear wavy boundary.

C1—21 to 29 inches; reddish brown (5YR 5/4) gravelly loam; massive; friable, nonsticky and nonplastic; 20 percent gravel; moderately acid; clear wavy boundary.

2C2—29 to 60 inches; reddish brown (5YR 5/4) very gravelly loamy sand; massive; friable, nonsticky and nonplastic; 60 percent gravel; moderately acid.

The solum ranges from 18 to 40 inches in thickness. Depth to the 2C horizon ranges from 20 to 40 inches. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 20 percent by volume above the 2C horizon and from 35 to 60 percent in the 2C horizon. Reaction ranges from moderately acid to very strongly acid in the solum and from strongly acid to slightly acid in the substratum.

The Ap horizon has hue of 7.5YR or 5YR, value of 3 or 4, and chroma of 2 to 4.

The B horizon has hue of 7.5YR or 5YR, value of 4 to 5, and chroma of 4. Fine earth texture ranges from fine sandy loam to silt loam.

The C horizon has hue of 7.5YR or 5YR, value of 4 to 5, and chroma of 4. Fine earth texture ranges from fine sandy loam to silt loam.

The 2C horizon has hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 3 to 6. Fine earth texture is loamy sand or loamy fine sand.

Basher Series

The soils of the Basher series are coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts. These soils are very deep and moderately well drained and somewhat poorly drained. They are on flood plains. They formed in alluvium from red, acid sandstone and shale. Slope ranges from 0 to 3 percent.

Basher soils are adjacent on the landscape to very deep, well drained Barbour soils and very deep, poorly drained Atkins soils.

Typical pedon of Basher silt loam, in Foster Township, along Kendall Run, 0.25 mile east of Bradford City line, 1,100 feet north of Pennsylvania Route 46 on north bank of creek, in a pasture:

Ap—0 to 6 inches; dark brown (7.5YR 3/2) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; very strongly acid; abrupt smooth boundary.

Bw—6 to 20 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; very strongly acid; gradual wavy boundary.

C1—20 to 32 inches; brown (7.5YR 5/4) fine sandy loam; many medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; massive; friable, nonsticky and nonplastic; very strongly acid; clear wavy boundary.

C2—32 to 41 inches; brown (7.5YR 5/2) fine sandy loam; few fine and medium distinct yellowish brown (10YR 5/6) mottles; massive; friable, nonsticky and nonplastic; strongly acid; clear wavy boundary.

2C3—41 to 73 inches; brown (7.5YR 5/2) very gravelly loamy sand; massive; friable, nonsticky and nonplastic; 50 percent gravel; very strongly acid.

The solum ranges from 20 to 40 inches in thickness. Depth to low chroma mottling ranges from 15 to 20 inches. Depth to contrasting textures is 40 inches or more. Depth to bedrock is more than 60 inches. The content of gravel in the horizons above the 2C horizon ranges from 0 to 20 percent and in the 2C horizon ranges from 20 to 60 percent. In unlimed areas reaction ranges from moderately acid to very strongly acid in the solum and from very strongly acid to slightly acid in the substratum.

The Ap horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4.

The B horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6. Fine earth texture is loam, silt loam, or fine sandy loam.

The C horizon is 7.5YR or 5YR, chroma of 4 or 5, and value of 2 to 4. Fine earth texture is silt loam or fine sandy loam above a depth of 40 inches and sand or loamy sand below that depth.

Braceville Series

The soils of the Braceville series are coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are very deep and moderately well drained and somewhat poorly drained. They are on terraces. They formed in brownish alluvium. Slope is 3 to 8 percent.

Braceville soils are adjacent on the landscape to very deep, somewhat poorly drained and poorly drained Rexford soils.

Typical pedon of Braceville silt loam, 3 to 8 percent slopes, in Keating Township, 1.2 miles west of Farmers Valley, 1,700 feet north of the junction of Township Routes 349 and 350, 10 feet west of Township Route 350, in a cultivated field:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; moderately acid; abrupt smooth boundary.

Bw1—7 to 14 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; 5 percent gravel; moderately acid; clear wavy boundary.

Bw2—14 to 18 inches; brown (10YR 5/3) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; 5 percent gravel; moderately acid; clear wavy boundary.

Bx—18 to 37 inches; yellowish brown (10YR 5/4) gravelly silt loam; common medium distinct gray (10YR 5/1) mottles; moderate very coarse prismatic structure parting to weak coarse platy; firm and brittle, nonsticky and nonplastic; 20 percent gravel; moderately acid; clear wavy boundary.

C—37 to 63 inches; yellowish brown (10YR 5/4) extremely gravelly loamy sand; massive; friable, nonsticky and nonplastic; 60 percent gravel.

The solum ranges from 30 to 55 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan is 15 to 30 inches. Depth to mottling is 12 to 30 inches. Gravel makes up 0 to 10 percent of the upper part of the solum and 20 to 40 percent of the lower part. In unlimed areas reaction ranges from very strongly acid to moderately acid above the Bx horizon and from strongly acid to slightly acid in the Bx and C horizons.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Fine earth texture is loam, sandy loam, or silt loam.

The Bx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Fine earth texture is loam, sandy loam, or silt loam.

The C horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 6. Fine earth texture is loamy sand or sandy loam.

Brinkerton Series

The soils of the Brinkerton series are fine-silty, mixed, mesic Typic Fragiaqualfs. These soils are very deep and poorly drained. They are in drainageways and at the base of the steeper slopes and the concave basins in broad, upland areas. They formed in colluvium from acid shale and siltstone. Slope ranges from 0 to 8 percent.

Brinkerton soils are on the landscape near very deep, moderately well drained and somewhat poorly drained Albrights soils, very deep, moderately well drained to somewhat poorly drained Buchanan soils, and deep and very deep, moderately well drained Cookport soils.

Typical pedon of Brinkerton silt loam, 3 to 8 percent slopes, in Ceres Township, 1.7 miles southwest of Ceres, 550 feet south of Legislative Route 42029 and 1,200 feet west of Legislative Route 42028, in a pasture:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; friable, nonsticky and nonplastic; moderately acid; abrupt smooth boundary.

Btg1—9 to 15 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common, prominent clay films on faces of peds; strongly acid; gradual wavy boundary.

Btg2—15 to 20 inches; gray (10YR 5/1) silty clay loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common, prominent clay films on faces of peds; strongly acid; clear wavy boundary.

Bxg1—20 to 26 inches; gray (10YR 5/1) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium platy; firm and brittle, sticky and plastic; many prominent clay films on faces of peds; strongly acid; gradual wavy boundary.

Bxg2—26 to 33 inches; gray (10YR 6/1) silt loam; moderate medium distinct yellowish brown (10YR 5/8) mottles; moderate very coarse prismatic structure parting to moderate thick platy; firm and brittle, sticky and plastic; many prominent clay films on faces of peds; moderately acid; gradual wavy boundary.

Bxg3—33 to 44 inches; gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure parting to weak thick platy; firm and brittle, slightly sticky and slightly plastic; common faint clay films on faces of peds; moderately acid; clear wavy boundary.

Cg—44 to 60 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct yellowish brown (10YR 5/4) mottles; weak very coarse prismatic structure; firm, slightly sticky and slightly plastic; 10 percent rock fragments; moderately acid.

The solum ranges from 40 to 50 inches in thickness. Depth to the fragipan ranges from 16 to 28 inches.

Depth to bedrock is more than 60 inches. Content of rock fragments ranges from 0 to 10 percent in the A and Btg horizons, from 0 to 15 percent in the Bxg horizon, and from 10 to 20 percent in the C horizon. Reaction ranges from very strongly acid to moderately acid in the solum and from strongly acid to slightly acid in the C horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Fine earth texture ranges from silt loam to silty clay loam.

The Bxg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Fine earth texture ranges from silt loam to silty clay loam.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 4. Fine earth texture ranges from silt loam to silty clay loam.

Buchanan Series

The soils of the Buchanan series are fine-loamy, mixed, mesic Aquic Fragiudults. These soils are very deep and moderately well drained to somewhat poorly drained. They are in broad valleys and drainageways. They formed in colluvium from gray sandstone and shale. Slope ranges from 0 to 25 percent.

Buchanan soils are adjacent on the landscape to deep, well drained Hartleton soils, deep and very deep, moderately well drained Cookport soils, very deep, somewhat poorly drained Cavode soils, and very deep, poorly drained Brinkerton soils. Buchanan soils have a thicker solum than Cookport soils, and are deeper than 72 inches to bedrock.

Typical pedon of Buchanan silt loam, 8 to 15 percent slopes, in Norwich township, 2.2 miles east of Crosby, 200 yards east of house, 6 feet south of Legislative Route 42017, in a hayfield:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; 5 percent rock fragments; strongly acid; abrupt smooth boundary.

Bt1—8 to 13 inches; yellowish brown (10YR 5/4) silt loam; few coarse faint pale brown (10YR 6/3) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 5 percent rock fragments; very strongly acid; gradual wavy boundary.

Bt2—13 to 26 inches; yellowish brown (10YR 5/4) clay loam; many coarse prominent gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; common faint clay films on ped faces and in pores; 10 percent rock fragments; very strongly acid; gradual wavy boundary.

Bx1—26 to 37 inches; brown (10YR 5/3) gravelly clay loam; many coarse prominent gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle, slightly sticky and slightly plastic; common distinct clay films in pores and on ped faces; 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bx2—37 to 43 inches; dark brown (10YR 4/3) gravelly clay loam; many medium and coarse light yellowish brown (10YR 6/4) mottles; moderate coarse prismatic structure parting to medium and coarse subangular blocky; firm and brittle, slightly sticky and slightly plastic; common distinct clay films in pores and on ped faces; 30 percent rock fragments; strongly acid; gradual wavy boundary.

C—43 to 83 inches; dark brown (10YR 4/3) gravelly silt loam; many coarse faint brown (10YR 5/3) mottles; massive; firm, slightly sticky and slightly plastic; 30 percent rock fragments; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 20 to 36 inches. Rock fragments make up 5 to 15 percent in the A and E horizons, from 5 to 25 percent in the Bt horizon, from 10 to 30 percent in the Bx horizon, and from 10 to 40 percent in the C horizon. In unlimed areas reaction ranges from extremely acid to moderately acid throughout.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 1 to 4.

Some pedons have an E horizon that has hue of 10YR, value of 4 to 6, and chroma of 2 to 6. Fine earth texture is silt loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Fine earth texture is silt loam or clay loam.

The Bx horizon has hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 2 to 6. Fine earth texture is loam, silt loam, or clay loam.

The C horizon has hue of 2.5Y to 7.5YR, value of 4 to 7, and chroma of 2 to 6. Fine earth texture is silt loam to sandy clay loam.

Cavode Series

The soils of the Cavode series are clayey, mixed, mesic Aeric Ochraquults. These soils are deep and very deep and somewhat poorly drained. They are on uplands. They formed in residuum from acid shale. Slope ranges from 0 to 8 percent.

Cavode soils are adjacent on the landscape to very deep, moderately well drained and somewhat poorly drained Buchanan soils, very deep, moderately well drained Wharton soils, and deep, moderately well drained Cookport soils.

Typical pedon of Cavode silt loam, 3 to 8 percent slopes, in Hamlin Township, 2.5 miles southeast of Mount Jewett, 900 feet west of Legislative Route 42004,

100 feet south of a private road to an old, clay stripmine, in woodland:

A1—0 to 1 inch; very dark, grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; very strongly acid; abrupt smooth boundary.

E—1 to 7 inches; yellowish brown (10YR 5/4) silt loam; weak medium granular structure; friable, nonsticky and nonplastic; very strongly acid; clear wavy boundary.

Bt—7 to 13 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common, faint clay films on faces of peds; 5 percent rock fragments; very strongly acid; clear wavy boundary.

Btg1—13 to 22 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm, sticky and plastic; common, faint clay films on faces of peds; 5 percent rock fragments; very strongly acid; clear wavy boundary.

Btg2—22 to 35 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure; firm, sticky and plastic; common faint gray (10YR 6/1) clay films on faces of peds; 5 percent rock fragments; very strongly acid; clear wavy boundary.

Btg3—35 to 47 inches; gray (10YR 5/1) silty clay loam; common medium distinct brown (10YR 5/3) mottles; moderate medium prismatic structure parting to moderate medium platy; firm, sticky and plastic; common, faint clay films on faces of peds; 5 percent rock fragments; very strongly acid; clear wavy boundary.

Cg—47 to 71 inches; light brownish gray (10YR 6/2) very channery silty clay loam; massive; firm, slightly sticky and slightly plastic; 50 percent rock fragments; very strongly acid; clear wavy boundary.

R—71 inches; light brownish gray (10YR 6/2) clay shale.

The solum ranges from 36 to 60 inches in thickness. Depth to bedrock ranges from 50 to 72 inches. Content of rock fragments ranges from 0 to 10 percent in the upper part of the solum, from 5 to 15 percent in the lower part of the solum, and from 10 to 80 percent in the C horizon. Reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Fine earth texture is silt loam to silty clay.

The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 2. Fine earth texture is silty clay loam or silty clay.

The C horizon commonly has hue of 10YR or 2.5YR, value of 4 to 6, and chroma of 1 to 4. Fine earth texture ranges from silt loam to silty clay loam.

Chenango Series

The soils of the Chenango series are loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are very deep and well drained. They are on stream terraces. They formed in brown alluvium. Slope is 3 to 8 percent.

Chenango soils are adjacent on the landscape to very deep, moderately well drained and somewhat poorly drained Braceville soils and very deep, somewhat poorly to poorly drained Rexford soils.

Typical pedon of Chenango gravelly loam, 3 to 8 percent slopes, in Ceres Township, 1.3 miles west of Shinglehouse, 3.0 miles east of Ceres, 1,900 feet south of the intersection of the stream draining Raub Hollow and Township Route 437, in a cultivated field:

Ap—0 to 7 inches; dark brown (10YR 3/3) gravelly loam; weak fine granular structure; very friable, nonsticky and nonplastic; 20 percent gravel; moderately acid; abrupt smooth boundary.

Bw1—7 to 14 inches; yellowish brown (10YR 5/6) gravelly loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; 25 percent gravel; strongly acid; gradual wavy boundary.

Bw2—14 to 19 inches; yellowish brown (10YR 5/6) gravelly loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; 30 percent gravel; strongly acid; gradual wavy boundary.

Bw3—19 to 31 inches; yellowish brown (10YR 5/6) very gravelly loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; 45 percent gravel; strongly acid; clear wavy boundary.

C—31 to 80 inches; brown (10YR 5/3) extremely gravelly loamy sand; single grain; loose, nonsticky and nonplastic; 70 percent gravel; moderately acid.

The solum ranges from 24 to 40 inches. Depth to bedrock is more than 60 inches.

Gravel makes up 15 to 30 percent of the Ap horizon, 20 to 60 percent of the B horizon, and 40 to 70 percent of the C horizon. Reaction is very strongly to moderately acid in the A and B horizons and strongly acid to neutral in the C horizon.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Fine earth texture ranges from silt loam to sandy loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Fine earth texture ranges from loamy fine sand to coarse sand.

Clymer Series

The soils of the Clymer series are fine-loamy, mixed, mesic Typic Hapludults. These soils are deep and very deep, well drained soils on uplands. They formed in residuum from sandstone and siltstone.

Clymer soils are adjacent on the landscape to deep, moderately well drained Cookport soils and deep, well drained Hazleton soils.

Representative profile of Clymer loam, 3 to 8 percent slopes, in Sergeant Township, 110 feet west of Township Route 321, along Tennessee Gas Pipeline, 0.4 mile northwest of the junction of Township Route 321 and Pennsylvania Route 146, approximately 2 miles north of Clermont:

A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; very friable, nonsticky and nonplastic; 10 percent rock fragments; extremely acid; abrupt smooth boundary.
E1—3 to 5 inches; brown (10YR 5/3) channery sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; 15 percent rock fragments; extremely acid; abrupt smooth boundary.
E2—5 to 10 inches; yellowish brown (10YR 5/6) channery loam; moderate fine granular structure; very friable, nonsticky and nonplastic; 30 percent rock fragments; extremely acid; gradual wavy boundary.
Bt1—10 to 19 inches; yellowish brown (10YR 5/4) channery loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common faint clay films on ped faces; 20 percent rock fragments; extremely acid; gradual wavy boundary.
Bt2—19 to 31 inches; yellowish brown (10YR 5/4) channery loam; moderate medium and coarse subangular blocky structure; friable, slightly sticky and plastic; common faint clay films on ped faces; 15 percent rock fragments; extremely acid; gradual wavy boundary.
C—31 to 48 inches; yellowish brown (10YR 5/4) extremely channery loam; massive; friable, nonsticky and nonplastic; 70 percent rock fragments; extremely acid; clear wavy boundary.
R—48 inches; grayish brown (10YR 5/2) sandstone.

The solum ranges from 24 to 36 inches. Depth to bedrock ranges from 42 to 84 inches. Rock fragments make up 5 to 35 percent of the solum and 40 to 80 percent of the C horizon. In unlimed areas reaction ranges from strongly acid to extremely acid throughout.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3.

The E horizon has hue of 10YR, value of 5, and chroma of 3 to 6. Fine earth texture is loam or sandy loam.

The B horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. Fine earth texture ranges from loam to clay loam.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 4 to 6. Fine earth texture ranges from loam to sandy loam.

Cookport Series

The soils of the Cookport series are fine-loamy, mixed, mesic Aquic Fragiudults. These soils are deep and very deep, moderately well drained soils on uplands. They formed in residuum from interbedded sandstone and shale. Slope ranges from 0 to 25 percent.

Cookport soils are adjacent on the landscape to deep, well drained Hartleton and Hazleton soils, very deep, moderately well drained to somewhat poorly drained Buchanan soils, deep and very deep, moderately well drained Wharton soils, very deep, somewhat poorly drained Cavode soils, and very deep, poorly drained Brinkerton soils.

Typical pedon of Cookport loam, 3 to 8 percent slopes, 350 feet north of Pennsylvania Route 59, 3.7 miles west of Smethport, 0.9 mile east of Ormsby, in woodland:

Oe—1 inch to 0; black (N2/0) partly decomposed organic matter; abrupt smooth boundary.
A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable, nonsticky and nonplastic; 5 percent rock fragments; very strongly acid; gradual wavy boundary.
E—3 to 9 inches; yellowish brown (10YR 5/4) loam; moderate medium granular structure; friable, nonsticky and nonplastic; 5 percent rock fragments; very strongly acid; clear wavy boundary.
Bt1—9 to 16 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common faint clay films; 5 percent rock fragments; very strongly acid; clear wavy boundary.
Bt2—16 to 21 inches; yellowish brown (10YR 5/4) clay loam; common medium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common faint clay films; 10 percent rock fragments; very strongly acid; clear wavy boundary.
Bx—21 to 39 inches; yellowish brown (10YR 5/4) loam; common medium distinct gray (10YR 6/1) mottles; moderate coarse prismatic structure; firm and brittle, slightly sticky and slightly plastic; common faint clay films; 10 percent rock fragments; very strongly acid; clear wavy boundary.

C—39 to 45 inches; brown (10YR 5/3) gravelly sandy loam; common medium distinct gray (10YR 6/1) mottles; massive; firm, nonsticky and nonplastic; 20 percent rock fragments; very strongly acid; abrupt wavy boundary.
R—45 inches; gray sandstone bedrock.

The solum ranges from 30 to 40 inches in thickness. Depth to bedrock ranges from 42 to 72 inches. Depth to the fragipan ranges from 16 to 27 inches. Rock fragments make up 5 to 30 percent of the solum. In unlimed areas reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or 3.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Fine earth texture is silt loam or loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. Fine earth texture ranges from loam and sandy loam to clay loam.

The Bx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8. Fine earth texture ranges from sandy loam to clay loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. Fine earth texture is loam or sandy loam.

Hartleton Series

The soils of the Hartleton series are loamy-skeletal, mixed, mesic Typic Hapludults. These soils are deep and well drained. They are on hillsides, benches, and hilltops. They formed in residuum from gray siltstone and shale. Slope ranges from 3 to 60 percent.

Hartleton soils are adjacent on the landscape to very deep, moderately well drained and somewhat poorly drained Buchanan soils, very deep and deep, moderately well drained Wharton and Cookport soils, and deep, well drained Hazleton soils.

Typical pedon of Hartleton channery silt loam, in an area of Hartleton and Buchanan soils, 25 to 60 percent slopes, in Corydon Township, 12 miles west of Bradford, 0.8 mile north of the intersection of Township Route 326 and Pennsylvania Route 346, 5 feet east of Township Route 326, in a wooded area:

A—0 to 1 inch; dark yellowish brown (10YR 4/4) channery silt loam; weak fine granular structure; friable, nonsticky and nonplastic; 25 percent rock fragments; very strongly acid; abrupt smooth boundary.
E—1 to 11 inches; yellowish brown (10YR 5/4) channery silt loam; weak fine granular structure; friable, nonsticky and nonplastic; 25 percent rock fragments; very strongly acid; clear wavy boundary.
Bt1—11 to 19 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 35 percent rock fragments; common faint clay films; very strongly acid; gradual wavy boundary.
Bt2—19 to 32 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 50 percent rock fragments; common faint clay films; very strongly acid; gradual wavy boundary.
BC—32 to 39 inches; yellowish brown (10YR 5/4) extremely channery silt loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 65 percent rock fragments; very strongly acid; clear wavy boundary.
C—39 to 57 inches; yellowish brown (10YR 5/4) extremely channery silt loam; massive; friable, nonsticky and nonplastic; 85 percent rock fragments; very strongly acid; clear wavy boundary.
R—57 inches; siltstone bedrock.

The solum ranges from 30 to 40 inches in thickness. Depth to bedrock ranges from 40 to 60 inches. Rock fragments range from 15 to 40 percent, by volume, in the A and E horizons, from 25 to 70 percent in the B horizon, and from 50 to 90 percent in the C horizon. In unlimed areas reaction ranges from strongly acid to very strongly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 2 to 4.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. Fine earth texture is silt loam or loam.

The B horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. Fine earth texture ranges from loam to silty clay loam.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. Fine earth texture is silt loam or loam.

Hazleton Series

The soils of the Hazleton series are loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are deep and well drained. They are on nearly level to moderately steep, convex hillsides and hilltops. They formed in residuum from gray sandstone. Slope ranges from 0 to 25 percent.

Hazleton soils are adjacent on the landscape to deep, well drained Clymer and Hartleton soils and deep and very deep, moderately well drained Cookport soils.

Representative profile of Hazleton channery loam, 8 to 25 percent slopes, very stony, in Keating Township, about 3 miles north of Smethport, 3,800 feet east of the lake in Elk Lick Boy Scout Camp, 2,400 feet south of Township Route 349, in woodland:

A—0 to 3 inches; very dark grayish brown (10YR 3/2) channery loam; weak fine granular structure; friable,

nonsticky and nonplastic; 20 percent rock fragments; very strongly acid; clear wavy boundary.
E—3 to 6 inches; brown (10YR 5/3) channery sandy loam; moderate fine granular structure; friable, nonsticky and nonplastic; 20 percent rock fragments; extremely acid; clear smooth boundary.
Bw1—6 to 12 inches; strong brown (7.5YR 5/6) channery loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 30 percent rock fragments; very strongly acid; gradual wavy boundary.
Bw2—12 to 22 inches; dark brown (10YR 4/3) very channery sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 40 percent rock fragments; very strongly acid; gradual wavy boundary.
Bw3—22 to 34 inches; dark brown (10YR 4/3) extremely channery sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 60 percent rock fragments; very strongly acid; gradual wavy boundary.
C—34 to 43 inches; dark brown (10YR 4/3) extremely channery sandy loam; massive; friable, nonsticky and nonplastic; 80 percent rock fragments; very strongly acid; clear irregular boundary.
R—43 inches; sandstone bedrock.

The solum ranges from 26 to 40 inches in thickness. Depth to bedrock is 40 to 60 inches. Rock fragments range from 15 to 60 percent, by volume, in the solum and from 50 to 80 percent in the C horizon. In unlimed areas reaction is strongly acid to extremely acid throughout.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 4.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 to 6, and chroma of 3 to 6. Fine earth texture is loam or sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1 to 8. Fine earth texture is loam to loamy sand.

Leck Kill Series

The soils of the Leck Kill series are fine-loamy, mixed, mesic Typic Hapludults. These soils are deep and well drained. They are on hillsides and hilltops. They formed in residuum from reddish shale and siltstone. Slope ranges from 3 to 50 percent.

Leck Kill soils are adjacent on the landscape to very deep, well drained Meckesville soils and very deep, moderately well drained and somewhat poorly drained Albrights soils.

Typical profile of Leck Kill channery silt loam, 3 to 8 percent slopes, in Annin Township, 6.3 miles north of Port Allegany, 25 feet north of the intersection of Township Routes 428 and 424, in a cultivated field:

Ap—0 to 6 inches; dark brown (7.5YR 3/2) channery silt loam; weak fine granular structure; friable, nonsticky and nonplastic; 15 percent rock fragments; very strongly acid; abrupt smooth boundary.
BE—6 to 14 inches; dark reddish brown (5YR 3/4) channery silt loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films; 15 percent rock fragments; very strongly acid; clear wavy boundary.
Bt—14 to 26 inches; dark reddish brown (2.5YR 3/4) channery silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common faint clay films; 20 percent rock fragments; very strongly acid; gradual wavy boundary.
C—26 to 44 inches; dark reddish brown (2.5YR 3/4) extremely channery silt loam; massive; friable, nonsticky and nonplastic; 60 percent rock fragments; very strongly acid; clear wavy boundary.
R—44 inches; dusky red shale bedrock.

The solum ranges from 24 to 36 inches in thickness. Depth to bedrock is 42 to 60 inches. Rock fragments make up 15 to 25 percent of the A horizon, 15 to 35 percent of the B horizon, and 60 to 80 percent of the C horizon. In unlimed areas reaction ranges from very strongly acid to moderately acid throughout.

The Ap horizon has hue of 7.5YR or 2.5YR, value of 3 or 4, and chroma of 2 to 4.

The B horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 4 to 6. Fine earth texture ranges from silt loam to silty clay loam.

The C horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 4 to 6. Fine earth texture ranges from silt loam to clay loam.

Meckesville Series

The soils of the Meckesville series are fine-loamy, mixed, mesic Typic Fragiudults. These soils are very deep and well drained. They are on the lower slopes. They formed in colluvium from red siltstone, shale, and sandstone. Slope is 15 to 25 percent.

Meckesville soils are adjacent on the landscape to deep, well drained Leck Kill soils and very deep, moderately well drained and somewhat poorly drained Albrights soils.

Typical pedon of Meckesville channery silt loam, 15 to 25 percent slopes, in Smethport, northeast of the corner of Hamlin and King Streets, 100 feet north of King Street, 200 feet east of Hamlin Street, in a hayfield:

Ap—0 to 9 inches; dark reddish gray (5YR 4/2) channery silt loam; weak fine granular structure;

friable, nonsticky and nonplastic; 25 percent rock fragments; moderately acid; abrupt smooth boundary.

Bt1—9 to 15 inches; reddish brown (5YR 5/4) channery silt loam; moderate fine subangular blocky structure; friable, sticky and plastic; faint continuous clay films; 20 percent rock fragments; moderately acid; clear wavy boundary.

Bt2—15 to 24 inches; reddish brown (5YR 5/4) channery silty clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; common faint clay films; 20 percent rock fragments; moderately acid; clear wavy boundary.

Bx—24 to 51 inches; reddish brown (5YR 5/4) channery silty clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle, sticky and plastic; common faint clay films; 30 percent rock fragments; strongly acid; abrupt smooth boundary.

2C1—51 to 56 inches; reddish brown (2.5YR 4/4) extremely channery silty clay loam; massive; friable, sticky and plastic; 70 percent rock fragments; strongly acid; abrupt smooth boundary.

3C2—56 to 66 inches; reddish brown (5YR 5/4) extremely channery silty clay loam; massive; friable, sticky and plastic; 75 percent rock fragments; strongly acid; clear wavy boundary.

R—66 inches; dusky red (10R 3/4) and light brownish gray (2.5Y 6/2) shale and sandstone bedrock.

The solum ranges from 40 to 75 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 25 to 40 inches. Rock fragments range from 5 to 30 percent, by volume, in the A and Bt horizons, from 10 to 50 percent in the Bx horizon, and from 25 to 80 percent in the C horizon. In unlimed areas reaction ranges from strongly acid to extremely acid throughout.

The Ap horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4.

The Bt horizon has hue of 5YR to 10R, value of 3 to 5, and chroma of 3 to 6. Fine earth texture ranges from silt loam to silty clay loam.

The Bx horizon has hue of 5YR to 10R, value of 3 to 5, and chroma of 4. Fine earth texture ranges from silt loam to silty clay loam.

The C horizon has hue of 10R to 2.5Y, value of 3 to 6, and chroma of 3 to 6. Fine earth texture ranges from loam to silty clay loam.

Palms Series

The soils of the Palms series are loamy, mixed, euic, mesic Terric Medisaprists. These soils are very deep and very poorly drained. They are in the basins along the major streams in the northeastern part of the county. They formed in organic matter mostly from herbaceous plants. Slope ranges from 0 to 2 percent.

Palms soils are adjacent on the landscape to very deep, poorly drained Atkins soils, very deep, moderately well drained Basher and Philo soils, and very deep, well drained Barbour and Pope soils.

Typical pedon of Palms muck, in Annin Township, 0.7 mile south of Turtlepoint, 1,200 feet west of Pennsylvania Route 155, 3,600 feet southeast of the intersection of the railroad tracks and Legislative Route 42018, 50 feet west of the railroad tracks, on the Allegheny River flood plain:

Oa1—0 to 10 inches; black (10YR 2/1) muck (sapric material); about 10 percent fibers, 5 percent rubbed; moderate medium granular structure; very friable; slightly acid; clear smooth boundary.

Oa2—10 to 23 inches; very dark brown (10YR 2/2) muck (sapric material); 10 percent fiber, 3 percent rubbed; weak coarse subangular blocky structure; very friable; slightly acid; clear smooth boundary.

Oa3—23 to 40 inches; dark brown (10YR 3/3) muck (sapric material); 20 percent fibers, less than 10 percent rubbed; massive; very friable; slightly acid; abrupt smooth boundary.

Cg—40 to 60 inches; dark gray (10YR 4/1) silty clay loam; massive; sticky and plastic; neutral.

The organic material ranges from 25 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Woody fragments in the organic material range from 0 to 15 percent. Reaction is slightly acid or neutral throughout.

The Oa1 and Oa2 horizons have hue of 10YR, value of 2, and chroma of 1 or 2.

The Oa3 horizon is neutral or has hue of 10YR or 7.5YR; value is 2 or 3 and chroma is 0 to 3.

The 2Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. Fine earth texture ranges from clay loam to silty clay loam.

Philo Series

The soils of the Philo series are coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts. These soils are very deep and moderately well drained. They are on flood plains. They formed in alluvium from yellow and brown, acid sandstone and shale. Slope ranges from 0 to 3 percent.

Philo soils are adjacent on the landscape to very deep, well drained Pope soils and very deep, poorly drained Atkins soils.

Typical pedon of Philo silt loam, in Keating Township, 1.4 miles south of East Smethport, 100 feet east of the bridge over Potato Creek, 50 feet west of the stream, 50 feet north of Township Route 377, in a cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable,

nonsticky and nonplastic; moderately acid; abrupt smooth boundary.

Bw1—7 to 15 inches; yellowish brown (10YR 5/6) silt loam; moderate medium granular structure; friable, nonsticky and nonplastic; strongly acid; gradual wavy boundary.

Bw2—15 to 34 inches; brown (10YR 5/3) fine sandy loam; common fine distinct gray (10YR 5/1) and strong brown (7.5YR 5/8) mottles; weak very fine subangular blocky structure; friable, nonsticky and nonplastic; strongly acid; gradual wavy boundary.

Cg1—34 to 46 inches; gray (10YR 5/1) sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; friable, nonsticky and nonplastic; strongly acid; clear wavy boundary.

Cg2—46 to 66 inches; gray (10YR 5/1) very gravelly loamy sand; massive; friable, nonsticky and nonplastic; 40 percent rock fragments; strongly acid.

The solum ranges from 24 to 40 inches in thickness. Depth to low chroma mottling ranges from 12 to 24 inches. Depth to the Cg2 horizon ranges from 40 to 60 inches. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 20 percent, by volume, above the Cg2 horizon and from 20 to 60 percent in the Cg2 horizon. In unlimed areas reaction ranges from strongly acid to moderately acid.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The B horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. Fine earth texture ranges from silt loam to sandy loam.

The C horizon is neutral or has hue of 10YR, value is 4 or 5, and chroma is 0 to 2. Fine earth texture ranges from silt loam to sandy loam above a depth of 40 inches and silt loam to sand below that depth.

Pope Series

The soils of the Pope series are coarse-loamy, mixed, mesic Fluventic Dystrochrepts. These soils are very deep and well drained. They are on flood plains. They formed in alluvium from yellow and brown acid shale and sandstone. Slope ranges from 0 to 3 percent.

Pope soils are adjacent on the landscape to very deep, well drained Philo soils and very deep, poorly drained Atkins soils.

Typical pedon of Pope loam, in Keating Township, on Potato Creek, 1 mile north of Smethport, 750 feet north of bridge on Township Route 366, 15 feet east of creek bank:

Ap—0 to 6 inches; brown (10YR 4/3) loam; weak fine granular structure; friable, nonsticky and nonplastic; strongly acid; abrupt smooth boundary.

Bw1—6 to 18 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; strongly acid; gradual wavy boundary.

Bw2—18 to 41 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; very strongly acid; gradual wavy boundary.

C—41 to 65 inches; yellowish brown (10YR 5/4) sandy loam; massive; friable, nonsticky and nonplastic; very strongly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 30 percent, by volume, above a depth of 40 inches and from 0 to 60 percent below that depth. In unlimed areas reaction is strongly acid or very strongly acid throughout.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Fine earth texture is fine sandy loam or loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. Fine earth texture ranges from loamy sand to loam.

Rexford Series

The soils of the Rexford series are coarse-loamy, mixed, mesic Aeric Fragiaquepts. These soils are very deep and somewhat poorly drained and poorly drained. They are on terraces of major streams. They formed in alluvium. Slope ranges from 0 to 3 percent.

Rexford soils are adjacent on the landscape to very deep, well drained Chenango soils and very deep, moderately well drained and somewhat poorly drained Braceville soils.

Typical pedon of Rexford silt loam, 0 to 3 percent slopes, in Ceres Township, 0.9 mile west of Ceres, 4,000 feet west of the junction of Pennsylvania Route 44 and Legislative Route 42028, 1,700 feet north of Oswayo Creek, 20 feet west of lane, 250 feet south of the New York state line, in a cultivated field:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; moderately acid; abrupt smooth boundary.

Bw1—9 to 11 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; moderately acid; clear wavy boundary.

Bw2—11 to 18 inches; brown (7.5YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; 5

percent gravel; moderately acid; clear wavy boundary.

Bx1—18 to 34 inches; brown (7.5YR 5/4) loam; many fine distinct gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; moderate coarse prismatic structure parting to moderate medium platy; firm and brittle, nonsticky and nonplastic; few faint films in pores; 5 percent gravel; moderately acid; gradual wavy boundary.

Bx2—34 to 39 inches; dark brown (7.5YR 4/4) gravelly loam; medium prominent gray (10YR 6/1) and yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium platy; firm and brittle, nonsticky and nonplastic; few faint films in pores; 15 percent gravel; moderately acid; clear wavy boundary.

2C1—39 to 47 inches; dark brown (7.5YR 4/4) gravelly sandy loam; massive; firm, nonsticky and nonplastic; 30 percent gravel; moderately acid; clear wavy boundary.

2C2—47 to 60 inches; dark brown (7.5YR 4/4) very gravelly loamy sand; 40 percent gravel; moderately acid.

The solum ranges from 24 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan is 15 to 24 inches. Rock fragments range from 0 to 15 percent, by volume, in the Ap and Bw horizons and from 5 to 40 percent in the Bx and 2C horizons. In unlimed areas reaction is strongly acid or moderately acid throughout.

The Ap horizon has hue of 10YR, value of 4, and chroma of 1 or 2.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 1 to 6. Fine earth texture is silt loam or loam.

The Bx horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 1 to 4. Fine earth texture is sandy loam, loam, or silt loam.

The 2C horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 1 to 6. Fine earth texture ranges from silt loam to sand.

Udorthents

Udorthents are very deep and well drained to somewhat poorly drained. Permeability is slow to rapid. These soils are on uplands. Areas of these soils were formed by excavating and stripping overburden to expose beds of coal and clay. The areas disturbed in these ways were eventually reclaimed. Udorthents also consist of quarries and areas where material was removed and used for highway construction. Slope ranges from 0 to 80 percent.

Udorthents are adjacent on the landscape to all other soils in the survey area, but are most commonly on the landscape with deep, well drained Hartleton soils and deep and very deep, moderately well drained Cookport soils.

Udorthents differ greatly from area to area. Consequently, a typical pedon is not given.

The solum ranges from 0 to 20 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments make up 15 to 80 percent of the volume throughout. Reaction is strongly acid to extremely acid throughout.

Some pedons have an A horizon that has hue of 5YR to 2.5Y and value and chroma of 0 to 8. Fine earth texture ranges from sandy loam to silty clay loam.

The C horizon has hue of 7.5YR to 5Y and value and chroma of 0 to 8. Fine earth texture ranges from sandy loam to silty clay loam.

Wharton Series

The soils of the Wharton series are fine-loamy, mixed, mesic Aquic Hapludults. These soils are deep and very deep and moderately well drained. They are on uplands. They formed in residuum from shale. Slope is 3 to 8 percent.

Wharton soils are adjacent on the landscape to very deep and deep, moderately well drained Cookport soils and very deep, somewhat poorly drained Cavode soils.

Typical pedon of Wharton silt loam, 3 to 8 percent slopes, in Lafayette Township, 3 miles west of Ormsby, 1 mile east of McKean County Airport, 100 feet north of Pennsylvania Route 59, in a cultivated field:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; 5 percent rock fragments; very strongly acid; abrupt smooth boundary.

Bt1—7 to 19 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; common faint clay films; 5 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—19 to 27 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common faint clay films; gray (10YR 6/1) coatings on peds; 10 percent rock fragments; very strongly acid; gradual wavy boundary.

Bt3—27 to 43 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct gray (10YR 6/1) mottles; moderate coarse prismatic structure; firm, sticky and plastic; common faint clay films; gray (10YR 6/1) coatings on prisms; 12 percent rock fragments; extremely acid; clear wavy boundary.

C—43 to 53 inches; brown (10YR 5/3) extremely channery silt loam; massive; friable, slightly sticky and slightly plastic; 60 percent rock fragments; extremely acid; clear wavy boundary.

R—53 inches; shale bedrock.

The solum ranges from 40 to 54 inches in thickness. Depth to bedrock ranges from 40 to 72 inches. Rock fragments make up 0 to 15 percent of the A and B horizons and 50 to 80 percent of the C horizon. In unlimed areas reaction ranges from strongly acid to extremely acid throughout.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. Fine earth texture is silty clay loam or clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. Fine earth texture ranges from silt loam to clay.

United States
Department of
Agriculture

Soil
Conservation
Service

RD #3, Box 107A
Coudersport, PA 16915
(814) 274-8166

June 5, 1990

KLH Engineers, Inc.
555 North Bell Avenue
Pittsburgh, PA 15106

Attention: Craig J. Bauer

Dear Mr. Bauer,

Enclosed are the lists of soil mapping units regarding Prime Farmland and wetlands (hydric soils) for McKean County.

The McKean County soil survey has also been enclosed for your convenience.

If you require additional surveys or other information, please feel free to contact our office.

Sincerely,

Terry B Simkins/sde

TERRY B. SIMKINS
District Conservationist

TBS/sde

Enclosures

Revised 6/83
By GHL

LIST OF SOIL MAPPING UNITS THAT QUALIFY AS PRIME FARMLAND

McKean County, Pennsylvania

Field Symbol	Mapping Unit Name
24B	Albrights silt loam, 3 to 8 percent slopes
03	Barbour loam
04	Basher silt loam
76B	Braceville silt loam, 3 to 8 percent slopes
72B	Chenango gravelly loam, 3 to 8 percent slopes
80B	Clymer loam, 3 to 8 percent slopes
81A	Cookport loam, 0 to 3 percent slopes
81B	Cookport loam, 3 to 8 percent slopes
14B	Gilpin channery silt loam, 3 to 8 percent slopes
67B	Hazleton channery sandy loam, 3 to 8 percent slopes
20B	Leck Kill shaly silt loam, 3 to 8 percent slopes
05	Philo silt loam
02	Pope loam
57B 1/	Wharton silt loam 3 to 8 percent slopes

1/ Some nonprime farmland areas are included in this mapping unit; however, it is our best judgement that in this county, over 50 percent of this unit have slopes of less than 5.4 percent and this soil qualifies for prime farmland.

134,225 ac Rural Land

Additional Farmland of Statewide Importance soil map units for McKean County

24C Albrights silt loam, 8 to 15 percent slopes
6 Atkins silt loam
18B Calvin channery silt loam, 3 to 8 percent slopes
18C Calvin channery silt loam, 8 to 15 percent slopes
48A Cavode silt loam, 0 to 3 percent slopes
48B Cavode silt loam, 3 to 8 percent slopes
72B Chenango gravelly loam, 3 to 8 percent slopes
81C Cookport loam, 8 to 15 percent slopes
9C Ernest silt loam, 8 to 15 percent slopes
14C Gilpin channery silt loam, 8 to 15 percent slopes
67C Hazleton channery sandy loam, 8 to 15 percent slopes
20C Leck Kill shaly silt loam, 8 to 15 percent slopes

HYDRIC SOILS - MCKEAN COUNTY, PENNSYLVANIA

Map Symbol	Map Name	Hydric Component	Location Notes
Map Units with Major Compnents Hydric:			
AT	Atkins Silt Loam	Atkins	
BRA	Brinkerton Silt Loam, 0 to 3 percent slopes	Brinkerton	
BRB	Brinkerton Silt Loam, 3 to 8 percent slopes	Brinkerton	
BSB	Brinkerton Silt Loam, 0 to 8 percent slopes, very stony	Brinkerton	
PA	Palms Muck	Palms	
REA	Rexford Silt Loam, 0 to 3 percent slopes	Rexford	
Map Units with Inclusion of Hydric Components:			
ABB	Albrights Silt Loam, 3 to 8 percent slopes	Wet Spots	Depressions, Swales
ABC	Albrights Silt Loam, 8 to 15 percent slopes	Wet Spots	Depressions, Swales
ADC	Albrights Silt Loam, 8 to 15 percent slopes, very stony	Wet Spots	Depressions, Swales
BA	Barbour Loam	Atkins	Bottom Lands
BB	Basher Silt Loam	Atkins	Bottom Lands
BEB	Braceville Silt Loam, 3 to 8 percent slopes	Rexford	Potholes, depressions
BUB	Buchanan Silt Loam, 3 to 8 percent slopes	Wet Spots	Drainageways, depressions
BUC	Buchanan Silt Loam, 8 to 15 percent slopes	Wet Spots	Drainageways, depressions
BXB	Buchanan Silt Loam, 9 to 8 percent slopes, very stony	Wet Spots	Drainageways, depressions
BXD	Buchanan Silt Loam, 8 to 25 percent slopes, very stony	Wet Spots	Drainageways, depressions
CAA	Cavode Silt Loam, 0 to 3 percent slopes	Brinkerton	Low flats, depressions
CAB	Cavode Silt Loam, 3 to 8 percent slopes	Brinkerton	Low flats, depressions
COA	Cookport Loam, 0 to 3 percent slopes	Brinkerton	Depressions, foot slopes
COB	Cookport Loam, 3 to 8 percent slopes	Brinkerton	Depressions, foot slopes
COC	Cookport Loam, 8 to 15 percent slopes	Brinkerton	Depressions, foot slopes
CPB	Cookport Loam, 0 to 8 percent slopes, very stony	Brinkerton	Depressions, foot slopes
CPD	Cookport Loam, 8 to 25 percent slopes, very stony	Brinkerton	Depressions, foot slopes
PH	Philo Silt Loam	Atkins	Bottom Lands
PO	Pope Loam	Atkins	Bottom Lands
SM	Udorthents, extremely channery	Wet Spots	Depressions, Swales
WAB	Wharton Silt Loam, 3 to 8 percent slopes	Brinkerton	Low flats, drainageways
W	Water		

Soils Classifications for Use as Sanitary Facilities Copied from Soil Survey from McKean County

TABLE 12.--SANITARY FACILITIES

...e terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
...brights	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
..., AdC---- ...brights	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
...xins	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Poor: wetness.
...rbour	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
...sher	Severe: flooding, wetness.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Poor: seepage, too sandy, small stones.
...rceville	Severe: percs slowly, wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness, seepage.	Poor: seepage, too sandy, small stones.
...rinkerton	Severe: wetness, percs slowly.	Slight----	Severe: wetness.	Severe: wetness.	Poor: wetness.
..., BsB---- ...rinkerton	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
...chanan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
...chanan	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
...chanan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
...chanan	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: wetness, slope.	Poor: small stones, slope, wetness.
...ede	Severe: percs slowly, wetness.	Moderate: depth to rock.	Severe: wetness, depth to rock, too clayey.	Severe: wetness.	Poor: too clayey, wetness.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CaB---------- Cavode	Severe: percs slowly, wetness.	Moderate: slope, depth to rock.	Severe: wetness, depth to rock, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
ChB---------- Chenango	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
ClB---------- Clymer	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: small stones.
CoA, CoB---------- Cookport	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, depth to rock.	Moderate: wetness, depth to rock.	Fair: area reclaim, too clayey, wetness.
CoC---------- Cookport	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, depth to rock.	Moderate: slope, wetness, depth to rock.	Fair: area reclaim, wetness, slope.
CpB---------- Cookport	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, depth to rock.	Moderate: wetness, depth to rock.	Fair: area reclaim, too clayey, wetness.
CpD---------- Cookport	Severe: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: slope, wetness, depth to rock.	Severe: slope.	Poor: slope.
HaB---------- Hartleton	Severe: large stones.	Severe: seepage, large stones.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: large stones.
HaC---------- Hartleton	Severe: large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: large stones.
HaD---------- Hartleton	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
HbB---------- Hazleton	Severe: poor filter.	Severe: seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
HbC---------- Hazleton	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
HdB---------- Hazleton	Severe: poor filter.	Severe: seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
---------- leton	Severe: poor filter, slope.	Severe: slope, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones.
tleton----------	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
hanan----------	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: wetness, slope.	Poor: small stones, slope, wetness.
---------- k Kill	Moderate: percs slowly, depth to rock.	Severe: seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
---------- k Kill	Moderate: percs slowly, slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
LeF*---------- Kill	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: small stones, slope.
---------- kesville	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope, thin layer.
---------- ns	Severe: subsides, ponding.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, seepage.	Poor: ponding, excess humus.
---------- lo	Severe: flooding, wetness, poor filter.	Severe: flooding, wetness, seepage.	Severe: flooding, depth to rock, seepage.	Severe: flooding, wetness.	Fair: area reclaim, wetness, thin layer.
---------- e	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
---------- ford	Severe: percs slowly, wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
rthents					
---------- rton	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

APPENDIX III

Contained Herein: Letter outlining field reconnaissance of Existing Sewage Facilities within Planning Area

KLH Engineers, Inc.

555 North Bell Avenue, Pittsburgh, PA 15106

(412) 279-0817
FAX (412) 279-1826

July 3, 1990
Ref. No. 221-01

The Wester Co.
P.O. Box 77
Clarendon, PA 16313

Attention: Mr. John C. Wester,
Sewage Enforcement Officer

Dear Mr. Wester:

Wetmore Township
Act 537 Plan

On Monday, July 2, 1990 a tour of the planning area as outlined by DER was conducted by Craig Bauer - KLH Engineers, Chet Bush - Township Supervisor and John Wester - Sewage Enforcement Officer. The purpose of the tour was to evaluate all existing on-lot sewage disposal systems and gather information regarding the use of on-lot sewage disposal systems for the developable vacant lots throughout the Township. The following is a summary of information gathered during the site visit.

Spring Street Area

Most existing on-lot subsurface sewage disposal systems are malfunctioning and discharging raw or partially treated sewage to surface waters. Grey water generated in this area is discharged directly to the surface or area storm sewers. Soils in this area unacceptable for conventional subsurface sewage disposal.

Route 321 Corridor Area South of Kane Borough

Most existing on-lot subsurface sewage disposal systems are malfunctioning and discharging raw or partially treated sewage to the ground surface. Most grey water generated in this area is discharged directly to the surface or area storm sewers. Soils in this area are unacceptable for conventional subsurface sewage disposal.

Pond Street/School Street/Flickerwood Road Areas

Most existing on-lot subsurface sewage disposal systems are malfunctioning and discharging raw or partially treated sewage to ditches or ground surface. Most grey water generated in this area is discharged directly to the surface or area storm sewers. An elevated sand mound on-lot sewage disposal system at #42 School Street appears to be operating properly and according to the Sewage Enforcement Officer other vacant properties in the area may be able to utilize this type of on-lot system.

Greendale Area

Most existing on-lot subsurface sewage disposal systems appear to be operating properly. There have been no complaints to the Township Supervisors from residents of this area regarding sewage discharges. The Sewage Enforcement Officer stated the on-lot elevated sand mound sewage systems may be acceptable in this area and that subsurface systems would be unacceptable due to soils conditions.

Northwest Area

All existing houses in this area utilize on-lot subsurface sewage disposal systems. Many of the subsurface systems are presently malfunctioning and discharging raw or partially treated sewage to the ground surface or drainage ditches. Soils conditions in this area may permit the use of elevated sand mound on-lot sewage disposal systems according to the local Sewage Enforcement Officer.

West Kane Area

All existing houses along Maple Street utilize on-lot subsurface sewage disposal systems. Most existing subsurface systems along Maple Street are malfunctioning and discharging raw or partially treated sewage to drainage ditches. The reason for the malfunctioning is the poor soil conditions that prevail along Maple Street. Several homes along West Kane Road have on-lot subsurface sewage disposal systems that operate properly. The Sewage Enforcement Officer stated that soils conditions along West Kane Road may be acceptable to subsurface systems and that elevated sand mounds would also work under these existing soils conditions. One house trailer on West Kane Road discharges raw sewage directly to surface water.

JoJo Road Area

Most existing on-lot subsurface sewage disposal systems are malfunctioning and discharging raw or partially treated sewage to drainage ditches. A property owned by Dr. Sicher along JoJo Road has recently been analyzed by the local Sewage Enforcement Officer and has been found acceptable for an on-lot elevated sand mound sewage disposal system. Other vacant properties along JoJo Road may also be acceptable for on-lot elevated sand mound sewage disposal. #162 JoJo Road discharges raw sewage directly to a drainage ditch.

Route 66/Ten Commandments Area

All existing houses in this area utilize on-lot subsurface sewage disposal. All on-lot systems in this area are rather old and are malfunctioning, discharging raw or partially treated sewage to drainage ditches and the ground surface. The soils conditions in this area will not permit the use of on-lot subsurface sewage disposal.

Old Mill Road Area

All existing houses in this area utilize on-lot subsurface sewage disposal. Most existing on-lot systems are malfunctioning, discharging raw or partially treated sewage to drainage ditches or the ground surface. The local Sewage Enforcement Office has performed some analyses on unoccupied lots in this area and has found the parcels acceptable for on-lot elevated sand mound sewage disposal.

West Wind Road Area

All existing houses in this area utilize on-lot subsurface sewage disposal. Most on-lot systems in this area are rather old and are malfunctioning, discharging raw or partially treated sewage to drainage ditches and the ground surface. The local Sewage Enforcement Officer has not analyzed any property in this area for the capability of utilizing on-lot sewage disposal. It can be assumed that on-lot subsurface sewage disposal would not be acceptable in this area.

Grandview Estates

Several houses at the entrance to this development utilize on-lot subsurface sewage disposal that is apparently operating properly. Twelve houses in this plan discharge sewage into a collector sewer that flows to an anaerobic lagoon that is not permitted. An additional 70 lots in this plan that are undeveloped presently have sewer service that would discharge to this same lagoon. The soils in this area are not acceptable to any type of on-lot sewage treatment.

Highland Road Area

Most existing houses in this area utilize on-lot subsurface sewage disposal systems that are malfunctioning and discharging raw or partially treated sewage to drainage ditches or the ground surface. Also, in this area there are three relatively new on-lot elevated sand mound sewage disposal systems that are operating properly. The local Sewage Enforcement Office stated that vacant lots in this area may be acceptable for on-lot elevated sand mound sewage disposal.

In summary, a majority of the houses in the planning area are utilizing on-lot subsurface sewage disposal systems, many are malfunctioning. A small percentage of the houses in the Township utilize on-lot elevated sand mound sewage disposal systems with varying treatment results. An even smaller percentage of houses in the Township discharge raw sewage directly to surface waters and drainage ditches. Many houses in the planning area discharge grey water directly to surface waters, storm sewers or the ground surface.

Please review the contents of this letter and provide KLH Engineers with any additions, deletions or revisions that you feel are required. If the letter is acceptable, please acknowledge by signing below and returning a copy to KLH Engineers.

Very truly yours,

KLH ENGINEERS, INC.

Craig J. Bauer

CB/ko

cc: Wetmore Township Supervisors

I have reviewed the contents of this letter and it is a correct summary of the field reconnaissance performed on July 2, 1990.

01192
Sewage Enforcement Officer

5 July 1990
Date

Township Supervisor

Date

APPENDIX IV

Contained Herein: - Holding Tank Ordinance

Ordinance #35

HOLDING TANK ORDINANCE

BE IT ENACTED AND ORDAINED by the Supervisors of Wetmore Township of McKean County, Pennsylvania, and it is hereby enacted and ordained as follows:

Section 1. Purposes. The purpose of this Ordinance is to establish procedures for the use and maintenance of existing and new holding tanks designed to receive and retain sewage whether from residential or commercial uses and it is hereby declared that the enactment of this Ordinance is necessary for the protection, benefit and preservation of the health, safety and welfare of the inhabitants of this municipality.

Section 2. Definitions. Unless the context specifically and clearly indicates otherwise, the meaning of terms used in this Ordinance shall be as follows:

A. "Authority" shall mean Supervisors of Wetmore Township, McKean County, Pennsylvania.

B. "Holding Tank" means a watertight receptacle, whether permanent or temporary which receives and retains sewage conveyed by a water carrying system and is designed and constructed to facilitate the ultimate disposal of the sewage at another site.

C. "Improved Property" shall mean any property within the Township upon which there is erected a structure intended for continuous or periodic habitation, occupancy or use by human beings or animals and from which structure sewage shall or may be discharged.

D. "Owner" shall mean any person vested with ownership, legal or equitable, sole or partial, of any property located in the Township.

E. "Person" shall mean any individual, partnership, company, association, corporation or other group or entity.

F. "Sewage" shall mean any substance that contains any of the waste products or excrement or other discharge from the bodies of human beings or animals and any noxious or deleterious substance being harmful or inimical to the public health, or to animal or aquatic life or to the use of water for domestic water supply or for recreation.

G. "Municipality" shall mean Wetmore Township, McKean County, Pennsylvania.

Section 3. Right and Privileges granted. That the Authority is hereby authorized and empowered to undertake within the Township the control and methods of holding tank use, sewage disposal and sewage collection and transportation thereof.

Section 4. Rules and Regulations. That the Authority is hereby authorized and empowered to adopt such rules and regulations concerning sewage which it may deem necessary from time to time to effect the purposes herein.

Section 5. Rules and Regulations to be in Conformity with Applicable Law. All such rules and regulations adopted by the Authority shall be in conformity with the provisions herein, all other Ordinances of the Township, and all applicable laws, and applicable rules and regulations of administrative agencies of the Commonwealth of Pennsylvania.

Section 6. Rates and Charges. The Authority shall have the right and power to fix, alter, charge and collect rates, assessments, and other charges in the area served by its facilities at reasonable and uniform rates as authorized by applicable law.

Section 7. Exclusiveness of Rights and Privileges.

A. The collection and transportation of all sewage from any improved property utilizing a holding tank shall be done solely by or under the direction and control of the Authority, and the disposal thereof shall be made only at such site or sites as may be approved by the Department of Environmental Resources of the Commonwealth of Pennsylvania.

B. The Authority will receive, review and retain pumping receipts from permitted holding tanks.

C. The Authority will complete and retain annual inspection reports for each permitted tank.

Section 8. Duties of Improved Property Owner. The owner of an improved property that utilizes a holding tank shall:

A. Maintain the holding tank in conformance with this or any Ordinance of this Township, the provisions of any applicable law, and the rules and regulations of the Authority and any administrative agency of the Commonwealth of Pennsylvania.

B. Permit only the Authority or its agent to inspect holding tanks on an annual basis.

C. Permit only the Authority or its agent to collect, transport, and dispose of the contents therein.

Section 9. Violations. Any person who violates any provisions of Section 8 shall, upon conviction thereof by summary proceedings, be sentenced to pay a fine of not less than One Hundred ($100.00) dollars and not more than Three Hundred ($300.00) Dollars and cents, and in default of said fine and costs to undergo imprisonment in the County Prison for a period not in excess of thirty (30) days.

Section 10. Abatement of Nuisances. In addition to any other remedies provided in this Ordinance, any violation of Section 8 above shall constitute a nuisance and shall be abated by the municipality or the Authority by either seeking mitigation of the nuisance or appropriate equitable or legal relief from a court of competent jurisdiction.

Section 11. Repeal. All Ordinances or resolutions or parts of Ordinances or resolutions, insofar as they are inconsistent herewith, be and the same are hereby repealed.

Section 12. Severability. If any sentence, clause, section or part of this Ordinance is for any reason found to be unconstitutional, illegal or invalid, such unconstitutionality, illegality or invalidity shall not affect or impair any of the remaining provisions, sentences, clauses, sections,or parts of this Ordinance. It is hereby declared as the intent of the Board of Supervisors of the Township, that this Ordinance would have been adopted had such constitutional, illegal or invalid sentence, clause, section or part thereof not been included therein.

Section 13. Effective Date. This Ordinance shall become effective five (5) days after its adoption.

ENACTED AND ORDAINED into an Ordinance this 4th. day of December A.D., 19 90, by the Supervisors of the Township of Wetmore, McKean County in Lawful Session duly assembled.

SUPERVISORS OF THE
TOWNSHIP OF WETMORE

Clayton N. Bush

Donald Hahlen

CERTIFICATION OF ADOPTION

I hereby certify the foregoing to be an exact copy of an Ordinance adopted by the Supervisors of the Township of Wetmore, McKean County, Pennsylvania, at a regular meeting of the Board on December 4, 1990.

Ray C. Terrill Secretary

APPENDIX V

Contained Herein: - Resolution for Adoption of Act 537 Plan Comprehensive Sewage Facilities Planning Study

RESOLUTION FOR ADOPTION
OF ACT 537 PLAN
COMPREHENSIVE SEWAGE FACILITIES PLANNING STUDY

RESOLUTION OF THE SUPERVISORS OF WETMORE TOWNSHIP, MCKEAN COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Resources (Department) adopted thereunder, Chapter 71 of Title 25 of the Pennsylvania code, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health hazards with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality, and

WHEREAS, the Wetmore Township Supervisors has prepared a Comprehensive Sewage Facilities Planning Study which provides for sewage facilities in a portion of Wetmore Township , and

NOW THEREFORE, BE IT RESOLVED that the Supervisors of the Township of Wetmore hereby adopt and submit to the Department of Environmental Resources for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan.

I, _____, Secretary, Wetmore Township Board of Supervisors, hereby certify that the foregoing is a true copy of the Township's Resolution No. _____ adopted _____, 19_____.

AUTHORIZED SIGNATURE **TOWNSHIP SEAL**

_____
Township Supervisor

_____
Township Supervisor

_____
Township Supervisor

APPENDIX VI

Contained Herein: PENNVEST Eligibility Letter

Commonwealth of Pennsylvania

PENNVEST

Pennsylvania Infrastructure Investment Authority

Keystone Building, 22 South Third St., Harrisburg, PA 17101
(717) 787-8137

Governor Robert P. Casey,
Chairman

Paul K. Marchetti,
Executive Director

August 15, 1991

Mr. Craig Bauer
KLH Engineers, Inc.
555 North Bell Avenue
Pittsburgh, PA 15106

Re: Wetmore Township
Act 537 Plan

Dear Mr. Bauer:

In response to your June 28, 1991 correspondence regarding potential PENNVEST financing of the Wetmore Township wastewater treatment plant, please be advised of the following:

PENNVEST eligibility criteria and priority criteria are spelled out in the PENNVEST Act and regulations. The Act and regulations also describe the financial analysis which must be conducted on each potential project, including criteria to be considered in determining the terms of any financial assistance offered. Without the information necessary to evaluate the project in light of these criteria, it is impossible to determine with any level of confidence whether the project would be eligible for PENNVEST funding, what priority it would carry, or what terms could be offered. However, we have attempted below to give you some information which should be useful.

The maximum interest rate that PENNVEST would currently charge (based on existing unemployment rates and the current interest rates charged to the Commonwealth in the bond market) as part of a loan package in McKean County would be 1.880% for the first five years and 3.712% for the remainder of the standard twenty year term. This maximum rate is subject to change from time to time as conditions change, but once terms are established for a project as part of PENNVEST Board approval, the rates remain consistent for the term of the financing.

The most favorable financing that may be made available would include a grant of up to $500,000 and a 1% loan for twenty years on the remaining portion. In some extreme cases, PENNVEST does grant loans of longer term, but this should not be relied on as part of the planning process.

AUG 2 1 1991

It would seem that any PENNVEST financing identified within the Act 537 Plan would have to be within these funding limits. It is not possible to perform the financial analysis required to determine an actual financing package without the information contained within the application. At a minimum, we need the information contained in Sections B, C and D of Part III of the PENNVEST application. If you submit this information, we would be happy to do some preliminary analysis, which might enable us to give you a better conception of potential PENNVEST funding for this project.

Any owner or operator of a facility or system for the collection treatment or disposal of wastewater, is an eligible sponsor and may apply for financial assistance.

I hope this information has been helpful to you in your planning process. I am looking forward to working with you on this project in order to help make it financially feasible.

If you have any questions concerning this information, please contact me.

Sincerely,

Brion Johnson
Project Specialist

cc: John Lester, Northwest Regional Office/DER (BWQM)

BTJ:lb

APPENDIX VII

- Letter from BCM Engineers, Inc. Outlining Funding Scenario for Joint Kane-Wetmore Project

- Wetmore Township Supervisors Resolution No. 61 Committing to Joint Project with Kane Borough

- Intermunicipal Agreement Between Kane Authority, Kane Borough and Wetmore Township

BCM Engineers Inc.
Engineers, Planners, Scientists and Laboratory Services

5777 Baum Boulevard • Pittsburgh, PA 15206-3745 • (412) 361-6000 • FAX (412) 361-6243

March 30, 1992

Mr. Michael Cardamone
Borough of Kane
112 Bayard Street
Kane, PA 16735

Subject: Official Sewage Plan
Change In Scope to Include
Wetmore Township
BCM No. 00-3495-01

Dear Mr. Cardamone:

We were recently informed on March 16, 1992, by Mr. Richard Kaintz that the proposed project to install sanitary sewers to Wetmore Township had stalled because the Township is ineligible to receive adequate grant funding from the Farmers Home Administration (FmHA) or other sources. Following discussion of Wetmore Township's problem with Mr. Richard Bly, Council President on March 20, 1992, we proceeded to investigate the possibility of expanding the Borough of Kane Authority's project to include construction of wastewater collection and conveyance facilities in Wetmore Township. This proposal received a very positive response from representatives of the PADER, FmHA, and the Pennsylvania Infrastructure Investment Authority (PENNVEST).

Mr. Kaintz of the PADER advised us on March 24, 1992, that he would welcome revisions to the Borough of Kane and Wetmore Township Act 537 Plans to show a joint project. Mr. Kaintz stated that he will recommend modification of the Consent Order and Agreement Compliance Schedule to allow project changes. A meeting with PADER in Meadville will be required.

Mr. Robert Schoenfeldt of the FMHA Meadville office stated on March 24, 1992, that the Borough of Kane Authority is eligible to receive FmHA funding to construct wastewater facilities in Wetmore Township.

In response to our request on March 25, 1992, Mr. John Williams of the FmHA office in Harrisburg coordinated a joint funding package for the expanded project with Mr. Brion Johnson of PENNVEST and developed a proposed funding plan, which is attached. Mr. Williams provided this information to us on March 26, 1992.

Mr. Johnson of PENNVEST advised our office on March 26, 1992, that he plans to recommend the funding plan proposed by Mr. Williams. The Borough Authority's pending PENNVEST application must be increased in scope prior to closing on the PENNVEST loan. Mr. Johnson plans to recommend that the PENNVEST Grant/Loan package be offered at the April 22, 1992, PENNVEST meeting.

To provide the most cost effective operation, wastewater facilities constructed by the Authority in the Township will be maintained by Borough forces and billing activities will be performed by Borough Administrative staff.

The FmHA will require that each municipality guarantee payment of sewer bills by the residents.

Mr. Williams suggested that the Township match the Borough Authority's local share by also contributing $250,000. This could be generated by collection tap-in fees and/or benefit assessments.

$250,000 ÷ 367 customers = $700 tap-in fee per customer

The proposed funding plan should result in an average residential sewer rate of $27 or $28 per month. This is the same rate that would be paid by Borough residents if wastewater facilities were not constructed in Wetmore Township.

We recommend that the Borough consider the following:

1. Revision of the Borough of Kane Wetmore Township Wastewater Service Agreement to allow for the installation/operation of sewers by the Borough Authority.

2. Establishing common sewer rates and tap-in fees for customers in the Borough and Township can be accomplished by front end contributions from the new sewer users.

3. Revisions to sewer use ordinances should include a provision to require a plumbing inspection be conducted on all new wastewater customer properties before connection is allowed. Foundation drains, floor drains, downspouts, sump pump discharges, and other sources of extraneous water should be disconnected from the plumbing before connection to the Authority sewerlines. Existing sewer lateral lines should be air tested to verify their integrity prior to connection.

BCM

4. Proposed wastewater facilities in Wetmore Township must be constructed and owned by the Borough Authority if FmHA grant and low interest loan financing is obtained.

5. Operation and maintenance of these new wastewater facilities should be performed by Borough Authority forces.

This opportunity to correct wastewater needs in the Borough and Township by such a favorable package of grants and low-interest loans is very uncommon in these times. We recommend that the Borough and Township proceed with these projects together for the benefit of all community residents.

If you have any questions, please call our office.

Very truly yours,

John F. Riley P.E.
Senior Engineer

JFR/rh
Attachment
cc: Borough
Authority
Mr. Richard Bly
Mr. Fred Siggins
Mr. Richard Kaintz, PADER
Mr. Michael Zimmerman
Mr. John Williams, FmHA
Mr. Robert Shoenfelt, FmHA
Mr. Brion Johnson, PENNVEST
Dennis Luttenhauer, Esquire
Erik Ross, Esquire

PRELIMINARY KANE/WETMORE

WASTEWATER FUNDING PLAN

Kane Facilities Project Costs	$10,200,000	
Wetmore Facilities Project Costs	4,300,000	
Total Project	$14,500,000	
Local Funding		
Kane Borough	$ 250,000	
Wetmore Township	250,000*	
	$ 500,000	
Balance To Finance	$14,000,000	
PENNVEST Grant	500,000	
PENNVEST Loan	4,500,000	(1% interest for 20 years)
FmHA Grant	$ 5,000,000	
FmHA Loan	4,000,000	(5 3/4% interest for 40 years)
Annual Debt Service		
PENNVEST Loan	$ 250,000	
FmHA Loan	260,000	
Debt Service Reserve FMHA	26,000	
Annual Operation & Maintenance	350,000	(FmHA Estimate)
Total Annual Costs	$ 886,000	
Total Equivalent Customers	2,712	
Average Residential Rate	$27 to $28/month	

* Funded by $700 tap-in fee from 367 new customers.

TOWNSHIP OF WETMORE

RESOLUTION NO. 61

SIGNIFYING THE INTENTION AND DESIRE OF THE BOARD OF SUPERVISORS OF THE TOWNSHIP OF WETMORE, MCKEAN COUNTY, PENNSYLVANIA TO AUTHORIZE THE KANE BOROUGH AUTHORITY TO CONSTRUCT WASTEWATER FACILITIES IN THE NEEDS AREAS OF WETMORE TOWNSHIP AS OUTLINED IN THE REVISED WETMORE TOWNSHIP ACT 537 PLAN.

BE IT RESOLVED by the Board of Supervisors (the "Board of Supervisors") of the Township of Wetmore, McKean County, Pennsylvania (the "Township"), being the municipal authorities of the Township, and it is hereby resolved by the authorities of the same as follows:

Section 1. It is the desire and intention of the Board of Supervisors to organize with; and to authorize the Kane Borough Authority to operate as a financing vehicle for the construction of wastewater facilities within the Township. The wastewater facilities shall include gravity collectors sewers, raw sewage pump stations, force mains and all other required appurtenances.

Section 2. The Township desires to have their Act 537 Comprehensiye Sewerage Facilities Planning Study revised to include the option and recommendation to provide sewerage facilities to the Township residents under a joint program with the Kane Borough Authority.

Section 3. The Township desires to retain the right and ability to choose the consulting engineer and resident project inspector to design, administer and inspect the construction of the facilities proposed to be constructed in the Township.

Section 4. The Township desires to have equitable representation on the Kane Borough Authority Board and the Kane Sewerage Advisory Committee. Appointment of a Township Representative to the Authority Board and Advisory Committee shall be prior to the acceptance of funding and disbursement of funds committed to the joint sewerage project.

Section 5. All items contained herein this resolution are contingent upon the execution of an Intermunicipal Agreement acceptable to both parties.

RESOLVED by the Board of Supervisors this 7th day of April, 1992.

TOWNSHIP OF WETMORE

By _____
Township Supervisor

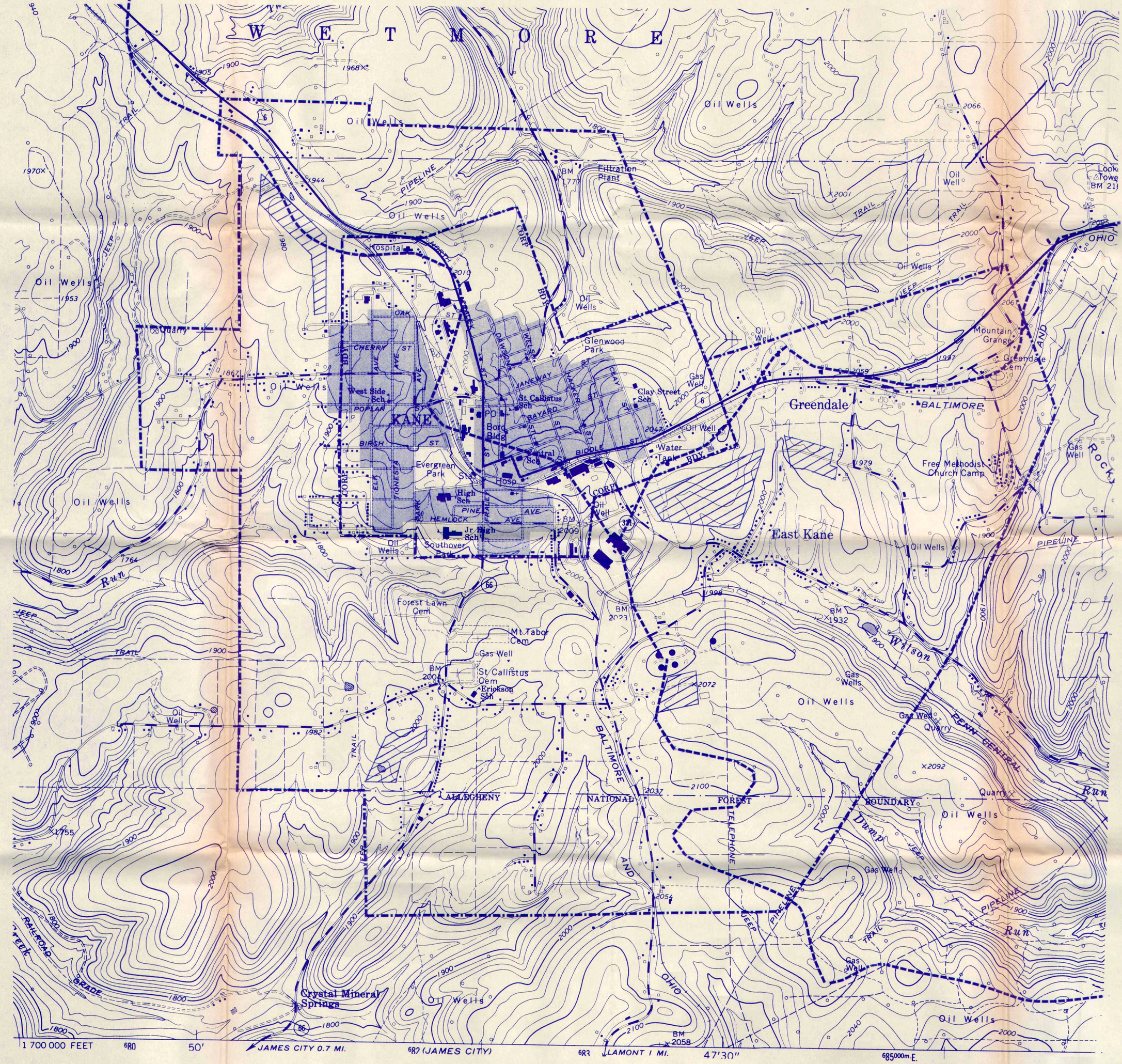
By _____
Township Supervisor

By _____
Township Supervisor

TOWNSHIP SEAL

Attest:

_____
Secretary

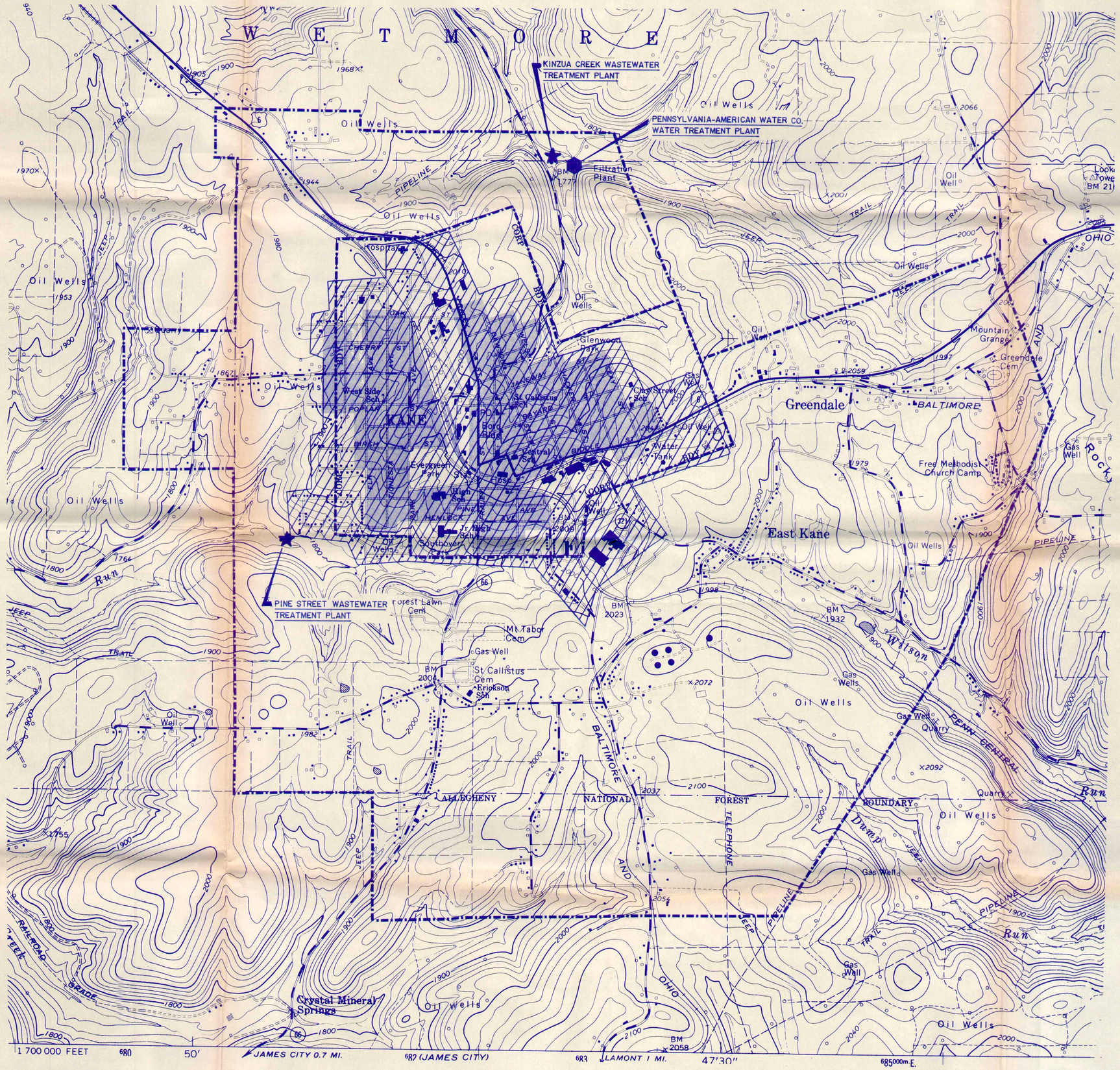


LEGEND

- PLANNING AREA / MUNICIPAL BOUNDARY
- WATERSHED BOUNDARY
- AREAS OF POTENTIAL DEVELOPMENT

WETMORE TOWNSHIP, McKEAN COUNTY, PENNS
ACT 537 PLAN
OCTOBER 1990
SCALE: 1" = 1000'
REVISED JUNE 1991
KLH ENGINEERS, INC. PITTSBURGH, PA

PLATE I



LEGEND

- PLANNING AREA / MUNICIPAL BOUNDARY
- PUBLICLY OWNED WASTEWATER TREATMENT PLANT
- WATER TREATMENT PLANT
- PUBLIC WATER AND SEWER SERVICE AREA

WETMORE TOWNSHIP, McKEAN COUNTY, PENNSYLVANIA
ACT 537 PLAN
OCTOBER 1990
SCALE: 1" = 1000'
REVISED JUNE 1991
KLH ENGINEERS, INC. PITTSBURGH, PA

PLATE II

LEGEND

- PLANNING AREA / MUNICIPAL BOUNDARY
- PROPOSED GRAVITY COLLECTOR SEWER
- PROPOSED FORCE MAIN
- PROPOSED PUMP STATION
- PROPOSED WASTEWATER TREATMENT PLANT

WETMORE TOWNSHIP, McKEAN COUNTY, PENNSYLVANIA

ACT 537 PLAN - ALTERNATIVE A

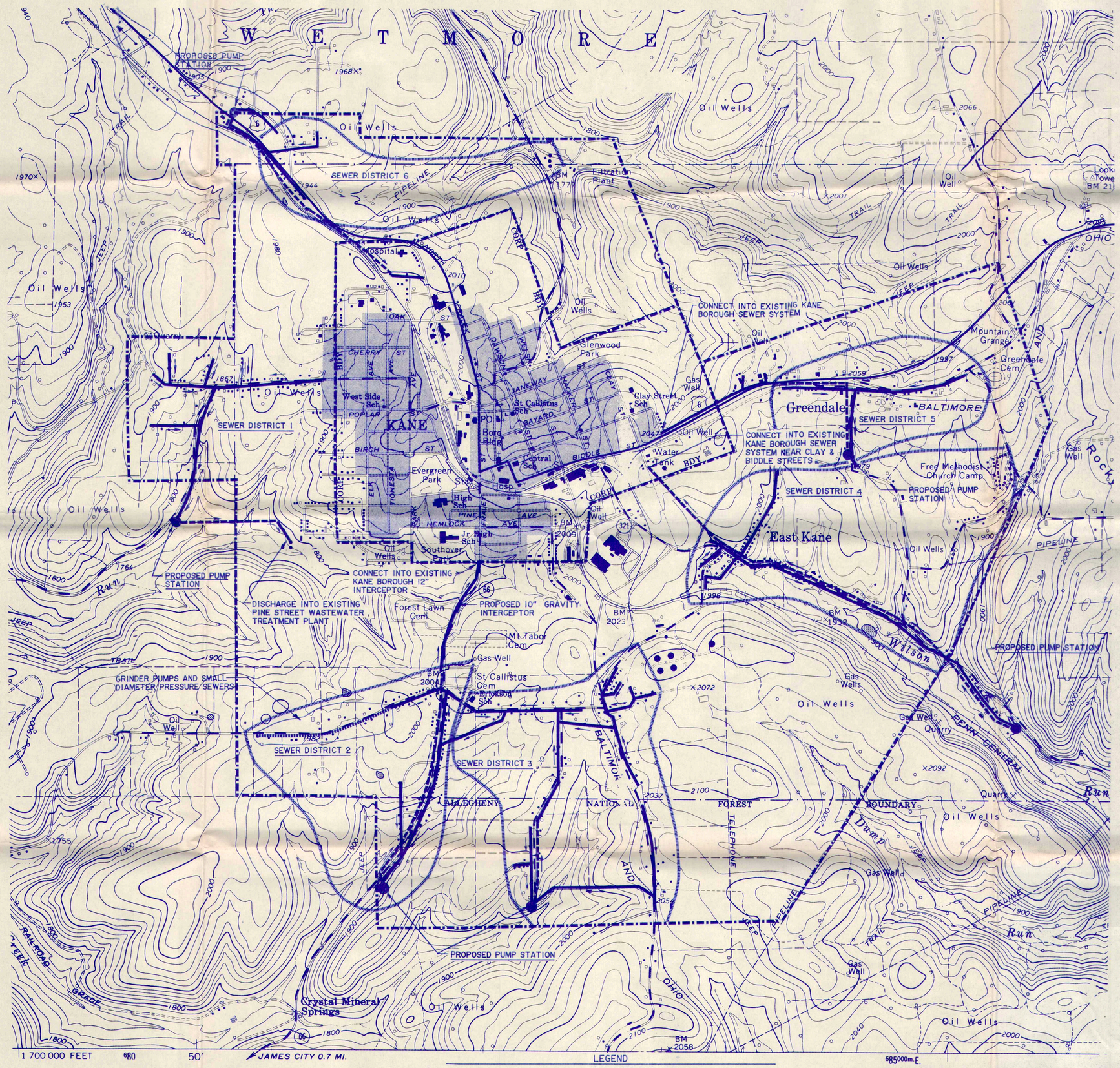
OCTOBER 1990

SCALE: 1" = 1000'

REVISED JUNE 1991

KLH ENGINEERS, INC. PITTSBURGH, PA

PLATE III



NOTE: THE SEWER LAYOUT FOR ALTERNATIVE B - CONVENTIONAL SEWERS AND ALTERNATIVE C - SMALL DIAMETER GRAVITY SEWERS WILL BE IDENTICAL. FOR NARRATIVE DESCRIPTION OF ALTERNATIVES SEE "PLANNING AND FACILITIES ALTERNATIVES AND RECOMMENDATIONS" IN BODY OF PLAN.

LEGEND

- PLANNING AREA / MUNICIPAL BOUNDARY
- PROPOSED GRAVITY COLLECTOR SEWER
- PROPOSED FORCE MAIN
- PROPOSED PUMP STATION
- SMALL DIA. PRESSURE SEWER

WETMORE TOWNSHIP, McKEAN COUNTY, PENNSYLVANIA
ACT 537 PLAN - ALTERNATIVE B & C
OCTOBER 1990
SCALE: 1" = 1000'
REV. JUNE 1991
REV. JULY 1992

KLH ENGINEERS, INC. PITTSBURGH, PA

PLATE IV