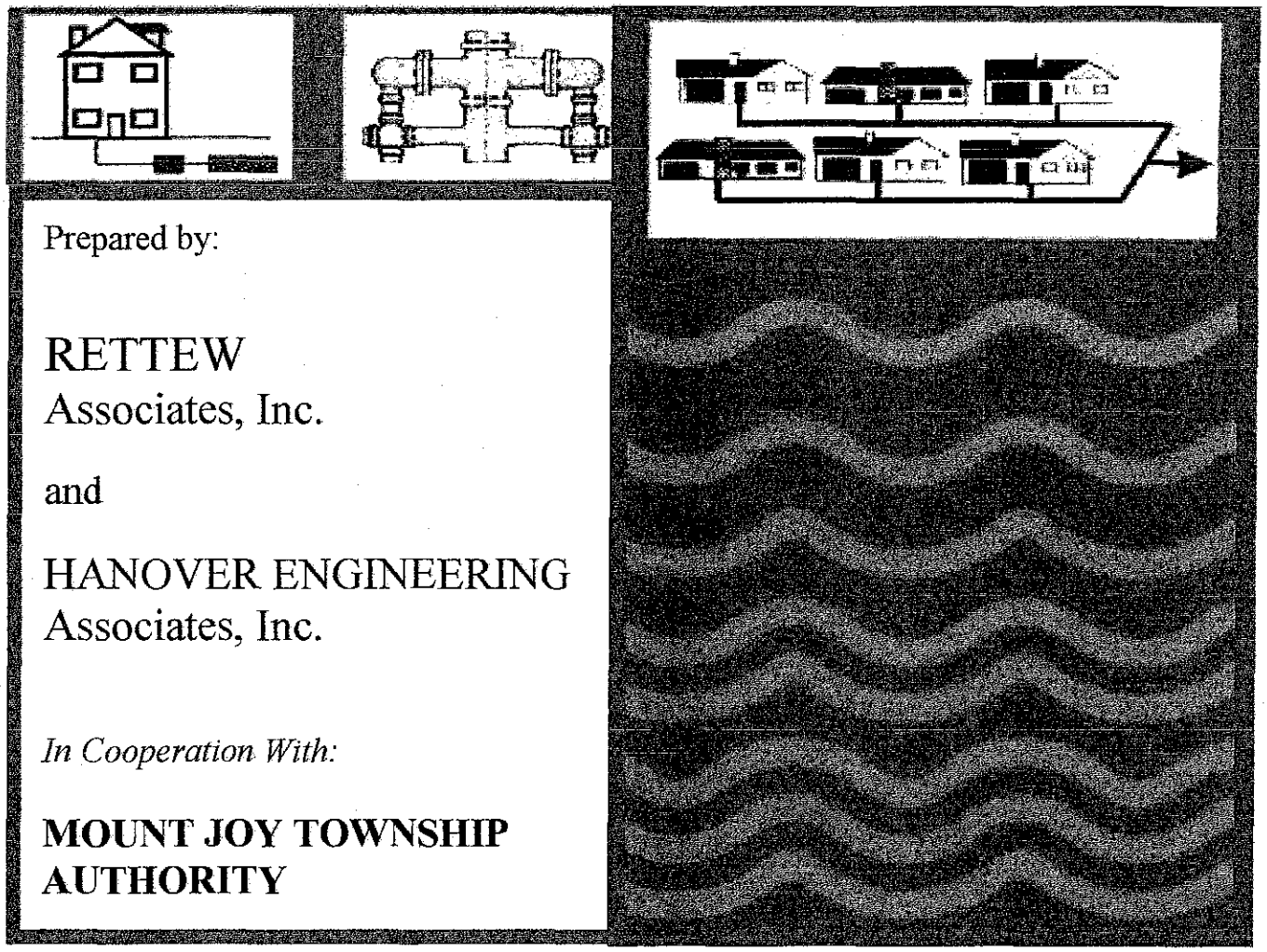
MOUNT JOY TOWNSHIP
LANCASTER COUNTY

ACT 537
WASTEWATER MANAGEMENT PLAN



Prepared by:

RETTEW
Associates, Inc.

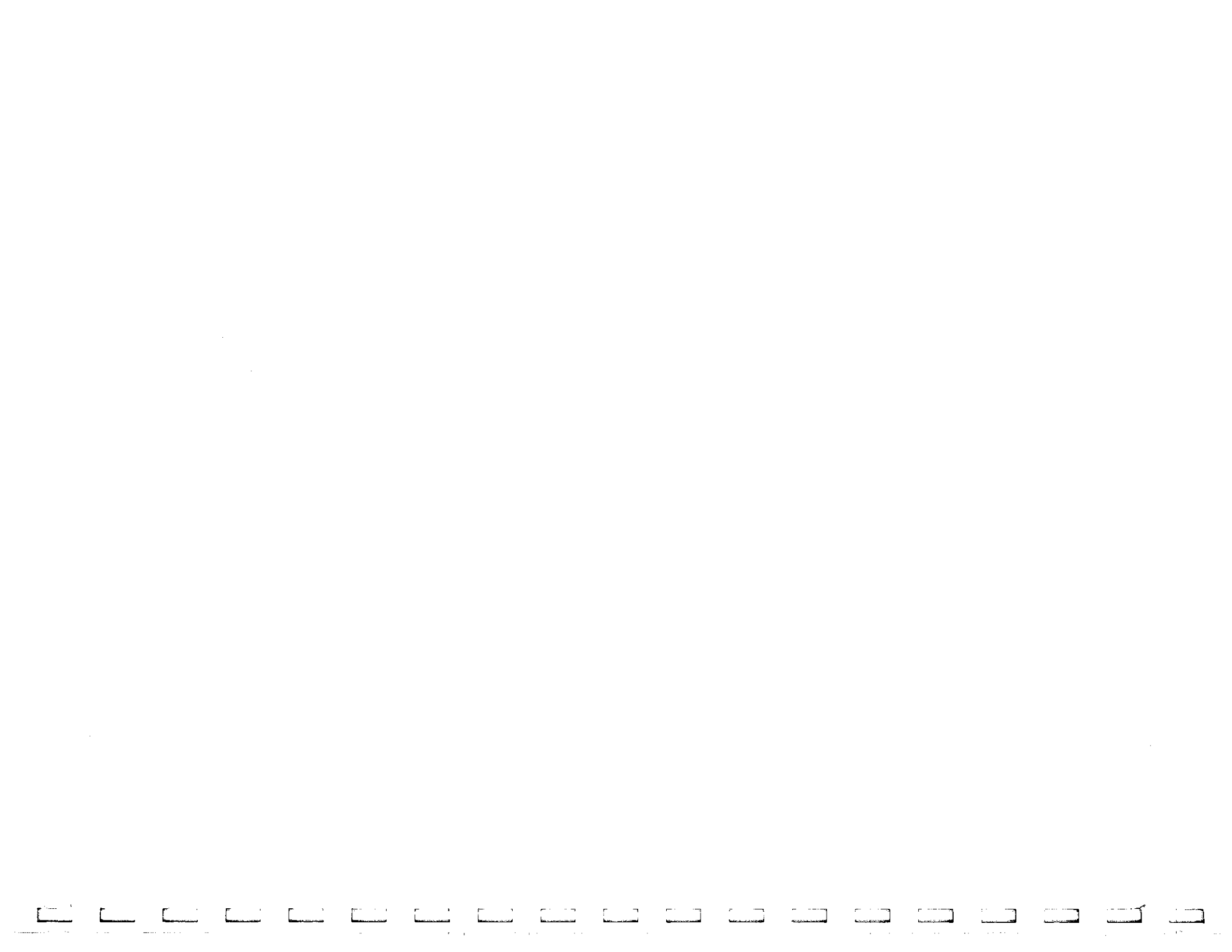
and

HANOVER ENGINEERING
Associates, Inc.

In Cooperation With:

MOUNT JOY TOWNSHIP AUTHORITY

November 1998



Pennsylvania Department of Environmental Protection

909 Elmerton Avenue
Harrisburg, PA 17110-8200

March 21, 2000

Southcentral Regional Office

717-705-4707
FAX - 717-705-4760

Mount Joy Township Supervisors
c/o Richard Forrey, Secretary
159 Merts Drive
Elizabethtown, PA 17022

Re: Act 537 Planning
APS ID No. 37966
DEP Code No. A1-36942-ACT
Mount Joy Township, Lancaster County

Ladies and Gentlemen:

This letter is in response to a Hanover Engineering Associates, Inc. letter dated February 21, 2000 requesting partial approval of the Mount Joy Township 1998 Act 537 Official Plan, that was determined by the Department of Environmental Protection (Department) to be technically incomplete on January 24, 2000. Based upon the expressed commitment to adequately address the on-lot disposal system related plan deficiencies identified in the Department's January 24 letter, and the fact that the township's plan is not deficient as it applies to the selected public sewer portion of the Mount Joy Township Act 537 Plan, the requested partial approval is granted. The remainder of the plan is expected to be completed in accordance with the implementation schedule furnished with the Hanover Engineering Associates, Inc. letter and will be identified as DEP Code No. B1-36942-ACT in future correspondence.

The Department has reviewed your 1998 Act 537 Plan, with information submitted February 25, 2000. The submission is consistent with the planning requirements given in Chapter 71, of the rules and regulations of the Department. The plan provides for upgrade and expansion of existing sewage collection and conveyance facilities.

The plan is approved with the following conditions:

1. The approved project will require a Water Management Part II Permit for the construction and operation of the proposed sewage facilities (upgrade existing interceptors). The permit application must be submitted in the name of the municipality or authority, as appropriate. Issuance of a Part II Permit will be based upon a technical evaluation of the permit application and supporting documentation. Starting construction prior to obtaining a Part II Permit is a violation of The Clean Streams Law.

2. Other Departmental permits may be required for construction if encroachment to streams or wetlands will result. Information regarding the requirements for such permits or approvals can be obtained from the Department's Soils and Waterways Section at the letterhead address or telephone at 717-705-4802.

3. Completion of Phase II of your Act 537 Plan includes an acceptable sewage disposal needs identification process in the nonpublic sewer serve areas of the township and must be accomplished within the schedules provided to the Department in your latest package of information. In accordance with Title 25, Chapter 71, Section 71.21(A)(6), upon completion of this survey activity, the alternatives previously selected for the nonsewer service areas must be reexamined for their continued appropriateness and acceptability.

4. Approval of the above Phase II of your plan will indicate the approval of your entire Act 537 Plan which is necessary to become eligible to apply for a planning a grant in accordance with Title 25, Chapter 71.41. A planning grant application will be provided with the Department's plan approval letter for the concluding phase of your plan.

It is now Mount Joy Township's responsibility to implement the 537 Plan in accordance with the schedules contained within the Plan.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, PO Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

If you have any questions, please call Mr. James Novinger at 717-705-4766.

Sincerely,

Leon M. Oberdick
Program Manager
Water Management Program

Enclosure

cc: Hanover Engineering Associates, Inc.
Lancaster County Planning Commission
Lancaster County Health Department
Mount Joy Township Sewer Authority

ACT 537 PLAN
SEWAGE FACILITIES PLAN UPDATE
FOR MOUNT JOY TOWNSHIP
LANCASTER COUNTY, PENNSYLVANIA

NOVEMBER 1998

Hanover Engineering Associates, Inc.
20C Snyder Lane
Ephrata, PA 17522-9101
(717) 721-7444

MOUNT JOY TOWNSHIP ACT 537 PLAN

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MUNRST140739
01-11-99

TOWNSHIP OF MOUNT JOY

Lancaster County, Pennsylvania

RESOLUTION NO. 3-1999

A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE TOWNSHIP OF MOUNT JOY, LANCASTER COUNTY, PENNSYLVANIA, TO ADOPT AN OFFICIAL SEWAGE FACILITIES PLAN FOR MOUNT JOY TOWNSHIP.

WHEREAS, the Board of Supervisors of the Township of Mount Joy (the "Board of Supervisors") authorized the preparation of an official sewage facilities plan update for the Township; and

WHEREAS, Rettew Associates, Inc., was selected as the consultant to assist the Board of Supervisors of the Township in the preparation of the official sewage facilities plan update; and

WHEREAS, pursuant to the regulations of the Pennsylvania Department of Environmental Protection (the "Department"), the Board of Supervisors advertised the preparation of the proposed official sewage facilities plan update and requested public comments on such plan update on January 8, 1999; and

WHEREAS, the Township provided copies of the proposed official sewage facilities plan update to the Lancaster County Planning Commission and the Mount Joy Township Planning Commission for their review in accordance with the regulations of the Department; and

WHEREAS, the Board of Supervisors of the Township desires to adopt the revised official sewage facilities plan as the Official Sewage Facilities Plan for the Township in accordance with the provisions and requirements of the Pennsylvania Sewage Facilities Act and the regulations of the Department.

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of the Township of Mount Joy, Lancaster County, Pennsylvania, as follows:

Section 1. The Board of Supervisors adopts the official sewage facilities plan update entitled "Mount Joy Township Lancaster County Act 537 Wastewater Management Plan, November 1998", hereinafter referred to as the "Plan", together with all revisions thereto, prepared by Rettew Associates, Inc., in the form

and content presented at this public meeting, as the official sewage facilities plan update for the Township in accordance with the Pennsylvania Sewage Facilities Act and the regulations of the Department.

Section 2. The Plan as adopted by the Board of Supervisors shall include the following chapters and all charts, tables, diagrams, appendices, figures and textual matter contained therein and appended thereto:

1. Planning Objectives and Needs
2. Physical Description of Planning Area
3. Evaluation of Existing Water and Wastewater Facilities
4. Evaluation of Wastewater Treatment Needs
5. Alternative Evaluation
6. Recommended Wastewater Management Alternatives
7. Plan Implementation

Section 3. The Board of Supervisors adopts the following alternatives set forth in the Plan as the alternatives of choice which shall be implemented by the Township upon approval of the Plan by the Department in accordance with the implementation schedule set forth in the Plan:

1. Implement nonstructural alternatives for areas served by on-lot sewage disposal systems as follows:

a. OLDS Education.

b. Hydrogeologic Evaluations. Due to widespread conditions that include hazardous soils and limestone geology, no Component I modules will be allowed and the Township will require preliminary hydrogeological analyses for subdivisions proposing OLDS in high nitrate areas.

c. Non-Building Planning Module Waiver.

d. Dispersion plume easement.

2. Public sewer service will be addressed by the implementation of Elizabethtown Alternative 2 which provides for wastewater treatment at the Elizabethtown Borough wastewater treatment facility by means of a plant expansion to a capacity of 4.5 million gallons per day to address the regional needs of the Township, West Donegal Township, and Elizabethtown Borough as set forth more fully at Section 6.1 of the Plan.

Section 4. To the maximum extent feasible, the Township commits to implement the plan in accordance with the implementation schedule set forth at Chapter 7.

Section 5. This Resolution shall become effective and be in force immediately.

DULY ADOPTED this 15TH day of FEBRUARY, 1999, by the Board of Supervisors of the Township of Mount Joy, Lancaster County, Pennsylvania, in lawful session duly assembled.

TOWNSHIP OF MOUNT JOY
Lancaster County, Pennsylvania

Attest: _____
~~Assistant~~ Secretary

By: _____
(Vice) Chairman
Board of Supervisors

[TOWNSHIP SEAL]

CERTIFICATE

I, the undersigned, (~~Assistant~~) Secretary of the Township of Mount Joy, Lancaster County, Pennsylvania ("Township") certify as follows: the foregoing is a true and correct copy of a Resolution which was duly adopted by affirmative vote of a majority of the members of the Board of Supervisors of the Township at a meeting of said Board of Supervisors duly convened and held according to law on 15 FEBRUARY 1999, at which meeting a quorum was present; that such Resolution has been duly recorded in the minutes of the Board of Supervisors of the Township; and that said Resolution is in full force and effect, without amendment, alteration or repeal, as of the date of this Certificate.

I further certify that the Board of Supervisors of the Township of Mount Joy met the advance notice requirements and public comment requirements of the Sunshine Act, Act No. 1986-84 of the General Assembly of the Commonwealth of Pennsylvania, approved July 3, 1986, by advertising said meeting, by posting prominently a notice of said meeting at the principal office of the Township or at the public building in which said meeting was held, and by providing a reasonable opportunity for public comment at said meeting prior to adopting such Resolution.

IN WITNESS WHEREOF, I set my hand and affix the official seal of the Township of Mount Joy, this 15TH day of FEBRUARY, 1999.

Richard E. Fry

(~~Assistant~~) Secretary

[TOWNSHIP SEAL]

SUMMARY OF RECOMMENDATIONS

In compliance with the Pennsylvania Sewage Facilities Act and the regulations of the Department of Environmental Protection (DEP), Mount Joy Township (Township) has adopted this document as its official sewage facilities plan. The 537 Plan is intended to address wastewater management of existing and new discharges of wastewater in the Township in order to prevent groundwater contamination caused by inadequately treated sewage. The Plan of Study was approved by DEP on July 11, 1990 and modifications approved on May 20,1993 (see Appendix 5).

Final Plan Recommendation

This 537 Plan update developed recommendations for future wastewater management planning in the Township through the year 2020. The scope included the entire Township and included provisions for public sewer service within the Township as well as contributions to the Elizabethtown Borough, West Donegal Township and Mount Joy Borough systems. Growth projections were developed for growth areas as developed by recent comprehensive planning and zoning revisions by the Township. With the goal of providing future growth with the availability of public sewer service, wastewater capacity estimates of 1,297,100 gallons per day were developed. These flow estimates provide for growth in the defined urban growth areas delineated by the comprehensive plan and commercial and industrial zoned areas of the Township. In addition, the plan allows for sizing of critical conveyance, treatment and pumping facilities to provide capacity for long-term growth of the area beyond the 2020 planning period.

Seven alternatives were evaluated for conveyance and treatment of the projected flows from the different drainage areas of the Township. Alternatives included conveyance to the Elizabethtown treatment plant by alternative routes using expanded capacity in the Elizabethtown and West Donegal interceptors. Alternatives also considered the construction of Township treatment sites as an alternative to the cost of conveyance and expansion of the Elizabethtown plant and outfall.

The alternatives addressed an expansion for conveyance capacity in the existing MJTA system. There are no MJTA provisions to construct extensions or collection sewers. Further extension of the sewer system into areas designated for public sewer will be constructed and financed by development.

There were no existing needs warranted for public sewer as a result of a review of on-lot disposal system (OLDS) data, well testing and soils information on the Township. Historically, system repairs have been evenly distributed throughout the areas of the Township and have been generally associated with older systems. The 537 Plan evaluated the possibility of public sewer service to scattered development around the Milton Grove area. However, high costs and lack of a justified need did not warrant a recommendation for sewer in this area. Agricultural zoning limitations and recommendations for non-structural alternatives are expected to address adequate wastewater management with the continued use of OLDS in this area.

The Township will also be selecting a number of sewage management programs that do not directly involve construction of sewers or collection systems. Specifically, the selected non-structural alternatives include:

1. OLDS Education.

2. Hydrogeologic Evaluations - Due to widespread conditions that include hazardous soils and limestone geology, no Component I modules will be allowed and the Township will require preliminary hydrogeological analyses for subdivisions proposing OLDS in high nitrate areas.

3. Non-Building Planning Module Waiver.

4. Dispersion Plume Easement.

Implementation

The selected alternative will be the primary activity to address growth in the Township and prevent potential future groundwater contamination.

The selected alternative identified in the plan as Elizabethtown Alternative 2 will provide for conveyance and treatment capacity for a total of 5,501 equivalent dwelling units (EDU's). With one exception, wastewater treatment will be provided at the Elizabethtown treatment facility by way of a plant expansion to a capacity of 4.5 million gallons per day to address the regional needs of Mount Joy Township, West Donegal Township and Elizabethtown Borough.

The only other treatment site utilized is the Mount Joy Borough sewer system. By prior agreement in December 1995, MJTA turned over its collection system tributary to the Mount Joy Borough system. Estimated growth in this small area of the Township totaling 524 EDU's will be served by Mount Joy Borough.

MJTA will need to modify its current intermunicipal agreements for capacity with Elizabethtown Borough and West Donegal Township. Through coordination of current planning and adoption of joint cooperative resolutions, all three municipalities will adopt revised 537 Plans.

The proposed sewer service area and 5- and 10-year estimated growth areas are illustrated on Map 13. Improvements to the MJTA system are presented on Map 16.

Estimated project costs for conveyance system improvements to the MJTA system including contributions to Elizabethtown Borough and West Donegal Township Authority for conveyance and treatment capacity total $11,423,000. Estimated operation and maintenance costs for the proposed improvements and capacity are $535,000 per year.

Funding for the project is anticipated to be provided by available MJTA funds in addition to capital financing income from proposed developer agreements to provide annual tapping fee income in support of a 5-year capital improvements program. Tapping fees are estimated to be in the $3,500 to $4,500 per EDU range. Project costs will be financed over an estimated 30-year term with a public bond issue. Additional revenue will come from an increase in annual user fees to cover increased debt service and operating costs. Estimated initial user fees will be in the $400 to $475 per year range.

MJTA will continue to be the owner and operator of the sewer collection and conveyance system. MJTA will be responsible for implementation of the capital improvement plan. The Township will administer the OLDS education plan and coordinate planning module planning requirements with land development planning ordinances and the services of the Township sewage enforcement officer.

The implementation schedule represents the intent of the Board of Supervisors of Mount Joy Township and MJTA. The proposed implementation plan, as noted in Chapter 7, was previously developed by all three municipalities and submitted to DEP in compliance with Chapter 94 requirements. The proposed schedule plans for completion of construction improvements to the Elizabethtown treatment plant by January of 2002.

This 537 Plan incorporates by reference the following:

- Mount Joy Township Zoning Ordinance, January 1998
- The Elizabethtown Region Strategic Comprehensive Plan
- Evaluation of the Elizabethtown Wastewater Treatment Plant Upgrade/ Expansion Alternatives prepared by Camp Dresser and McKee, November 1995.

MJTA formally submitted this 537 Plan to the Township Planning Commission and the Lancaster County Planning Commission for review and comments. The Board has also advertised and established a 30-day public comment period pursuant to Pennsylvania Code Title 25, Section 71.31(b). Appendix 2 includes proof of publication of public notice, written comments from the public, the Mount Joy Township Planning Commission and the Lancaster County Planning Commission, as well as the Township's response to all written comments.

CHAPTER 1

CHAPTER 1

PLANNING OBJECTIVES AND NEEDS

1.1 Previous Wastewater Planning

Mount Joy Township has not previously adopted an Act 537 Plan (537 Plan). The following wastewater plans were prepared on a regional or county scale which included the Township.

- ***1970 Lancaster County Comprehensive Sewerage Plan*;**
- ***1972-3 Sewage Collection Facilities Feasibility* prepared by Gannett Fleming Corddry and Carpenter;**
- ***1982 Comprehensive Water Quality Management Plan* for the Lower Susquehanna River Basin; and**
- ***1987 Lancaster County Sewer and Water Resources Study.***

1970 Lancaster County Comprehensive Sewerage Plan

The 1970 Comprehensive Sewerage Plan for Lancaster County was prepared by the Lancaster County Planning Commission (LCPC). The plan adopted a regional approach for sewage disposal in Lancaster County. The regional system would have connected the boroughs of Marietta, Mount Joy, and Elizabethtown, as well as the townships of Conoy, West Donegal, East Donegal, and Mount Joy, along with a small portion of Rapho. A new collection system and a new treatment system at Chickies Creek near Marietta Borough was proposed. The plant would discharge approximately 6.0 million gallons per day (mgd) by the year 2010. According to Figure G-2 of the County's Plan, no part of Mount Joy Township demonstrated "severe onsite sewage disposal problem areas."

1972-1973 Sewage Collection Facilities Feasibility Reports

These reports were prepared for Mount Joy Township to determine the feasibility of providing public sewer service to Mount Joy Township. The studies were prepared by Gannett Fleming Corddry and Carpenter as engineering consultant for the Township.

As a result of the studies, the Mount Joy Township Authority (MJTA) was formed to finance and construct the existing sanitary sewer system in 1975. The original sewer system provided service to 630 equivalent dwelling units (EDU's).

1982 Comprehensive Water Quality Management Plan

In 1982, the Pennsylvania Department of Environmental Resources (currently the Pennsylvania Department of Environmental Protection [DEP]) prepared the Comprehensive Water Quality Management Plan (COWAMP) for the Lower Susquehanna Basin area. The study reported the following:

* Municipalities, especially in more rural portions of the study area, should consider formation of multi-municipal, and possibly county-wide on-lot enforcement agencies.

* The scope of the existing on-lot management program should be expanded to include regular maintenance requirements. These requirements would be administered and enforced by local government through the certified Sewer Enforcement Officer (SEO), and would include periodic inspection of systems by the SEO. DEP would submit and the Environmental Quality Board would adopt uniform standards for operation and maintenance of the on-lot facilities.

* The General Assembly should amend the Sewage Facilities Act to clarify and broaden the powers of the local agencies and their SEOs as related to operation and maintenance of on-lot systems.

* Adequate budget and education consultants should be available to DEP to design and implement the training necessary for an SEO.

* Municipalities should revise their official plans to provide for on-lot management programs. These programs could include education and maintenance duties, and give additional responsibility to the community through ordinances and regulations to encourage or require water conservation and the sound planning of new development.

* DEP should assist municipalities by developing guidelines and providing training for on-lot management, and by exercising surveillance over the local agency and their SEO. Written comments should be supplied whenever deficiencies are found in permits that have been issued.

Specific recommendations in COWAMP related to Mount Joy Township were as follows:

* Extend sewers where possible to serve any needs or problem areas. Treatment would be provided by the Elizabethtown Borough and Mount Joy Borough wastewater treatment plant.

* Continued On-Lot Disposal System (OLDS) management in these portions of the Township not proposed for public sewers.

1987 Lancaster County Sewer and Water Resources Study

Lancaster County conducted the Lancaster County Sewer and Water Resources Study in 1987 which reported that the MJTA served 592 customers, with a total capacity of 0.40 mgd and 0.11 mgd of average flow in 1986 based on 135 gallons per day (gpd) per home. No plans existed for further expansion in 1986. In general, the study made the following recommendations:

* Require a larger minimum lot size of 0.75 acre for on-lot sewage disposal systems in areas not likely to be served in the near future by public water supplies or sewers. (To be implemented by LCPC and municipal government; high priority)

* Seek municipal management and, where appropriate, municipal ownership of individual on-lot sewage disposal systems and community wastewater treatment and disposal systems. (To be implemented by LCPC and municipal government; high priority.)

* Sewer existing on-lot problem areas wherever rehabilitation of existing systems is not feasible. (To be implemented by municipal government.) Only one problem area was identified in the Township. The Aberdeen area in the northern part of the Township has since been sewered.

* Provide technical guidance and uniform training to municipal enforcement employees and SEOs. (To be implemented by DEP, LCPC, and the Lancaster County Conservation District.)

* Assign greater enforcement powers with regard to septic tank pump-outs and septic system rehabilitation, particularly in problem areas. (To be implemented by the proposed Lancaster County Health Department.)

No wastewater studies or planning have been conducted since the 1987 Sewer and Water Resources Study.

1.2 Land Use Regulations and Planning

County Comprehensive Planning

The Lancaster County Comprehensive Plan is composed of four components: (1) the Policy Plan, (2) the Growth Management Plan, (3) the Action Plan, and (4) Regional Plans. The first component, the Policy Plan, was first adopted by the Lancaster County Board of Commissioners in January, 1991, and contains policy goals and objectives concerning major issues facing the County.

The Growth Management Plan is the second component of the Lancaster County Comprehensive Plan. The County adopted the Growth Management Plan in September 1993.

The purpose of the Growth Management Plan is to "visually represent the land use goals and objectives contained in the Policy Plan." It is designed to assist the County and local municipalities in guiding and influencing the pattern, location and timing of growth, and in determining areas appropriate for continued agriculture, resource, and rural uses.

The Growth Management Plan proposes the use of urban growth boundaries as the primary way to manage growth effectively within the County. An urban growth boundary (UGB) is a line drawn on a map around an area that includes a city or borough (such as Elizabethtown and Mount Joy Borough) at its center, developed portions of townships, and enough additional

buildable lands to meet future land use need to the year 2010. A UGB line provides a "boundary" that separates areas appropriate for urban growth and the extension of urban services, particularly sewer and water, from areas intended for agricultural, resource and rural uses.

Some of the benefits UGBs can provide include the preservation of community identity and character, the control of sprawled development patterns, the preservation of prime agricultural lands, predictability in capital improvements planning, tax savings in the efficient provision of public services and facilities, the revitalization of urban areas, and simplified decision-making at the urban edge.

The Growth Management Plan proposes than each municipality meet its own future needs as determined by a 20-year population projection for that municipality. Townships adjacent to boroughs are encouraged to meet their need primarily within UGBs, and to a lesser extent in villages (through Village Growth Boundaries [VGBs]), crossroads communities and in other rural areas. Growth within UGBs is encouraged to occur sequentially, at an average density of 5.5 units/acre. Areas within a UGB not immediately needed for development or not yet provided with needed public services and facilities may receive phased development. It is proposed that townships work together with the County to cooperatively establish UGBs, and any applicable changes in plan designations. Municipalities will continue to determine appropriate zoning districts. Adopted UGBs and any changes in plan designations will be reflected in the County's Growth Management Plan on the Future Land Use Map.

The Growth Management Plan includes a County-wide Future Land Use Map and regional growth guidance maps for 13 urban areas. Mount Joy Township is included as part of the Elizabethtown-Mount Joy Urban Growth Area. The Elizabethtown-Mount Joy UGB Map identified a draft Urban Growth Boundary (UGB) in the area which includes the following three areas:

- Elizabethtown Area - between Route 283, Ridge Road, and Hershey Road.
- Mount Joy Borough Area - south of Terrace Road.
- Route 230 - west side only.

Mount Joy Township has established a UGB area as part of the 1996 Regional Comprehensive Plan.

Municipal Comprehensive Planning

Mount Joy Township previously completed a Comprehensive Plan in 1989 (as part of the Regional Comprehensive Plan including neighboring municipalities). The Comprehensive Plan proposed that growth should occur in the northwest portion of the Township, generally north of Elizabethtown Borough. Growth would also continue in the area between the boroughs of Mount Joy and Elizabethtown and around the Route 283 interchanges. The remainder of the Township east of Route 283 would remain primarily in agricultural use.

As a result of the continued significant growth in the Elizabethtown area and the recognized need to address future impacts on land use as well as water, sewer, schools and public services, the Township together with West Donegal Township and Elizabethtown Borough, have prepared an update to the Regional Comprehensive Plan. The plan further identified areas for management of controlling growth. Growth areas were in areas designated for public water and sewer service.

The Comprehensive Plan provides for accommodating residential, commercial and industrial growth with public sewer. Where public sewer presently exists in rural areas, higher density residential development can also be planned outside of the UGB.

Where areas of the Township are designated as residential holding areas, planning for development in these areas is recommended when sizing capacity for conveyance interceptors, pump stations and treatment as long-term planning.

Zoning

The Mount Joy Township Zoning Ordinance was originally adopted in 1978. Map 1 represents the Township's current Zoning Map as adopted in January 1998 to implement the Comprehensive Plan. The Township's Zoning Districts are summarized as follows:

Agricultural District - Allows agricultural uses, single-family dwellings, recreation uses, farm businesses, and public facilities. Single-family dwellings are allowed according to tract size, from 1 unit for 7 acres, up to 10 units for 240 acres. Minimum lot size is 40,000 square feet (S.F.).

Conservation Residential - Allows for agricultural, municipal and single-family detached dwellings, churches, and recreational uses. The minimum lot size is two acres. This district takes into consideration environmental site restrictions on land development.

Rural District - Allows agriculture, single-family dwellings, recreational uses, municipal, public and quasi-public uses. Additional uses are provided for by special exception. Minimum lot area is 1 acre.

Residential R-1 District - Allows uses similar to the Rural District, with 20,000 S.F. minimum lot size served by public sewer.

Residential R-2 District - Allows uses similar to the R-1 District, as well as semi-detach, apartments and attached dwellings. Minimum lot sizes are 40,000 S.F. (no public sewer or public water), 15,000 S.F. (public sewer and water), and 10,000 S.F. per dwelling unit for semi-detached dwellings served by both public sewer and water. Apartments are permitted at a density of one unit for each 6,000 S.F. (with public water and sewer), Townhouses are allowed at a density of up to 1 unit per 2,000 S.F. (with public sewer and water) with a net density of 4 units per acre.

Residential R-3 District - Allows uses similar to the R-2 District. Minimum lot sizes for single family detached dwellings served by public water and sewer is 10,000 S.F. Townhouses are allowed at a density of up to 6 units per acre.

Limited Commercial C-1 District - Allows agriculture, offices, municipal facilities, and various retail uses. Minimum lot size is 10,000 S.F with public water and sewer; 40,000 S.F. with neither.

General Commercial C-2 District - Allows uses in the C-1 District as well as expanded uses including hotels and motels, restaurants, recreation facilities, dry cleaning establishments and veterinary offices and large-scale retail establishments. Mobile home parks and accessory dwelling units are also permitted by special exception. Dwellings are allowed when combined with a business use. Minimum lot size is 10,000 S.F. with public water and sewer. The C-2 District also permits mobile home parks with a maximum density of 5 units per acre.

General Industrial District - Allows agricultural, municipal and accessory uses by right. By special exception it allows laboratories; manufacturing; processing and assembling; storage, warehousing and wholesaling; industrial parks; and mineral extraction. Minimum lot area is 15,000 S.F.

Light Industrial District - Allows same uses as the General Industrial District with the exception of junkyards, mineral extraction, asphalt manufacture, hazardous chemical, and solid waste facilities.

Floodplain Provisions - These provisions function as an overlay district, and include regulations that supersede the regulations of any underlying zoning district. Floodplain areas are generally limited agricultural, recreational, and open space uses.

Subdivision and Land Development Regulations

The Mount Joy Township Subdivision and Land Development Ordinance contains regulations for on-lot sewage disposal systems which are particularly relevant to sewage facility planning. Section 402(C) includes a feasibility study for subdivisions proposing OLDS which requires the preservation of an area suitable for a replacement absorption area, satisfactory soils testing for each lot prior to subdivision approval, and establishes standards for alternate on-lot systems. Likewise, Section 402(E) establishes requirements for on-lot water supplies which address groundwater recharge, usage rates, and the effect on the water table.

1.3 Analysis of Wastewater Planning

Previous wastewater planning has not adequately addressed the current needs of Mount Joy Township. The wastewater planning documents summarized earlier in this section are deficient due to their age and the lack of detailed background data specific to the Township. Recent and projected growth trends have varied from previous planning. Options for greater regionalization beyond Elizabethtown are no longer feasible options.

1.4 Growth Areas

The Township's 1996 Comprehensive Plan contains growth area delineations for growth over the next 10 years. The Growth Management Plan provides for growth around the Elizabethtown and

Mount Joy Borough centers generally in the Route 230 and Route 283 corridor. The management areas and zoning discourage further residential growth east of Route 283. A residential rural buffer has also been established to encourage an open gap between the Rheems and Elizabethtown growth centers within the 10-year growth period. As the current growth areas are built out, it is anticipated that growth in the 10- to 20-year period and beyond will occur in this area with the availability of public water and sewer.

A second aspect of the future Township Growth Management Plan and new zoning is the expansion and encouragement of industrial core development areas around the two Route 283 interchanges. The Township is investigating options for developing these areas to develop an industrial tax base.

Growth is also planned for balanced commercial growth in the Township. Commercial development zones exist along the Route 230 (Harrisburg Pike) between Elizabethtown and Mount Joy Boroughs, along the Route 743/Route 283 interchange, and at the existing Ridgeview Road area.

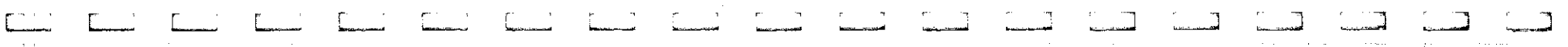
For the purpose of this 537 Plan, the areas zoned for growth will be evaluated to determine existing and anticipated sewage facility needs and will initiate a plan of action intended to resolve the perceived needs.

The 537 Plan will address residential, commercial and industrial growth areas as proposed for public sewer service.

Non-growth residential areas west of Route 283 will be considered for continued on-lot service unless a clear need would be established for a local treatment option.

With the potential capital investment that may be needed for the region to achieve planning goals for public sewer service in future growth areas of the Township, the 537 Plan will need to evaluate projected demand beyond the 5- to 10-year growth period.

Improvements such as sewer interceptors are designed for a 40-year life. In addition, intermunicipal coordination and capital expansion requires longer term planning due to longer implementation constraints and financing considerations.



CHAPTER 2

CHAPTER 2

PHYSICAL DESCRIPTION OF PLANNING AREA

2.1 Description of Study Area

Base Planning Area

Mount Joy Township is located in the northwestern part of Lancaster County. Elizabethtown Borough, East Donegal Township, and West Donegal Township are to the west, Mount Joy Borough is to the south, Rapho Township is to the east, and South Londonderry Township, Lebanon County and Conewago Township, Dauphin County are to the north. The base planning area for this study includes all of Mount Joy Township. Plate 1 illustrates the regional location of Mount Joy Township with respect to Southcentral Pennsylvania.

Sewer Authority Boundaries

The sewer service boundaries of MJTA are congruent with the Township's municipal boundaries.

Topography

The majority of Mount Joy Township lies within the Triassic Lowlands. The southeastern portion of the Township lies within the Lancaster Plain and the northeastern tip lies within the Furnace Hills. The region can be characterized as having gently rolling to moderately sloped topography. The Township contains four major drainage basins which are drained by a tributary to Donegal Creek, Conewago Creek, Conoy Creek, and Little Chickies Creek. The most significant areas with slopes in excess of 25 percent are found adjacent to the following roads: Fairview Road (adjacent to Mount Joy Borough), Ridge Road (north side), Grand View Road (west side), Quarry Road (south side), Camp Road (north side), and Newville Road (north side). Map 2 shows the Township's drainage basins and steep slopes.

The highest point within the region is at approximately 720 feet above sea level and is located in the far northeastern tip of the Township between Camp Creek Road, the Little Chickies Creek, and the Lebanon County line. The lowest point is at approximately 320 feet above sea level and is located in the far southeastern corner of Mount Joy Township along the Little Chickies Creek at Mount Joy Road.

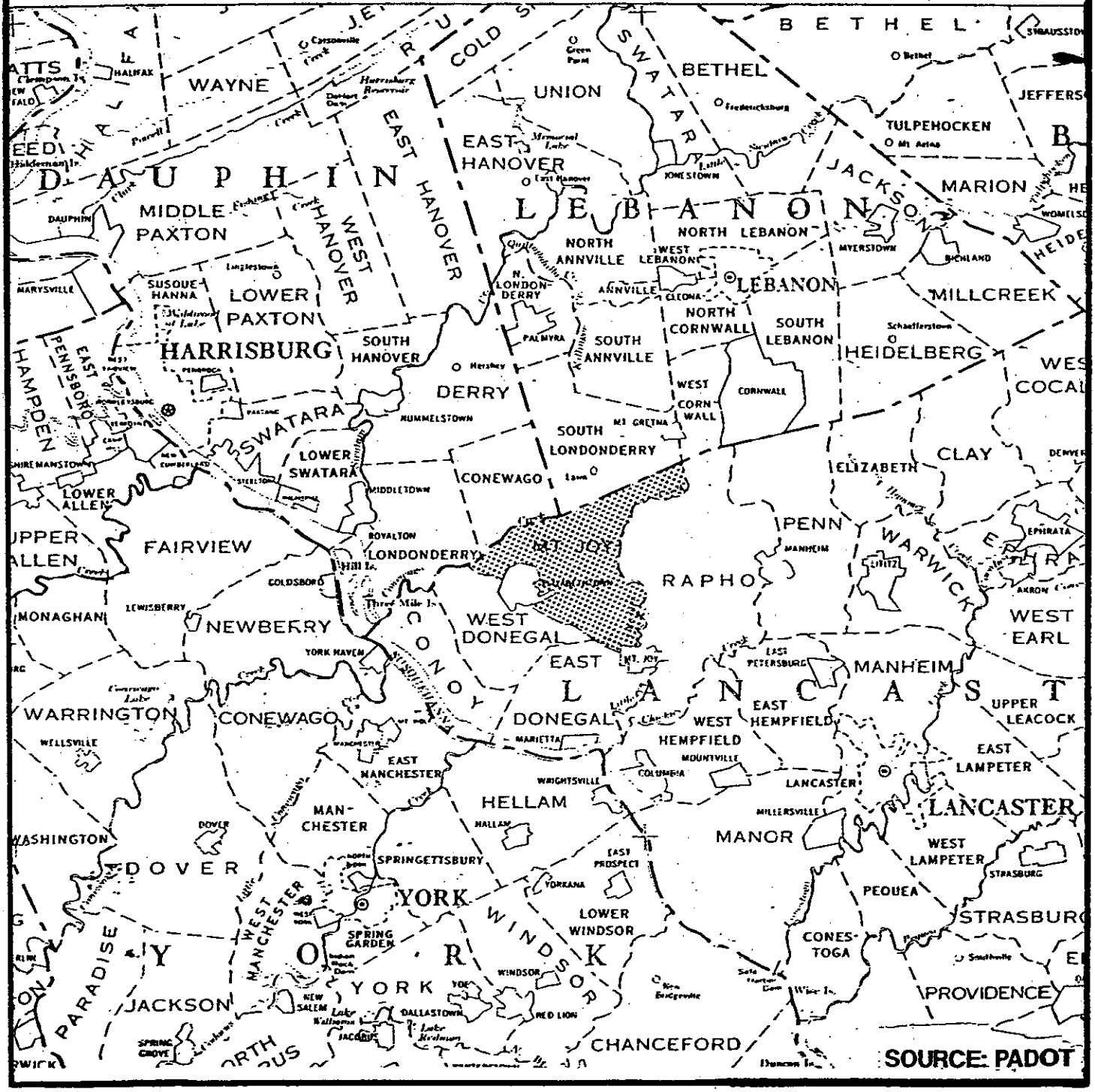
Surface Waters

Water quality standards were established by DEP through the adoption of Title 25, Chapter 93. Streams are designated according to the water use. The following water use designations apply to the streams in Mount Joy Township:

PLATE 1

REGIONAL LOCATION

MOUNT JOY TOWNSHIP, LANCASTER COUNTY, PA



CWF Cold Water Fisheries - Maintenance and propagation of fish species and additional flora and fauna which are indigenous to a cold water habitat.

TSF Trout Stocking - Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.

HQ High Quality Waters - A stream or watershed which has excellent quality waters and environmental or other features that require special water quality protection.

Major streams within the Township are classified as follows:

Little Chickies Creek:	TSF
Unnamed Tributary to Donegal Creek:	CWF
Donegal Springs:	HQ-CWF
Conewago Creek:	TSF
Conoy Creek:	TSF

Floodplains

Floodplains allow for the drainage of large amounts of water during wet weather, and any dense vegetation covering floodplains filters out sediment and pollutants. Increased development and agricultural activity close to and within floodplains can result in increased erosion, stormwater runoff, and a general degradation of the quality of surface water. The 100-year floodplains shown on Map 2 are based on studies prepared by the Federal Emergency Management Agency. Floodplains include areas along the banks and/or tributaries of the Conewago, Conoy, Donegal, and Little Chickies creeks.

Wetlands

As defined by DEP, the U.S. Environmental Protection Agency (EPA), and the U.S. Army Corps of Engineers, wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Map 3 shows wetlands which were mapped by the National Wetlands Inventory and the Lancaster County Natural Heritage Project. In Mount Joy Township, wetlands are generally confined to relatively small areas adjacent to surface waters or within other low lying areas.

Wildlife Preservation

DEP maintains the Pennsylvania Natural Diversity Inventory (PNDI), a database which identifies plant and animal species which are either endangered or threatened. Throughout 1989 and 1990, LCPC and the Pennsylvania Science Office of the Nature Conservancy conducted field studies and consulted PNDI records for the preparation of the Natural Areas Inventory of Lancaster County. This study identified two sites of local significance within Mount Joy Township: (1) Bellaire Woods and (2) Conewago Trail Floodplain (see Map 3). Bellaire Woods was recognized for its woodland wildlife habitat and the relatively few invasive plant species.

Likewise, the Conewago Trail Floodplain is important due to its recreational value, forested floodplain, and the variety of herb species found in one section.

Prime Agricultural Soils

A description of the physical characteristics of Mount Joy Township would not be complete without addressing the agricultural value of the land. Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited for producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and water supply needed to economically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment (USDA-SCS 1985). Qualities which characterize prime agricultural soils include high permeability to water and air, few or no rocks, optimum levels of acidity and alkalinity, 0 to 8 percent slopes, and the absence of flooding during the growing season. These soils may now be utilized for crops, pasture, woodland, or land covers other than urban land or water areas.

Prime agricultural soils, presented in Map 4, comprise approximately two-thirds of the Township's land area. The largest contiguous concentrations of prime agricultural soils are found east of Route 283 in the vicinity of Elizabethtown Road and on both sides of Route 283 south of Mount Pleasant Road.

2.2 Soils Analysis

The region consists of three general soils units. The Ungers-Bucks-Lansdale unit covers the northern two-thirds of Mount Joy Township; the Duffield-Hagerstown unit covers the southern tip of the Township; and the Bedington unit is a pie-shaped wedge between these two units.

The Ungers-Buck-Lansdale unit consists of mostly well-drained soils, underlain with Triassic siltstone, conglomerate, shale, and sandstone. Much of it is in agricultural use, while other uses include woodland, recreation, and residential development. Slope and stoniness are the main limitations for non-agricultural use. The Duffield-Hagerstown unit consists of well-drained soils which are underlain with limestone. This unit is mainly in cropland, and sinkholes and the possibility of groundwater contamination are its major limitations. The Bedington unit consists of well-drained soils, underlain with acid shale. This unit is mostly in cropland, with some areas being woodland or in urban uses. Slope is the main limitation for non-agricultural uses in some areas.

This soils evaluation is given to provide a general indication of the soils limitations for OLDS which generally exist in the various Township sectors. The specific determination of the soil limitations should only be made after detailed testing at the site by a Sewage Enforcement Officer or soil scientist.

The characteristics of soils in Mount Joy Township were reviewed in order to determine the probable soil limitations for on-lot sewage disposal. Information on this topic was obtained from

the *Soil Survey of Lancaster County* (Custer 1985). The following classification system was used to rate these soils according to their limitations for OLDS:

slight	generally favorable.
moderate	not favorable; special planning and design is needed to overcome limitations.
severe	very unfavorable; special design, significant increases in construction costs, and possibly increased maintenance would result.

In addition to the general limitations for OLDS, it is important to evaluate the types of on-lot systems which are appropriate based on individual soil characteristics. The vast majority of the Township's soils typically have severe or moderate limitations caused by shallow depth to bedrock. Therefore, elevated sand mound systems are the most appropriate system design for these areas unless site-specific soils testing contradicts the general limitations of the soils. Typical soil limitations for OLDS are presented in Map 5 and Table 1.

2.3 Geological Analysis

The soils series identified by DEP as being underlain by limestone geology have a high hazard of groundwater pollution through bedrock solution channels. As a result, even though many of these soils may be indicated in the *Soil Survey of Lancaster County* (Custer 1985) as having moderate limitations, the underlying geology is another factor to consider in the location of on-lot systems.

The geology of an area generally dictates important groundwater characteristics. The groundwater quality is affected by the manner in which the geological formation processes the infiltration of water from the surface to the aquifer. Typical contaminants which enter the groundwater in this fashion include nitrate-nitrogen and various bacteria. The hardness of water is also directly related to the mineral composition of the geology. The geological formation is also a good indicator of groundwater yield.

Potable water in Mount Joy Township is provided by private wells as well as from public wells and Elizabethtown Borough sources by MJTA. MJTA has recently established its own water supply sources on the north side of the Township.

From a geological standpoint, there are two factors to evaluate when considering development in limestone areas. These factors are ease of excavation for basements, foundations, and on-lot septic systems, and groundwater contamination potential. Table 2 presents a general summary of regional geological information. According to *Engineering Characteristics of the Rocks of Pennsylvania* (1977), excavation in these limestone formations is difficult and expensive due to numerous bedrock pinnacles and quartz veins. In addition, sufficient soil depth to bedrock for the dilution of sewage effluent may be inadequate.

TABLE 1 - O.L.D.S. SOIL LIMITATIONS FOR Mount Joy Township

SOIL	SYMBOL	LIMITATIONS	SAND MOUND*
Abbottstown silt loam	AbB	Severe-percs slowly, wetness	
Bowmansville silt loam	Bo	Severe-flooding wetness, percs slowly	
Bedington silt loam	BdA	Moderate-depth to bedrock, percs slowly	X
Bedington silt loam	BdB	Moderate-depth to bedrock, percs slowly	X
Bedington silt loam	BdC	Moderate-depth to bedrock, percs slowly, slope	X
Bedington Channery silt loam	BeD	Severe-slope	
Blairton silt loam	BM	Severe-depth to bedrock wetness, percs slowly	X
Brecknock gravelly silt loam	BrB	Moderate-depth to bedrock, percs slowly	X
Brecknock gravelly silt loam	BrC	Moderate-depth to bedrock, percs slowly, slope	X
Brecknock very stony silt loam	BsB	Moderate-depth to bedrock, percs slowly	X
Brecknock very stony silt loam	BsC	Severe-wetness, slope	X
Bucks silt loam	BuA	Severe-percs slowly	
Bucks silt loam	BuB	Severe-percs slowly	
Bucks silt loam	BuC	Severe-percs slowly	
Bucks very stony silt loam	BxC	Severe-percs slowly	
Clarksburg silt loam	CkA	Severe-wetness, percs slowly	
Duffield silt loam	DbA	Moderate-depth to bedrock	X
Duffield silt loam	DbB	Moderate-depth to bedrock	X
Elk silt loam	EcA	Moderate-percs slowly	
Elk silt loam	EcB	Moderate-percs slowly	
Hagerstown silt loam	HaA	Moderate-depth to bedrock, percs slowly	X
Hagerstown silt loam	HaB	Moderate-depth to bedrock, percs slowly	X

TABLE 1 - O.L.D.S. SOIL LIMITATIONS FOR Mount Joy Township, cont'd

SOIL	SYMBOL	LIMITATIONS	SAND MOUND*
Hagerstown silty clay loam	HbC	Moderate-depth to bedrock, percs slowly, slope	X
Hagerstown silty clay loam	HbD	Severe-slope	
Holly silt loam	Hg	Severe-flooding, wetness, percs slowly	
Lansdale loam	LaB	Moderate-depth to bedrock, percs slowly	X
Lansdale loam	LaC	Moderate-depth to bedrock, percs slowly, slope	X
Lansdale loam	LaD	Severe-slope	
Lehigh silt loam	LbB	Severe-percs slowly, wetness	
Lehigh silt loam	LbC	Severe-percs slowly, wetness	
Lindside silt loam	Ln	Severe-flooding, wetness	
Mount Lucas silt loam	MdB	Severe-wetness, percs slowly	
Mount Lucas very stony silt loam	MeB	Severe-wetness, percs slowly	
Quarries	Qu	not rated	
Readington silt loam	RaB	Severe-wetness, percs slowly	
Rowland silt loam	Rd	Severe-flooding, wetness, percs slowly	
Ungers loam	UaB	Moderate-depth to bedrock, percs slowly	X
Ungers loam	UaC	Moderate-depth to bedrock, percs slowly	X
Ungers loam	UaD	Severe-slope	
Ungers extremely stony loam	UbB	Moderate-depth to bedrock, percs slowly	X
Ungers extremely stony loam	UbD	Severe-slope	X

SOURCE: USDA Soil Conservation Service Soil Survey of Lancaster County (1985)

* Sand mounds generally required

TABLE

GEOLOGIC FORMATIONS

Formation	Characteristics	Water Bearing Properties
Annville	Finely crystalline, calcium limestone.	Median yield of nondomestic wells is over 100 gal/min.
Cocalico	Bluish-black to dark-gray fissile shale.	Reported yields range from 1 to 100 gal/min; about half acre less than 20 gal/min.
Epler	Limestone and dolomite.	Reported yields range from 1 to 600 gal/min.; median is about 30 gal/min. (High nitrates are common).
Hershey & Myerstown Formations, Undivided	Hershey: limestone Myerstown: crystalline limestone	Water bearing properties unknown.
Diabase	Feldspar, pyroxene, and associated magnetite.	Often inadequate for domestic use; about 25 percent of wells require storage.
Hammer Creek	Limestone and sandstone.	Median yield for domestic wells is 10 gal/min, 90-144 gal/min. for non-domestic.
Hammer Creek Conglomerate	Red sandstone.	Median yield for domestic wells is 10 gal/min, 90-144 gal/min. for non-domestic.
New Oxford	Red mudstone, shale, and sandstone.	Reported yields range from 1 to 330 gal/min. Median is about 12 gal/min.
New Oxford Conglomerate	Red mudstone, shale, and sandstone.	Reported yields range from 1 to 330 gal/min. Median is about 12 gal/min.
Stonehenge	Limestone	Reported median yield is 20 gal/min.

Groundwater contamination is a critical factor to consider when developing land use plans for residential or agricultural uses. The limestone formations present in Mount Joy Township are extremely susceptible to groundwater contamination. This is due to the fact that contaminants entering the groundwater can be transported long distances in an undiluted and untreated manner through cracks and solution channels that form in limestone bedrock. As a result, caution should be exercised when applying nutrients (and pesticides or herbicides) during agricultural operations, and when issuing permits for on-lot septic systems in limestone formations in Mount Joy Township. Geology is shown on Map 6.

In summary, from a geologic standpoint, development of on-lot septic systems throughout the Township should be conducted with caution, especially in the limestone formations (Annville, Epler, Hershey, Myerstown, and Hammer Creek).

2.4 Demographics

Table 3 presents 1990 U.S. Census data which is relevant to sewage facilities planning.

TABLE 3

SUMMARY OF 1990 U.S. CENSUS DATA
MOUNT JOY TOWNSHIP

Total Population:	6,227
Persons in Households:	6,190
Occupied Housing Units:	2,169
Persons per Household:	2.85

Table 4 shows past population trends and Table 5 shows population projections derived from various sources.

For purposes of this study, the current population is estimated at 7,905 persons. At 2.85 persons per household, currently there are an estimated 2,774 total households or EDU's in the Township.

TABLE 4

HISTORIC POPULATION GROWTH

Year	Population	Percent Increase
1960	4,135	--
1970	4,228	2.2
1980	5,128	21.3
1990	6,227	21.4
1998	7,905	26.9

TABLE 5

POPULATION PROJECTIONS

Source	1990	2000	2010	2020
1970 Lancaster Sewerage Plan	4,440	NA	5,700	NA
1987 Lancaster Sewer and Water Study	6,090	6,860	7,520	NA
1994 LCPC	6,227	7,312	8,467	9,896
1996 Regional Comprehensive Plan	NA	NA	11,370	NA

Discrepancies between these projections are due to older data or different methods of making projections. Due to the number of proposed developments in the Township and the potential for future development as a result of the availability of public services, projections for future wastewater needs will be developed independently as a part of this study.

2.5 Subdivision Activity

Appendix 1 presents a history of subdivision and land development planning in the Township. The listing is keyed to locations of the developments on Map 7.

CHAPTER 3

CHAPTER 3

EVALUATION OF EXISTING WATER AND WASTEWATER FACILITIES

3.1 Existing Water Supply

The majority of water supplied to Mount Joy Township is provided by individual onsite wells. Section 3.5, Groundwater Quality, addresses the area geology and the estimated quantity and quality of the groundwater.

Water supply is also provided by MJTA to customers by extensions of the Elizabethtown Borough and West Donegal Township Authority (village of Rheems) water systems and more recently by development of MJTA's Northside water system to supply the developments of Rockwood, Northbrooke and Ironstone Manor, in addition to adjacent existing and future development.

As of September 1998, approximately 721 customers were served. Map 8 identifies the existing areas served by public water and extensions in the near future due to ongoing development. The map also includes major components of the Elizabethtown system which continues to supply water to adjoining areas of the Township. Public water is also available at the Lakeview Mobile Home Park., State Correctional Institute Training Academy, and to a few customers tributary to the Mount Joy Borough system. In 1996, MJTA completed the first extension of water to its Southside water system by the extension of a water main along Cloverleaf Road to the Route 283 interchange.

Proposed development within the Township has resulted in a request for over 600 additional public water system connections. MJTA is in the process of investigating options for new capacity to meet the projected demand for water. MJTA has worked with developers to develop a capitalization plan to finance the extension of public water to new development. This includes requirements for installation of capped water lines in new developments.

Current water rates for public water are as follows:

Connection - $2,700 plus $75 permit plus $110 meter assembly and backflow prevention.

Yearly Rental - $23.00 per quarter for the first 5,000 gallons plus $4.60 per 1,000 gallons over 5,000 gallons.

As the public water system is expanded within Mount Joy Township, consideration needs to be given to interbasin transfers of water and wastewater. MJTA's rules and regulations requires the use of water conservation devices in new construction.

Planning goals for the Township and MJTA are to continue to provide public water service to growth areas where feasible.

3.2 Existing Wastewater Facilities

Mount Joy Township Authority Service

MJTA provides public wastewater facilities within the Township. Map 9 illustrates the extent of the existing facilities. Wastewater flow is conveyed to both the Elizabethtown and Mount Joy Borough treatment facilities. This system consists of over 13 miles of 8- and 12-inch sewers. There are presently no treatment facilities owned or operated by MJTA in the Township. However, MJTA operates five pump stations located at Mill Road, Hershey Road, Schwanger Road, Aberdeen Road and at the Conewago Creek. Table 6 from the 1996 Chapter 94 report summarizes existing pump station conditions.

At the end of 1997, there were 1,683 and 61 equivalent dwelling units (EDU's) connected to the Elizabethtown and Mount Joy Borough systems, respectively. Existing flows to Elizabethtown were 239,000 gpd in 1997 based on metered and estimated unmetered flow. Metering accounts for 74 percent of Township flow. Based on a metered flow, current gpd per EDU was calculated to be 142. The metering chambers are identified as Kiwanis Boulevard, Radio Road, and the West Donegal metering chambers.

TABLE 6

MJTA WASTEWATER PUMPING STATIONS

Station	Actual Capacity (mgd)	Present Conditions EDU's	Present Conditions Flow (mgd)
Hershey Road	0.114	337	0.044
Mill Road	0.071	248	0.037
Schwanger Road	0.108	507	0.058
Aberdeen Road	0.045	74	0.009
Conewago	0.012	24	0.003

(1) Actual capacity based on Average Daily Flow with pump out of service, 2.5 peak factor, and wet well drawdown testing.

(2) Information provided from 1996 MJTA Chapter 94 report prepared by Gannett Fleming.

MJTA allocates its capacity on a "first-come-first-served" basis. Connection permits are valid for two years. If a connection permit is not purchased within one year, the developer must begin to pay MJTA a percentage of the carrying cost of reserving the capacity. Capacity in the past was based on DEP's standard of 350 gpd per EDU (gpd/EDU). Based on metered data, average flows are between 150 and 180 gpd per EDU. Future planning is proposed based on 270

gpd/EDU to reflect a smaller household population and more reliable estimated flows utilized in the region. The 270 gpd/EDU estimate also accounts for 3-month maximum average daily flows during seasonal wet weather periods.

Current fees in Mount Joy are as follows:

Connection	
Sewer:	$2,170 plus a $75 permit
Yearly Rental (Sewer)	
Residential:	$66.50 per quarter per EDU
Non-Residential:	$66.50 per quarter for the first EDU plus $5.82 per 1,000 gallons over the first EDU. (All commercial flows are metered)

Based on a review of the existing system and the Chapter 94 reports prepared for MJTA, the West Donegal Township Municipal Authority (WDTMA), Elizabethtown Borough, and Mount Joy Borough, the existing wastewater facilities are adequate to serve current conditions. The MJTA maintains its system in good operating condition and has a current infiltration/inflow (I/I) inspection program to determine priorities for preventive maintenance of the system. Based on current gpd/EDU calculations, I/I is not considered to be excessive for the overall system in Mount Joy Township.

Elizabethtown Borough Treatment Facility Service

MJTA has an agreement with Elizabethtown Borough for 404,000 gpd of reserved capacity. Appendix 2 includes a copy of this agreement.

Elizabethtown Borough owns and operates a secondary wastewater treatment plant (WWTP) which utilizes a 2-stage trickling filter process with chemical addition for phosphorus removal. In addition to Mount Joy Township, this facility treats flows from Elizabethtown Borough and portions of West Donegal Township. The Borough operates the facility under DEP NPDES Permit No. PA-0023108, which is valid through March, 2000 for discharge to the Susquehanna River. A summary of the NPDES permit criteria is presented below:

Parameter	Monthly Average Loading	Monthly Average Concentration
BOD	626 #/day	25 mg/l
TSS	751 #/day	30 mg/l
P	50 #/day	2 mg/l
DO		5.0 mg/l minimum
pH		6.0 min. to 9.0 max.
Flow		3.0 mgd
Total Residual Chlorine		0.5 mg/l
Fecal Coliform		200/100 ml summer 100,000/100 ml winter

The Borough staff's efforts in the operation, maintenance, and utilization of the wastewater treatment facilities are reflected in the outstanding plant performance record; the limited down-time of key system components; the general excellent condition of the facilities; and in the continued training efforts to maintain up-to-date operational techniques. As a result, the treatment facility is able to consistently meet or exceed its effluent limits.

Recent Chapter 94 annual reporting for the Elizabethtown WWTP from 1994 through 1997 is summarized in Table 7 along with a comparison of rainfall data.

While able to currently address permit limits for treatment, the plant in recent years due to protracted wet weather conditions has suffered from hydraulic overloading. Capacity limits, particularly in the outfall sewer from the treatment plant to the Susquehanna River, do not have the peak flow capacity to serve current conditions.

In August 1998, DEP was required to act and requested the contributing municipalities to submit a plan of action to address the hydraulic overload conditions. In addition, DEP imposed a building limitation on further connections.

The three contributing municipalities have developed an implementation plan to further increase efforts at infiltration/inflow control. The implementation plan also includes completion of planning efforts to expand and upgrade capacity for the plant and outfall.

Further evaluation of the Elizabethtown wastewater treatment facility is presented in the accompanying report prepared as a part of the regional alternatives evaluation for the 537 planning effort of Mount Joy Township, West Donegal Township and Elizabethtown Borough.

In order to utilize the Elizabethtown WWTP, it was necessary for MJTA to purchase the capacity of conveyance and collection facilities in West Donegal Township owned by WDTMA and Elizabethtown Borough. MJTA has purchased 535,200 gpd of average daily flow capacity in the Elizabethtown collection and conveyance system main interceptor. In addition, MJTA has approximately 132,500 gpd of average daily flow capacity in WDTMA conveyance facilities to the Borough plant. Current estimated flows through the WDTMA system are 109,000 gpd. Map 9 illustrates the key intermunicipal facilities utilized by MJTA. MJTA is currently evaluating these conveyance facilities for future development if additional treatment capacity at Elizabethtown is available or expanded.

Mount Joy Borough Treatment Facility Service

Current wastewater flow to Mount Joy Borough was estimated at 8,500 gpd in 1995 based on 61 EDU's at 144 gpd/EDU. Treatment facilities include a 2-stage aeration plant with a capacity of 1.53 mgd, and an average flow of 0.75 mgd (1995) with discharge into Little Chickies Creek. Summer season discharge permit requirements are as follows:

NPDES Permit No. PA-0021067
25 mg/l $CBOD_5$
30 mg/l SS
4.5 mg/l NH_3 - N
2.0 mg/l TP

TABLE 7

MONTHLY ANNUAL AVERAGE DAILY FLOW TOTALS AND RAINFALL DATA

TREATMENT PLANT AVERAGE FLOWS (ADF)				
	1994	1995	1996	1997
Annual ADF (mgd)	2.129	1.700	2.430	1.927
Total Annual Rainfall (inches)	48.41	45.52	55.81	36.83

	1994		1995		1996		1997		1998	
	Monthly Average Flow (mgd)	Monthly Rainfall (inches)	Monthly Average Flow (mgd)	Monthly Rainfall (inches)	Monthly Average Flow (mgd)	Monthly Rainfall (inches)	Monthly Average Flow (mgd)	Monthly Rainfall (inches)	Monthly Average Flow (mgd)	Monthly Rainfall (inches)
Jan.	1.600	4.89	2.292	4.63	3.722	7.75	2.198	2.12	2.735	5.46
Feb.	2.499	2.90	1.696	2.05	2.905	1.75	1.999	1.99	3.286	4.94
March	6.334	6.30	1.833	1.50	2.469	4.37	2.417	4.45	3.989	5.88
April	2.582	3.40	1.536	2.25	2.929	4.61	2.097	1.08	2.475	5.03
May	1.582	3.10	1.453	3.18	2.275	3.98	1.633	3.92	3.305	6.07
June	1.375	3.15	1.401	4.10	1.803	5.09	2.236	3.20	2.478	6.66
July	1.610	6.30	1.796	8.20	2.547	6.64	1.628	4.77		
Aug.	1.756	4.95	1.481	1.85	1.777	2.68	1.820	4.06		
Sept.	1.472	2.65	1.243	2.01	2.166	3.79	1.554	2.27		
Oct.	1.332	0.90	1.876	8.10	2.217	5.27	1.845	2.14		
Nov.	1.607	6.22	2.302	5.10	2.330	4.03	1.762	4.66		
Dec.	1.804	3.65	1.495	2.55	3.312	5.85	1.932	2.17		

Requests for capacity in the past were negotiated on a case-by-case basis by Mount Joy Borough. MJTA has negotiated with the Mount Joy Borough Authority to establish a reserved capacity for future connections.

The agreement provides for 183,400 gpd of capacity which is equivalent to 524 EDU's at 350 gpd/EDU. A copy of the agreement and established service area is provided in Appendix 2.

As part of this agreement, in 1996 MJTA turned over responsibility and ownership of its facilities within the agreement's service area to the Mount Joy Borough Authority. The Mount Joy Borough Authority is in the process of implementing recommendations of a March 1995 Sewer Study to upgrade the treatment facility to 2.5 mgd of capacity.

Other Treatment Facilities

The Conewago Industrial Park in West Donegal Township is a private facility constructed in 1970 with a present capacity of 75,000 gpd. The plant is permitted to 150,000 gpd under NPDES Permit No. PA-0080055. Existing flows are estimated at 8,000 gpd. The plant consists of a steel package extended aeration process with a concrete sludge holding tank. Effluent limits are 15/15 BOD/TSS, seasonal NH_3-N at 3 and 9 mg/l, and 2 mg/l phosphorus. Effluent discharge is to the Conewago Creek.

3.3 On-Lot Disposal Areas

Individual onsite wastewater treatment is utilized by development in the Township not currently on public sewer. Aside from individual lots and strip R-2 zoned development surrounded by agriculturally zoned areas, there is no significant area zoned for new residential development that relies on on-lot wastewater management. There are no community on-lot systems in the Township

3.4 Unpermitted Disposal Areas

To the Township and SEO's knowledge, there are no existing unpermitted wastewater disposal areas in the Township with the exception of those on-lot facilities constructed prior to 1966 before permitting was required.

3.5 Sludge Generation and Disposal

Solids generated from public sewer wastewater treatment in Mount Joy Township are treated at the Elizabethtown and Mount Joy Borough treatment facilities. The Elizabethtown facility dewaters its solids and landfills at the Lancaster County Solid Waste Authority facility or incineration at the Harrisburg incinerator. The Edward Sumpman farm along Fairview Road in Mount Joy Township is utilized by Mount Joy Borough for agricultural utilization of its solids. Neither facility handles septage waste.

Septage sludge is typically handled by three septic services:

- Edward Armstrong & Sons
- Kline's Septic Service
- Kauffman's Septic Service

Edward Armstrong & Sons and Kline's Septic Service provide their own treatment operations for septage.

Sludge from these services are typically transported to the Derry Township Municipal Authority for treatment. None of these services has permitted sites for disposal in the Township.

CHAPTER 4

CHAPTER 4

EVALUATION OF WASTEWATER TREATMENT NEEDS

4.1 Areas Dependent on OLDS

In accordance with the current Regional Comprehensive Plan, the proposed growth in Mount Joy Township is planned for the area west of Route 283 and in the vicinity of the Rheems and Route 743 interchanges. This growth is proposed to be handled by the extension of public sewer and water. Existing onsite systems will be served by the sewer lines which will be constructed in their vicinity.

Agriculturally zoned areas are to be maintained as rural low density, and therefore, will need to rely on on-lot treatment. The majority of these areas lie in the Little Chickies Creek drainage basin.

4.2 Identification of Malfunctions

According to the Township SEO, there are no known on-lot system malfunctions in Mount Joy Township. All known malfunctions have been issued repair permits by the SEO. Repair permits which were issued between 1987 and the present are shown on Map 10. In the past, malfunctions were recorded in the Aberdeen area, Milton Grove, the area north of Elizabethtown Road, and in other scattered locations throughout the Township. Malfunctions primarily resulted from poorly drained soils and systems designed prior to the enactment of DEP's Chapter 73 regulations in 1966.

4.3 Potential Malfunctions

An assessment was conducted to identify the areas of the Township where the following conditions exist that may contribute to the potential failure of an on-lot system:

- Dwellings constructed prior to 1966 (when design, construction, and inspection standards were developed);
- Repair permits;
- Floodplain;
- Steep slopes; and
- Housing density.

This information is presented in Map 10. By comparison with the existing wastewater facilities map (Map 9), soils map (Map 5), and existing information, two areas were identified as a consideration for public sewer service:

- Fairview and Terrace Roads junction north of Mount Joy Borough. Area consists of 12 EDU's.

- Village of Milton Grove. Area consists of 20 EDU's with surrounding strip development.

The Fairview and Terrace Roads area consists of older small lot homes. This area is proposed to be sewered within five years as a result of the extension of public sewer by a proposed development tributary to Mount Joy Borough. MJTA has negotiated with the Borough to reserve capacity for growth which will allow this to occur.

The Milton Grove area is surrounded by agriculturally zoned areas and is currently located some distance from existing public sewers or proposed growth areas. In addition there is limited potential for further growth in this area. This area can be evaluated for alternatives to on-lot systems as a long-term improvement to the area if financially feasible.

Surrounding strip development will also be considered to evaluate cost effectiveness.

Table 8 presents a summary of the needs analysis of the estimated 1,173 EDU's that presently utilize on-lot disposal in the Township. As noted, an estimated 35 percent of the on-lot systems represent a potential malfunctioning system. Primarily this percentage may be due to the possibility that systems constructed prior to 1966 may not have been built to current acceptable standards, and in soils that may not be suitable for on-lot systems. Other than the areas mentioned above, these potential malfunctions are considered to be fairly well dispersed across those areas of the Township that are not presently served by public sewer. These areas are also either not zoned for future growth or have been fully developed as strip development.

4.4 Hydrogeological Analysis

A hydrogeological analysis of groundwater quality in the Township was performed during the summer of 1991. Results are summarized in Table 9. Nitrate-nitrogen results and sample locations are shown on Map 11. Areas with elevated nitrate-nitrogen results are presented in Map 12. A listing of all results are provided in Appendix 4. In total, 270 samples were tested.

The samples were tested for nitrate-nitrogen levels, total coliform, and fecal coliform with a representative sampling for fecal streptococcus. General results are found in Table 9.

TABLE 8

MOUNT JOY TOWNSHIP
SUMMARY OF NEEDS ANALYSIS

Limitation	EDU's Affected	Percent of Total
Floodplains	0	0
Slopes Over 25%	0	0
Severe Limitations as Defined by the SCS (geology and soils)	231	20
Wetland/Hydric Soils[1]	5	<1
Wells With Unacceptable Test Results (270 tests)	195	72
Potential Sub-Standard On-Lot Systems (pre-1966)	412	35
Potential Malfunctions	412	35

* 1,173 EDU's utilize OLDS. Percentages do not total 100 due to multiple limitations for some EDU's.

[1] Includes floodplain soils, wetlands as indicated by the USDA Fish and Wildlife Service's National Wetlands Inventory, and all soils listed as having major hydric components and inclusions of hydric components, according to the USDA Soil Conservation Service's Hydric Soils of the State of Pennsylvania, 1985.

TABLE 9

MOUNT JOY TOWNSHIP
HYDROGEOLOGICAL STUDY RESULTS AND SUMMARY

	Total Coliform (/100 ml)	Nitrate-Nitrogen (mg/l)	Fecal Coliform (/100 ml)	Fecal Strep (/100 ml)
Total Samples	270	270	270	~~270~~ 66
Average	10.82	8.4	5.58	6.03
Maximum Value	95	34.3	80	513
Total Unacceptable	95	83	60	21
	35.2%	30.7%	22.2%	31.8%
Total Marginal	--	87	--	--
		32.2%		
Total Acceptable	175	100	210	45
	64.8%	37.0%	77.8%	68.2%

Nitrate-Nitrogen

DEP and EPA have adopted a maximum allowable limit of 10 milligrams per liter (mg/l) of nitrate-nitrogen for public/community water and sewer systems.

For the 270 samples, the nitrate-nitrogen levels ranged from 0.18 mg/l to 34.3 mg/l. More specifically, 83 (30.7 percent) of the samples tested have nitrate-nitrogen levels above the allowable limit of 10 mg/l. In addition, 84 (31.1 percent) of the samples had nitrate-nitrogen levels between 5 and 10 mg/l. Nitrate-nitrogen is a chemical compound containing nitrogen and oxygen, and may be associated with excessive or inappropriate land applications of manure. Ingestion of large amounts of nitrate-nitrogen can cause blood to be less able to carry oxygen. This condition may be dangerous to infants up to 6 months of age, as well as to pregnant or nursing mothers. High nitrate-nitrogen levels can also cause harm to livestock. DEP also recommends that infants, pregnant women, and nursing mothers be provided with alternate sources of safe drinking water if their domestic water exceeds 10 mg/l of nitrate-nitrogen.

The high nitrate levels also correspond to the predominantly long-term agricultural use in the area. High nitrate levels in agricultural areas with limestone geology are common in the Lancaster County area. As a result, nitrate groundwater contamination cannot be determined to be a result of malfunctioning OLDS, agricultural activity or both. Nitrate test results alone cannot be used in this case as a determination for the need for public sewer.

Coliform

Coliform bacteria are measured in terms of colonies per 100 milliliters (ml). Of the samples collected, 95 (35.2 percent) had more than one colony of total coliform per 100 ml. Also, 60 (22.2 percent) of the samples collected had more than one colony of fecal coliform per 100 ml. Total coliform is normally found in the intestines of humans, but is found in birds and animals, as well as in the soil. The bacteria is used as an indication that other pathogenic organisms may also be present. Fecal coliform is more closely associated with humans and warm blooded animals.

Fecal Streptococcus

Fecal streptococcus tests were performed on 25 percent of the samples. Of the samples collected, 21 (31.8 percent) had more than one colony per 100 ml. This bacteria is found in human and animal waste, but is not usually pathogenic. Fecal streptococcus is a relatively fragile organism and does not survive long in a cold water environment. Presence of fecal streptococcus usually indicates that the source of contamination is relatively close to the water source otherwise, the organism would probably have died.

The hydrogeological study also investigated the type and condition of each tested well. (In some cases, no information regarding type or condition was available). In general, most wells are drilled, with depths ranging from 30 feet to 450 feet. The shallowest drilled wells appear to be associated with coliform contamination, suggesting improper casing. There does not appear to be any strong correlation between increasing depth and decreasing nitrate-nitrogen levels. Hand-dug wells showed high levels of contamination but the sample (3) is not sufficient to support any conclusions.

In view of the data and general dispersal of potential problem sites throughout the Township, there are no specific areas identified as need areas that are required to be addressed by methods other than an individual lot-by-lot basis through repairs, voluntary in-home water treatment measures or improvements to well construction.

Further needs assessment is not justified at this time unless it is necessary to support PennVEST funding if sewer is shown to be economically feasible.

The Milton Grove area represents the greatest remaining village and population density when nearby strip development is included. An investigation of public sewer could be considered if economically feasible as a benefit to the residents of this area.

4.5 Projected Development Wastewater Needs

Proposed and future development clearly present the greatest need for wastewater facilities in Mount Joy Township. In accordance with previous planning, this growth is occurring as extensions of both Elizabethtown and Mount Joy Boroughs where both existing centralized sewer and water facilities exist.

Table 10 presents a summary of the MJTA capacity reservation list. This list illustrates the number of EDU's currently proposed for development that will require public sewer. Of the 1,792 EDU's requested, 528 EDU's are reserved for connection out of an original 780 EDU's granted. The 528 EDU's represent 142,560 gpd as the remaining allocation at Elizabethtown. An additional 1,012 EDU's are awaiting capacity at the Elizabethtown plant.

Based on 2.85 persons per household and 95 gpd per person to determine the above flows, an additional capacity of 273,240 gpd is needed in treatment capacity for currently proposed development.

Map 13 was developed to assist in the determination of future sewer needs in remaining available lands zoned for growth. This map identifies areas presently served by sewer, areas accounted for in the MJTA reservation list and areas considered unavailable for development due to agricultural zoning and current use (i.e. cemetery, institutional land, floodplain). The remaining lands were evaluated for additional wastewater capacity needs in the 20-year planning period. Based on current zoning provisions, the ultimate development potential was calculated using 60 percent of the land areas which are available for residential and commercial development.

A projection of 680 gpd per acre was used for industrial zoned land based on historical usage in similar industrial parks in Lancaster County.

The projections have been developed for the minor drainage basins shown on Map 2. These basins correspond to the conveyance system service areas identified on Map 9. Table 11 summarizes the estimate of the number of EDU's for available undeveloped land zoned for growth.

Table 12 was developed to establish flow projections for each sewer service basin using the 20-year projections (based on a 40 percent build-out rate) as well as existing and proposed development. Projections of 1,297,100 gpd exceed the current reserved capacity by 893,100 gpd. Note that these estimates do not include capacity for serving the Milton Grove area if feasible.

TABLE 10

MOUNT JOY TOWNSHIP AUTHORITY
SEWER CAPACITY RESERVATION REQUEST
LIST (EDU'S) as of 04/15/98

Drain Area	Development	Requested	Granted	Remaining	Year 1-5	Year 6-10	Year 10+
B	Bailey-Lakeview Country Est.	2	2	2	2		
J_P	Virgina Hoover	25	0	0	0	25	
L	Shybrook Meadows	45	45	6	6		
J_P	Gerald Hackman	15	0	0	0	15	
J_P	Pfaunmiller, Elwood	3	3	3	3		
J_G	Westbrooke II	28	28	2	2		
J_P	Westbrooke III	37	37	30	30		
H	Wendy's	8	8	8	8		
J_P	Farmbrooke III	30	30	6	6		
I	Espenshade	2	2	1	1		
J_G	Cloverleaf Sports Center	32	32	32	32		
J_P	Messick	2	2	2	2		
I	Bradfield Place I,II,III	136	136	136	91	45	
J_G	Shady Oaks I,III	74	74	74	28	46	
I	Shady Oaks II	38	38	38	38		
B	Rockwood III,IV	176	98	29	29	78	
L	MJT Associates	32	32	32	32		
H	Matthews Apartments	1	1	1	1		
M	Northbrooke I, II, III	194	70	25	25	124	
M	Sweigart Tract	58	-	-		58	
J_G	Sico (Muir Lot)	1	1	1	1		
J_G	Olweiler - Route 230 Tract	3	3	3	3		
A	Timber Ridge	45	45	45	45		
J_P	Elizabeth Management	6	6	6	6		

TABLE 10

MOUNT JOY TOWNSHIP AUTHORITY
SEWER CAPACITY RESERVATION REQUEST
LIST (EDU'S) as of 04/15/98

Drain Area	Development	Requested	Granted	Remaining	Year 1-5	Year 6-10	Year 10+
M	Foxbury V	24	24	1	1		
D	St. Peter's Catholic Church	4	4	4	4		
A	English Brothers	1	1	1	1		
M	Brook Ridge - Morris	8	8	3	3		
M	Olweiler - Mount Gretna Road	6	6	6	6		
A	O'Conner Rental Center	1	1	1	1		
C	Paul Liskey	9	9	2	2		
A	Miller Tract	538	-		-	200	338
L	Spring Ridge	2	2	2	2		
J_G	Pennmark	45	-	-	-	45	
J_P	Farmbrooke IV	48	-	-	-	48	
B	Kings Mill	18	18	13	13		
A	Colin Management	31	31	0	-	31	
B	Mary Royer	2	2	1	1		
B	Steinkamp	9	9	9	9		
M	Brethren in Christ Church	1	1	1	1		
J_P	Paul Zaiac	1	1	1	1		
J_P	Hernley's Farm Equipment	1	1	1	1		
C	Dorothy Slesser	1	-	-	1		
C	Roy Slesser	1	-	-	1		
C	Gary Johnson	1	-	-	1		
J_P	Kreider/Snowden Apts.	32	-	-	32		
J_G	Olweiler - Route 230	15	-	-	15		
TOTALS		**1,792**	**780**	**528**	**487**	**715**	**338**

TABLE 11

ULTIMATE GROWTH PROJECTIONS FOR AVAILABLE UNDEVELOPED GROWTH AREAS

Drainage Basin	Undeveloped EDU Projections[1]	Undeveloped Land Acres	Undevelopable Acres	Developed Acres[2]	Total Acres
A	217	89	90	286	465
B	258	99	163	121	383
C	141	84	205	47	336
D	494	273	158	-	431
E	371	158	70	13	241
F	179	71	106	20	197
G	-	-	103	65	168
H	705	270	-	43	313
I	414	185	-	82	267
J	1,796	837	62	348	1,247
K	20	8	-	26	34
L	691	305	5	130	440
M	16	6	-	178	184
TOTAL	5,302	2,385	962	1,359	4,705

[1] EDU's represent ultimate development.

[2] Existing sewered and projected development.

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TABLE 12

PROJECTED WASTEWATER NEEDS
ELIZABETHTOWN AREA

Drainage Basin	Existing Flow (gpd)	Proposed Flow		Projected Flow[1]		Total[2] (gpd)
		(EDU)	(gpd)	(EDU)	(gpd)	
A	28,200	616	178,500	87	23,500	224,700
B	32,000	132	73,700	103	27,800	111,200
C	--	5	18,100	56	15,100	25,500
D	--	4	--	198	53,500	54,600
E	--	--	--	148	40,000	40,000
F[3]	--	7*	1,900	72	19,400	21,300
G[3]	--	10*	2,700	--	--	2,700
H	9,600	9	500	282	76,100	87,900
I	3,500	175	48,300	155	41,900	101,600
J_G	18,000	172	48,100	104	28,100	97,800
J_P	61,700	169	44,800	626	169,000	272,600
K	7,100	--	--	8	2,200	9,700
L	33,600	40	12,700	276	74,500	116,700
M	26,000	218	72,900	6	1,600	90,800
P	--	--	--	148	40,000	40,000
Total	**229,700**	**1,557**	**420,400**	**2,269**	**612,700**	**1,297,100**

1 Projections based on approx. 40% of ultimate EDU's (5,302) at 270 gpd/EDU.
2 Average Daily Flow.
3 Miller tract proposed development included in Drainage Basin A.
* Existing homes w/ on-lot disposal systems.

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155
2269
3826

A similar estimate was developed for the growth area tributary to the Mount Joy Borough system. Table 13 summarizes the estimates for this area. A development of 70 percent was assumed for this area due to its proximity to the Borough boundary and the limited land area which is available.

TABLE 13

PROJECTED WASTEWATER NEEDS
MOUNT JOY BOROUGH AREA

	EDU's	Flows gpd[1]
Existing Development	69	24,150
Proposed Development		
Gantz	3	1,050
Deerfield II	48	16,800
Grandview Meadows	98	34,300
Terrace/Fairview Road	12	4,200
Mount Joy Career/Tech Center	1	350
Projected Development		
R-1	193	67,550
R-2	50	17,500
C	50	17,500
Total	**524**	**183,400**

[1] Based on 350 gpd/EDU.

Based on 350 gpd/EDU, a total of 183,400 gpd of capacity is projected for the Mount Joy Borough area. As noted previously, Mount Joy Borough is in the process of implementing a plan to provide for expansion in plant capacity to 2.5 mgd.

This capacity was included in the turnover agreement with Mount Joy Borough. A copy of the agreement is included in Appendix 2.

The overall projections to the year 2020 represent a total of 5,795 persons.

Projected population growth from 1998 based on ongoing and proposed residential development is equivalent to an increase of 617 EDU's or 1,759 persons to a total 2005 population of 9,664.

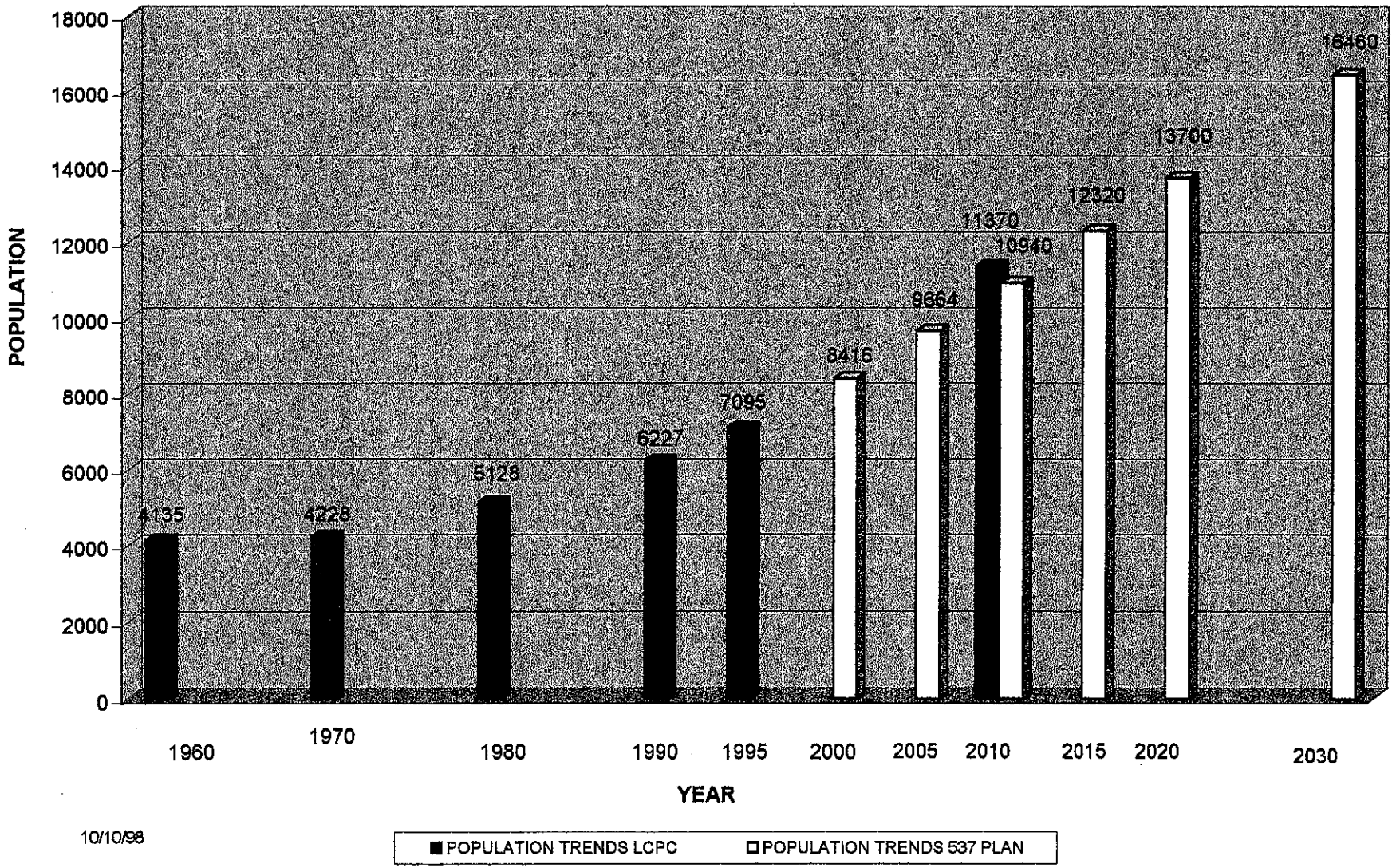
Projected growth of only residential ongoing and proposed development would add an additional 448 EDU's or 1,276 persons for a total year 2010 population of 10,940.

Projected long-term population in the year 2020 is estimated at 13,700.

Plate 2 illustrates a graph of projected population growth in Mount Joy Township.

These projections for growth will require evaluations of conveyance and treatment capacity on the Elizabethtown and West Donegal systems to determine the best method of wastewater management for this growth. Complicating this evaluation is the projected concurrent demands of these municipalities as a result of similar growth pressures.

PLATE 2
MOUNT JOY TOWNSHIP 537 PLAN POPULATION TRENDS



CHAPTER 5

CHAPTER 5
ALTERNATIVE EVALUATION

5.1 Identification of Alternatives

Two alternative evaluations are considered for Mount Joy Township. The first evaluation includes assessment of the feasibility of providing community or centralized sewer to the Milton Grove area and surrounding strip development. The second evaluation considers methods for conveyance and treatment of projected wastewater flow in the Elizabethtown growth area.

In addition to structural alternatives, non-structural alternatives will be identified for evaluation.

5.2 Milton Grove Area Alternatives

The following three alternatives were evaluated for serving the Milton Grove area.

Alternative 1:	Collection/conveyance and treatment at a single wastewater treatment facility.
Alternative 1A:	Collection/conveyance to the Elizabethtown WWTP.
Alternative 2:	Collection/conveyance and treatment at community on-lot facilities.

Due to current agricultural zoning, the systems were assumed to serve only existing EDU's. Area 1 consists of 20 EDU's in the village of Milton Grove. Area 2 consists of 22 EDU's along Ridge Road. Area 3 consists of 39 EDU's in the Snyder Drive and Hilltop Circle development. Area 4 consists of 72 EDU's of strip development at the intersection of Elizabethtown Road and Trail Road. A total of 153 EDU's were included in the evaluation.

Based on site evaluations and preliminary analysis, a combination of gravity sewer, and pressure sewer was utilized for each alternative to convey wastewater flow.

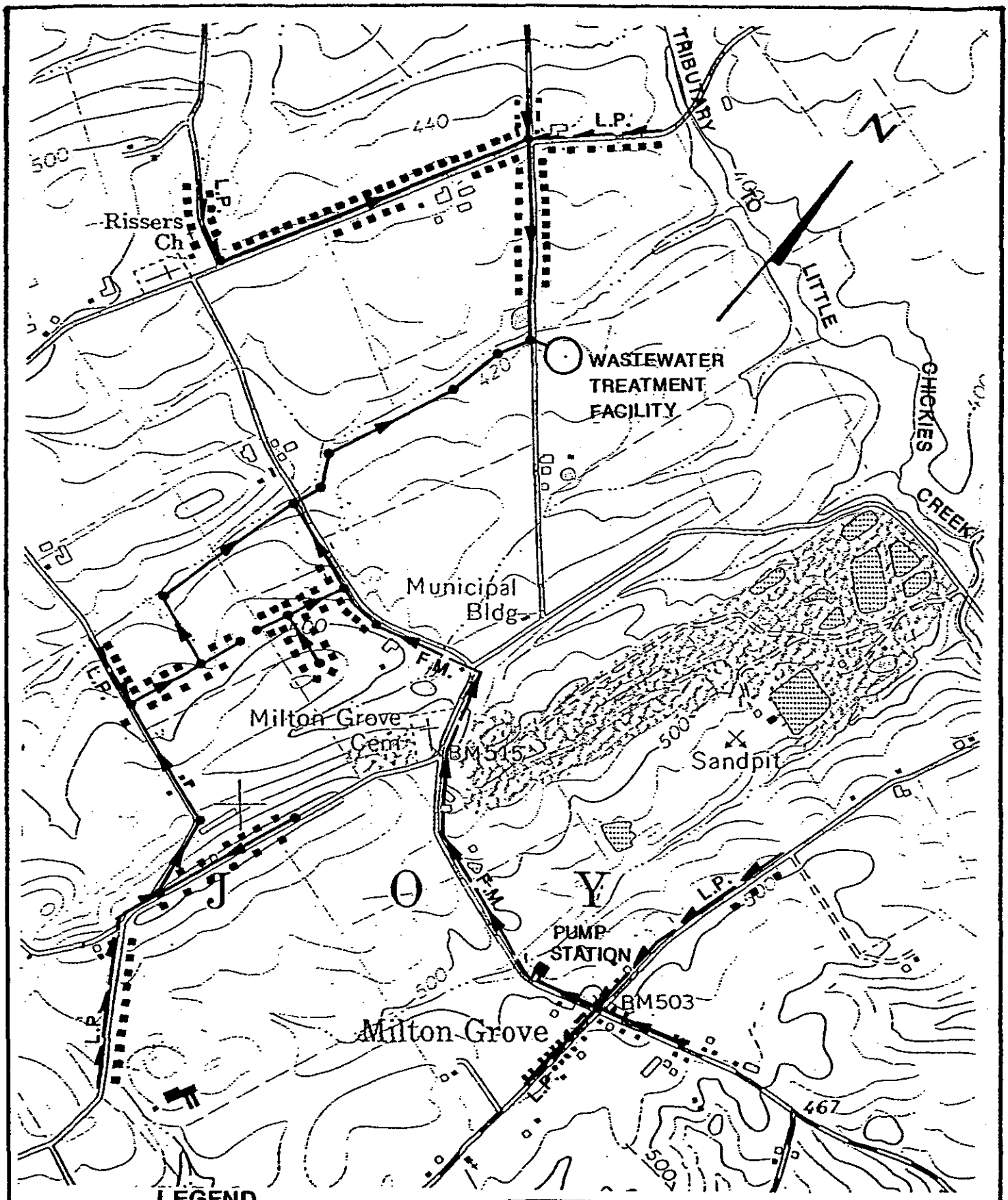
Alternative 1 considers a small package treatment plant with a capacity of 45,000 gpd located off of Trail Road with a discharge to a tributary of Little Chickies Creek. Plate 3 illustrates Alternative 1.

Alternative 1A conveys flows to the same site as Alternative 1. A pump station is utilized to convey flows by a pressure main along Ridge Road to an existing manhole at the intersection of Sheaffer Road. Flow is then conveyed through the Borough system to the Elizabethtown WWTP. Plate 4 illustrates Alternative 1A.

Alternative 2 conveys wastewater flow by a pressure sewer to a small on-lot community system. Plate 5 illustrates Alternative 2.

Each alternative is illustrated on the following pages. Table 14 summarizes estimated costs for these alternatives

PLATE 3

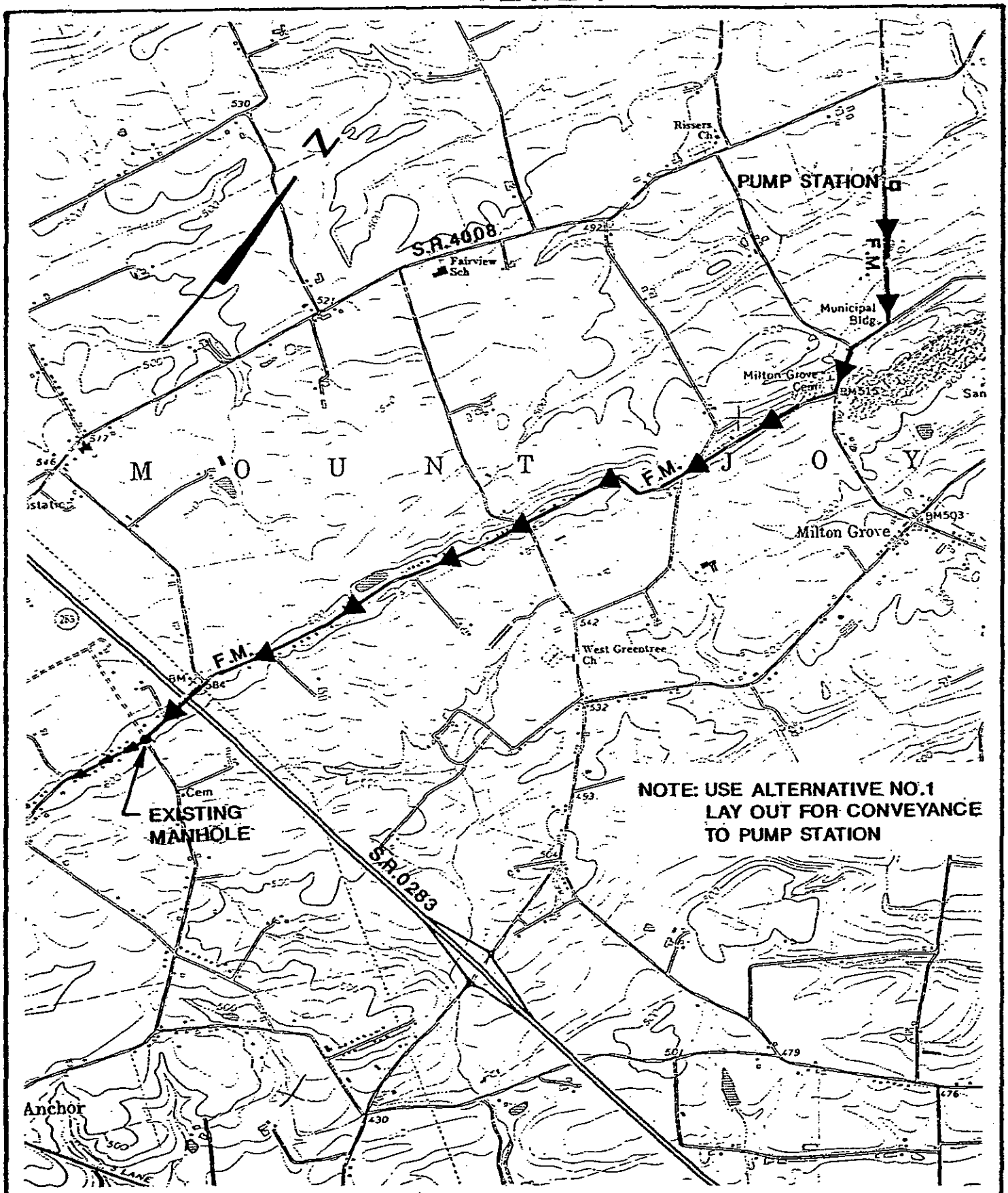


LEGEND

- GRAVITY SEWER
- F.M. FORCE MAIN
- L.P. LOW PRESSURE SEWER

MOUNT JOY TOWNSHIP, 537
MILTON GROVE AREA
ALTERNATIVE NO. 1

PLATE 4



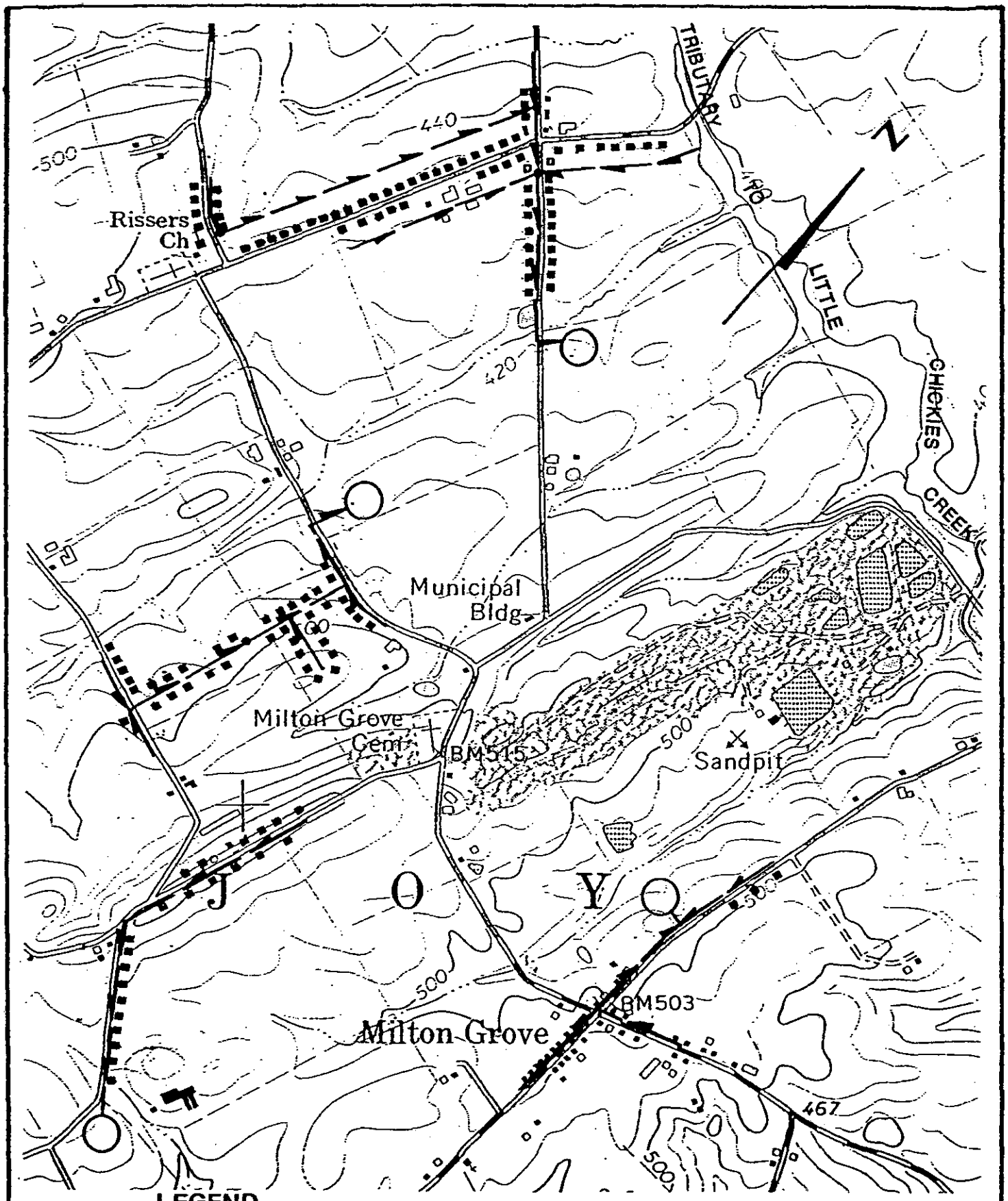
LEGEND

F.M. ——▶ FORCE MAIN

——▶——▶——▶ EXISTING SANITARY SEWER

MOUNT JOY TOWNSHIP 537
MILTON GROVE AREA
ALTERNATIVE NO. 1A

PLATE 5



LEGEND

LOW PRESSURE SEWER

COMMUNITY TREATMENT FACILITY

MOUNT JOY TOWNSHIP 537
MILTON GROVE AREA
ALTERNATIVE NO.2

TABLE 14

MILTON GROVE AREA ALTERNATIVES

Construction Cost	Alternative 1	Alternative 1A	Alternative 2
8" PVC	$ 822,000	$ 742,800	-------
6" Service	72,000	70,800	-------
Manholes	87,600	78,000	-------
8" Road Boring	75,600	75,600	--------
6" Road Boring	228,000	201,600	--------
3" Low Pressure	158,400	181,200	493,200
1 1/2" Service Twp	8,400	9,600	30,000
1 1/2" Value Assembly	4,800	4,800	18,000
Simplex Grinder	21,600	33,600	62,400
Duplex Grinder	138,000	152,400	501,600
1 1/2" Boring	26,400	37,200	54,000
3" Boring	21,600	32,400	43,200
Air Release Chambers	---------	20,400	15,600
Pump Station	121,200	160,800	--------
4" Force Main	114,000	---------	--------
6" Force Main	---------	628,800	--------
Wastewater Treatment	470,400	---------	793,200
Total Construction Cost [1]	2,370,000	2,430,000	2,011,200
Connection Fees	----------	332,000	--------
Land Acquisition	18,000	5,000	175,000
Construction Contingency, 10%	237,000	243,000	201,000
Non Construction Cost, 25%	593,000	607,000	503,000
Total Project Cost	3,218,000	3,617,000	2,890,200
Estimated Annual O & M	50,000	45,000	30,000
Present Worth [2]	**3,223,000**	**3,621,500**	**2,893,000**

(1) Total Construction Cost updated to 1999 costs.
(2) Present worth is based on 7.75% at 20 years for annual costs.

Based on a present worth analysis, Alternative 2 is the most cost-effective alternative for the Milton Grove area. The total construction cost is based on four individual community systems for each area. The systems would be conventional with alternating pressure dosing of absorption beds. The system would include staging of septic tanks and have sufficient land for a replacement system. No nitrate reduction is assumed since the system is sized as a replacement for existing systems.

Note that no detailed field analysis was conducted to determine design conditions. Sites were preliminarily located within proximity to the development and in Lansdale or Unger soil groups with moderate imitations for on-lot systems.

Table 15 presents an evaluation of the financial feasibility for this system.

Based on the feasibility analysis, centralized or community sewer facilities are not economically feasible for the Milton Grove area.

TABLE 15

MILTON GROVE SERVICE AREA
FINANCIAL FEASIBILITY

Estimated Construction Cost	$2,011,200	
Land Acquisition	175,000	
Construction Contingency, 10%	201,000	
Non Construction Costs, 25%	503,000	
Estimated Total Project Cost	2,890,200	
Capital Contribution [1]	459,000	
Amount to be Financed	2,431,200	
Annual Debt Service [2]	205,000	(148,700)[3]
Annual O&M	30,000	30,000
Total Annual Cost	$ 235,000	$178,700
Estimated Annual Cost EDU	$ 1,536	$ 1,168

(1) Based on $3,000/EDU at 153 EDU's
(2) Based on 6.5% and 30 year w/10% cover
(3) Assuming Penn Vest Financing at 2% for 20 years

It is recommended that the Township consider non-structural alternatives for management of the existing systems in the Milton Grove area. These alternatives are discussed in more detail in Section 5.4. However these alternatives could include:

- Develop a Township-sponsored Homeowner Education Program to promote care and maintenance of OLDS.
- Create a Septage Management District to fund maintenance and replacement programs.
- Restrict the use of garbage grinders for onsite systems.
- Require mandatory septic tank pumping.
- Use Municipal Authority to acquire land for replacement systems if necessary on a case-by-case basis.

5.3 Evaluation of Elizabethtown Growth Area

The alternatives evaluation of the area of Mount Joy Township presently served by the Elizabethtown wastewater treatment facility involved the development of conveyance and treatment alternatives to provide capacity in the different drainage basins where future development is proposed or projected over the next 20 years. The drainage areas have been delineated on Map 2. Table 12 presents the total flows from each drainage basin that will be used for the alternative evaluation. Note that Drainage Area J has been subdivided to delineate the portion that flows by gravity into West Donegal Township (Jg) from the area that is serviced by the Schwanger Road pump station and must be pumped (Jp). This clarification was helpful in the evaluation.

As noted previously, MJTA must presently rely on conveyance facilities owned by Elizabethtown Borough and WDTA to convey wastewater flows from its system to the Elizabethtown WWTP in West Donegal Township. There are seven defined connection points from Mount Joy Township into the Elizabethtown Borough system. The flows from these points converge where the 27-inch Elizabethtown interceptor travels from the Borough to the plant. Table 16 presents the details of the various connection points, their allocated capacity to Mount Joy Township, and projected flows.

Connections to the West Donegal Township system occur primarily at the metering chamber located near the intersection of Cloverleaf Road and Harrisburg Avenue designated as connection point 8 by MJTA. In addition there are four other connection points (C9, C10, C11 and C12) where by MJTA has an agreement for capacity in WDTA sewers to serve homes in Mount Joy Township along Harrisburg Avenue.

In addition to sewer capacity, MJTA has reserved capacity in the Nolt Road, Colebrook Road and Cameron Street pump stations in the WDTA system serving the village of Rheems and the Miller Road pump station which conveys flow at the end of the WDTA system to the Elizabethtown treatment facility. Table 17 summarizes MJTA's reserved capacity and projected flows from the drainage areas tributary to the WDTA system.

TABLE 16

COMPARISON OF PROJECTED FLOWS WITH RESERVED CAPACITY IN ELIZABETHTOWN CONVEYANCE SYSTEM

Connection Point	Sewer Main	Reserved Capacity[1]	Basin	Projected Flow[2]
C-5	1	24,500	K	24,500
C-4	2 (10")	275,000	L	1,726,500
C-4	2 (12")	275,000	L	1,726,500
C-1	3	136,320[3]	B ,C, D	0
C-2	4	26,680[3]	B^H	23,750
C-3	5 (15")	750,000	A, E, F, G, M	750,000
C-1, 2, 3	5 (18")	913,000	A to G, M	773,750
C-4, 5, 6, 7	6 (15")	424,800	K, L, H	1,775,750
C-1 to C-7	6 (27")	1,338,000	A to H, K, L, M	2,549,500
			A to H, K, L, M	1,019,800 ADF

1 As per January 15, 1977 agreement.

2 Based on peak flow factor of 2.5.

3 Transfer of EDU capacity from Highlawn Avenue to Mill Road approved in 1994.

Rev. 10/13/98

TABLE 17

COMPARISON OF PROJECTED FLOWS WITH RESERVED CAPACITY IN WDTMA CONVEYANCE SYSTEM

Sewer Main	Reserved Capacity[1]	Projected Flow[2]
To Nolt Road P.S.	44,700	131,125
Nolt Road P.S.	30,600	131,125
Nolt Road F.M.	62,300	131,125
To Colebrook Road P.S.	547,700	140,875
Colebrook Road P.S.	252,300	385,375
Colebrook Road F.M.	313,600	385,375
To Cameron Street P.S.	304,800	390,125
Cameron Street P.S.	262,200	390,125
Cameron Street F.M.	445,800	390,125
Harrisburg Pike	408,700	498,500
To Miller Road P.S.	331,200	693,250
Miller Road P.S.	272,000	693,250
Miller Road	489,200	693,250
		(277,300 ADF)

1. Capacity based on actual constructed capacity.
2. Based on peak flow factor of 2.5.

Rev. 10/13/98

As can be noted from Tables 16 and 17, projected flows from MJTA will exceed reserved capacity on the Elizabethtown and WDTA conveyance system. Studies by Elizabethtown Borough to evaluate remaining sewer capacity have indicated that there is no remaining capacity available to MJTA for additional flow above the current reserved capacity. Elizabethtown is currently performing ongoing infiltration/inflow studies to reduce wet weather surcharging in its collection system. As a result, an alternative for additional capacity at the Elizabethtown plant will require the construction of a new interceptor(s) to convey flow from Mount Joy Township through the Borough to the wastewater treatment facility. Due to the distance and difficulty of construction through the developed areas of the Borough, it would be more effective to construct a single parallel interceptor along Conoy Creek and divert flow as required from the MJTA pump stations in the Conewago Basin (referred to as the Northside system) and Donegal Basin (referred to as the Southside system) to the interceptors.

In the WDTA conveyance system there is currently the possibility of MJTA purchasing additional capacity from WDTA and/or upsizing certain limiting sections to increase capacity.

The most critical section is the 12-inch interceptor from Harrisburg Pike to the Miller Road pump station and to the Elizabethtown plant.

By diversion of the Schwanger Road pump station force main (Drainage Area Jp and pumped flow from Area P) from its current location at the West Donegal Township metering chamber to a new connection point (C-13) at the WDTA interceptor or into the Elizabethtown system, MJTA can avoid extensive improvements to the three pump stations and collection system in the village of Rheems. In addition, this diversion would include a reduction of 61,700 gpd of existing flow which can be utilized by future growth in drainage areas that flow by gravity into the village (areas Jg and I).

West Donegal Township is currently evaluating the future growth along the WDTA interceptor to the Miller Road pump station. Because of the availability of public sewer, this area is a likely candidate for future development. As a result, WDTA is unable to commit to additional existing conveyance capacity to meet its future needs, because it may need the remaining capacity for growth in West Donegal Township.

WDTA has been able to provide some additional capacity to MJTA for two developments (Bradfield and Espenshade) through the village of Rheems. This is a result of existing availability of capacity and the limited availability of land in the Rheems area for future growth in West Donegal Township. A copy of this agreement is included in Appendix 2.

If it is assumed that there is no new additional capacity in the West Donegal interceptor, then MJTA would be required to construct a parallel interceptor along the WDTA right-of-way. Given that MJTA already would have to construct an interceptor to the plant through Elizabethtown, it would be more effective to construct additional capacity in an MJTA interceptor along Conoy Creek and reach the plant by gravity rather than construct two interceptors, one of which would require expansion of the Miller Road pump station.

Elizabethtown Alternatives

The basis for developing these alternatives is for all wastewater flow from Mount Joy Township in the Elizabethtown area to be treated at the Elizabethtown treatment facility. Total projected flow to the Elizabethtown plant would be 1,297,100 gpd. The Elizabethtown plant would be need to be expanded and upgraded to a capacity of 4.5 mgd to treat projected flows from MJTA, WDTA, the Masonic Homes and Elizabethtown Borough.

Three Elizabethtown alternatives have been developed as a means of conveying wastewater flows to the WWTP. They are described as follows:

1. Elizabethtown Alternative 1

   Alternative 1 involves the diversion of Northside flows in the Conewago Basin by way of modifications to the Hershey Road pump station to convey flows to a new MJTA interceptor along Conoy Creek. The diversion of existing flows into the new interceptor will make capacity available in the Elizabethtown system for projected growth in the Conoy Basin.

The Conoy Creek interceptor would start at the Kiwanis Boulevard metering chamber and extend along the Conoy Creek tributary through the Borough park to a point where the current Elizabethtown interceptor (at MH 45) begins. From there, the interceptor would follow Conoy Creek to the plant site. One possible route would be to follow the original plant interceptor sewer which was abandoned as part of the last plant expansion.

Improvements to the Southside system in the Donegal Basin would require diversion of flow from the Schwanger Road pump station directly into the West Donegal Township interceptor. With this alternative, we have assumed that MJTA can acquire remaining capacity in the WDTA system and upsize sections to obtain the capacity necessary to continue to utilize the WDTA system. Appendix 4 presents Table D as an evaluation of the WDTA system and capital contribution by MJTA for the reallocation of collection system capacity ($7,738) and interceptor capacity reallocation ($107,229). Also included in Appendix 4 is a summary of the WDTA pump stations that would be affected by an increase in the MJTA allocation.

Table 18 presents a summary of the Elizabethtown alternative connection points and capacity allocations. Map 14 illustrates the location of the connection points and improvements to the MJTA system.

2. Elizabethtown Alternate 2

   This alternative is similar to the first alternative with the exception that an assumption is made that capacity is not available in the WDTA interceptor. Conveyance to Elizabethtown is provided for areas Jp and P by diverting the Schwanger Road pump station force main along Campus Road to tie into the diversion of the Kiwanis Boulevard metering chamber to the new MJTA Conoy Creek interceptor. This would require the interceptor to be increased in size from 18 inches to 24 inches.

3. Elizabethtown Alternative 3

   This alternative again assumes no capacity is available in the WDTA interceptor. However, an alternate route for the Schwanger Road forcemain is utilized to connect into the new Conoy Creek interceptor. The connection is located downstream from the Borough near Manhole 45 of the Elizabethtown interceptor, just west of the end of College Avenue.

Elizabethtown Treatment Capacity

The three Elizabethtown alternatives have explored different conveyance methods for getting wastewater flow to the Elizabethtown plant for treatment.

As presented, the cost to make these improvements is anticipated to be significant. In addition, it is necessary to make significant improvements to the treatment facilities to provide capacity for MJTA.

In order to determine the cost of these improvements to the treatment facilities, the three contributing municipalities (Mount Joy Township, West Donegal Township and Elizabethtown Borough) funded a regional study in November 1995 to evaluate the existing facilities and make

TABLE 18

ELIZABETHTOWN ALTERNATIVE 1
PROPOSED CONNECTION POINT
CAPACITY ALLOCATIONS

Connection Point	Location	Allocation	
		gpd ADF	gpd PDF
C1	E - Mill Road	0	0
C2	E - Highlawn Avenue	9,500	23,750
C3	E - Radio Road Metering Chamber	0	0
C4	E - Kiwanis Boulevard Metering Chamber	0	0
C5	E - Ridge Avenue	9,700	24,250
C6	E - Mount Joy Street	0	0
C7	E - Oak Manor Pump Station	0	0
C8	WD - West Donegal Metering Chamber	97,800	244,500
C9	WD - E. Harrisburg Ave. to Brett Blvd.	52,450	131,125
C10	WD - Brett Blvd. to Colebrook Road	3,900	9,750
C11	WD - Colebrook Road to Lime Street	1,900	4,750
C12	WD - Anchor Road to Route 230	43,350	108,375
C13 new	WD - West Donegal Interceptor Metering Chamber	400,500	1,001,250
C14 new	Elizabethtown Interceptor	678,000	1,695,000
	Total Allocated Flow	**1,297,100**	**3,242,750**

REV. 10/09/98 w/Diversion of Area P to Schwanger Road Pump Station.

recommendations on expansion and upgrading to provide future capacity. A copy of this report is provided as an attachment to the 537 Plan.

The report, as prepared by the Borough's consultant, Camp Dresser & McKee, Inc. (CDM), initially determined that the treatment facilities at current design conditions would be utilized to their maximum capacity. There is little or no additional wastewater treatment capacity in the facility (i.e. interunit piping, settling volume, pumping capacity, etc.) which could be utilized cost effectively in an expansion. This was attributed to earlier value engineering during the last plant improvements and the need to manage peak flows through the plant.

As a result, it is necessary to either make modifications to virtually all of the existing plant wastewater processes or construct an entirely new plant to obtain the required capacity.

The one exception to the need for expansion of the Elizabethtown plant is the solids dewatering and storage facilities. These facilities recently completed in 1995, were provided with sufficient capacity for future expansion.

In addition to the treatment facilities, the CDM study also determined that the existing 5-mile outfall pipe to the Susquehanna River would need to be upsized or converted to a pumped forcemain. The current outfall has a capacity of 6.0 mgd before flow begins to back up in the chlorine contact tanks. Hydraulically the outfall was found to be the weakest link in the plant and the greatest concern for an upgrade/expansion.

In light of the apparent significant cost of providing additional treatment capacity at the Elizabethtown plant, other alternatives were also developed to explore new treatment facility locations that would not require as large a capital investment in conveyance facilities by locating the treatment site closer to the source of the flow.

Conewago Alternatives

Drainage areas A, B, C, D, E, F, and G within the Conewago Basin as shown on Map 2 represent 514,400 gpd of projected capacity or 30 percent of the total flow projected to be needed by MJTA through the year 2020.

Conewago Creek provides a potential effluent discharge location for serving Mount Joy Township as well as potentially other neighboring municipalities including Conewago, West Donegal and Londonderry Townships for area wastewater management. There are presently only two other area discharges to the creek, including the previously mentioned Conewago Industrial Park in West Donegal Township and the Conewago Mobile Home Park and Campground upstream in Conewago Township. The stream is designated under Chapter 93.90 as a Trout Stocking Fishery.

The preferred site location for a possible treatment facility would be downstream from the Aberdeen Road ridge where the Borough draws water for its public water supply (see Map 8). Site locations could include a site adjacent to Route 230 in Mount Joy Township to permit gravity service upstream along Conewago Creek

An alternative site would be located in the Conewago Industrial Park site adjacent to Zeager Road in West Donegal Township. This site, which is located in an industrial use area, would also permit transfer of flow from and abandonment of the Industrial Park treatment facility and would provide service to several existing commercial facilities including Agway and a mobile home park in West Donegal Township. Furthermore, the site is downstream from Lynch Run, a tributary of Conewago Creek that flows through Londonderry Township. Londonderry's Township Act 537 Plan eventually proposes serving this area with public sewer to accommodate growth and service to several existing mobile home parks.

Plate 6 illustrates the layout of the Conewago Industrial Park and potential site location of a regional treatment facility. Table 19 presents a preliminary facility wastewater capacity sizing for a 25-year planning period using information from the Londonderry Township 537 Plan.

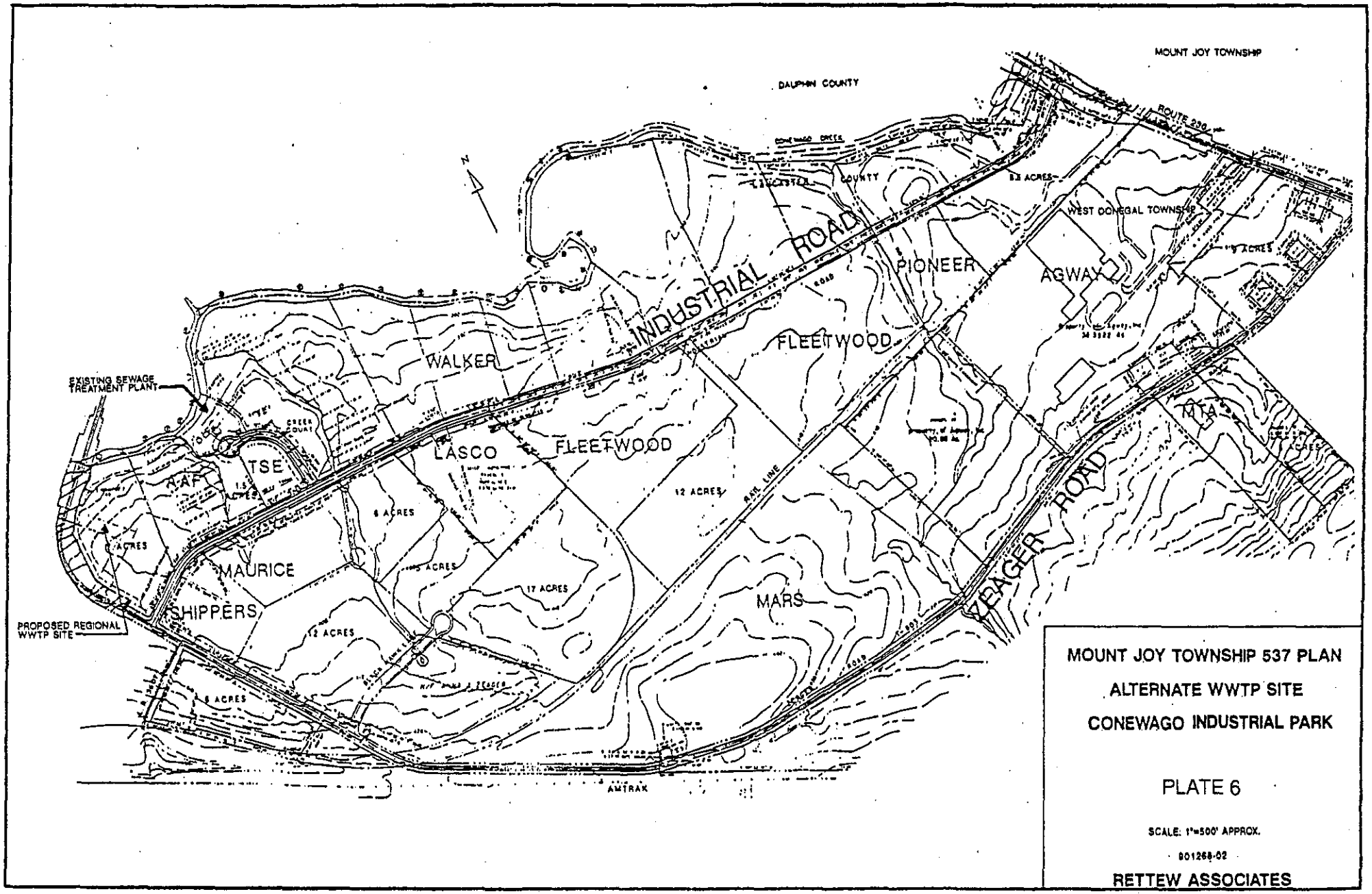

MOUNT JOY TOWNSHIP
DAUPHIN COUNTY
ROUTE 230
INDUSTRIAL ROAD
PIONEER
AGWAY
FLEETWOOD
WALKER
LASCO
FLEETWOOD
EXISTING SEWAGE TREATMENT PLANT
TSE
NAFF
MAURICE
SHIPPERS
MARS
ZEAGER ROAD
MTA
PROPOSED REGIONAL WWTP SITE
AMTRAK
WEST DONEGAL TOWNSHIP
MOUNT JOY TOWNSHIP 537 PLAN
ALTERNATE WWTP SITE
CONEWAGO INDUSTRIAL PARK
PLATE 6
SCALE: 1"=500' APPROX.
901268-02
RETTEW ASSOCIATES

TABLE 19

CONEWAGO WASTEWATER TREATMENT FACILITY ALTERNATIVE PRELIMINARY WASTEWATER CAPACITY SIZING

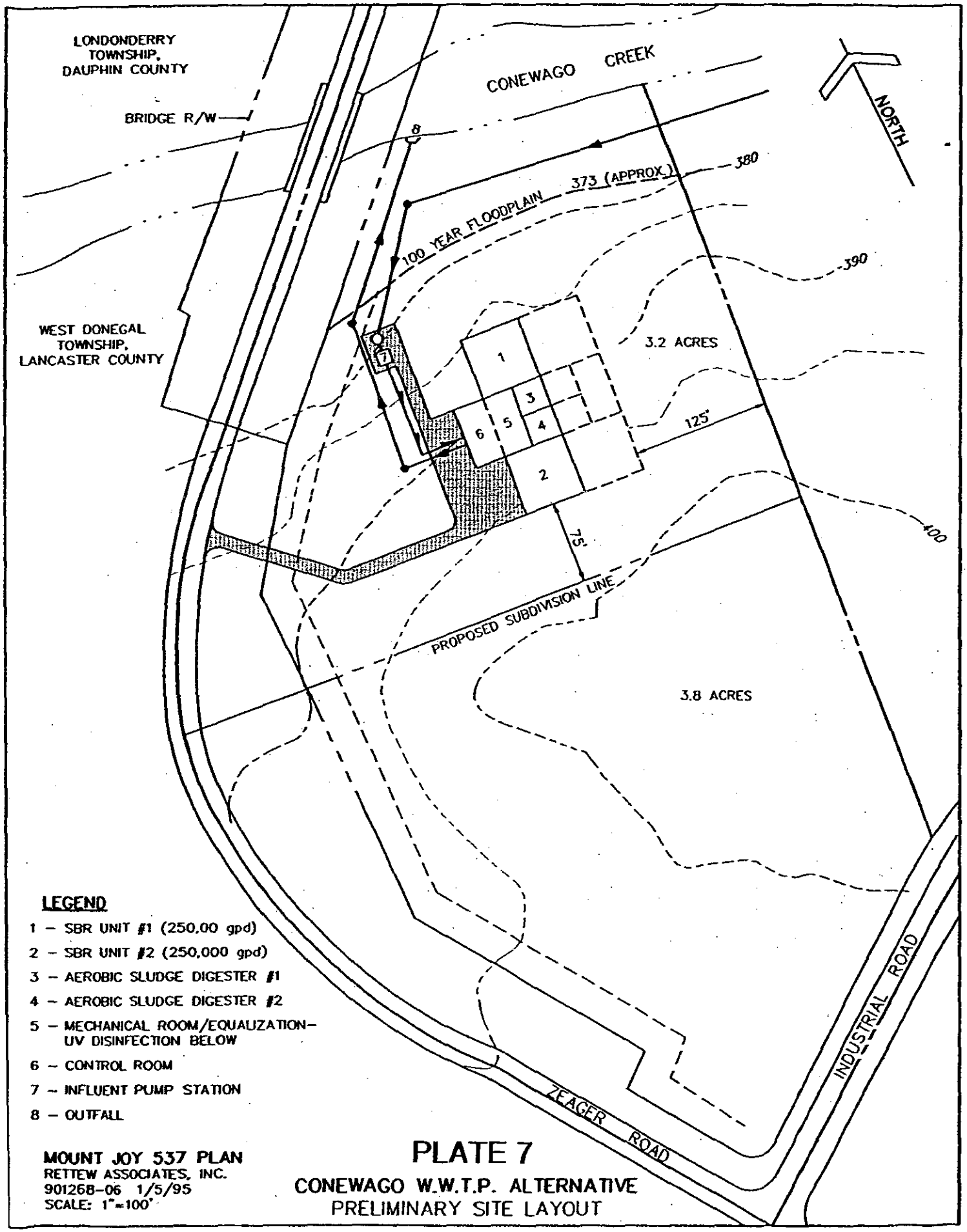
	1-5 Year	10- Year	25- Year
Mount Joy Township	203,900	306,800	500,900
West Donegal Township	20,000	20,000	20,000
Conewago Industrial Park	75,000	115,000	150,000
Londonderry Township	160,000	210,000	300,000
Conewago Township	--	--	--
Elizabethtown Borough	--	--	--
Total Flow (gpd)	458,900	651,800	970,900
Design Capacity	**500,000**	**750,000**	**1,000,000**

Construction in three phases would permit a total of 1.0 mgd of capacity of which MJTA would utilize 500,900 gpd. The remaining 13,500 gpd flow on the basin from MJTA would continue to flow into the Borough from areas directly adjacent to the Borough system through currently allocated conveyance capacity (generally, the Highlawn Avenue area).

For planning purposes, we have selected the plant location in the Conewago Industrial Park site since it would represent the preferred location and the most conservative in terms of cost for Mount Joy Township due to its distance further downstream. While potentially a higher cost, there is also a greater potential for cost sharing and economy of scale advantages at this location. As a result, depending upon regional participation, there would actually be a lower net cost to MJTA. Plate 7 illustrates a preliminary site layout for the Conewago regional wastewater treatment facility.

It is understood that this location would require concurrence with 537 Planning by West Donegal Township in order to facilitate its implementation. In the event it becomes difficult to obtain approvals for a treatment facility in this location, an alternative site in Mount Joy Township would be proposed adjacent to Route 230 and Conewago Creek.

Plate 8 illustrates the location of the Conewago interceptors that would convey flows in the basin to a Conewago treatment facility. The location of the interceptor generally follows the Conewago Recreation Trail which utilizes a converted railroad right-of-way. Table 20 presents a summary of the proposed connection point capacity allocations for the Conewago Alternative. Map 15 illustrates the location of the connection points and improvements to the MJTA system.



LEGEND

1 – SBR UNIT #1 (250,00 gpd)
2 – SBR UNIT #2 (250,000 gpd)
3 – AEROBIC SLUDGE DIGESTER #1
4 – AEROBIC SLUDGE DIGESTER #2
5 – MECHANICAL ROOM/EQUALIZATION– UV DISINFECTION BELOW
6 – CONTROL ROOM
7 – INFLUENT PUMP STATION
8 – OUTFALL

MOUNT JOY 537 PLAN
RETTEW ASSOCIATES, INC.
901268-06 1/5/95
SCALE: 1"=100'

PLATE 7

CONEWAGO W.W.T.P. ALTERNATIVE

PRELIMINARY SITE LAYOUT

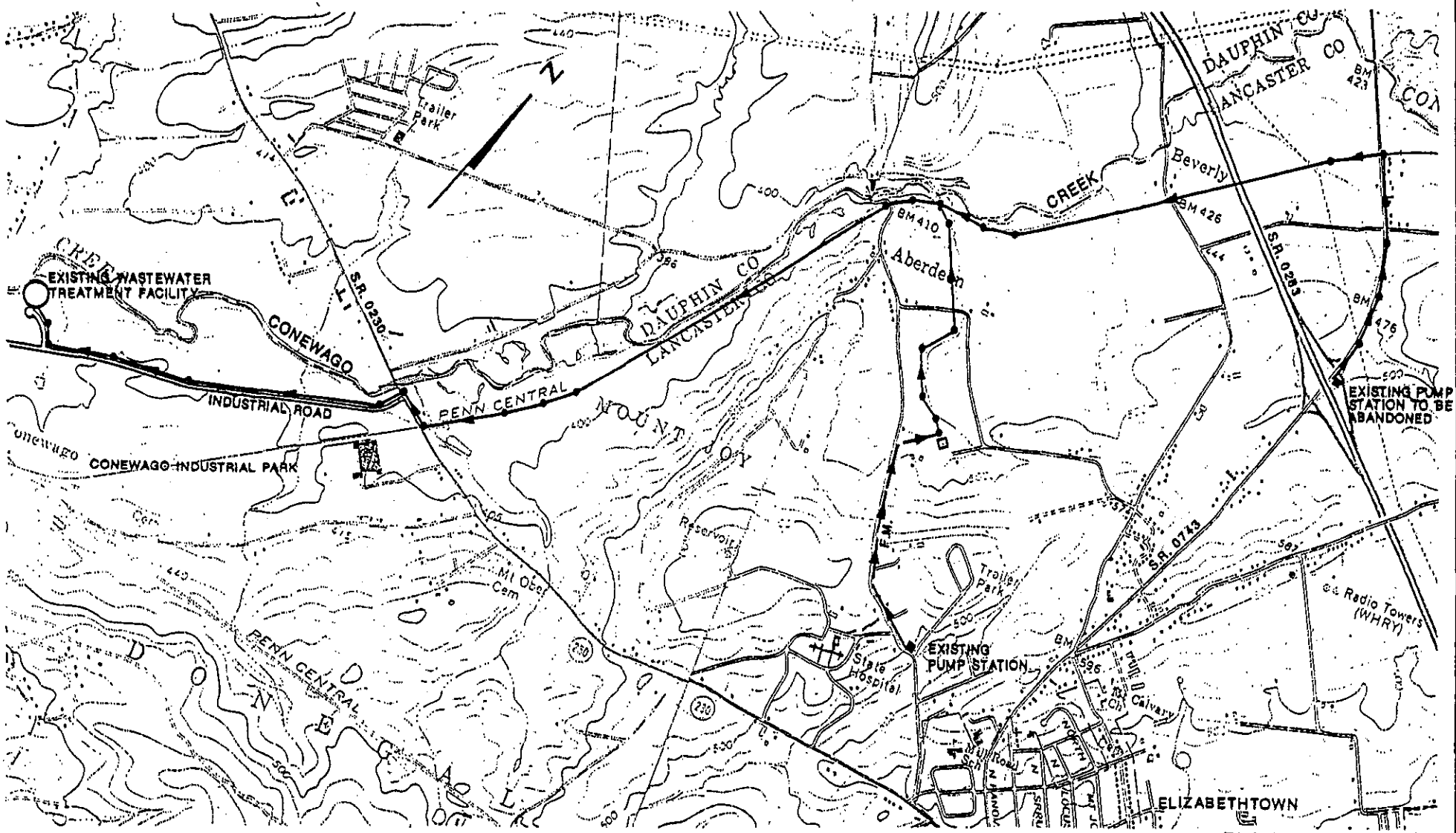

EXISTING WASTEWATER TREATMENT FACILITY
CONEWAGO
INDUSTRIAL ROAD
PENN CENTRAL
CONEWAGO INDUSTRIAL PARK
SR. 0230
DAUPHIN CO
LANCASTER CO
Trailer Park
Aberdeen
BM 410
BM 426
Beverly
CREEK
SR. 0283
EXISTING PUMP STATION TO BE ABANDONED
SR. 0743
Reservoir
Mt Olivet Cem
State Hospital
EXISTING PUMP STATION
Calvary
Radio Towers (WHRY)
ELIZABETHTOWN
PLATE 8
LEGEND
GRAVITY SEWER
F.M.
FORCE MAIN
MOUNT JOY TOWNSHIP 537
CONEWAGO CREEK INTERCEPTOR

TABLE 20

CONEWAGO ALTERNATIVE
PROPOSED CONNECTION POINT
CAPACITY ALLOCATIONS

Connection Point	Location	Allocation	
		gpd ADF	gpd PDF
C1	E - Mill Road	0	0
C2	E - Highlawn Avenue	9,500	23,750
C3	E - Radio Road Metering Chamber	90,700	226,750
C4	E - Kiwanis Boulevard Metering Chamber	116,700	291,750
C5	E - Ridge Avenue	9,700	24,250
C6	E - Mount Joy Street	0	0
C7	E - Oak Manor Pump Station	0	0
C8	WD - West Donegal Metering Chamber	97,800	244,500
C9	WD - E. Harrisburg Ave. to Brett Blvd.	52,450	131,125
C10	WD - Brett Blvd. to Colebrook Road	3,900	9,750
C11	WD - Colebrook Road to Lime Street	1,900	4,750
C12	WD - Anchor Road to Route 230	43,350	108,375
C13 new	WD - West Donegal Interceptor Metering Chamber	400,500	1,001,250
	Conewago Interceptor	470,600	1,176,500
	Total Allocated Flow	**1,297,100**	**3,242,750**

REV. 10/06/98 w/Diversion of Area P to Schwanger Rd. PS.

In consideration of the significant cost to expand and upgrade the Elizabethtown treatment plant, the cost of building a new interceptor to reach the Elizabethtown treatment plant and the requirement for a new outfall line, a second Conewago alternative was developed. This alternative considers construction of the Conewago plant to a 1.0 mgd capacity as a comparison to handle all of the additional capacity needed by Mount Joy Township. As a result, MJTA would be able continue to maintain its current allocation at Elizabethtown (0.404 mgd).

While there would be a significant reduction in the Authority's contribution toward the Elizabethtown expansion, there would still be a contribution for upgrading costs at the plant as

well as annual costs to process biosolids from the Conewago plant at Elizabethtown using available belt filter press capacity.

In order to convey flows to a Conewago site it would also be necessary to divert flows from the Schwanger Road (areas Jp and P) pump station as well as drainage basins K and L into the Conewago interceptor at the former Hershey Road pump station.

This alternative would also reduce the contribution necessary for MJTA to obtain additional capacity in the WDTA system.

Southside Treatment Facility Alternatives

The concept of locating treatment facilities closer to the Township in an effort to reduce conveyance facility construction costs was taken one step further by developing two treatment alternatives in the Donegal drainage basin on the south side of the Township. These alternatives would be developed in conjunction with a 0.5 mgd Conewago treatment facility. This would allow the Authority to avoid conveying wastewater by pumping twice across two drainage basins from the Schwanger Road pump station to a larger Conewago plant site or over to the Elizabethtown plant.

Both alternatives would allow MJTA to maintain its existing allocation at Elizabethtown. Both alternatives would also involve the same conveyance costs. The difference would be on the method of treatment.

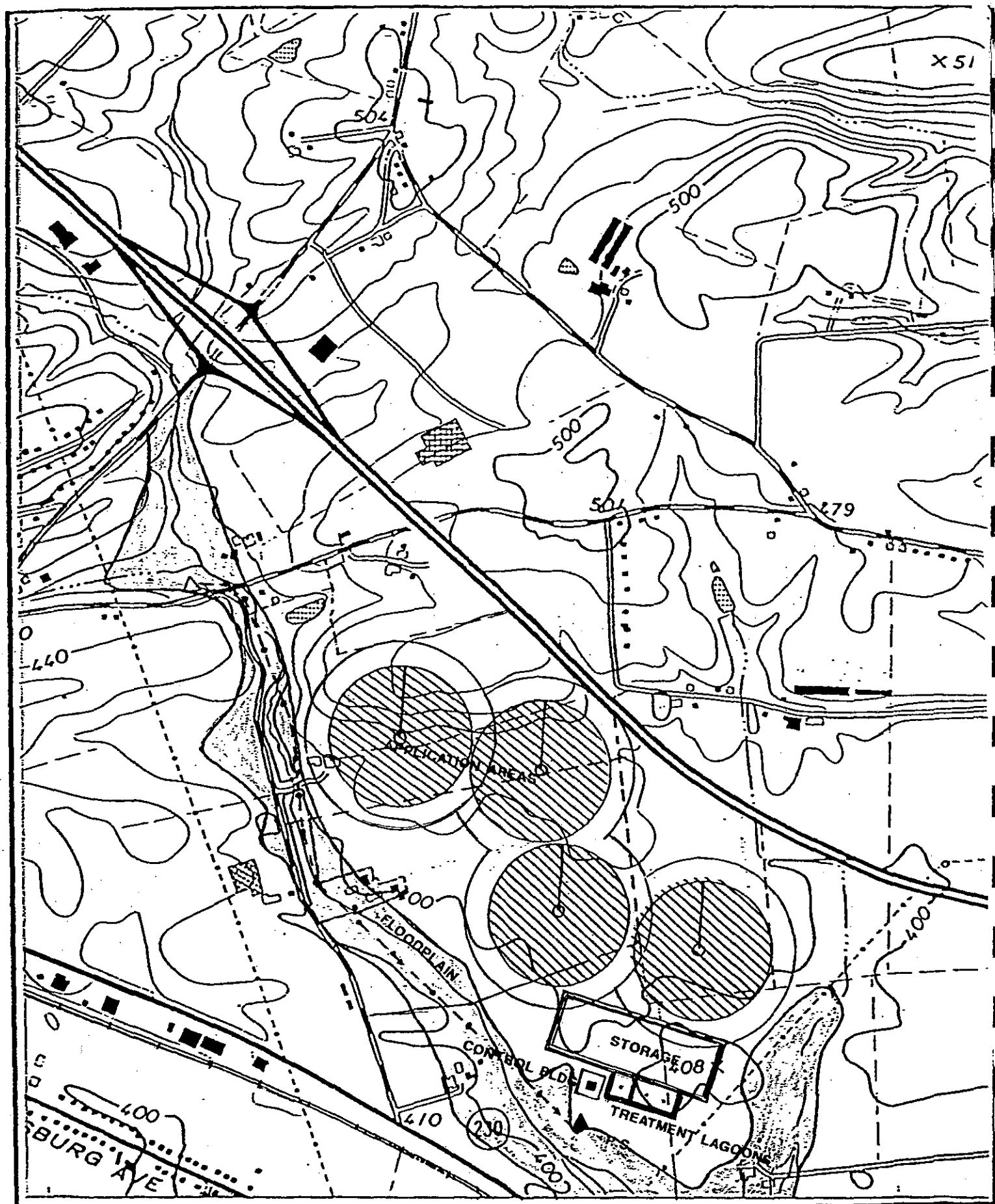
Because the Donegal Springs drainage basin is designated as a high quality stream DEP, a stream discharge would require a greater degree of treatment utilizing best available technology. In many cases, this involves filtration and chemical treatment. A stream discharge must also demonstrate that it is socially and economically justified and other alternatives such as conveyance to other sites and land application are shown to be environmentally and economically unfeasible.

To demonstrate this, a second Southside treatment alternative utilizing spray irrigation was developed.

Both Southside treatment alternatives would provide approximately 0.5 mgd of capacity. Plate 9 illustrates a proposed land application system that was used for developing a construction cost estimate.

The following presents a summary of the seven wastewater management alternatives for development in the Elizabethtown growth area.

Table 21 also provides a summary of the projected flow distribution among treatment facilities for each alternative.



TITLE

SOUTHSIDE LAND APPLICATION ALTERNATIVE

MOUNT JOY 537 PLAN

Rettew Associates, Inc.

DRAWN BY: _____

DATE: 5/3/95

SCALE: 1" = 1000'

TABLE 21

ELIZABETHTOWN AREA
WASTEWATER MANAGEMENT ALTERNATIVE FLOW DISTRIBUTION
AVERAGE DAILY FLOW (MGD)

	Existing Capacity	Elizabethtown Alternative 1	Elizabethtown Alternative 2	Elizabethtown Alternative 3	0.5 MGD Conewago Alternative	1.0 MGD Conewago Alternative	Conewago Southside Alternative	Conewago Southside L.A. Alternative
Elizabethtown Interceptor	0.5352	0.0192	1.0198	1.0198	0.2266	0.1099	0.1099	0.1099
MJTA Interceptor		0.6780						
WDTA Interceptor	0.1325	0.5999	0.2773	0.2773	0.5999	0.2873	0.2873	0.2873
Conewago Interceptor					0.4706	0.8265	0.4706	0.4706
Elizabethtown WWTP	0.4040	1.2971	1.2971	1.2971	0.8265	0.3972	0.3972	0.3972
Conewago WWTP					0.4706	0.8265	0.4706	0.4706
Southside WWTP							0.4293	0.4293
TOTAL WWTP	**0.4040**	**1.2971**	**1.2971**	**1.2971**	**1.2971**	**1.2971**	**1.2971**	**1.2971**

Summary of Alternatives for Cost Evaluation

1. Elizabethtown Alternative 1- Convey all flow to the Elizabethtown WWTP by way of a new interceptor through the Borough and a diversion of the Schwanger Road pump station to an upsized WDTA interceptor.

2. Elizabethtown Alternative 2 - Convey all flow to the Elizabethtown WWTP by way of a new interceptor through the Borough and a diversion of the Schwanger Road Pump Station to the new interceptor at Kiwanis Boulevard.

3. Elizabethtown Alternative 3 - Convey all flow to the Elizabethtown WWTP by way of a new interceptor through the Borough and a diversion of the Schwanger Road pump station to the new interceptor at Conoy Creek (in the vicinity of EMH-45).

4. Conewago Alternative (0.5 mgd) - Divert flows in the Conewago basin to a new 0.5 mgd WWTP located near the Conewago Industrial Park. Wastewater flows in the Southside area would be conveyed through an upsized WDTA interceptor as in the Elizabethtown Alternative 1.

5. Conewago Alternative (1.0 mgd) - Divert flows in the Conewago basin, as well as the Schwanger Road, Wissler, Ridge Road, and Kiwanis Boulevard basins, to a new Conewago interceptor and a 1.0 mgd WWTP near the Conewago Industrial Park. This alternative would maintain Mount Joy Township's current allocation of 0.404 mgd at the Elizabethtown WWTP.

6. Conewago - Southside Alternative - Divert flows in the Conewago basin to a 0.5 mgd WWTP near the Conewago Industrial Park. In addition, the Schwanger Road pump station, Wissler, Kiwanis Boulevard, and Ridge Road flows would be diverted to a new Southside 0.5 mgd WWTP. This alternative would maintain Mount Joy Township's current allocation of 0.404 mgd at the Elizabethtown WWTP.

7. Conewago - Southside L.A. Alternative - Similar to Alternative 6, except that a land application treatment facility is considered instead of a stream discharge facility.

Development of Construction Costs

Planning estimates of construction costs for a 4.5 mgd and 4.0 mgd expansion/upgrade of the Elizabethtown treatment facility were developed as part of the regional study performed by CDM in November, 1995. This study also provided information to determine what portion of the treatment facility costs are related to upgrading the facility for the MJTA's current allocation. This would result in a 3.6 mgd capacity treatment facility at Elizabethtown.

Table 22 presents a summary of the construction cost distribution for MJTA for the Elizabethtown facility expansion and upgrade from the CDM study.

TABLE 22

ELIZABETHTOWN WWTP CONSTRUCTION COST DISTRIBUTIONS
(as per 11/95 CDM Report)

Construction Costs - High/Low Cost Average

	4.5 mgd		4.0 mgd	
	WWTP	Outfall	WWTP	Outfall
Expansion	$3,306,000	$1,330,000	$3,010,000	$1,080,000
Upgrade	$2,009,000	$ 970,000	$1,995,000	$1,220,000

Construction w/ Construction Contingency and Mark-up 35%

	4.5 mgd		4.0 mgd	
	WWTP	Outfall	WWTP	Outfall
Expansion	$4,463,000	$1,796,000	$4,064,000	$1,458,000
Upgrade	$2,712,000	$1,310,000	$2,693,000	$1,647,000

MJTA Distribution Factors

	4.5 mgd		4.0 mgd	
	WWTP	Outfall	WWTP	Outfall
Expansion	0.62525	0.62525	0.43825	0.43825
Upgrade	0.13467	0.16865	0.13467	0.16865

MJTA Cost Share

	4.5 mgd		4.0 mgd	
	WWTP	Outfall	WWTP	Outfall
Expansion	$2,790,000	$1,123,000	$1,781,000	$ 639,000
Upgrade	$ 365,000	$ 221,000	$ 363,000	$ 278,000
Total	$3,155,000	$1,344,000	$2,144,000	$ 917,000
Overall Share	**$4,499,000**		**$3,061,000**	

The following pages provide a breakdown of the different components of the sewer alternatives. Each component is subtotaled and titled to identify the improvement. These components are then assembled to develop an overall construction cost estimate for each alternative.

Table 23 provides a breakdown and composition of estimated construction costs for the four Township treatment components. The difference in relative cost per gallon between the 0.5 and 1.0 mgd Conewago facilities reflects an economy of scale achieved with a larger facility.

The higher cost of the Southside treatment facility reflects the higher degree of treatment required. The land application treatment cost primarily reflects the high cost of land in the area.

Present Worth Analysis

Table 24 presents a summary of the different component capital costs estimated for each of the seven alternatives. Included are conveyance system and treatment facility improvements associated with each of the three systems that MJTA would construct or make a capital contribution. Total capital construction costs have been updated to 1999 costs. To the total estimated construction cost an estimate for planning purposes of 35 percent for engineering, construction observation, legal, permits, and administration costs has been added to develop a total project cost.

Given the significant cost of the proposed alternatives and the similar objective, there is a $292,000 or 25 percent difference in capital cost between the highest and lowest cost alternatives. The apparent lowest capital cost alternative is Elizabethtown Alternative 2 at a cost estimate of $11,423,000.00. The 1.0 MGD Conewago Alternative is the lowest cost of the non-Elizabethtown alternatives.

The present worth evaluation must also consider operation, maintenance and administrative cost differences between alternatives. Each alternative has different operating costs due to the number and size of pump stations and treatment facilities needed to implement each alternative. Common to each alternative are administrative and collection system costs associated with MJTA's annual operations budget. These costs have been projected in Table 25.

A summary of the operation and maintenance (O&M) costs and the equivalent present worth is presented in Table 26. Conversion to a present worth cost is based on a 7.75 percent interest rate and 20-year time frame.

The difference in estimated costs between the highest and lowest annual O&M cost is $210,000 per year or a range of 28 percent. The Elizabethtown alternative's O&M costs are the lowest, reflecting the economy of scale for a large treatment facility as compared to the highest cost for the Conewago - Southside alternative utilizing a high quality water discharge and three treatment facilities. The 1.0 MGD Conewago Alternative is in the upper range of O&M costs for the seven alternatives.

ELIZABETHTOWN WWTP CONVEYANCE ALTERNATIVE

Item	Description	Units	Quantity	Unit Cost	Total
Conoy Creek Interceptor					
1	18" PVC Pipe	LF	8780	$65.00	$570,700.00
2	Manholes	EA	30	$1,265.00	$37,950.00
3	Road Boring	LF	120	$240.00	$28,800.00
4	Stream Crossing	LF	240	$150.00	$36,000.00
5	Encasement	LF	330	$75.00	$24,750.00
6	Conn. to Exist. MH	EA	1	$1,500.00	$1,500.00
7	Seed & Mulch	LF	8450	$1.50	$12,675.00
8	Metering Chamber	EA	1	$18,000.00	$18,000.00
	Subtotal				**$730,375.00**
Conoy Creek Combined Interceptor at MH 45					
1	24" PVC Pipe	LF	8780	$82.00	$719,960.00
2	8" DI FM	LF	7600	$32.00	$243,200.00
3	Manhole	EA	30	$1,265.00	$37,950.00
4	Road Boring	LF	170	$750.00	$127,500.00
5	Stream Crossing	LF	240	$150.00	$36,000.00
6	Encasement	LF	330	$75.00	$24,750.00
7	Conn. to Exist. MH	EA	1	$1,500.00	$1,500.00
8	Seed & Mulch	LF	8450	$1.50	$12,675.00
9	Road Restoration	LF	7600	$13.00	$98,800.00
10	Metering Chamber	EA	1	$18,000.00	$18,000.00
11	Air Release Chamber	EA	1	$2,500.00	$2,500.00
	Subtotal				**$1,322,835.00**
Conoy Creek Combined Interceptor at Kiwanis Boulevard					
1	24" PVC Pipe	LF	14180	$82.00	$1,162,760.00
2	Manhole	EA	52	$1,265.00	$65,780.00
3	Road Boring	LF	360	$750.00	$270,000.00
4	Stream Crossing	LF	270	$150.00	$40,500.00
5	Encasement	LF	330	$75.00	$24,750.00
6	Conn. to Exist. MH	EA	1	$1,500.00	$1,500.00
7	Seed & Mulch	LF	12650	$1.50	$18,975.00
8	Road Restoration	LF	1200	$13.00	$15,600.00
9	Metering Chamber	EA	1	$18,000.00	$18,000.00
	Subtotal				**$1,617,865.00**
WDTA System Improvements @ 1.4992 MGD					
1	Exist. Capacity Reallocation	LS	1	$107,229.00	$107,229.00
2	15" Interceptor Upsizing	LF	2694	$40.00	$107,760.00
3	18" Interceptor Upsizing	LF	1453	$45.00	$65,385.00
4	21" Interceptor Upsizing	LF	2027	$60.00	$121,620.00
5	Manhole	EA	28	$1,265.00	$35,420.00
6	Seed and Mulch	LF	6174	$1.50	$9,261.00
7	Miller Rd. PS Expansion	LS	1	$84,000.00	$84,000.00
8	Miller Rd. FM Expansion	LS	1	$245,000.00	$245,000.00
	Subtotal				**$775,675.00**

ELIZABETHTOWN WWTP CONVEYANCE ALTERNATIVE

Item	Description	Units	Quantity	Unit Cost	Total
Kiwanis Boulevard PS to Schwanger Road					
1	Kiwanis Blvd. PS	LS	1	$120,000.00	$120,000.00
2	6" DI FM	LF	4400	$26.00	$114,400.00
3	8" PVC Pipe	LF	2600	$32.00	$83,200.00
4	Conn. to Exist. MH	EA	1	$1,000.00	$1,000.00
5	Road Restoration	LF	7000	$13.00	$91,000.00
	Subtotal				**$409,600.00**
WDTA System Improvements @ 0.6804 MGD					
1	Exist. Capacity Reallocation	LS	1	$34,429.00	$34,429.00
2	18" Interceptor Upsizing	LF	2027	$45.00	$91,215.00
3	Manhole	EA	10	$1,265.00	$12,650.00
4	Seed and Mulch	LF	2027	$1.50	$3,040.50
5	Miller Rd. PS Expansion	LS	1	$53,750.00	$53,750.00
	Subtotal				**$195,084.50**
WDTA Parallel Interceptor					
1	15" Parallel Interceptor	LF	15100	$40.00	$604,000.00
2	Manholes	EA	49	$1,265.00	$61,985.00
3	Stream Crossing	LF	50	$125.00	$6,250.00
4	Railroad Boring	LF	50	$240.00	$12,000.00
5	Road Restoration	LF	150	$13.00	$1,950.00
6	Seed and Mulch	LF	14950	$1.50	$22,425.00
7	Miller Rd. PS Expansion	LS	1	$84,000.00	$84,000.00
8	Miller Rd. FM Expansion	LS	1	$245,000.00	$245,000.00
	Subtotal				**$1,037,610.00**
Schwanger Road Pump Station to MH 45					
1	8" DI FM	LF	16500	$32.00	$528,000.00
2	Conn. to Exist PS	EA	1	$1,500.00	$1,500.00
3	Road Boring	LF	180	$240.00	$43,200.00
4	Stream Crossing	LF	60	$125.00	$7,500.00
5	Curb Replacement	LF	60	$12.00	$720.00
6	Road Restoration	LF	9200	$13.00	$119,600.00
7	Seed and Mulch	LF	7300	$1.50	$10,950.00
8	Air Release Chamber	EA	1	$2,500.00	$2,500.00
9	Alt. to Exist. PS	LS	1	$220,000.00	$220,000.00
	Subtotal				**$933,970.00**

ELIZABETHTOWN TREATMENT PLANT ALTERNATIVE

Item	Description	Units	Quantity	Unit Cost	Total
Mill Road Pump Station					
1	6" DI FM	LF	2600	$26.00	$67,600.00
2	Conn. to MH 30	EA	1	$1,000.00	$1,000.00
3	Road Restor.	LF	50	$13.00	$650.00
4	Seed & Mulch	LF	2550	$1.50	$3,825.00
5	Alt to P.S.	LS	1	$50,000.00	$50,000.00
	Subtotal				**$123,075.00**
Route 743 Relief Sewer					
1	8" PVC Pipe	LF	4350	$32.00	$139,200.00
2	Manholes	EA	18	$1,265.00	$22,770.00
3	Road Boring	LF	300	$240.00	$72,000.00
4	Conn. to Exist. MH	EA	2	$1,000.00	$2,000.00
5	Conn. to Exist. Sewer	EA	2	$2,000.00	$4,000.00
6	Stream Crossing	LF	15	$125.00	$1,875.00
7	Road Restoration	LF	350	$20.00	$7,000.00
8	Seed & Mulch	LF	4000	$1.50	$6,000.00
	Subtotal				**$254,845.00**
Hershey Road Pump Station					
1	10" PVC Pipe	LF	900	$34.00	$30,600.00
2	12" PVC Pipe	LF	1550	$37.00	$57,350.00
3	12" x 6" Wyes	EA	3	$65.00	$195.00
4	6" PVC Lateral	LF	30	$30.00	$900.00
5	Manholes	EA	10	$1,265.00	$12,650.00
6	Conn. to Exist. MH	EA	1	$1,000.00	$1,000.00
7	10" DI FM	LF	4600	$38.00	$174,800.00
8	Air Release Chamber	EA	1	$2,500.00	$2,500.00
9	Road Boring	LF	30	$240.00	$7,200.00
10	Road Restoration	LF	4500	$13.00	$58,500.00
11	Seed & Mulch	LF	2550	$1.50	$3,825.00
12	Alt to PS	EA	1	$75,000.00	$75,000.00
	Subtotal				**$424,520.00**
Radio Road Pump Station					
1	New Radio Rd. PS	LS	1	$120,000.00	$120,000.00
2	10" DI FM	LF	2650	$38.00	$100,700.00
3	15" PVC Pipe	LF	1050	$50.00	$52,500.00
4	Air Release Chamber	EA	1	$2,500.00	$2,500.00
5	Manholes	EA	5	$1,265.00	$6,325.00
6	Road Boring	LF	50	$240.00	$12,000.00
7	Stream Crossing	LF	15	$125.00	$1,875.00
8	Road Restoration	LF	1000	$13.00	$13,000.00
9	Seed & Mulch	LF	2700	$1.50	$4,050.00
	Subtotal				**$312,950.00**
Elizabethtown Interceptor					
1	18" PVC Pipe	LF	5400	$45.00	$243,000.00
2	Manholes	LF	22	$1,265.00	$27,830.00
3	Road Boring	LF	240	$240.00	$57,600.00
4	Stream Crossing	LF	30	$150.00	$4,500.00
5	Road Restoration	LF	1200	$13.00	$15,600.00
6	Seed and Mulch	LF	4200	$1.50	$6,300.00
	Subtotal				**$354,830.00**

WEST DONEGAL TOWNSHIP AUTHORITY ALTERNATIVE

Item	Description	Units	Quantity	Unit Cost	Total
Schwanger Road Pump Station to Schwanger Road					
1	8" DI FM	LF	8500	$32.00	$272,000.00
2	Conn. to Exist PS	EA	1	$1,500.00	$1,500.00
3	Road Boring	LF	60	$240.00	$14,400.00
4	Stream Crossing	LF	30	$125.00	$3,750.00
5	Conc. Curb Repl.	LF	30	$12.00	$360.00
6	Road Restoration	LF	2800	$13.00	$36,400.00
7	Seed and Mulch	LF	5700	$1.50	$8,550.00
8	Alt. to Exist. PS	LS	1	$220,000.00	$220,000.00
	Subtotal				**$556,960.00**
Schwanger Road Extension					
1	12" PVC Pipe	LF	3800	$37.00	$140,600.00
2	Manholes	EA	17	$1,265.00	$21,505.00
3	Road Boring	LF	80	$240.00	$19,200.00
4	Conn. to Exist. MH	EA	1	$1,000.00	$1,000.00
5	Stream Crossing	LF	30	$125.00	$3,750.00
6	Road Restoration	LF	350	$13.00	$4,550.00
7	Seed and Mulch	LF	3800	$1.50	$5,700.00
8	Demolition	LF	350	$100.00	$35,000.00
9	Metering Chamber	LS	1	$18,000.00	$18,000.00
	Subtotal				**$249,305.00**
Woodland Avenue Extension					
1	8" PVC Pipe	LF	700	$32.00	$22,400.00
2	Manholes	EA	3	$1,265.00	$3,795.00
3	Conn. to Exist. MH	EA	2	$1,000.00	$2,000.00
4	Stream Crossing	LF	15	$125.00	$1,875.00
5	Road Restoration	LF	300	$13.00	$3,900.00
6	Seed and Mulch	LF	400	$1.50	$600.00
	Subtotal				**$34,570.00**
Schwanger Road Replacement					
1	8" PVC Pipe	LF	400	$32.00	$12,800.00
2	Manholes	EA	3	$1,265.00	$3,795.00
3	Conn to Exist. MH	EA	1	$1,000.00	$1,000.00
4	Road Restoration	LF	800	$13.00	$10,400.00
5	Demolition	LF	400	$100.00	$40,000.00
	Subtotal				**$67,995.00**
WDTA Collection System Improvements					
1	Existing Capacity Reallocation	LS	1	$7,738.00	$7,738.00
2	Nolt Rd. PS/FM Expansion	LS	1	$196,000.00	$196,000.00
3	Colebrook PS Expansion	LS	1	$25,000.00	$25,000.00
	Subtotal				**$228,738.00**

CONEWAGO TREATMENT FACILITY ALTERNATIVE

Item	Description	Units	Quantity	Unit Cost	Total
Mill Road Pump Station					
1	6" DI FM	LF	2700	$26.00	$70,200.00
2	8" PVC Pipe	LF	2550	$32.00	$81,600.00
3	Manholes	EA	10	$1,265.00	$12,650.00
4	Conn to Exist. MH	EA	2	$1,000.00	$2,000.00
5	Road Restoration	LF	1000	$13.00	$13,000.00
6	Seed and Mulch	LF	4250	$1.50	$6,375.00
7	Mod. to Mill Rd. PS	LS	1	$25,000.00	$25,000.00
8	Mod. to Aberdeen PS	LS	1	$25,000.00	$25,000.00
9	Conn. to Exist. FM	LS	1	$3,000.00	$3,000.00
	Subtotal				**$238,825.00**
Radio Road P.S.					
1	Radio Road PS	LS	1	$120,000.00	$120,000.00
2	6" DI FM	LF	5200	$25.00	$130,000.00
3	Air Release Chamber	EA	1	$2,500.00	$2,500.00
4	Road Boring	LF	50	$240.00	$12,000.00
5	Road Restoration	LF	5200	$13.00	$67,600.00
6	Aband. Hershey Rd. PS	LS	1	$20,000.00	$20,000.00
	Subtotal				**$352,100.00**
S.R. 0743 Extension					
1	12" PVC Pipe	LF	3000	$37.00	$111,000.00
2	Manholes	EA	11	$1,265.00	$13,915.00
3	Road Boring	LF	50	$240.00	$12,000.00
4	Stream Crossing	LF	20	$125.00	$2,500.00
5	Seed and Mulch	LF	3000	$1.50	$4,500.00
	Subtotal				**$143,915.00**
Conewago Creek Interceptor					
1	15" PVC Pipe	LF	6700	$40.00	$268,000.00
2	18" PVC Pipe	LF	22000	$45.00	$990,000.00
3	Manholes	EA	72	$1,265.00	$91,080.00
4	Road Boring	LF	200	$240.00	$48,000.00
5	Stream Crossing	LF	100	$125.00	$12,500.00
6	Road Restoration	LF	3000	$13.00	$39,000.00
7	Seed and Mulch	LF	25700	$1.50	$38,550.00
	Subtotal				**$1,487,130.00**

1 MGD CONEWAGO ALTERNATIVE

Item	Description	Units	Quantity	Unit Cost	Total
Mill Road Pump Station					
1	6" DI FM	LF	2700	$26.00	$70,200.00
2	8" PVC Pipe	LF	2550	$32.00	$81,600.00
3	Manholes	EA	10	$1,265.00	$12,650.00
4	Conn. to Exist. MH	EA	2	$1,000.00	$2,000.00
5	Road Restoration	LF	1000	$13.00	$13,000.00
6	Seed and Mulch	LF	4250	$1.50	$6,375.00
7	Mod. to Mill Rd. PS	LS	1	$25,000.00	$25,000.00
8	Mod. to Aberdeen PS	LS	1	$25,000.00	$25,000.00
9	Conn. to Exist. FM	LS	1	$3,000.00	$3,000.00
	Subtotal				**$238,825.00**
S.R. 0743 Extension					
1	12" PVC Pipe	LF	3000	$37.00	$111,000.00
2	Manholes	EA	11	$1,265.00	$13,915.00
3	Road Boring	LF	50	$240.00	$12,000.00
4	Stream Crossing	LF	20	$125.00	$2,500.00
5	Seed and Mulch	LF	3000	$1.50	$4,500.00
	Subtotal				**$143,915.00**
Conewago Creek Interceptor					
1	18" PVC Pipe	LF	6700	$45.00	$301,500.00
2	21" PVC Pipe	LF	22000	$60.00	$1,320,000.00
3	Manholes	EA	72	$1,265.00	$91,080.00
4	Road Boring	LF	200	$750.00	$150,000.00
5	Stream Crossing	LF	100	$125.00	$12,500.00
6	Road Restoration	LF	3000	$13.00	$39,000.00
7	Seed and Mulch	LF	25700	$1.50	$38,550.00
	Subtotal				**$1,952,630.00**
Schwanger Road Pump Station					
1	8" DI FM	LF	9000	$32.00	$288,000.00
2	12" PVC Pipe	LF	4000	$37.00	$148,000.00
3	Conn. to Exist. PS	EA	1	$1,500.00	$1,500.00
4	Road Boring	LF	60	$240.00	$14,400.00
5	Stream Crossing	LF	30	$125.00	$3,750.00
6	Conc. Curb Repl.	LF	30	$12.00	$360.00
7	Road Restoration	LF	10400	$13.00	$135,200.00
8	Seed and Mulch	LF	2600	$1.50	$3,900.00
9	Alt. to Exist. PS	LS	1	$220,000.00	$220,000.00
	Subtotal				**$815,110.00**
Kiwanis Boulevard Pump Station					
1	Kiwanis Blvd. PS	LS	1	$280,000.00	$280,000.00
2	8" DI FM	LF	11300	$32.00	$361,600.00
3	Air Release Chamber	EA	2	$2,500.00	$5,000.00
4	Road Boring	LF	100	$240.00	$24,000.00
5	Road Restoration	LF	7100	$13.00	$92,300.00
6	Seed and Mulch	LF	4200	$1.50	$6,300.00
7	Aband. Hershey Rd. PS	LS	1	$20,000.00	$20,000.00
	Subtotal				**$789,200.00**

TABLE 23

MOUNT JOY TOWNSHIP 537 PLAN
TOWNSHIP TREATMENT FACILITY ESTIMATED CONSTRUCTION COSTS

	0.5 MGD Conewago	1.0 MGD Conewago	0.5 MGD S. Side[1]	0.5 MGD Land App.
Preliminary Treatment	$ 37,400	$ 52,000	$ 37,400	$ 37,400
Pumping Station	62,900	159,000	62,900	142,900
Pumps	78,200	120,000	78,200	380,000
Concrete	520,000	753,000	675,000	20,000
Biological Treatment	366,000	510,000	630,000	290,000
Control Building	150,000	280,000	360,000	120,000
Emergency Power	85,000	130,000	95,000	60,000
Chemical Treatment	20,000	30,000	42,000	------
Piping	87,000	140,000	100,000	10,000
Disinfection	57,000	85,500	57,000	------
Potable/Process Water	15,000	38,000	38,000	15,000
Sitework	32,000	60,000	45,000	160,000
Excavation	56,000	95,000	74,000	------
Storage	------	------	------	720,000
Distribution	------	------	------	320,000
Mobilization/Demobilization	50,000	69,000	62,000	63,700
Land[2]	80,000	80,000	80,000	1,400,000
Electrical	132,500	382,000	346,500	80,000
Outfall	5,000	5,500	5,000	------
Estimated Treatment Facilities Construction Cost	**$1,834,000**	**$2,989,000**	**$2,788,000**	**$3,819,000**

[1] Based on Socio-Economic justification for discharge to a High Quality Stream.

[2] Land cost based on $5,000/acre.

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TABLE 24
MOUNT JOY TOWNSHIP 537 PLAN ALTERNATIVES
CAPITAL COST COMPARISON
AS OF 10/9/98

CONSTRUCTION COST ESTIMATES	ELIZABETHTOWN ALTERNATIVE 1 (CONOY & WDTA INTERCEPTOR)	ELIZABETHTOWN ALTERNATIVE 2 (CONOY INTERCEPTOR @ KIWANIS)	ELIZABETHTOWN ALTERNATIVE 3 (CONOY INTERCEPTOR @ MH 45)	0.5 MGD CONEWAGO ALTERNATIVE	1.0 MGD CONEWAGO ALTERNATIVE	CONEWAGO SOUTHSIDE ALTERNATIVE	CONEWAGO SOUTHSIDE L.A. ALTERNATIVE
MJTA System Improvements							
Mill Road Pump Station	$123,075	$123,075	$123,075	$238,825	$238,825	$238,825	$238,825
Route 743 Sewer Improvements	$254,845	$254,845	$254,845	$143,915	$143,915	$143,915	$143,915
Hershey Road Pump Station	$424,520	$424,520	$424,520	$20,000	$0	$20,000	$20,000
Radio Road Pump Station	$312,950	$312,950	$312,950	$0	$0	$0	$0
Elizabethtown Interceptor	$354,830	$0	$354,830	$0	$0	$0	$0
Conewago Creek Interceptor	$0	$0	$0	$1,487,130	$1,952,630	$1,487,130	$1,487,130
Schwanger Road Pump Station	$556,960	$815,110	$933,970	$556,960	$815,110	$180,000	$180,000
Schwanger Road Extension	$249,305	$0	$0	$249,305	$0	$0	$0
Woodland Avenue Extension	$34,570	$0	$0	$34,570	$0	$0	$0
Schwanger Road Replacement	$67,995	$0	$0	$67,995	$0	$0	$0
Kiwanis Blvd. Pump Station	$0	$0	$0	$0	$789,200	$409,600	$409,600
Subtotal (3)	**$2,379,000**	**$1,931,000**	**$2,404,000**	**$2,799,000**	**$3,940,000**	**$2,479,000**	**$2,479,000**
WDTA System Improvements							
Collection System Capacity Realloc.	$3,684	$3,425	$3,425	$3,684	$3,425	$3,425	$3,425
Interceptor Capacity Reallocation	$38,843	$1,783	$1,783	$38,843	$1,783	$1,783	$1,783
Interceptor Upsizing	$478,148	$250,727	$250,727	$478,148	$250,727	$250,727	$250,727
Nolt Road PS/FM Expansion(1)	$196,000	$196,000	$196,000	$196,000	$196,000	$196,000	$196,000
Colebrook PS Expansion	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
Miller Road PS Expansion (1)	$84,000	$53,750	$53,750	$84,000	$53,750	$53,750	$53,750
Miller Road FM Expansion(1)	$245,000	$0	$0	$245,000	$0	$0	$0
Subtotal (3)	**$1,071,000**	**$531,000**	**$531,000**	**$1,071,000**	**$531,000**	**$531,000**	**$531,000**
Elizabethtown System Improvements							
Interceptor Parallel Extension(1)	$321,000	$401,775	$333,600	$0	$0	$0	$0
Conewago Treatment Plant							
0.5 or 1.0 MGD Capacity	$0	$0	$0	$1,834,000	$2,989,000	$1,834,000	$1,834,000
Southside Treatment Plant							
0.5 MGD Capacity	$0	$0	$0	$0	$0	$2,788,000	$3,819,000
Elizabethtown Treatment Plant							
4.5 MGD Expansion/Upgrade	$4,499,000	$4,499,000	$4,499,000				
4.0 MGD Expansion/Upgrade				$3,061,000			
3.6 MGD Expansion/Upgrade					$582,000	$582,000	$582,000
Total Estimated Construction Cost(3)(4)	**$8,849,000**	**$7,878,000**	**$8,311,000**	**$9,379,000**	**$8,605,000**	**$8,789,000**	**$9,892,000**
Construction Contingency (10%)	**$885,000**	**$788,000**	**$831,000**	**$938,000**	**$861,000**	**$879,000**	**$989,000**
Total Estimated Project Cost(2)(3)	**$12,831,000**	**$11,423,000**	**$12,051,000**	**$13,600,000**	**$12,478,000**	**$12,744,000**	**$14,343,000**

(1)Cost Sharing considered between MJTA and Borough or WDTA.

(2) Project Costs estimated at 35% of construction costs.

(3) Totals rounded to nearest $1,000.

(4) Costs updated to 1999

D:\LLA1003\537 Plan\Capital Cost Comparison

TABLE 25

MOUNT JOY TOWNSHIP
537 PLAN ALTERNATIVES
ESTIMATED ANNUAL ADMINISTRATIVE COSTS

Item	Estimated Cost
Administration	8,000.00
Operator Salary w/ Benefits	72,000.00
Trustee Fee	2,500.00
Office Supplies	4,000.00
Advertising	500.00
Insurance	15,000.00
Audit	5,000.00
Telephone	3,200.00
Postage	2,000.00
Legal	2,000.00
Engineering	15,000.00
Electricity	0.00
Collection System Maintenance and Repair	20,000.00
Chemical and Supplies	200.00
Testing	100.00
Total Estimated Operating Cost	149,500.00
Includes overall system operating costs associated with all alternatives.	

TABLE 26
MOUNT JOY TOWNSHIP 537 PLAN ALTERNATIVES
ESTIMATED OPERATION AND MAINTENANCE COSTS
AS OF 10/9/98

O AND M COST ESTIMATES	ELIZABETHTOWN ALTERNATIVE 1 (CONOY & WDTA INTERCEPTOR)	ELIZABETHTOWN ALTERNATIVE 2 (CONOY INTERCEPTOR @ KIWANIS)	ELIZABETHTOWN ALTERNATIVE 3 (CONOY INTERCEPTOR @ MH 45)	0.5 MGD CONEWAGO ALTERNATIVE	1.0 MGD CONEWAGO ALTERNATIVE	CONEWAGO SOUTHSIDE ALTERNATIVE	CONEWAGO SOUTHSIDE L.A. ALTERNATIVE
Pump Stations							
Mill Road Pump Station	$4,000	$4,000	$4,000	$4,050	$4,050	$4,050	$4,050
Hershey Road Pump Station	$14,550	$14,550	$14,550	$0	$0	$0	$0
Radio Road Pump Station	$11,325	$11,325	$11,325	$0	$0	$0	$0
Schwanger Road Pump Station	$11,750	$12,800	$16,100	$11,750	$12,800	$0	$0
Kiwanis Pump Station	$0	$0	$0	$0	$19,300	$4,500	$4,500
Conewago Pump Station	$1,475	$1,475	$1,475	$0	$0	$0	$0
Aberdeen Pump Station	$1,530	$1,530	$1,530	$0	$0	$0	$0
Subtotal (3)	$44,630	$45,680	$48,980	$15,800	$36,150	$8,550	$8,550
Wastewater Treatment Facilities							
0.5 Mgd Conewago	$0	$0	$0	$202,000	$0	$202,000	$202,000
0.5 Mgd Southside	$0	$0	$0	$0	$0	$223,500	$0
1.0 Mgd Conewago	$0	$0	$0	$0	$354,500	$0	$0
0.5 Southside Land Application	$0	$0	$0	$0	$0	$0	$99,000
Elizabethtown System							
Treatment Charges	$153,300	$223,300	$223,300	$57,400	$31,500	$31,500	$31,500
Conveyance Charges	$500	$515	$720	$5,350	$2,700	$2,700	$2,700
West Donegal System							
Treatment Charges	$126,300	$57,700	$57,700	$141,000	$69,700	$69,700	$69,700
Conveyance Charges	$126,900	$58,000	$58,000	$126,900	$58,000	$58,000	$58,000
MJTA System Administration	$149,500	$149,500	$149,500	$149,500	$149,500	$149,500	$149,500
Total Estimated Annual O&M Cost(1)	**$601,000**	**$535,000**	**$538,000**	**$698,000**	**$702,000**	**$745,000**	**$621,000**
Estimated Present Worth O&M Cost (1)(2)(3)	**$6,438,000**	**$5,731,000**	**$5,764,000**	**$7,478,000**	**$7,520,000**	**$7,981,000**	**$6,653,000**

(1) Totals rounded to nearest $1,000.

(2) Present Worth Based on 7.75% and 20 Years.

(3) Costs updated and estimated to 1999

It is interesting to note that while the Elizabethtown alternatives provide the economy of scale for treatment costs, there is a higher price to be paid for conveyance charges and pumping costs to convey flow to the distant plant site.

Salvage values are included as a part of the cost effectiveness analysis to compare the seven different alternatives equally within the same 20-year time frame. For example, a salvage value would place a higher value on interceptor construction over a treatment facility due to the interceptors' longer life expectancy. The remaining 30 years of interceptor value is credited as a straight line depreciation to the present worth analysis.

The following schedule is used as a basis for determining salvage values for the sewer alternatives.

Estimated Depreciation Schedule for Wastewater Facilities

1. **Conveyance Facilities**
   50 years - straight line depreciation
2. **Wastewater Treatment Facilities**
   Equipment (1/2 construction cost) - 20 years - straight line depreciation
   Structures (1/2 construction cost) - 40 years - straight line depreciation
3. **Pumping Facilities**
   Equipment (1/3 construction cost) 20 years - straight line depreciation
   Structures (2/3 construction cost) 40 years - straight line depreciation
4. **Spray Irrigation Facilities**
   Spray System - 20 years - straight line depreciation
   Sitework - 40 years - straight line depreciation
5. **Land**
   No depreciation

Table 27 presents a summary of the estimated future salvage values and the equivalent present worth value based on 7.75 percent interest and a 20-year time frame. As expected the alternative utilizing a spray irrigation treatment system has the highest salvage value as attributed to the value of land utilized for spray irrigation.

The lowest salvage value is attributed to the Conewago-Southside alternative which utilized closer treatment facility sites to avoid higher conveyance interceptor costs.

Table 28 presents the present worth analysis combining the project costs, annual generation and maintenance and salvage values. The table allows a common comparison of the cost benefits of each alternative in terms of lower construction cost, lower O&M cost or greater life expectancy to be compared in an equal manner.

Net present worth is determined by adding the estimated project costs and present worth O&M costs and deducting the present worth salvage value.

TABLE 27
MOUNT JOY TOWNSHIP 537 PLAN ALTERNATIVES
ESTIMATED SALVAGE VALUES
AS OF 10/9/98

SALVAGE VALUES	ELIZABETHTOWN ALTERNATIVE 1 (CONOY & WDTA INTERCEPTOR)	ELIZABETHTOWN ALTERNATIVE 2 (CONOY INTERCEPTOR @ KIWANIS)	ELIZABETHTOWN ALTERNATIVE 3 (CONOY INTERCEPTOR @ MH 45)	0.5 MGD CONEWAGO ALTERNATIVE	1.0 MGD CONEWAGO ALTERNATIVE	CONEWAGO SOUTHSIDE ALTERNATIVE	CONEWAGO SOUTHSIDE L.A. ALTERNATIVE
MJTA System Improvements							
Mill Road Pump Station	$60,550	$60,550	$60,550	$130,000	$130,000	$130,000	$238,825
Route 743 Sewer Improvements	$152,900	$152,900	$152,900	$86,350	$86,350	$86,350	$143,915
Hershey Road Pump Station	$234,700	$234,700	$234,700	$0	$0	$0	$0
Radio Road Pump Station	$203,800	$203,800	$203,800	$0	$0	$0	$0
Elizabethtown Interceptor	$212,900	$0	$212,900	$0	$0	$0	$0
Conewago Creek Interceptor	$0	$0	$0	$892,300	$1,171,500	$892,300	$1,487,130
Schwanger Road Pump Station	$275,500	$430,400	$560,400	$275,500	$430,400	$108,000	$180,000
Schwanger Road Extension	$149,600	$0	$0	$149,600	$0	$0	$0
Woodland Avenue Extension	$20,750	$0	$0	$20,750	$0	$0	$0
Schwanger Road Replacement	$40,800	$0	$0	$40,800	$0	$0	$0
Kiwanis Blvd. Pump Station	$0	$0	$0	$0	$198,800	$213,750	$409,600
Subtotal (3)	**$1,352,000**	**$1,082,000**	**$1,425,000**	**$1,595,000**	**$2,217,000**	**$1,430,000**	**$2,459,000**
WDTA System Improvements							
Collection System Capacity Realloc.	$2,200	$2,050	$2,050	$2,200	$2,050	$2,050	$2,050
Interceptor Capacity Reallocation	$23,300	$1,050	$1,050	$23,300	$1,050	$1,050	$1,050
Interceptor Upsizing	$286,900	$150,400	$150,400	$286,900	$150,400	$150,400	$150,400
Nolt Road PS/FM Expansion (1)	$97,300	$97,300	$97,300	$97,300	$97,300	$97,300	$97,300
Colebrook PS Expansion	$8,300	$8,300	$8,300	$8,300	$8,300	$8,300	$8,300
Miller Road PS Expansion (1)	$28,000	$17,900	$17,900	$28,000	$17,900	$17,900	$17,900
Miller Road FM Expansion (1)	$147,000	$0	$0	$147,000	$0	$0	$0
Subtotal (3)	**$593,000**	**$277,000**	**$277,000**	**$593,000**	**$277,000**	**$277,000**	**$277,000**
Elizabethtown System Improvements							
Interceptor Parallel Extension(1)	$192,600	$241,100	$200,200	$0	$0	$0	$0
Conewago Treatment Plant							
0.5 or 1.0 MGD Capacity	$0	$0	$0	$518,500	$807,250	$518,500	$518,500
Southside Treatment Plant							
0.5 MGD Capacity	$0	$0	$0	$0	$0	$697,000	$2,064,750
Elizabethtown Treatment Plant							
4.5 MGD Expansion/Upgrade	$1,124,750	$1,124,750	$1,124,750				
4.0 MGD Expansion/Upgrade				$765,250			
3.6 MGD Expansion/Upgrade					$145,500	$145,500	$145,500
Total Estimated Future Salvage Value(2)(4)	**$3,491,000**	**$2,916,000**	**$3,239,000**	**$3,715,000**	**$3,688,000**	**$3,283,000**	**$5,847,000**
Present Worth Salvage Value (2)(3)	**$787,000**	**$658,000**	**$730,000**	**$838,000**	**$832,000**	**$740,000**	**$1,318,000**

(1) Cost Sharing considered between MJTA and Borough or WDTA.
(2) Totals rounded to nearest $1,000.
(3) Present Worth Based on 7.75% and 20 Years.
(4) Future costs updated to 1999 estimates

TABLE 28
MOUNT JOY TOWNSHIP 537 PLAN ALTERNATIVES
PRESENT WORTH COST COMPARISON
AS OF 10/9/98

CONSTRUCTION COST ESTIMATES	ELIZABETHTOWN ALTERNATIVE 1 (CONOY & WDTA INTERCEPTOR)	ELIZABETHTOWN ALTERNATIVE 2 (CONOY INTERCEPTOR @ KIWANIS)	ELIZABETHTOWN ALTERNATIVE 3 (CONOY INTERCEPTOR @ MH 45)	0.5 MGD CONEWAGO ALTERNATIVE	1.0 MGD CONEWAGO ALTERNATIVE	CONEWAGO SOUTHSIDE ALTERNATIVE	CONEWAGO SOUTHSIDE L.A. ALTERNATIVE
MJTA System Improvements							
Mill Road Pump Station	$123,075	$123,075	$123,075	$238,825	$238,825	$238,825	$238,825
Route 743 Sewer Improvements	$254,845	$254,845	$254,845	$143,915	$143,915	$143,915	$143,915
Hershey Road Pump Station	$424,520	$424,520	$424,520	$20,000	$0	$20,000	$20,000
Radio Road Pump Station	$312,950	$312,950	$312,950	$0	$0	$0	$0
Elizabethtown Interceptor	$354,830	$0	$354,830	$0	$0	$0	$0
Conewago Creek Interceptor	$0	$0	$0	$1,487,130	$1,952,630	$1,487,130	$1,487,130
Schwanger Road Pump Station	$556,960	$815,110	$933,970	$556,960	$815,110	$180,000	$180,000
Schwanger Road Extension	$249,305	$0	$0	$249,305	$0	$0	$0
Woodland Avenue Extension	$34,570	$0	$0	$34,570	$0	$0	$0
Schwanger Road Replacement	$67,995	$0	$0	$67,995	$0	$0	$0
Kiwanis Blvd. Pump Station	$0	$0	$0	$0	$789,200	$409,600	$409,600
Subtotal (3)	**$2,379,000**	**$1,931,000**	**$2,404,000**	**$2,799,000**	**$3,940,000**	**$2,479,000**	**$2,479,000**
WDTA System Improvements							
Collection System Capacity Realloc.	$3,684	$3,425	$3,425	$3,684	$3,425	$3,425	$3,425
Interceptor Capacity Reallocation	$38,843	$1,783	$1,783	$38,843	$1,783	$1,783	$1,783
Interceptor Upsizing	$478,148	$250,727	$250,727	$478,148	$250,727	$250,727	$250,727
Nolt Road PS/FM Expansion (1)	$196,000	$196,000	$196,000	$196,000	$196,000	$196,000	$196,000
Colebrook PS Expansion	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
Miller Road PS Expansion (1)	$84,000	$53,750	$53,750	$84,000	$53,750	$53,750	$53,750
Miller Road FM Expansion (1)	$245,000	$0	$0	$245,000	$0	$0	$0
Subtotal (3)	**$1,071,000**	**$531,000**	**$531,000**	**$1,071,000**	**$531,000**	**$531,000**	**$531,000**
Elizabethtown System Improvements							
Interceptor Parallel Extension (1)	$321,000	$401,775	$333,600	$0	$0	$0	$0
Conewago Treatment Plant							
0.5 or 1.0 MGD Capacity	$0	$0	$0	$1,834,000	$2,989,000	$1,834,000	$1,834,000
Southside Treatment Plant							
0.5 MGD Capacity	$0	$0	$0	$0	$0	$2,788,000	$3,819,000
Elizabethtown Treatment Plant							
4.5 MGD Expansion/Upgrade	$4,499,000	$4,499,000	$4,499,000				
4.0 MGD Expansion/Upgrade				$3,061,000			
3.6 MGD Expansion/Upgrade					$582,000	$582,000	$582,000
Total Estimated Construction Cost (3)(4)	**$8,849,000**	**$7,878,000**	**$8,311,000**	**$9,379,000**	**$8,605,000**	**$8,789,000**	**$9,892,000**
Construction Contingency (10%)	**$885,000**	**$788,000**	**$831,000**	**$938,000**	**$861,000**	**$879,000**	**$989,000**
Total Estimated Project Cost (2)(3)	**$12,831,000**	**$11,423,000**	**$12,051,000**	**$13,600,000**	**$12,478,000**	**$12,744,000**	**$14,343,000**
Total Estimated Annual O&M Cost (3)	**$601,000**	**$535,000**	**$538,000**	**$698,000**	**$702,000**	**$745,000**	**$621,000**
Estimated Present Worth O&M Cost (3)	**$6,438,000**	**$5,731,000**	**$5,764,000**	**$7,478,000**	**$7,520,000**	**$7,981,000**	**$6,653,000**
Total Estimated Future Salvage Value (3)	**$3,491,000**	**$2,916,000**	**$3,239,000**	**$3,715,000**	**$3,688,000**	**$3,283,000**	**$5,847,000**
Present Worth Salvage Value (3)	**$787,000**	**$658,000**	**$730,000**	**$838,000**	**$832,000**	**$740,000**	**$1,318,000**
ESTIMATED PRESENT WORTH (3)	**$18,482,000**	**$16,496,000**	**$17,085,000**	**$20,240,000**	**$19,166,000**	**$19,985,000**	**$19,678,000**

(1) Cost Sharing considered between MJTA and Borough or WDTA.
(2) Project Costs estimated at 35% of construction costs.
(3) Totals rounded to nearest $1,000.
(4) Costs updated to 1999 costs.

Based on the relative present worth, the Elizabethtown alternatives are the most cost-effective of the seven alternatives. Alternative 2, using a diversion of the Schwanger Road pump station to bypass the WDTA interceptor and discharge into the Conoy Creek interceptor at Kiwanis Boulevard, is the most cost-effective of the three Elizabethtown alternatives.

We note that the comparisons made for these alternatives included opportunities for cost sharing by municipalities toward construction and O&M costs that may result from the following:

- Upsizing of the Conoy Creek interceptors by the Borough to accommodate additional flows in Mount Joy Township; and

- Possible joint regional use of the Conewago treatment facility site to accommodate flows from West Donegal Township and Londonderry Township.

During the development of alternatives it was recognized that it would be costly for MJTA to be responsible for cost improvements to both the WDTA interceptor and Elizabethtown interceptor to reach the treatment facility. It would be beneficial to identify a single route for expansion of an existing interceptor to reduce the cost of conveyance.

As the Borough and WDTA developed their planning, it was determined that WDTA would need to reserve any remaining capacity in their interceptor for growth in West Donegal Township. As a result, any expansion costs would be the responsibility of MJTA. However, in Elizabethtown, the Borough determined the need to rehabilitate the Conoy Creek interceptor through the Borough to the treatment plant. By jointly participating in this project there would be a significant cost savings to both municipalities. It would also be cost effective to size the new interceptor to handle the additional flows proposed in the Township due to the central location of the Conoy Creek interceptor.

With respect to the Conewago treatment facility, initial discussions on the location of a site in the Conewago Industrial Park were not favorable. Interest in a cooperative cost sharing with West Donegal Township and Londonderry Township was also hampered by differences in implementation schedules for public sewer.

In addition to cost there are other factors that will need to be considered in the final selection (i.e., environmental, service area availability, construction phasing, implementation, reliability, and operability).

5.4 Non-Structural Alternatives

The continued use of individual sewage disposal systems is currently the only feasible alternative for those areas of the Township which cannot be served by existing public sewer systems. Therefore, the Township can develop effective non-structural measures aimed at increasing the longevity of on-lot systems and improving groundwater protection measures.

A "no action" alternative would potentially create future long-term problem areas as it would not address the issues of properly maintained systems and further groundwater degradation from future system malfunctions. Therefore, a no-action alternative is not recommended.

The following non-structural alternatives should be evaluated by the Township to protect the groundwater from further degradation and to promote adequate sewage facilities planning:

OLDS Education

An educational program should be initiated which would involve mailings and/or public meetings intended to promote proper maintenance of on-lot sewage disposal systems. The Township SEO would be primarily responsible for developing such a program.

Sewage Management Program

In addition to encouraging the proper maintenance of OLDS through an educational program, the Township should adopt a comprehensive sewage management program, by ordinance, which would require adequate management of sewage facilities. This ordinance would be consistent with the requirements of the Pennsylvania Code 25, Chapter 71, and would address the following:

1. Modifications to OLDS - Any modifications or improvements to existing on-lot systems will be consistent with the requirements of this program as well as Chapter 71. Depending on the type of modification, the Township or DEP may require expanded absorption areas, alternating absorption areas, or water conservation devices.

2. Maintenance of OLDS - Consistent with Chapter 71, Section 71.73, the sewage management program would establish the legal authority to require proper maintenance or operation for facilities which are not properly functioning. Based on the deficiencies, the Township could enforce regulations regarding periodic pumping of septage, surface contouring, water conservation, mechanical and electrical devices, standards for septage pumpers/haulers, and the maintenance of holding tanks.

3. Holding Tanks and Privies - Procedures would be established for the use and maintenance of existing and new holding tanks and privies consistent with the requirements of Chapter 71, Section 71.63.

4. Alternate Absorption Areas - The testing and designation of land suitable for an alternate on-lot system would be required for each lot proposed in all new subdivisions and land developments.

5. Inspection Procedures - In order to effectively enforce the sewage management program, the Township must establish the right to inspect all sewage facilities within the Township.

6. Flow Metering - The Township may require flow metering if hydraulic overloading is believed to be the cause of a malfunctioning facility.

Areas Requiring Hydrogeologic Studies

State regulations in Chapter 71, Section 71.62(c)(2) require a preliminary hydrogeologic analysis for developments proposing on-lot sewage disposal systems when any of the following conditions exist:

1. A large volume (>10,000 gpd) on-lot sewage system is proposed.

2. A subdivision of more than 50 EDU's with a density of more than one lot or EDU per acre is proposed.

3. A well within ¼ mile of the development is known to have nitrate results exceeding 5 parts per million (ppm).

4. The underlying geology may contribute to the potential for groundwater pollution from on-lot sewage systems.

Based on the background findings of this Plan, the Township must develop a plan of action for requiring hydrogeologic analyses for proposed land developments which is consistent with the intent of these state regulations. In addition to requiring such studies for all properties within 1/4 mile of any well containing elevated nitrates, the Township should consider requiring hydrogeologic studies prior to the development or subdivision of land in other areas of concern which are addressed in this Plan. The Township should consider the following alternatives for requiring hydrogeological analyses for projects proposing the use of on-lot sewage disposal:

1. Require such studies for all subdivisions or land developments which require a planning module.

2. Require such studies for all subdivisions or land developments which require a planning module, in areas which are underlain by limestone geology.

3. Require such studies for all projects which require a planning module in areas which are designated by this Plan as having a history of malfunctioning on-lot sewage disposal systems.

4. For those areas of the Township which are not identified by this Plan as having elevated nitrates or any of the conditions listed in the above paragraphs (a-c), require the applicant to present at least one nitrate test result from the site (or adjacent to the site if no well exists) which was collected and tested by a DEP-certified laboratory. A hydrogeologic study is only required if the nitrate result is greater than 5 ppm. As a condition to this requirement, the laboratory and applicant shall certify that all well results collected for this purpose have been presented to the Township.

Nitrate Monitoring Policy

Based on the number of nitrate results above 5.0 ppm which were tested for this study, it is apparent that hydrogeologic studies will be required prior to land development in many areas of

the Township. The Township should adopt a nitrate monitoring policy which would evaluate the consistency between this Plan and hydrogeologic studies submitted by a developer as part of a planning module. Well results submitted with planning modules would be compared to the results of the 537 Plan for nearby areas and would be recorded by the Township on the Hydrogeologic Map (Map 11). If the submitted well results vary from the findings of the 537 Plan, the Township may require additional testing. This program will enhance the administration of DEP's requirements for preliminary hydrogeologic studies while producing a continuous supply of new well data which will be available to the Township and DEP for future studies.

Non-Building Waivers

DEP has developed a procedure (Form B) which allows a property owner to apply for a waiver of the requirement to obtain planning module approval for the subdivision of land if the lots which are to be created will not be built upon. By acknowledging such a waiver, the municipality accepts full responsibility, now and in the future, to prevent any violation of the conditions of the lot. If a violation occurs, the Township must acquire planning module approval from DEP which will include soil testing and other environmental studies for the entire subdivision. Therefore, the Township should consider attaching the following conditions to such waivers for all or specified areas of the Township:

1. Any existing lot which required a hydrogeologic analysis prior to its creation shall not be decreased in size through the use of a non-building waiver. The applicant of such a subdivision shall acquire planning module approval using the Component 2 process.

2. Non-building waiver requests for properties utilizing on-lot sewage disposal systems, in areas with elevated nitrates shall include evidence which supports the proposed lot sizes. If the Board of Supervisors determines that this evidence does not adequately address the nitrate issue, the applicant shall be required to submit a Component 2 planning module which would include a hydrogeologic analysis.

3. In addition to the requirements of Section D of Form B which requires an inspection of any existing OLDS by the Township SEO, the applicant shall also demonstrate that there is an adequate location for a replacement absorption field for the proposed lot or lots. This replacement area shall be approved by the SEO and reserved for future use. The replacement area shall remain free of any structures or vegetation which may adversely impact the suitability of the soil. Only shallow-rooted plant matter will be permitted in the replacement area.

Capped Sewer Ordinance

Depending on the availability of public sewer service, the installation of capped sewers may be required by the Township for land developments in areas which are proposed by this Plan to be sewered within five or ten years. After adopting a capped sewer ordinance, the Township would require such systems when the existing public sewer system is currently incapable of accepting flows from a proposed development due to either the location of the project or the lack of sufficient conveyance or treatment capacity. Since on-lot sewage disposal systems would be utilized as an interim measure, the developer of such a project would be required to comply with

all regulations of the Township and DEP for OLDS which may include, but is not limited to, minimum lot sizes and hydrogeologic studies. Additionally, capped sewers must be constructed in accordance with MJTA regulations.

Dispersion Plume Easements

Preliminary hydrogeologic analyses usually require large lots in areas with marginally elevated nitrates (5 ppm to 10 ppm). Although this requirement is intended to protect the groundwater by restricting the development potential of land which is not currently served by public sewers, excessive lot sizes most often result in the inefficient use of land. Additionally, larger lots are more costly to serve with public sewers if it is required at some point in the future.

The concept of a dispersion plume easement is intended to protect the groundwater in a manner which is equal to, or greater than, the requirement of large lot sizes. A hydrogeologic study would be performed in a similar manner as required with traditional development; however, the study must include the mapping of the plume of dispersion from each proposed drainfield which is in excess of 10 ppm. Smaller lot sizes would be utilized in combination with an easement near the drainfield on the adjacent or remaining lands. The easement would cover the area of land which is outside the proposed lot and would contain the dispersion plume. This method would protect the groundwater to a greater extent than the large-lot method since it would require developers to position each drainfield in a location where the dispersion plume will not adversely impact any future or existing land uses. (The traditional large-lot hydrogeologic analysis does not address the location of each proposed drainfield since it is based only on lot area.)

For subdivisions which would require excessive lot sizes, a dispersion plume easement may be utilized on the parent tract, or adjacent land, so that the subdivision may utilize smaller, more efficient lot sizes. If public sewer service is later provided to the development, the easement would be removed from the deed and the land which the easement covered would become available for development. Dispersion plume easements could also be used with capped sewers in areas where sewer service is planned but not yet available.

In addition to any DEP policies, land developments proposing the use of dispersion plume easements shall be consistent with the following standards:

1. The dispersion plume must be delineated by a qualified professional hydrogeologist, and the proposed easement shall be located and sized to correspond to the limits of the dispersion plume.

2. The use of dispersion plume easements should be limited to developments proposing four or fewer lots unless a capped sewer system is installed to MJTA standards and public sewer service is planned within 10 years.

3. The placement of wells within the easement area will be prohibited.

4. Impervious surfaces may not be included as land which is available for groundwater recharge within the dispersion plume easement area. Additionally, no impervious materials may be added to the easement area after the limits of the easement have been defined.

5. The easement area may not be used to dilute future sewage effluent proposed by any additional subdivision or land development.

6. A legal description of the surveyed boundary of the easement shall be required by the Township prior to the issuance of a building permit.

7. Dispersion plume easements will not be permitted in areas which have documented well test results indicating nitrate-nitrogen levels in excess of 10 ppm, nor will any easement be approved which has not been certified by a professional hydrogeologist to be large enough to maintain background nitrate levels below 10 ppm.

8. The easement must remain as a deed restriction until public sewer service is provided to the lots which created the need for the easement.

9. The Township shall develop techniques to administer deed restrictions which may include any of the following options:

    a. Require the easement to be recorded as a separate instrument prior to planning module approval.

    b. Require the proposed easement to be shown on the subdivision plan.

    c. Approve the planning module based on the condition that the proposed easement will be recorded prior to the issuance of the on-lot sewage disposal permit for the lot which created the need for the easement. The Township Zoning Officer would also require a copy of the deed showing the easement, prior to the issuance of a building permit.

5.5 Environmental Considerations

As with any waste handling facility, the environmental impacts of the proposed action(s) in the planning area must be assessed. The construction and operation of new facilities will have some adverse environmental impacts. Impacts may be temporary or permanent; some may even be beneficial to the environment. In addition to immediate impacts, there may be those which do not appear until the system has been in operation for a period of time. These delayed impacts may be of two types; those resulting from the aging of the system and those known as secondary impacts, which include land development induced by the location of new sewers.

Long-term impacts are primarily effects on soils, ground and surface waters, and some aesthetic considerations. By altering the ground and surface water regimes, certain wastewater treatment schemes can have an adverse environmental impact on soils. Long-term aesthetic considerations include the proximity of the treatment plant to existing development and drinking water sources.

Short-term effects on the environment are basically the effects of treatment plant construction.

Environmental quality may benefit from certain treatment schemes which improve the quality of effluent discharged to surface waters or groundwater. Suitable aquatic habitats are enlarged and overall water quality and supply is improved.

Some problems result as treatment systems age. These problems include equipment breakdowns or failures and leaks in piping or tanks.

The specific temporary (short-term), permanent (long-term), and delayed adverse impacts as well as beneficial impacts are presented for the wastewater treatment methods in this report as non-monetary cost considerations. The environmental factors to be considered are listed below.

Environmental Considerations

- Climate
- Aesthetics
  - Noise
  - Air
  - Visual
- Terrestrial Ecology
- Aquatic
- Soils
- Physiography
- Geology
- Groundwater
  - Quality
  - Quantity
- Surface Water
  - Quality
  - Quantity

A mattrix summary of the environmental impacts associated with the different alternatives is provided on Table 29. Factors range from 1 to 5 on the basis of least impact to greater impact. The alternative with the lowest total score in the matrix is considered to have the lowest impact associated with environmental considerations.

TABLE 29

ENVIRONMENTAL IMPACTS

Category	Alternatives						
	Elizabethtown			Conewago		Southside	
	1	2	3	.5 mgd	1 mgd	Stream	Spray
Climate	1	1	1	1	1	1	1
Aesthetic							
Visual	1	1	1	2	2	2	3
Noise	1	1	1	1	1	1	1
Air	1	1	1	1	1	1	2
Culture	1	1	1	1	1	1	1
Physiology	2	2	2	2	2	2	2
Geology	1	1	1	1	1	1	2
Groundwater							
Quality	1	1	1	1	1	1	3
Quantity	3	3	3	3	3	2	1
Surface Water							
Quality	2	2	2	2	3	4	1
Quantity	2	2	2	1	2	1	1
Soils	1	1	1	1	1	1	2
Terrestrial Ecology	1	1	1	1	1	1	2
Aquatic Ecology	2	2	2	2	2	3	1
Total Point Factors	**20**	**20**	**20**	**20**	**22**	**22**	**23**

In addition to environmental considerations, there are also several other impacts associated with state and federal preservation programs as well as operations and implementation issues. These impacts are summarized below with general comment as a consideration in the selection of a preferred alternative by the Township.

- Archeological and Historical - No historical structures are anticipated to be disturbed as a result of the proposed improvements associated with the lowest cost alternative. Due to the location of sewer near natural water courses, a Phase I archaeological survey is expected to be required during design by the Pennsylvania Historical and Museum Commission (PHMC) (see correspondence).

- Natural Resources - Based on a review of the Pennsylvania Natural Diversity Inventory (PNDI), some natural resources can be potentially impacted by the proposed sewer conveyance facilities. A response from PNDI (see correspondence) indicated a Pennsylvania rare plant on wooded slopes. Generally, most of the proposed facilities will be located in low areas and along roads. Some wetlands involvement is anticipated by the extension of sewers. This impact is anticipated to be temporary due to sewer construction with no loss of wetlands.

- Prime Agricultural Land - Some prime agricultural soils are located in the proposed sewer areas. However, the limited defined service areas severely limit the potential for significant loss of prime agricultural land. The large tracts of prime agricultural land to the east of Route 283 will be protected by directing growth to occur in the designated growth areas where public sewer service will be available. No public sewer is proposed in agricultural zoned areas of the Township. Capacity has been developed to serve areas zoned for residential, commercial and industrial uses.

- Wild and Scenic Rivers - No involvement of this resource occurs in the project area.

- Socioeconomic Considerations - The availability of sewer service to Mount Joy Township (Township) is necessary to maintain water quality, protect public health and secondarily to support growth in the Township. The proposed conveyance facilities continue to support a goal of providing public sewer facilities to growth areas of the Township.

- Operability - Alternatives proposing conveyance to existing treatment facilities are considered to have the best operability due to an existing operations structure and lower increase in operating needs. The local Township treatment alternatives can be considered equal if the systems are operated as an extension of the existing MJTA system. Operating needs could then be supported by the expansion of the existing Township Authority operations structure.

- Reliability - The conveyance alternatives to Elizabethtown are considered the more reliable due to the availability of a larger operating system, full-time staffing, and onsite analysis. The local treatment alternatives need to provide the necessary reliability by the use of current technology utilizing computer system process control, equipment redundancy, alarm telemetry, and emergency power generation capability.

- Resource Use - High conveyance cost alternatives are considered to require the most significant need of resources due to the need to transport wastewater significant distances involving several pump stations prior to treatment. A single treatment facility is also generally more efficient in handling larger volumes of flow than multiple plant locations.

- Implementability - Regional treatment alternatives are usually considered to be the least implementable due to intermunicipal involvement, existing limits on available conveyance capacity and the need to acquire and locate sites and easements in adjacent municipalities. In this case, an intermunicipal structure for regionalization currently exists.

5.6 Organizational and Management Considerations

The implementation of the expansion of wastewater facilities in Mount Joy Township will be sponsored and financed by the existing MJTA. This 5-member group was organized over twenty-three years ago. MJTA is experienced at owning and operating the existing sewer and water systems in the Township.

Continued ownership and operation of the wastewater facilities by MJTA offers the following advantages:

- Existing management and operations structure.

- Availability of operating and administration staff.

- Established legal basis for securing debt and system regulation.

- Coordination of water and wastewater utilities within a common sewer service area.

Elizabethtown Borough is also experienced and capable of owning and operating the existing sewer treatment facilities.

Both municipalities have demonstrated a long-term cooperation through an existing intermunicipal service agreement. Continued operation and management of the existing respective sewer facilities by MJTA and Elizabethtown Borough is feasible for any alternative under consideration.

CHAPTER 6

CHAPTER 6

RECOMMENDED WASTEWATER MANAGEMENT ALTERNATIVES

Based on the detailed evaluation of alternatives, this chapter identifies the recommended alternatives which are proposed to be implemented by the Township. The consistency between the plan of action and the goals and policies of the Township, county, state, and federal government will also be addressed in this chapter.

6.1 Recommended Structural Alternatives

Based on the proposed Comprehensive Plan and recently revised zoning map of the Township, it is proposed that improvements to the MJTA sewer system be implemented to continue to provide public sewer service to areas of the Township where growth is to be directed. Concurrently, MJTA should also make provisions for additional capacity to be obtained in the West Donegal Township sewer system to continue to serve areas of the Township that can naturally flow into the West Donegal Township system. Capacity should also be obtained through the cooperative expansion and rehabilitation of the park conveyance sewer from the Kiwanis Boulevard metering chamber to Market Street and the Conoy Creek interceptor to the Elizabethtown treatment facility.

In addition to conveyance capacity, it is recommended that MJTA obtain additional treatment capacity at the Elizabethtown treatment plant to serve capacity needs through the year 2020.

Capacity determinations for the conveyance and treatment facilities should address long term needs of the Township. This will result in capacity beyond the planning time frame of the proposed Comprehensive Plan. However, due to the large capital investment needed to install and/or replace conveyance facilities and the time required to develop planning and intermunicipal constraints associated with implementation, it is more cost effective to provide for future needs in an increased pipe size at this time.

As a result of the maximization of the existing treatment plant hydraulic capacity, studies by Elizabethtown Borough have determined that it is not feasible to phase the addition of treatment capacity. Considering the time needed to develop planning and implementation of future capacity, the limited need of the Borough for future capacity and the need to build proposed capacity initially at the plant, it is recommended that long-term capacity also be considered in the plant expansion for the Township.

Elizabethtown Alternative 2 has been demonstrated to be the most cost-effective alternative for developing additional conveyance and treatment capacity for the Township. Alternative 2 is recommended for implementation as a part of the 537 Plan. Alternative 2 will provide an increase in sewer treatment capacity from 404,000 gpd to 1,297,100 gpd.

Total estimated project costs for implementing Elizabethtown Alternative 2 are $11,423,000. Included in the project costs is a contribution of $4,499,000 in construction cost ($6,498,800 project cost) to Elizabethtown Borough for upgrading of the treatment plant and an additional capacity of 893,100 gpd.

Table 30 provides a breakdown of projected flows from the Township into the various connection points with the Elizabethtown Borough and West Donegal Township sewer systems. Map 16 illustrates the proposed improvements to the MJTA system.

No collection sewer facilities are proposed as part of these costs. The proposed facilities are anticipated to provide additional conveyance capacity within the existing system service area. Extensions to the existing sewer service area will be constructed and paid for by development and proposed for dedication to MJTA. Any existing homes that will be provided with sewer service will occur as a result of developer extensions within 150 feet of the home.

It is recommended that MJTA negotiate with Elizabethtown Borough on a cost-sharing agreement for the Conoy Creek and Park interceptor. By proceeding on this project as a joint venture, it is estimated that MJTA will save over $1,200,000 in construction costs over having to do the project themselves.

In the Mount Joy Borough service area, projected growth has been addressed through the existing service agreement with Mount Joy Borough. No further implementation is required in this area.

6.2 Recommended Non-Structural Alternatives

Public sewer service to other existing developed areas of the Township is not warranted at this time. The Milton Grove area, as evaluated in the plan, is not recommended for public sewer service due to a lack of justified need, the high cost of sewer service, and it would not be compatible with the Township comprehensive plan and zoning for an agricultural zoned non-growth area.

In order to continue to address wastewater management in areas of the Township that will not be served with public sewer, it is recommended that the Township promote OLDS education to homeowners. This would educate homeowners on the value of maintaining their septic systems and greatly reduce the potential for future system failures.

New development in the Township which utilize OLDS treatment is required as part of the Township subdivision and land development ordinance to test and preserve a replacement area on any proposed lot.

Due to the widespread conditions where high nitrates and limestone geology is present, it is recommended that the Township not allow a Component 1 module in areas of the Township where high nitrate ground water levels have been identified as indicated on Map 12. The Township should require preliminary hydrogeological analyses for all subdivisions proposing OLDS in these areas. Where appropriate, dispersion plume easements should be provided to mitigate increases in nitrate levels due to OLDS.

TABLE 30

ELIZABETHTOWN ALTERNATIVE 2
PROPOSED CONNECTION POINT
CAPACITY ALLOCATIONS

Connection Point	Location	Allocation	
		gpd ADF	gpd PDF
C1	E - Mill Road	0	0
C2	E - Highlawn Avenue	9,500	23,750
C3	E - Radio Road Metering Chamber	300,000	750,000
C4	E - Kiwanis Boulevard Metering Chamber	690,600	1,726,500
C5	E - Ridge Avenue	9,700	24,250
C6	E - Mount Joy Street	5,500	13,750
C7	E - Oak Manor Pump Station	4,500	11,250
C8	WD - West Donegal Metering Chamber	97,800	244,500
C9	WD - E. Harrisburg Ave. to Brett Blvd.	52,450	131,125
C10	WD - Brett Blvd. to Colebrook Road	3,900	9,750
C11	WD - Colebrook Road to Lime Street	1,900	4,750
C12	WD - Anchor Road to Route 230	43,350	108,375
C13 new	WD - West Donegal Interceptor Metering Chamber	77,900	194,750
	Total Allocated Flow	**1,297,100**	**3,242,750**

REV. 10/09/98 w/Diversion of Area P to Schwanger Road Pump Station.

6.3 Financial Considerations

The proposed project and operating costs associated with the implementation of the proposed alternative represent a significant cost to MJTA. As a large portion of the costs are needed to service future development in growth areas of the Township, initially there will not be a sufficient number of users to finance these costs. As a result, it will be necessary for MJTA to arrange for long-term financing to spread the cost of the improvements out over a period of time.

A second source of funding is also necessary to secure an equity contribution from developers proposing to build in the Township in the next 5 to 10 years until the user base has increased to support the debt service. Provisions are allowed under the Act 209 Tapping Fee to allow an increase in capital contributions to the sewer system in anticipation of improvements proposed as part of a 5-year capital improvements plan.

The development of this 537 Plan is considered to meet the planning requirements of the Act for establishing a capital contribution to incorporate costs of improvements proposed by the 537 Plan. Capital contribution fees will be utilized by MJTA to meet debt service requirements during the initial years of operation.

MJTA has conducted several meetings with area developers planning to and presently committed to development in the Township. Based on the response from these meetings, it is anticipated that MJTA will be able to negotiate developer agreements to provide guarantees of developer contributions to meet debt service requirements.

As noted previously, it will be necessary to construct improvements to the treatment facilities, outfall and Conoy Creek and Park interceptors to take advantage of cost savings on an intermunicipal project level. In order to reduce initial costs until there is growth in the user base, MJTA may consider deferring some construction to the 5-year improvement plan, when that specific need is demonstrated due to development. For example, additional improvements to the WDTA system may be deferred as a result of the diversion of the Schwanger Road pump station to the new Park interceptor. The diversion will immediately create an availability of existing capacity in the WDTA system for MJTA areas that will continue to flow into the WDTA interceptor by gravity.

Another example would be the Radio Road pump station construction. The Township has existing capacity in the Conoy Creek interceptor at Radio Road. A pump station could be delayed until available capacity in the interceptor is utilized.

Table 31 presents an analysis of financial costs for implementation of Elizabethtown Alternative 2 based on the assumptions as we have noted here. Scenario 1 is based on limiting some of the initial improvements. Scenario 2 is based on completion of all the proposed improvements initially. O&M costs are estimated based on projected first year operation flows in 2002. Estimated developer contributions are conservatively estimated at a rate less than current rates and the projected growth rate. The tapping fee rate is also estimated less than the maximum rate depending on final rate determinations and costs. Financing is based on securing a public bond issue for 30 years.

TABLE 31

MOUNT JOY TOWNSHIP 537 PLAN
WASTEWATER MANAGEMENT ALTERNATIVES
MJTA FINANCED IMPROVEMENTS FINANCIAL ANALYSIS
Based on Elizabethtown Alternative 2

	Scenario 1	Scenario 2
Total Estimated Construction Cost	**$6,389,000.00**	**$7,878,000.00**
Construction Contingency, 10%	639,000.00	788,000.00
Estimated Non-Construction Costs, 35%	2,236,000.00	2,757,000.00
Total Estimated Project Cost	**$9,264,000.00**	**$11,423,000.00**
1999-2002 Developer Tapping Fees [1]	$800,000.00	$800,000.00
Tapping Fee Discount Purchase	0.00	0.00
Capital Contribution [2]	750,000.00	750,000.00
Amount of New Construction to be Financed	$7,714,000.00	$9,873,000.00
Existing Debt Service	1,900,000.00	1,900,000.00
Total Amount to be Financed	**$9,614,000.00**	**$11,773,000.00**
Debt Service [3]	$688,000.00	$842,000.00
Estimated Year 2002 Annual O&M Cost	430,000.00	430,000.00
Total Estimated Annual Cost	**$1,118,000.00**	**$1,272,000.00**
Connection Fee Revenue	$320,000.00[4]	$360,00.00[5]
Miscellaneous Revenue [6]	35,000.00	35,000.00
Rental Fees	763,000.00	877,000.00
Total Estimated Revenue	**$1,118,000.00**	**$1,272,000.00**
Estimated Number of EDU's, 2002	1,870	1,870
Estimated Annual User Fee, $/EDU/Year	$408.00	$469.00
Estimated Number of EDU's, Current	1,675	
Existing Annual User Fee, $/EDU/Year	$266.00	

Scenario 1 includes construction of WWTP, outfall, Conoy Creek interceptor, Schwanger Road pump station and Route 743 improvements.

Scenario 2 includes all project improvements.

(1) Based on 65 EDU's/year for three years (1999-2002).
(2) Estimated funds available from the Bond Redemption, Debt Reserve and Operating Funds.
(3) Based on 5%, 30 years with 10% coverage (0.06505).
(4) Assume 80 EDU's/year at $4,000/EDU used toward debt principal payments.
(5) Assume 80 EDU's/year at $4,500/EDU used toward debt principal payments.
(6) Administrative Fees, Lancaster County Solid Waste Management Authority income, interest, etc.

10/98

Because the project will primarily address new growth in the area, PENNVEST funding is not considered to be viable due to an anticipated low priority ranking. As a result, PENNVEST funding is not considered as part of this 537 Plan.

Based on the projected number of EDU's in 2002 and the proposed number of developer contributions, the estimated initial user fee is anticipated to range from $480 to $541 per year. In addition to the cost of expansion of conveyance and treatment capacity, the increase in user fees will also address the need to upgrade the existing treatment and conveyance interceptor facilities as part of the project that serve current users.

6.4 Growth Areas

Growth areas corresponding to areas that will be proposed for sewer service are shown on Map 13. Included on Map 14 is the UGB 5 and 10 year growth areas as an overlay on the Township zoning map. Public sewer service is proposed in residential, commercial and industrially zoned areas.

6.5 Consistency Analysis

The following consistency analysis was utilized during the preparation of this 537 Plan.

1. **Consistency between the proposed alternative and the objectives and policies of the Clean Streams Law or Section 208 of the Clean Water Act.**

   Generally, the Clean Streams Law is intended to prevent further pollution and reclaim and restore a clean, unpolluted condition to every stream in Pennsylvania that is presently polluted; to allow no discharge of sewage, industrial waste, or any substance which contributes to pollution; and to review all related permit applications. The Clean Water Act directs a federal administrator to designate problem watersheds and have states prepare plans to improve them.

   The preparation of the 537 Plan by Mount Joy Township is in response to state requirements for wastewater management planning as established by the Clean Water Act. The proposed alternative is intended to address the requirements of the Clean Water Act by providing a plan to address wastewater management of future growth to prevent the degradation of area groundwater.

   The proposed plan provides a continued regional approach to wastewater management through the improvement and expansion of existing facilities. Treatment will be consistent with the Clean Water Act for discharge into the Susquehanna River.

   The non-structural alternatives are intended to provide guidelines for managing sewage disposal, under the requirements of Chapter 71. Therefore, the non-structural alternatives are consistent with the Clean Water Act.

2. **Consistency with municipal wasteload management plans developed under Chapter 94.**

This regulation prevents overloaded facilities, limits their expansion (according to permitted plans), prevents the introduction of pollutants, untreatable wastes or substances which would interfere with their operations, and to improve the recycling and reclamation of wastewater sludge for municipalities.

The plan is consistent with Chapter 94 by providing a schedule to implement treatment plant improvements to relieve hydraulic overload conditions.

3. **Consistency with plans developed under Title II of the Clean Water Act or Titles II and VI of the Water Quality Act of 1987.**

This applies primarily to federal funding. The following items have been or will be addressed as required when the proposed plan is in the preliminary design stage. No federal funding for this project is anticipated to e available.

a. **A demonstration that innovative and alternative (I/A) technologies have been evaluated.**

The existing conveyance system already utilizes a gravity conveyance system with remote pump stations. The MJTA system also flows into existing gravity systems in Elizabethtown Borough and West Donegal Township. As the proposed plan only proposes expansion to the existing system and no extension construction by MJTA, I/A conveyance technology was not feasible for consideration.

The treatment plant evaluation performed by CDM considered I/A technology including use of sequencing batch reactor technology for treatment.

b. **A demonstration that potential open space and recreational opportunities has been analyzed.**

The proposed improvements will be located along existing right-of-ways, roads and utility sites to minimize impacts on open space areas. The Park interceptor construction is located within the Elizabethtown Borough linear park. Recreation opportunities will be preserved after construction of these improvements.

c. **A demonstration of non-excessive infiltration and inflow (I/I) to existing sewers.**

As part of the sewer moratorium response, the three municipalities have presented an implementation plan to DEP for I/I investigation and

d. **A demonstration that the chosen alternative is the most cost effective and environmentally sound.**

The 537 Plan includes detailed cost estimates, and the environmental characteristics of the proposed alternative will be controlled by applicable regulations.

e. Compliance with the National Environmental Policy Act

As identified in the plan and as part of the design process, coordination will be provided with PHMC, PNDI, and DEP to avoid adverse impact to the following:

- Historical and archeological sites
- Natural resources
- Endangered and protected species
- Fish and wildlife
- Prime agricultural land
- Wetlands
- Air quality
- Floodplains
- Water supplies

Based on correspondence from regulatory agencies presented in the Appendix and available site information, no significant adverse environmental impact is predicted that would prevent the project from further implementation into the design and permit application stages.

Prime agricultural soils are shown on Map 4. Most of these areas are located in the agricultural zoning district.

As part of the implementation process, it is anticipated that MJTA and Elizabethtown Borough will renegotiate the existing intermunicipal agreement for service. Presently, however, there is an existing sewer use ordinance and user charge system in place by MJTA.

4. Consistency with comprehensive plans developed under the Pennsylvania Municipalities Planning Code.

Comprehensive Plans for the County and Township were previously evaluated for this 537 Plan. Both the County and Township comprehensive plans envision public sewer service to the urban growth areas and commercial and industrial zoned areas of Mount Joy Township. Infrastructure will also plan for long-term development in residential zoned areas.

The 537 Plan reflects growth management policies expressed by the County and Township land use plans. Therefore, the proposed facilities are considered consistent with applicable comprehensive plans.

The policies and procedures of the non-structural recommendations support the Township's proposed structural alternative, as well as Chapter 71. Therefore, these recommendations are considered to be consistent.

5. Consistency with antidegradation requirements as contained in Chapters 93, 95, and 102 (relating to water quality standards; wastewater treatment requirements; and erosion control) and the Clean Water Act.

Chapter 93.5 through 93.8(a) regulates the uses and quality of discharges permitted according to a ranking of stream quality.

Chapter 95 sets the wastewater treatment requirements for each water quality designated in Chapter 93.

Chapter 102 mandates erosion control by setting requirements for earthmoving which could result in accelerated erosion and by establishing a permitting process for soil conservation practices to prevent sedimentation or pollution from fertilizers, pesticides or other harmful substances.

The Elizabethtown sewage treatment facility will be designed by the Borough to meet applicable construction and effluent standards. Compliance with these requirements will be demonstrated by submittal and approval of NPDES, Water Quality, and Erosion and Sedimentation Control Permit applications. Therefore, this alternative is consistent with the applicable requirements.

Non-structural recommendation consistency is not considered applicable.

6. **Consistency with state water plans developed under the Water Resources Planning Act.**

The Comprehensive Water Management Plan for the Lower Susquehanna Basin was previously discussed in this study.

The proposed sewer system involves providing service to existing population centers, and is therefore consistent with state water plans.

Non-structural recommendations consistency is not considered applicable.

7. **Consistency with Title 4 of the Pennsylvania Code, Chapter 7, Subchapter W (relating to prime agricultural land policy).**

Some areas of prime agricultural land are potentially impacted by the future extension of sewers by development. However, these areas have been designated for growth by zoning. The Township's prime agricultural land protection policy protects the large areas of agricultural land located east of Route 283. No sewer service has been proposed in this area.

In as much as the proposed improvements are intended to serve growth in areas zoned for development in the Township, the 537 Plan is generally consistent with prime agricultural land policy.

Non-structural recommendations consistency is not considered applicable.

8. **Consistency with plans adopted by the County and approved by DEP under the Stormwater Management Act.**

Lancaster County has no County-wide stormwater management plan. All development in the County is required to meet locally oriented stormwater management plans. Mount Joy

Township has its own stormwater management requirements as part of its subdivision and land development ordinance. Therefore, this provision is not applicable.

9. **Consistency with wetland protection under Chapter 105 (relating to dam safety and waterway management).**

   Map 3 shows wetland locations.

   Construction of conveyance sewer lines will primarily be located in streets or in shoulder areas an will not typically involve wetlands. Where a stream crossing or stream bed location is required, applicable regulations will be followed to minimize temporary impacts and result in no net loss of wetlands. Therefore, the proposed alternative is compatible with wetland protection policies.

   Non-structural recommendations consistency is not considered applicable.

10. **Consistency with the protection of rare, endangered, or threatened plant and animal species as identified by PNDI.**

    A request was made to the DEP Bureau of Forestry on September 2, 1998 for comments regarding the potential presence of any rare, endangered or threatened plants or animal species in the proposed project area. A response was received from the Bureau on September 17, 1998 from Jeanne Brennan which indicated that a potential endangered plant species in Helt's Woods. The correspondence recommended that a field survey be conducted prior to any earth disturbance. This activity will be conducted during the design phase to be consistent with these requirements.

11. **Consistency with Section 507 of Title 37 of the Pennsylvania Consolidated Statutes (relating to cooperation by public officials with PHMC.**

    This section requires public officials to cooperate with PHMC's Bureau of Historic Preservation by notifying PHMC of any project, activity or program which affects or may affect an archeological site, and empowering PHMC to require a survey or other investigation to recover, preserve or otherwise protect information from the archaeological resource.

    The Township has complied to date with the requirements and notified PHMC. MJTA intends to continue to cooperate with PHMC during the development of the design and preliminary investigation. Refer to Appendix 5 for correspondence with PHMC.

    MJTA will coordinate their program with all applicable agencies as required by law. Therefore, all proposals and alternatives are compatible with this provision.

12. **The resolution of inconsistencies identified in this section.**

    Any inconsistencies identified in this section have or will be resolved through implementation of the proposed project in accordance with current regulations for permitting and construction of the proposed wastewater facilities.

CHAPTER 7

CHAPTER 7

PLAN IMPLEMENTATION

7.1 Implementation Schedule

The Selected Alternative presumes local financing and developer contributions over a 20-year period. The Selected Alterative will be the primary activity to provide wastewater management for new growth in the Township. The Selected Non-Structural Alternative policies and programs will be utilized for maintenance of existing on-lot systems.

Mount Joy Township has a full-time manager and clerical staff, as well as contract engineering and sewage enforcement services on an as-needed basis. The Mount Joy Township Authority will primarily be responsible for implementation of the structural alternative with respect to improvements in Mount Joy Township. MJTA will enter into agreements with West Donegal Township Authority and Elizabethtown Borough for cost sharing and expansion of their facilities to handle the projected flows.

As a result of review of the 1997 Borough Chapter 94 report, DEP has required the three municipalities to develop an implementation schedule for addressing hydraulic overloads at the treatment plant. An implementation schedule was developed to address steps necessary to complete expansion of the treatment plant, outfall and main interceptor. This schedule has been submitted to the DEP for approval. This schedule has been reproduced as Table 32 for this 537 Plan.

The Implementation Schedule represents the intent of the Board of Supervisors of Mount Joy Township based on a timely review and approval of this 537 Plan, regulatory approvals for construction and completion of 537 planning in West Donegal Township and Elizabethtown Borough.

Ordinances and Programs for Outlying Areas

Ordinance Requiring Hydrogeologic Testing	Within 6 months of approval of 537 Plan
Education Management Program for Private On-Lot Systems	Within 24 months of approval of 537 Plan

TABLE 32

ELIZABETHTOWN REGIONAL
IMPLEMENTATION SCHEDULE
MOUNT JOY TOWNSHIP 537 PLAN

	Activity	1998												1999												2000												2001											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
A.	I/I Identification and Removal Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B.	DEP Action Plan and Schedule							X	X	X																																							
C.	Corrective Act 537 Plan							X	X	X	X	X	X	X	X																																				
	Townships' Submittals of Finallzed Flow Projections									X																																								
	DEP Review/Approval of Act 537 Plan															X	X	X	X	X	X																													
D.	Intermunicipal Agreement																																																
	Kiwanis Boulevard Interceptor Agreement									X	X	X	X																																				
	WWTP Outfall Agreement													X	X	X	X																																
	Main Interceptor Agreement																	X	X	X	X																												
	WWTP Letter of Understanding													X	X	X	X																																
	WWTP Agreement																		X	X	X	X	X	X	X	X	X	X	X	X	X																		
E.	Kiwanis Boulevard Interceptor Upgrade/Expansion																																																
	Design							X	X	X	X	X	X	X	X																																			
	Construction																		X	X	X	X																												
F.	WWTP Outfall Expansion																																																
	Design													X	X	X	X	X	X	X	X	X	X	X	X																								
	Construction																											X	X	X	X	X	X	X	X	X	X	X	X	X									
G.	Main Interceptor Expansion																																																
	Design																				X	X	X	X	X	X	X	X	X	X																			
	Construction																															X	X	X	X	X	X	X	X									
H.	WWTP Expansion																																																
	Conceptual Design										X	X	X																																				
	Submit NPDES Part 1 Permit Application/Obtain effluent limits												X	X	X	X																																
	Preliminary Design														X	X	X	X	X																														
	Final Design																		X	X	X	X	X	X	X	X	X																						
	Submit NPDES Part 2 Permit Application/Obtain construction approval																									X	X	X																					
	Construction																														X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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APPENDIECES